ANGRAU

ANNUAL REPORT - 2018-'19

Administrative Building, ANGRAU, Lam, Guntur

Millet Varieties from ANGRAU

ANGRAU

Acharya N. G. Ranga Agricultural University

Guntur, Andhra Pradesh, India

Celebration of the International Yoga Day
at Administrative Office

Inauguration of Kisan Mela by Hon'ble Vice Chancellor, ANGRAU
at RARS, Maruteru

Fifty-Fifth Annual Report 2018-`19

ANGRAU

Acharya N.G. Ranga Agricultural University

Lam, Guntur-522 034, Andhra Pradesh, India

Compiled by

Planning and Monitoring Cell

Acharya N G Ranga Agricultural University

Lam, Guntur - 522 034

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First Page : **Varieties (GBG-01; MTU-1224, ABV 04; NJ-2647)**
Blackgram (GBG-1); Rice (MTU-1224);
Pearl Millet (ABV-04); Jowar (NJ-2647)

Printed at

ACHARYA N.G RANGA AGRICULTURAL UNIVERSITY

Guntur-522 034, Andhra Pradesh, India

ANGRAU

Acharya N.G Ranga Agricultural University
Lam, Guntur-522 034, Andhra Pradesh, India

A. Vishnuvardhan Reddy
Vice-Chancellor

FOREWORD

It is a great pleasure for me to present the 55^{th} Annual Report of Acharya N.G. Ranga Agricultural University for the year 2018-'19. The University which served 50 long years for United Andhra Pradesh now serving for a residual state of Andhra Pradesh with much greater commitment and dedication by emerging as an 'Institute of National Importance', while upscaling the brand image further with a continuous focus on the mandatory areas viz., Teaching, Research and Extension activities to accelerate Agricultural growth and development in 'Navyandhra Pradesh'.

On the academic front, a total number of 1598 students comprising of 1232 in Agriculture, 321 in Agricultural Engineering & Technology and 45 in Home Science faculties have passed out andpresently 5574 students comprisingof the University inUndergraduate, Postgraduate, Doctoral and Diploma programmesduring the academic year 2018-'19 are on the roll. The Students' Counselling and Placement Cells are functioning in all the Colleges and Polytechnics of the University. A total of ninety three students of different colleges of ANGRAU qualified in ICAR-JRF/ SRF and GATE examinations, while 124 students obtained different fellowships, awards and medals duringAcademic Year 2018-'19

On the research front, during the period 2018-'19, nine improved crop varieties, two each in Rice (Bapatla Mashuri BPT 2295; Panduranga - MCM 100), Sugarcane (Swarnamukhi - 2005T16/CoT0367; Ranga - 2009V127/ CoV15-0356), Jowar (NandyalaPachhaJonna - NJ 2446; NandyalaTellaJonna - NJ 2647); and one variety each in Ragi (Tirumala - PPR 1012), Blackgram (Ghantasala Minumu-1- GBG 1) and Groundnut (Dheeraj - TCGS 1073) were developed and released from ANGRAU at state level. One Pearl millet variety ABV 04was notified and released by the Central Sub-Committee on Crop Standards Notification. Besides, we have developed ecologically safe approaches for combating various biotic & abiotic stresses, Integrated Farming System models, and progressed well in research including biotechnology and nanotechnology. I appreciate the efforts of our scientists in presenting research at various national and international fora.

The University has an effective network of transfer of technology (ToT) in realizing the desired benefit. During the year 2018-'19, the DAATTCs (13 nos.) and KVKs (5 nos.) together have tested 42 minikit cultures of 10 crops at 1113 locations during Kharif (719 nos.) and Rabi (394 nos.), 309 technologies were assessed covering field crops, horticultural crops, animal husbandry/fisheries and home science, a total of 1945 diagnostic surveys were undertaken. Extension Team organized about 261 capacity building programmes to extension personne l, 929 programmes to farmers and farm women, 136 programmes to NGOs and input agencies, 111 programmes to rural youth, 526 method demonstrations, 44 vocational training programmes, 103 'RythuSadassus', 577 group discussions and 141 field days were organized for the benefit of the farmers'etc. New initiatives like National Initiative on Climate Resilient Agriculture (NICRA), Farm Science Clubs, Tribal Youth Network, Kisan Mobile Advisories and Integrated Agromet Advisory Services were taken up during this year.

In addition, the University has impressive track record having collaboration with leading National and International Institutes in Education, Research and Extension activities for mutual benefit in frontier areas.

I congratulate the Planningand Monitoring Cell team on their strenuous efforts in compiling and bringing out the 55th Annual Report of ANGRAU.

(A. VISHNUVARDHAN REDDY)

CONTENTS

List of Tables

List of Figures

Annexures

SUMMARY

Acharya N G Ranga Agricultural University (ANGRAU) was established on June 12, 1964 as "Andhra Pradesh Agricultural University" (APAU). Later, on November 7, 1996, the APAU was renamed after the noted Parliamentarian and Kisan Leader, Sri Gogineni Ranga Nayakulu (popularly known as N G Ranga) as "Acharya N G Ranga Agricultural University" as a mark of honor and respect on him. Subsequent to bifurcation of United Andhra Pradesh into Andhra Pradesh (AP) and Telangana State (TS) on June 2, 2014, the ANGRAU has been bifurcated on "Order to Serve Basis" into ANGRAU for residual AP and PJTSAU (Professor Jayashankar Telangana State Agricultural University) for the State of Telangana.

The University is executing its functions through its FIVE agricultural colleges, TWO Agricultural Engineering colleges, TWO Food Science and Technology colleges, ONE Home Science college, NINETEEN Polytechnics, of which Agriculture, Seed Technology, Organic Farming, Agricultural Engineering, THIRTY SIX Research stations, THIRTEEN District Agricultural Advisory and Transfer of Technology Centres (DAATTCs), THIRTEEN Krishi Vigyan Kendras (KVKs) and ONE Farmers' Call Centre (FCC), located throughout the Residual Andhra Pradesh state.

Administration

His Excellency, the Governor of Andhra Pradesh is the Chancellor of the University. The Board of Management (BoM) with 21 Members is the governing body of the University with Vice-Chancellor as the Chairman. The BoM met six times during the year and took decisions on various issues and aspects. The Vice-Chancellor acts as the Chief Executive Officer of the University with the assistance of SIX Deans of Agriculture, Agricultural Engineering & Technology, Home Science, Post Graduate Studies, and Student Affairs, besides TWO Directors *viz*. Director of Research and Director of Extension, besides one each of Registrar, Comptroller, Estate Officer, University Librarian and Controller of Examinations.

The activities of the University in the areas of education, research and extension carried out during the period of June 2018 to May 2019 have been summarized and placed below.

Teaching

- During the academic year 2018-'19, a total of 1500 students were admitted in the University. Out of them, 725 were admitted in Undergraduate courses, 149 in Masters, 50 in Doctoral programmes and 576 in diploma courses.
- A total number of 5574 students are on rolls of the University in different Undergraduate, Postgraduate, Doctoral and Diploma programmes. Out of them 2308 were boys and 3266 were girls.
- A total number of 1598 students comprising of 1232 in Agriculture, 321 in Agricultural Engineering & Technology and 45 in Home Science faculties have passed out of the different portals of the University during the academic year 2018-'19.
- Eight students of Agricultural College, Bapatla participated in XIX All India ICAR Inter Agricultural Universities Meet 2018-'19 held at Punjab Agricultural University, Ludhiana from 02.01.2019 to 05.01.2019.
- Mr. T. Edwin Blessy, BA 16-038 & S. V. Rajeswari BA 18-241 won the Men and Women Athletic individual championship in intramural competitions 2018-'19 .
- Twenty two students from ANGRAU have participated in XIX All India Inter-

Agricultural Universities Youth Festival held at Sardar krishinagar Dantiwada Agricultural University (SDAU), Sardar krishinagar, Gujarat from 03-07th February, 2019.

- Students viz.,Ms.Y. Aswini Teja, NA.2018-009, Mr.K. Vara Prasad, NA.2015-092, Shaik Sazid, NA.2015-079, Mr.P. Viswaraj, NA.2016-177, Sri G. Nehru, NA.2015-051 of Agril. College, Naira participated in XIX All India Agricultural University Sports and Games Meet 2018-19 from 2nd to 5th Jan. 2019 at Punjab Agricultural University, Ludhiana.
- The NSS volunteers of various colleges actively participated in NSS camps during the year under report. The NSS activities included planting of ornamental and tree plants, sanitation programmes, awareness programmes on health & hygiene and AIDS, blood donation programmes, vaccination to animals, rodent control, Parthenium eradication in public places and Clean & Green programmes etc.
- The NSS special camps of about seven days duration were organized for the students of all the final year undergraduate and diploma programmes.
- Mr. P. Bhanu Taja , Ch. Ramya and G. Propulla Sri from College of Food Science and Technology, Bapatla participated in XIX All India inter University Sports and Games Meet, 2018-19 from 2nd to 5th January, 2019 held at PAU , Ludhiana.
- Mr. G.Ranjeeth represented Shot put , Discus & Javelin Throw; Mr. K.Naveen, has represented High Jump from College of Food Science and Technology, Pulivendula for ANGRAU at XIX All India Inter Agricultural Universities meet held at Punjab Agricultural University, Ludhiana from 2nd to 5th January 2019.
- The Students' Counseling and Placement Cells are functioning in all the Colleges and Polytechnics of the University. They are acting as liaison between the University Colleges and the public & private sector organizations / institutes that are in need of graduates/diploma holders. During this year, the campus interviews were held by several organizations and a total of 129 students got placed in different public and private organizations.
- The ANGRAU University library has very rich collections of print and non-print documents *viz.* of books, e-books, e-journals, databases such as J-Gate Agriculture and Biological Sciences (CeRA), KrishiKosh, DELNET, EPRF Agricultural database, Indiastat.com and many more. All the library e-resources are being made available through EZProxy and RemoteXs remote access to various colleges, research stations, polytechnic colleges, DAATT centers and KVKs of ANGRAU for the benefit of students, scientists, teachers and research staff.

Research

Research has been carried out in the areas of crop improvement viz.,rice, millets, legumes, oil seeds, crop management practices, soil health, organic farming, drought mitigation aspects, bio fertilizers etc., studies are initiated on natural farming. Important research findings are summarized.

- Studies on nutrient management for higher productivity in different rice establishment methods (mechanized transplanting, wet direct seeded rice using drum seeders, transplanting, (puddled soil) indicated that machine transplanting recorded significantly higher grain yield of (6.09 t ha^{-1}) which is on par with manual planting (5.49 t ha^{-1}) but superior over direct sowing method.
- Among different crop establishment methods tried for rice varieties during Kharif, 2018

revealed that, highest grain yield of 4.93 t ha^{-1} was recorded with manual transplanting followed by Bengal method of planting (4.48 t ha^{-1}). Among varieties, MTU 1075 responded well and recorded 4.69 t ha^{-1} followed by MTU 1061 with 4.53 t ha^{-1}

- In organic rice during *kharif* 2018, grain yield of 7.80 t ha^{-1} was recorded with application of NPK @ 120-60-50 kg ha^{-1} + $ZnSo_4$ @ 50 kg ha^{-1} with the variety Srikurma (RGL 2332) whereas organic production practices gave 6.57 t ha^{-1} and Green manuring + Application of NPK @ 80-60-50 kg ha^{-1} (INM approach) recorded 7.10 t ha^{-1} and all the treatments recorded higher yield over Control (No fertilizer or manurial application) which recorded the lowest yield of 5.56 t ha^{-1}.
- During *rab*i,2018, highest grain yield was recorded with MTU1010 (6.62 t ha^{-1}) which was on par with NLR34449 (6.46 t ha^{-1}) and the lowest grain yield was recorded with BPT 5204 (4.25 t ha^{-1}) under machine transplanting
- Network experiment on natural farming in rice revealed that, ANGRAU- ICM practice recorded highest grain yield (6.10 t ha^{-1}) followed by Sahaja mariyu sendriya vyavasaya vidhanalu (SSVV) of Department of Agriulture (1.92 t ha^{-1}) and ZBNF (Palekar's concept) recorded lowest yield (1.59 t ha^{-1}).
- In the experiment on Plant Sensor based diagnostic information for real time nitrogen management in rice crop, the highest grain yield was recorded with SPAD directed N application (7.09 t ha^{-1}) followed by LCC based N application (6.72 t ha^{-1}). The lowest yield was recorded in control (3.75 t ha^{-1}).
- Among the combinations tested, DPX-RAB 55 recorded 51.73 per cent reduction of WBPH over control, Spinetoram 6% + methoxyfenozide 30% and Spinetoram 6% + methoxyfenozide 30% + Baan recorded 79.05 per cent deduction of BPH over control and Spinetoram 6% + methoxyfenozide 30% + Baan recorded 66.23 per cent reduction of leaf folder damage over untreated control.
- The results on effect of ecological engineering of plant hoppers reveals that 14.38 per cent yield increase was noticed in EEPM plot when compared with farmers practice. In case of plant hoppers, both BPH and WBPH population was high in EEPM plot. The mirid bug population was also high in EEPM plot.
- Among different combinations of insecticides and fungicides tested during *kharif* 2018, Spinetoram 6% + methoxyfenozide 30% + Hexaconazole @ 0.75 + 2.0 ml was found effective against stem borer. The insecticide and fungicide combination Triflumezopyrim + Hexaconazole @ 0.48 + 2.0 ml against plant hoppers and sheathblight and recorded higher grain yield.
- Studies on population dynamics of insect pests of rice through light trap catches during *rabi* 2018 indicated that maximum light trap catches of stem borer were at 10th SMW and again in 15th to 16th SMW. Peak catches of gall midge was observed from 13th SMW to 15th SMW.Activity of plant hoppers increased progressively from 11th SMW to 15th SMW.
- Among nine insecticides tested, spray of spinetoran 6% + methoxyfenoxide 30% @ 0.75 ml + hexaconazole @ 2ml l^{-1} of water effectively reduced the incidence of gallmidge (1.01%), stem borer (2.28%) and sheath blight (6.91%) and recorded superior grain yield (5.98 t ha^{-1}) compared to untreated control(2.55% SS, 5.75%, 11.54% & 4,51 t ha^{-1}). However, incidences of all the insect pests were below ETL but the incidence of white ears and sheath blight were above ETL at harvest.
- Studies on integrated disease management of sheath blight, bacterial leaf blight and blast

indicated that low sheath blight severity and incidence (44.69 % & 51.57%) was recorded with incorporation of FYM in nursery plot, seed treatment, application DAP, FYM + *Trichoderma* in the main field, cleaning of bunds, using 75% recommended dose of fertilizers, granular insecticide application and need based fungicide spray compared to the control plot (50.13% & 65.00%).

- Among the new fungicides tested for sheath blight, azoxystrobin 18.2% + difenoconazole 11.4% @ 1.0 ml l^{-1} was found effective in controlling the sheath blight incidence and severity (11.04% & 12.51%) followed by azoxystrobin 11% + tebuconazole 18.3% @ 1.5 ml l^{-1} (13.99% & 15.60%) compared to the control plot (87.02% & 57.46%).
- In sweet corn, the entry SUZ I260 (8.52 t ha^{-1}) recorded superior fresh cob yield over the check hybrid MISTHI (7.74 t ha^{-1}).
- Studies on different chemical weed management practices in *kharif* maize revealed that pre emergence application of Atrazine @ 1.0 Kg a.i ha^{-1} followed by post emergence application of Topramazone @ 25 g a.i ha^{-1} found to be a good combination in efficient weed control in maize.
- Studies on influence of weather parameters on growth and yield of *rabi* Maize of 2018-19 indicated that sowing of maize during first FN of November gave significantly higher grain yield of 8.60 kg ha^{-1} as compared to sowing of maize during first FN of December (7.46 t ha^{-1}) or 2nd fortnight of December (7.10 t ha^{-1}) or first FN of January (6.83 t ha^{-1}) but found to be on par with sowing of maize during second FN of November (7.99 t ha^{-1}).
- Application of 250– 90 – 60 kg N, P_2O_5 & K_2O ha^{-1} recorded the highest green cob (19.16 t ha^{-1}) and fodder yield (33.8 t ha^{-1}) and net returns Rs. 2,19,560 ha^{-1} and B:C ratio 3.14 was comparable with 200 – 80 – 55 kg N, P_2O_5 & K_2O ha^{-1}.
- Studies on evaluation of insecticides against FAW of maize during *rabi,* 2018-19 revealed that lowest percent infestation by FAW was noticed in novaluron 10 EC (3.79) followed by spinosad 45SC (4.74), spinotoram 11.7SC (6.63) and novaluron + emamectin Benzoate (6.28).
- In biological control studies on maize stem bore, release of *Trichogramma chilonis* @ 100,000 ha^{-1} $release^{-1}$ at 15, 22 and 29 days after seedling emergence at 7- 10 day interval resulted in 100 per cent reduction in *Chilo partellus* damage ; 35.47 percent reduction in *Sesamia inferens* damage and 9.2 percent reduction in *Spodoptera frugiperda* damage and registered higher yields (3.05 t ha^{-1}) compared to farmers practice (2.88 t ha^{-1}).
- NTJ-5 (NJ 2647) white grain sorghum and N-15 (NJ 2446) yellow grain sorghum were released by SVRC, Andhra Pradesh during the year 2018.
- Effective weed control in rabi grain sorghum was observed with the application of pre-emergence herbicide atrazine @ 800 g ha^{-1} and post-emergence application of tembotrione @ 50 g ha^{-1} at 30 DAS or post emergence application of atrazine @ 800 g t ha^{-1} at 30 DAS).
- Evaluation of post emergence herbicides for selectivity and weed management in sorghum revealed that, hand weeding @ 20 & 30 DAS recorded the highest grain yield (4.97 t ha^{-1}) and was followed by atrazine @ 0.60 kg/ha followed by hand weeding at 20 DAS (4.80 t ha^{-1}.). Herbicide treatments recorded lesser yield when compared to two hand weedings but were significantly superior to weedy check.
- Insecticides, Profenophos 40 EC+

Cypermethrin 4 EC @ 500 ml acre^{-1}, Nuvan @ 200 ml + Emamectin Benzoate 5 SG @ 80 g acre^{-1} , Rynaxypyr 18.5 SC @ 80 ml acre^{-1}, Poison bait (10 + 1 + 1 + 0.1) with rice bran + jagerry +Thiodicarb 75 SP @ 20 kg acre^{-1}), Spinosad 45 % SC @ 70 ml acre^{-1} &Bt 127 Formulation @ 600 ml acre^{-1} recorded the best management of Fall Army Worm (*Spodoptera frugipeda*) over control with 34.4, 32.7, 31.6, 30.7, 27.3 & 22.5% at 20 days after sowing.

- A new pearl millet variety "Ananthapuramu Bajra Variety – 04" (ABV - 04) developed at AICRP on Pearl Millet, Agricultural Research Station (ARS), Ananthapuramu, was notified and released by the Central Sub-Committee on Crop Standards Notification and Release of Variety for Agricultural Crops in 2018 as **"Central Pearl Millet Variety ABV 04".**
- The bajra hybrid, *viz*. ABH 15 (4.07 t ha^{-1}) recorded 5.0 percent higher grain yield over the best check, PHB 3 (3.88 t ha^{-1}) along with early flowering (46 days). Straw yield ranged from 1.56 t ha^{-1} (ABH-1) to 2.94 t ha^{-1} (ABV-05).
- Weed management studies in pearlmillet during *Kharif* showed that hand weeding twice at 20 and 40 DAS recorded lowest weed density and dry weight as well as the highest weed control efficiency and higher grain and straw yield, which was on par with pre-emergence application of atrazine @ 750 g a.i ha^{-1} + one hand weeding at 30 DAS. Higher net returns (Rs,22038 ha^{-1}) and B:C ratio (2.33) were obtained with pre-emergence application of atrazine @ 750 g a.i ha^{-1} + one hand weeding at 30 DAS (2.33) followed by POE of chlorimuron ethyl + metsulfuron-methyl @ 4 g a.i. ha^{-1} (Rs.18534/- ha^{-1} and 2.21 respectively).
- Ragi variety, PPR 1012 was released in the name of Tirumala in state varietal release committee during 2018.
- The results on effect of organic manures on grain yield and quality of finger millet showed that the yield level in organic treated plot (grain yield 2.34 t ha^{-1} and straw yield (7.27 t ha^{-1}) reached to that of inorganic plot (grain yield 2.77 t ha^{-1} and straw yield 7.93 t ha^{-1}).
- Foxtail millet entries SiA 3159 (4.66 t ha^{-1}) and SiA 3220 (4.01 t ha^{-1}) were advanced in All India Coordinated Trials.
- In a study on response of four pre-release varieties of foxtail millet i.e., FXV 603, SiA 326, DHFT 109-3 and SiA 3156 to different levels of fertilization indicated that application of 100% RDF recorded higher grain yield (2.44 t ha^{-1}). Similarly pre-release variety FXV 603 recorded higher grain yield (2.35 t ha^{-1}).
- During *Kharif* under irrigated dry situation in transplanted sama crop higher grain yield was recorded with a spacing of 20 cm x 10 cm (1.36 t ha^{-1}).With regard to fertilizer doses 40-40-20-NPK ha^{-1} recorded higher grain yield (1.48 t ha^{-1}).
- Conservation furrows were formed adjacent to every row of pigeonpea for insitu moisture conservation, highest pigeonpea equivalent yield was recorded with pigeonpea + pearlmillet (1:1) with conservation furrows. Maximum B: C ratio of 0.84 and highest RWUE was also recorded with pigeonpea + pearlmillet (1:1) with conservation furrows.
- During *Kharif*, 2018, redgram + groundnut (1:8) intercropping system was found to be remunerative with the highest redgram grain equivalent yield (1.71 t ha^{-1}) and net returns of Rs.42078 ha^{-1} followed by redgram + fingermillet (1:8) with Rs.41835 ha^{-1} under mechanized sowing for rainfed alfisols.
- The insecticidal spray schedule consisting of

chlorantraniliprole followed by flubendiamide and dimethoate at 10 days interval starting from 50% flowering recorded less pod damage due to pod borer complex (14.09%) as against 55.12% in untreated control.

- In management of pod borer complex in redgram, one spray of Cyantraniliprole @ 0.3ml l^{-1} at flowering stage was found to be effective in reducing the incidence of *Helicoverpa armigera* (6.36 %) and pod fly (7.77 %) followed by Chloratraniliprole @ 0.3ml l^{-1}. (*Helicoverpa*: 9.57% and pod fly 9.47%) and Thiodicarb 1 g l^{-1} of water (*Helicoverpa*:11.81 % and pod fly 12.65 %).
- Biofertilizer inoculation with Rhizobium + LMn 16 recorded significantly higher Blackgram grain yield (0.86 t ha^{-1}) than that of Rhizobium (0.79 t ha^{-1}) but on a par with LMn16 (0.81 t ha^{-1}).
- Studies on evaluation of novel insecticides for their efficacy against sucking pests of blackgram indicated that spinetoram 0.6 ml l^{-1} was effective at lower thrips population per plant (0.74) and recorded highest yield (1.53 t ha^{-1}) followed by spinosad (1.25) and cyantraniliprole (1.42). Spiromesifen 1 ml l^{-1} effectively reduced whitefly population (0.91) followed by diafenthiuron (1.65) and spinetoram (1.93).
- Seed treatment with imidacloprid @ 5ml kg^{-1} + foliar spray of trifloxystrobin + tebuconazole (Natio) @ 0.75 g l^{-1}, three sprays at 15 days interval recorded the lowest PDI (8.50) of *Alternaria* leaf spot and powdery mildew (20.93) and highest grain yield (1.51 t ha^{-1}) during *rabi* 2018-19.
- Among the fertilizer doses tested for greengram, 125% RDF recorded significantly the maximum grain yield (1.14 t ha^{-1}) than 75% RDF (0.94 t ha^{-1}) and 100% RDF (1.10 t ha^{-1}) doses. Inoculation with *rhizobium* recorded higher grain yield (1.06 t ha^{-1}) than LMn16 (1.01 t ha^{-1}) however, combined inoculation of *Rhizobium* + LMn16 recorded superior grain yield (1.10 t ha^{-1}).
- Adoption of IPM practices such as seed treatment with imidacloprid 600 FS @ 5.0 ml kg^{-1} seed, sowing of maize as guard crop in four rows around the greengram, installation of yellow sticky traps and blue sticky traps for each @ 20 $acre^{-1}$, foliar application of neem oil 10000 ppm @ 1.5 ml l^{-1} at 20 DAS and need based application of insecticides In IPM module realised B:C ratio 2.70:1 as against 2.26:1 in farmers practice (Weekly application of insecticides).
- In a study on effect of foliar nutrition on chickpea to mitigate midseason drought in rainfed vertisols, the highest seed yield of 2.26 t ha^{-1} was recorded in foliar spray with 2% Urea (2 Sprays) at 35-40 and 55-60 DAS along with STBF followed by spraying of 19:19:19 along with STBF (1.97 kg ha-1) and D.A.P @ 2% along with STBF (1.98 t ha^{-1}) compared to basal application of N, P and S and no spray (1.57 t ha^{-1}).
- Application of recommended dose of fertilizer and foxtail millet crop residue along with 5 t ha^{-1} of FYM recorded highest seed yield (2.44 t ha^{-1}) of bengalgram which is at par with other nutrient combinations except where 50% RDF along with foxtail millet crop residue and bio-fertilizer consortia was applied (1.86 t ha^{-1}).
- Studies on compatibility of different insecticides with foliar nutrients in chickpea revealed that no phytotoxic symptoms were exhibited when the recommended insecticides *i.e* chlorantrinilliprole 18.5SC and Emamectin benzoate combined with foliar nutrients viz., Urea @ 2 %, DAP 2% and KNO_3 @ 2 % and sprayed at pod initian stage against *H. armigera*.
- During *kharif,* 2018, among 4 CRIDA

horsegram varieties evaluated for seed yield along with local check. The entry ATPHG 11 (0.32 t ha^{-1}) recorded significantly high seed yield followed by CRIDA 1-18 R (0.31 t ha^{-1}) and CRHG-13 (0.30 t ha^{-1}) compared to check CRHG-19 with seed yield of 0.21 t ha^{-1}.

- Among the seven rajmash varieties evaluated, the variety Amber (0.72 t ha^{-1}) recorded the highest seed yield followed by Utkarsh (0.51 t ha^{-1}) compared to the local variety CTPL red (0.30 t ha^{-1}).
- "Dheeraj" (TCGS 1073), a water-use efficient Spanish bunch culture with high yield potential suitable for cultivation in irrigated situation both in *kharif* and *rabi* seasons has been released by the State Varietal Release Committee.
- "Nithya Haritha" (TCGS 1157), a short statured spanish bunch culture with high yield potential that matures in 110 days and having fresh seed dormancy, bears higher frequency of three seeded pods was released for Zone IIIB (Maharashtra and Madhya Pradesh). It wss notified by the Central Varietal Release Committee in its 81st meeting.
- DNA fingerprinting of groundnut pre-released cultures *viz.,* TCGS 1157, TCGS 1157, TCGS 1622, TCGS 894, TCGS 1616 and TCGS 1694 with three check varieties Narayani, Greeshma and Tirupati 3 was carried out to facilitate the varietal release with 15 RAPD markers. The RAPD markers *viz.,* OPC10, OPA4, OPC7, OPB6, OPA19 which displayed distinct allelic differences and clearly distinguished the varieties TCGS 1157, TCGS1622, TCGS 894, TCGS 1616 and TCGS1694 and other check varieties.
- Among the varieties tested for their performance under irrigated conditions during summer/early *kharif*, the variety Nithya-haritha recorded significantly higher pod yield of 1.89 t ha^{-1} compared to Dharani 1.72 t ha^{-1}.
- Three years pooled data showed that significantly higher pod yield (2.09 t ha^{-1}) and haulm yield (3.57 t ha^{-1}) was recorded with the application of FYM @ 5 t ha^{-1} + 100% P + DGRC2 followed by FYM @ 5 t ha^{-1} + 100% P + DGRC1 and FYM @ 5 t ha^{-1} + 50% P + $DGRC_2$. Further it can be concluded that 50% recommended dose of inorganic phosphorous application can be reduced when phosphorous solubilising bacteria DGRC used along with FYM.
- Studies on integrated nutrient management for groundnut over 34 years indicated that integration of both organics (FYM @ 4 t ha^{-1}) and inorganics (half rec. ferti. dose @ 10-20-20 N-P_2O_5-K_2O kg ha^{-1}) recorded 9.68 t ha^{-1} over rec. dose @ 20-40-40 N-P_2O_5-K_2O kg ha^{-1} (943 t ha^{-1}). However, the control recoded 0.73 t $ha^{-1}$of groundnut pod yield. The treatment with half the recommended dose of fertilizer (10:20:20 kg N, P_2O_5, K_2O) along with FYM @ 4 t ha^{-1} recorded higher Soil Organic carbon stocks (13.42 mg ha^{-1}) at surface soil depth.
- In studies on compatibility of insecticides, fungicides and nutrients, foliar spray with Monocrotophos @ 1.6ml l^{-1} + Hexaconazole @ 2 ml l^{-1} + 19-19-19 combination was found effective in reducing foliar damage caused by thrips (11.35%) and low incidence of leaf spot score score (2) with high pod yield of 1.12 t ha^{-1} compared to untreated control (leaf damage due to thrips was 24.84 % , leaf spot score (6 score) pod yield (0.66 t ha^{-1}).
- Management of white grubs and termites during *kharif,* 2018 showed that soil drenching with chlorpyriphos 20 EC @ 8 ml l^{-10} of water and soil drenching with urea + phorate 10 G @1 kg + 1 kg l^{-10} of water were statistically recorded significant lowest plant damage of 5.03 % and 5.17 % respectively

by white grub with highest dry pod (1.40 and 1.38 t ha^{-1}) and haulm yields (2.78 and 2.71 t ha^{-1}).

- Among the semiochemical blends tested for trapping of *Caryedon serratus* from 2016 to 2018, combination of blends proved effective for trapping of groundnut bruchids. Blend I (47), blend –II (45), blend –III (26.5) trapped in 2016. Blend IV (92) and blend IV a (146) trapped number of bruchids per blend in 2017. Blend I(35), blend II (48), blend III (66), blend IV (74) and blend IV a (88) bruchids per blends tested in 2018.

- Evaluation of different modules against management of diseases and insect pests in groundnut for three years revealed that low incidence stem rot (5.6 %) and low intensity early leaf spot (33.7 % PDI), rust (19.4 % PDI) and *Alternaria* blight (11.9 % PDI), low mean leaf damage of thrips (16.2 %) along with higher pod (1524.0 kg/ha) and haulm yield (2.64 t ha^{-1}) with highest ICBR of 7.2 were registered by seed treatment with *Trichoderma asperellum* @ 4 g kg^{-1} seed + foliar spray of imidacloprid 17.8 SL @ 0.3ml l^{-1} + foliar spray of novaluran 10 EC @ 1ml l^{-1} 50-70 DAS + foliar spray of tebuconazole 25.9 EC @ 1.5 ml l^{-1} at 50-70 DAS).

- Studies on management of sunflower leaf curl disease for three years (pooled analysis) indicated that, seed treatment with imidacloprid 600 FS @ 5 ml kg^{-1} seed + foliar spray with diafenthiuron 50 WP @ 1.25 gm l^{-1} at 30, 45 and 60 DAS followed by seed treatment with imidacloprid 600 FS @ 5ml kg^{-1} seed + foliar spray with flonicamide 50WG @ 0.25 g l^{-1} at 30, 45 and 60 DAS recorded significantly less disease incidence of 13.49 % and 15.61 % and higher yields of 1.65 and 1.63 t ha^{-1} respectively compared to control (29.92% and 1.29 t ha^{-1}).

- Sequential application of pre and post emergence herbicides for weed management revealed that, two hand weedings at 15 and 30 DAS significantly reduced weed population and weed dry weight at 30 & 50 DAS over rest of the treatments and it was on par with pendimethalin @ 0.5 kg a.i ha^{-1} and quizalofop-ethyl @ 40 g a.i ha^{-1} at 20 DAS.

- Efficacy of insecticides for management of sucking pests in sesame revealed that imidacloprid 70 WS (7.5 g kg^{-1} seed) was effective in reducing the sucking pest upto 30 DAS. However, persistent and significant reduction in pest incidence was observed with foliar spray of imidacloprid 17.8 SL (0.25 ml l^{-1}) at 30 and 60 DAS and foliar spray of diafenthiuron 50 WP (1.25 g l^{-1}) at 30 and 60 DAS.

- In evaluation of castor hybrids and varieties, the results revealed that the entries DCH-519 (0.51 t ha^{-1}), DCH-177(0.50 t ha^{-1}), GCH-4 (0.46 t ha^{-1}) and PCH-111 (0.44 t ha^{-1}) recorded significantly higher seed yield when compared with other entries. Among the entries, DCH-519 recorded the highest gross returns, net returns and B : C ratio compared to Haritha

- Among different cropping systems evaluated, castor sole crop recorded higher growth and yield attributes which resulted in highest Gross returns, net returns, B:C ratio, Castor equivalent yield. The lowest Gross returns, net returns, B:C ratio, Castor equivalent yield was registered by finger millet sole crop . However, LER was highest in Castor + foxtail millet among all treatments.

- In studies on technology for organic cotton production results revealed that highest seed cotton yield was recorded in application of RDN through inorganic sources (1.54 t ha^{-1}) followed by (RD of Nutrient through organic based on P equivalent basis (1.08), application of Neem cake 250 kg ha^{-1} (1.00 t ha^{-1}), raising of sunhemp between rows and incorporated before flowering (1.09 t ha^{-1}).

- Studies on long-term fertilization on the productivity of rainfed cotton and soil quality in vertisols, highest seed cotton yield of 3.34 t ha^{-1} was recorded with 150% RDF + FYM @ 5 t ha^{-1} + Gypsum @ 0.50 t ha^{-1} + ZnSO4 @ 50 kg ha^{-1}) and 2.95 t ha^{-1} in 150 % RDF + Gypsum @ 0.50 t ha^{-1} which was on par with all treatment except Control and FYM @ 0.50 t ha^{-1} (1.26 and 1.98 0.50 t ha^{-1} respectively).
- Evaluation of insecticides against pink bollworm showed that green boll locule damage (%) was lowest in cypermethrin 25 EC, bifenthrin10 % EC and profenophos 40 EC and superior to rest of the treatments. Highest yields were obtained in cypermethrin 25 EC, profenophos 40 EC and bifenthrin 10 EC.
- Bioefficacy of insecticides against cotton pest complex revealed that spinetoram 10% + sulfoxaflor 30% WG @ 120 g a.i. ha^{-1} recorded significantly lowest jassid population per three leaves (3.80) over control (10.13) and other treatments except spinetoram 10% + sulfoxaflor 30% WG @ 140 g a.i ha^{-1}and sulfoxaflor 24% SC @ 105 g a.i ha^{-1}.
- Minimum temperature and evaporation significantly influenced the progress of grey mildew in cotton while maximum temperature and wind speed showed partial influence on the development of grey mildew.
- Integrated weed management studies in mesta indicated that application of pretilachlore 50 EC @ 900 ml ha^{-1} with one hand weeding recorded the highest fibre yield along with maximum weed control and it was on par with two hand weedings and significantly superior over all other practices.
- Studies on the effect of sowing time and spacing of kenaf on seed yield as influenced by topping management practices revealed that sowing kenaf on 1st july recorded significantly more seed yield (0.72 t ha^{-1}) over other dates of sowing and a decline trend was observed with further delay in sowing of the crop.
- Among the inter cropping systems, Mesta + Maize inter cropping (2:1) recorded highest mesta equivalent fibre yield of 9.68 t ha^{-1} with B:C ratio 4.73 followed by Mesta + Sunnemp intercrop (3:4) (3.10 t ha^{-1}) with B:C ratio 3.69 compared to Mesta sole crop (2.24 t ha^{-1}) with B:C ratio 2.64.
- Management of mesta sucking pests through eco-friendly insecticides revealed that, seed treatment with imidacloprid 600 FS (2 ml + 4 ml water) @ 5 ml kg^{-1} seed gave protection up to 50 DAS against sucking pests. Botanicals *viz.,* NSKE 5% and Azadirachtin (1500 ppm) @ 5 ml l^{-1} and bio-agent, *Lecanicillium lecani* @ 6 g l^{-1} were significantly superior over control by recording lowest population of sucking pests and were on par with each other.
- The studies for three years (2016-'17 to 2018-'19) on performance of sugarcane seedlings under late planted conditions recorded that higher cane yields at population density of 27,700 seedlings ha^{-1} i.e. 60 x 60 cm (65.5 t ha^{-1}) or 37,000 seedlings ha^{-1} i.e. 90 x 30 cm (63.2 t ha^{-1}) when compared to lower population density of 18,500 seedlings ha^{-1} i.e. 90 X 60 cm (57.9 t ha^{-1}) or 24,700 seedlings ha^{-1} (60.5 t ha^{-1}).
- Among different tillage systems evaluated, sugarcane planted in conventional tillage system registered higher cane yield of 76.2 t ha^{-1}compared to zero tillage (71.2 t ha^{-1}) or minimum tillage (67.1 t ha^{-1}). Among different types of seed material, three bud setts

registered significantly higher cane yield of 74.0 t ha^{-1} when compared to single node seedlings (69.0 t ha^{-1}).

- Studies on evaluation of varieties for drought tolerance revealed that IW/CPE ratio of 1.0 gave significantly higher cane yield of 87,6 t ha^{-1} and among the varieties tested 87A298 (88.2 t ha^{-1}) and 2000A225 (90.1 t ha^{-1}) performed well but on par with the remaining varieties except 2003A255 (77.1 t ha^{-1}).
- Influence of organic farming in sugarcane (crop rotation with paddy), application of 100% RDF recorded higher grain yield (6.67 t ha^{-1}) than organic manure application (5.36 t ha^{-1}). Available N and P_2O_5 showed 7.8% and 52.6% buildup with 100% RDF and 1.3% and 36.4% build up with organic manures, respectively. Soil organic carbon increased from 0.34% to 0.49% with the use of organic manures and from 0.34% to 0.47% with the use of 100% RDF.
- Among ten entries studied for delayed and post harvest deterioration, the entries 2012 T 81, 2012 T 180. 2012 T 72 and 2012 T 78 were found to be suitable for delayed harvesting. The entries 2012 T 81 and 2012 T 182 showed tolerance to post harvest deterioration.
- Integrated management of shoot borers in sugarcane with special reference to internode borer, the damage of internode borer and top shoot borer was considerably low in acephate @ 1.5 g l^{-1} , chlorantraniliprole @ 0.3 ml l^{-1} at 150 DAS after planting. In mass trapping by pheromone traps, the incidence of borers was comparatively high.
- Soil application of chlorantraniliprole 0.4G @ 22.5 kg ha^{-1} (6.0% DH; 20.67%; 71.28 ha^{-1}) at basal and 60 days after planting or chlorantraniliprole 18.5 SC @ 375 ml ha^{-1} (14% DH; 26%, 69.50 t ha^{-1}) at 30 days after planting and 60 days after planting found effective against early shoot borer and internode borer and recorded superior cane yields with a benefit cost ratio of 1.67 & 1.68 respectively, over check insecticide, chlorpyriphos @ 2.5ml l^{-1} (33% DH, 58.67%; 66.0 t ha^{-1}).
- Sett treatment with azoxystrobin + tebuconazole was found effective for the management of whip smut of sugarcane in plant crop. In ratoon crop, spraying of tebuconazole (0.1%) immediately after ratooning followed by another spray at 30 days after ratooning was found highly effective.
- Higher seed yield (0.39 t ha^{-1}) and cured leaf yield (1.76 t ha^{-1}) was realized with 60 x 60 cm spacing and higher seed yield (0.39 t ha^{-1}) and cured leaf yield (1.81 t ha^{-1}) was obtained with application of 150% RDF (165 N + 105 P_20_5 + 75 K_2O). Higher seed yield (0.40 t ha^{-1}) was recorded with A119 and cured leaf yield (1.84 t ha^{-1}) in ABD 132.
- Crop + large ruminants based farming system revealed that, improved practice (groundnut + fodder maize + feeding of buffaloe with groundnut haulm @5 kg/day + fodder maize 10 kg + UMMB 1 kg block $days^{-10}$) has recorded higher net returns of Rs. 96,667 ha^{-1} with respect to marginal farmers, improved practice (groundnut + fodder maize + feeding of desi cow with groundnut haulm @ 5kg/ day + fodder maize 10 kg + UMMB 1 kg block $days^{-10}$) has recorded higher net returns (Rs. 89,767 ha^{-1}) for small farmers compared to farmers practice. In case of medium farmers improved practice (groundnut + fodder maize + feeding of crossbred cow/ with groundnut haulm @ 5kg/day + super napier 30 kg + rice bran 1 kg + RSMM 80 g) has recorded higher net returns of Rs.1,14,564 ha^{-1}.
- Studies on crop response to plant nutrients in rice-maize cropping system indicated that,

there was a significant response to applied recommended dose of NPK and NPK + Zn in base crop rice as well as maize crop. Application of NPK + Zn recorded significantly higher grain yield (5.80 t ha^{-1} & 7.37 t ha^{-1}) over other levels and on par with recommended dose of NPK application (5.52 t ha^{-1} & 6.76 t ha^{-1}) respectively. Application of NPK + Zn recorded higher system net returns (Rs 104640 ha^{-1}) followed by recommended dose of NPK application and farmer practice. Benefit Cost Ratio were higher in case of NPK+ Zn (1.37) followed by NPK (1.31) and farmer practice (1.20).

- The control track system planter was designed and developed to form conservation furrows along with the sowing operation. The tines of the Ananta planter were adjusted to form a track for every four rows with spacing of 45 cm to make the inter cultivation easier with tractor drawn implements. Among the treatments conducted, control track mechanism with conservation furrow recorded higher pod yield of 0.29 t ha^{-1} than the other treatments.
- Feasibility testing of paddy straw chopper conducted in 1.2 ha of farmers' field revealed that the straw cutting efficiency was 85% with a field capacity of 0.22 hr/ha (32.2% field efficiency). The cost of operation worked out to be Rs.3182 ha^{-1}.
- Techno-economic analysis in sugarcane revealed that, the use of cutter planter and budchip planter reduces drudgery, saving of 52-56%;labour cost, 58% time and 68-75% seed cost over conventional planting. The population count was found to be very low in sugarcane crop planted with easy planter due to shallow depth of planting.
- A quantity of 11,600.64 quintals of breeder seed was produced during 2018-'19. Among the various crops, large quantity of groundnut breeder seed (6964 quintals) was produced covering the major varieties viz., K6, Dharani and K9 during 2018-'19. A sizeable quantity of breeder seed (3442 q) of rice particularly in six varieties of viz., BPT 5204, MTU 1001, MTU 1010, MTU 7029, NLR 34449 and NDLR 7 was also produced during 2018-19. In addition, 7739.62 quintals of foundation seed was produced in different crops during the year 2018-'19.
- Development of gene based markers for MAS of drought tolerance in groundnut, cDNA-RAPD profiles were developed with 35 RAPD markers in three regimes of moisture stress *i.e.,* 60, 70 and 80 DAS. Altogether, 35 RAPD primers produced 714 reproducible and scorable Transcript Derived Fragments (TDFs). Maximum number of TDFs (78) was amplified by OPA2 and least number of TDFs (10) was identified with OPD16. A total of 347 TDFs were found to be up-regulated and 347 TDFs were found to be down regulated out of which 72 in 10 Days while 173 in 20 Days and 102 in 30 days stressed plants
- Different nanoscale materials including nanoscale ZnO, nanoscale CaO, nanoscale MgO, nanoscale iron oxide, nanoscale silicon dioxide were prepared using sol-gel method. The average size range of the prepared nanoparticles was found to be 25-50 nm.
- Costs of cultivation (per hectare) for important crops in North Coastal Zone were worked out such as sugarcane (irrigated plant crop - Rs.2,62,025, rain-fed plant crop -Rs.1,81,885), sugarcane ratoon crop (irrigated -Rs.1,91,647, rainfed - Rs. 1,37,878) rice (transplanted Rs.1,46, 260; direct sown Rs.1,10,070; Drum Seeder sowing Rs.1,11,292; SRI method Rs.1,49,530), maize (Rs. 88,017) ragi (Rs.73,817), blackgram (Rs. 14,562), greengram (Rs. 14,045), redgram (Rs. 31.535), groundnut (Rs. 74,937), sesamum (Rs. 22,00) and mesta (Rs. 68,217).

- During 2018-'19, in cotton, sugarcane, bengalgram, redgram, turmeric and tobacco the farmers realized -0.06,0.01,-0.38 ,-0.48,0.10 and -0.36 as return on rupee of investment respectively. The per quintal cost of production of cotton, sugarcane, bengalgram, redgram, turmeric and tobacco was Rs.5195.42/-,2813.85/- Rs.6326.88/- Rs.9272/-, Rs.5279 and Rs.18980/- respectively.

Extension

- The District Agricultural Advisory and Transfer of Technology Centres (13 nos.) and Krishi Vigyan Kendras (5 nos.) together have tested 42 minikit cultures of 10 crops at 1113 locations during Kharif 2018-19 (719 nos.) and Rabi 2018-19 (394 nos.) covering all the districts of the state..
- A total of 309 technologies were assessed by KVKs and DAATT Centres and Extension Specialists of RARSs, covering field crops, horticultural crops, animal husbandry/fisheries and home science.
- A total of 190 FLDs were organized by KVKs in 631.4 ha (1754 farmers) and 47 FLDs by DAATTCs and ESs in 94.85 ha (277 farmers) covering cereals, millets, pulses, oilseeds, commercial crops, fodder crops, vegetables, fruits, flowers, spices, plantation crops, medicinal plants, farm machinery, animal husbandry, aquaculture and home science.
- A total of 1945 diagnostic surveys were undertaken in different districts of the state. Out of 1945, 597 surveys were undertaken by the DAATTC scientists and ESs alone and 700 by KVKs alone while 648 surveys were conducted jointly by the DAATTC, KVK, ARS scientists and officers of DoA.
- About 261 capacity building programmes to Extension personnel, 929 programmes to farmers and farm women, 136 programmes to NGOs and input agencies, 111 programmes to rural youth, 526 method demonstrations, 44 vocational training programmes, 103 rythu sadassus, 577 group discussions and 141 field days were organized for the benefit of the farmers.
- A total of 577 group discussions were organized by the DAATTCs and KVKs for 10,028 farmers during 2018-'19. The topics included like Culture of improved fish varieties in fresh water fish tanks, zero tillage maize, systems of paddy cultivation, nutrient and weed management practices in paddy, mushroom cultivation, liquid biofertilisers, importance of nutritional garden, remedial measures for cyclone affected crop, importance of pheromone traps in vegetable crops, weed management in pulses, importance of terrace garden, staking in tomato, drip irrigation in banana, awareness on drudgery reduction tools, anaemic problems in pregnant women and adolescent girls, IPM in vegetable crops, paddy production technologies, entrepreneurship development, viral disease management in cucurbits, interpretation soil health cards, marigold cultivation, waste decomposer preparation and uses, safe storage of pulses for seed purpose, Fall Army Worm management in maize, cashew pest management, YMV management in summer pulses etc.
- A total of 141 field days were conducted by DAATTCs and KVKs and 4761 farmers were benefited. These included field days on performance of MTU-1156 paddy variety, cluster frontline demonstrations of bengalgram and seed hub, MSRI in rice, rhizome rot management in turmeric, drum seeder technology in rice, TCGS 1694 performance, performance of NLR 3354, NLR 3186, NLR 3354 minikit of paddy,

K 1735 minikit of groundnut, greengram GGG-1 minikit, soil test based fertilizer application in paddy, rice fallow jowar, weed management in bengalgram, double cropping system, rice minikit MTU 1217, MTU 1210, liquid bio fertilizer in rice, introduction of marigold as an alternative crop to tomato in late *kharif* etc.

- ANGRAU is one of the few Agricultural Universities in the country to start distance education through a private TV channel, ETV under "Annadata-Velugubata" programme from 2nd October, 1998 twice a week, Tuesday and Friday.
- Electronic Media Wing became functional from July, 2016 after bifurcation of the university.
- The Phone in Live Programmes were telecasted in popular TV channels like Pasidipantalu (Doordarshan), Annapurna (TV5), ETV-Annadata, JaiKisan, DD-Saptagiri, 24X7-TV, CVR News, etc during 2018-'19. All the topics pertaining to crops cultivated in AP were covered by the Extension Scientists from all the agro-climatic zones.. Thirty six (36) programmes were telecasted during the period under report.
- Agricultural Information and Communication Centre (AI & CC), Guntur has brought out the publications viz., Vyavasaya Panchangam, Journal of Research, ANGRAU (Quarterly), ANGRAU e-News Letter and Vyavasayam – Monthly Telugu Farm Magazine during the year 2018-19.
- Technology Week for a duration of 3-5 days was organized at KVKs of Rastakuntubai, Banavasi and Reddipalli, and created awareness on soil health management, farm mechanization, entrepreneurial activities, home science technologies, horticulture, animal health camps and fisheries technologies to the farmers.
- The scientists of the DAATTCs and the KVKs along with other scientists of the Research stations have actively participated inT&V Meetings, Polam pilusthondi, AMC level interaction meetings, Janmabhumi – MaaVuru programme and Swachhta Pakhwada programe and interacted with the farmers and suggested solutions for their problems.
- Protection of Plant Varieties and Farmers Right Act 2001with an objective of creation of awareness among farmers and other stakeholders were organized by three (3) Krishi Vigyan Kendras viz., Nellore, Reddipalli and Utukurduring the year 2017-18. A total of three awareness cum training programmes on provisions of PPV and FR act 2001 were organized and 500 farmers have participated.
- Several android based mobile applications were developed and kept for downloading by the farmers free of cost from Google Play Store. The applications developed /supported from ANGARU are Eruvaka, Greeshma, Krishi Vigyan, Manaverusanaaga, Plantix, and alsoPocket Cards for the benefit of the farming community.
- In addition to existing popular extension methods such as Flag Method and Developing Farmer Master Trainers etc., new initiatives such as National Initiative on Climate Resilient Agriculture (NICRA), Farm Science Clubs, Tribal Youth Network, Kisan Mobile Advisories and Integrated Agromet Advisory Services etc., have been taken during the current period.

Research Publications

- The research and extension activities carried out by the students and the faculty were published in various national and international journals, accounting to a total of 276 by the teaching faculty in agriculture, 19 in agricultural engineering faculty, 244 by the research scientists and 23 by the extension specialists, besides 20 under chapters and books, during the report period.

Awards

- Dr. V. Srinivasa Rao, Professor & Univ. Head, Department of Statistics & Computer applications and Dr. P. V. Sathyagopal, Professor & Head, Department of Agricultural Extension, Agricultural College, Bapatla have received AP State Best Teacher Awards 2018.
- Dr. D. Subramanyam, S.V. Agricultural College, Tirupati received Fellow of Indian Society of Weed Science-2017 award for significant contributions in the field of weed science at Directorate of Weed Research, Jabalpur on 24-11-2018.
- Dr. P. Bala Hussain Reddy, S.V. Agricultural College, Tirupati received Young Scientist Award – 2018 at National Education Congress Conference organized by Society of Extensional Education Agra, ICAR complex NEH Region and Central Agricultural University, Imphal at Ganagtok, Sikkim on 14th to 17th November.
- Dr. P. Sudhakar, Professor & Head, S.V. Agricultural College, Tirupati selected in Editorial Committee for the Indian Journal of Plant Physiology and Journal Research, ANGRAU.
- Dr. Prabhakar Reddy, Professor, S.V. Agricultural College, Tirupati received State Best Teacher Award of Govt. of Andhra Pradesh.
- V.P. Sreebala, Agricultural College, Rajamahendravaram received NAARM, ABM award.
- M.V.J. Ravichandra, Agricultural College, Rajamahendravaram received IRMA, ABM award.
- Dr. A. Mani, Associate Dean, Dr.NTR College of Agricultural Engineering, Bapatla received State Best Teacher Award by Government of Andhra Pradesh.
- Dr. A. Ashok Kumar, Assistant Professor, Dr.NTR College of Agricultural Engineering, Bapatla received Student Gold Medal for Ph.D. research work.
- Dr. K. Ashok Kumar, Assistant Professor (Agronomy), College of Agricultural Engineering, Madakasira received Outstanding Faculty in Agriculture - Venus International Faculty Awards-VIFA 2018 on 07.07.2018.
- Dr. Lal Ahamed M, Associate Professor, APGC, Lam, Guntur received the Associate Fellow of the Andhra Pradesh Academy of Sciences for the year 2018.
- Dr. Ch. Mukunda Rao, Principal Scientist (Crop Physiology), RARS, Anakapalle received Bharat Jyoti Puraskar for 2018 from Best Citizen Partnership Home, NewDelhi.
- Dr G.Rama Rao, RARS, Lam received Fellow of Academy of Environment and Life Sciences -2018 by Academy for Environment and Life Sciences, Agra.(National Level).
- Dr G. Rama Rao, RARS, Lam Prof. M.S.Swaminathan Best Scientist Award - 2018 by Bose Science Society and Tamilnadu Scientific Research Organization and Department of Science &Technology, Govt. of India.
- Dr. M.V. Ramana, Principal Scientist (Ag. Engg), RARS, Tirupati received Leadership Award 2018 from Soil Conservation Society of India, New Delhi.
- Dr. K. John, Principal Scientist (Pl. Breeding), RARS, Tirupati received the “Excellence in Research Award” in the National Conference held at Trichy from 09-02-2019 to 10-02-2019.

- ARS, Anantapuramu received "Best Institution Award" - Research and Extension Advisory Council (REAC) Meeting of ANGRAU, RARS, Tirupati on 19-12-2018.
- Dr. M. VijayaSankar Babu, ARS, Anantapuramu received Distinguished Scientist Award - Venus International Foundation - 4th Contemporary Academic Meet on 18th July, 2018.
- ARS, Ragolu received the Best Research Station Award in 'B' category for 2017-2018 from Hon'ble Vice Chancellor Dr.V.Damodara Naidu on 19.12.2018.
- Dr. T.S.S.K. Patro, ARS, Vizianagaram received Professor JP Verma memorial award - Indian Phyto Pathological Society, New Delhi.
- Dr.V. Shilpakala, Scientist (PP), DAATTC, Utukur, Kadapa got best oral presentation award for presenting "the Molecular characterization of Brown Plant Hopper populations collected from various places of India" (Ph.D. work) in National Conference for Post Graduate Students at S.V.Agricultural College, Tirupati, ANGRAU on 08.03.2019.
- KVK, Darsi received best poster award from ICAR, ATARI, Zone X - "Impact of pigeonpea variety, LRG 52 in Prakasam Dist., (21/09/18)
- KVK, Darsi received Appreciation Award from ICAR, ATARI, Zone X for analyzing highest soil samples in Zone X. on 21-09-2018.
- KVK, Darsi received Best oral presentation, ICAR, ATARI, Zone X – Annual Zonal workshop of KVKs 2019 held at NAARM, Hyderabad from 24th to 26th May, 2019.
- Dr. K. L. Rao Krishi Vigyan Kendra, Garikapadu, Krishna District has got appreciation certificates on "Best Fact Sheets" and "Best Performance in CFLD (Oil seeds) Project" during Annual Zonal Workshop of KVKs held from 24th to 26th May, 2019 at NAARM, Hyderabad.
- KVK, Kondempudi, Visakhapatnam, achieved first position in implementing the activities of KKA by Krishi Vigyan Kendras among 117 aspiration districts in India.
- KVK, Reddipalle received best KVK Award for the year 2018-'19 from Hon'ble Vice Chancellor Dr.V.Damodara Naidu on 19.12.2018.
- KVK, Utukur received appreciation certificate for best performance in KKA programmes.
- SMS crop production, KVK, Banavasi, Kurnool district received Young Professional award in International Conference on Advances in Agriculture and Allied Sciences - Technologies for Sustainable Development on 10th and 11th February 2018.
- Programme Coordinator, KVK, Banavasi, Kurnool district received Best Oral Presentation Award from the Director, ICAR-ATARI, Zone-X, Hyderabad during Annual Zonal Review Workshop of KVKs of Zone-X of ICAR-ATARI, Hyderabad .
- ARS, Anantapuramu received Best Research Station Award under category A during 48th REAC meeting.
- MULLaRP, RARS, Lam received best AICRP Centre for 2018-19
- Dr. T.N.V.K.V. Prasad, Principal Scientist (Soil Physics), RARS, Tirupati received an Australian Endeavour Ambassador Award-2018 from Australian High Commissioner to India.
- Dr. K. Suseela, Assistant Professor, Department of Agricultural Economics, Agricultural College, Bapatla, won World Championship 2018 in Agriculture Science

(Dryland) and Certified as Fellow, Directorate of Agriculture, IASR (Lifetime membership) for outstanding scientific contributions.

Other events

Inauguration

- The state-of-the-art Soil Spectroscopy lab was inaugurated at Institute of Frontier Technology, RARS, Tirupati, ANGRAU on 14.11.2018. Shri. B. Rajsekhar, Spl. Chief Secretary, Department of Agriculture and Cooperation, Government of Andhra Pradesh and Dr. V. Damodara Naidu, Vice Chancellor of ANGRAU, e-launched the Soil Spectroscopy lab.
- Hon'ble Minister for Agriculture inaugurated the liquid and powder biofertilizer units at ARS, Amaravati in presence of Hon'ble MLA, Pedakoorapadu, Hon'ble Vice-chancellor, Director of Research and other University authorities of ANGRAU on 15.11.2018.
- Inaugurated the Home Science College building and Girls Hostel at Lam, Guntur by Sri Somireddy Chandra Mohan Reddy, the Hon'ble Minister for Agriculture, Horticulture, Sericulture and Agricultural Processing, Government of A.P. on 22.01.2019.
- Inauguration of three buildings (Experimental learning Building, Girls Hostel and Boys Hostel) at Dr. NTR College of Food Science and Technology, Bapatla was done by Sri Somireddy Chandra Mohan Reddy, the Hon'ble Minister for Agriculture, Horticulture, Sericulture and Agricultural Processing, Government of A.P. on 22.01.2019.
- Inauguration of three buildings (Experimental learning Building, Girls Hostel and Boys Hostel) at Dr. NTR College of Agricultural Engineering, Bapatla was done by Sri Somireddy Chandra Mohan Reddy, the Hon'ble Minister for Agriculture, Horticulture, Sericulture and Agricultural Processing, Government of A.P. on 22.01.2019.
- Inaugurated four buildings *viz.,* Student Knowledge Centre, Central Instrumentation Cell, Girls Hostel and Kreeda Pranganam at Agricultural College, Bapatla by Sri Somireddy Chandra Mohan Reddy, Hon'ble Minister for Agriculture, Horticulture, Sericulture and Agricultural Processing, Government of A.P. on 22.01.2019.
- Dr.M.B.Chetty, Hon'ble Vice Chancellor of University of Agricultural Sciences, Dharwad and Dr.V.Damodara Naidu, Hon'ble Vice Chancellor, ANGRAU, Lam, Guntur inaugurated the PG Mess Block (Boys Hostel) at S.V. Agricultural College, Tirupati on 07.03.2019.
- Inaugurated the 150 KWP Solar Power Supply Station at RARS, Tirupati on 06.03.2019 by Dr. V. Damodara Naidu, Hon'ble Vice-Chancellor, ANGRAU.
- Inaugurated the 50 KWP Solar Power Supply Station at Admn. Building, Lam, Guntur on 08.03.2019 by Dr. V. Damodara Naidu, Hon'ble Vice-Chancellor, ANGRAU.
- Liquid Biofertilzer Laboratory & Modern Jaggery Plant were inaugurated by Hon'ble Vice Chancellor, Dr. V. Damodar Naidu on 25.05.2019 at RARS, Anakapalle.

Laying Foundation Stone

- Hon'ble Minister for Agriculture, Horticulture Sericulture and Agri processing, Sri Somireddy Chandra Mohan Reddy, Hon'ble Minister for Industries, Food Processing, Agribusiness, Commerce and Public Enterprises, Sri N.Amarnatha Reddy garu, Hon'ble Vice Chancellor, Dr.V. Damodhar Naidu garu, local MLA and MLC laid foundation stone for Liquid Bio Fertilizer Laboratory and inaugurated Solid Bio Fertilizer unit on 10-12-2018.

- Foundation stone laying for Seed cum Soil Testing Laboratory at RARS, Maruteru was done by Sri Somireddy Chandra Mohan Reddy, Hon'ble Minister for Agriculture, Horticulture, Sericulture & Agri-processing, Govt. of A.P & Sri Pitani Satyanarayana garu, Hon'ble Minister for Labour and Employment, Training and Factories, Govt. of A.P. on 08.01.2019.
- Foundation Stones for four Research buildings of PHTC, FIM, SWS and ARS at College farm, Agricultural College, Bapatla by Sri Somireddy Chandra Mohan Reddy, the Hon'ble Minister for Agriculture, Horticulture, Sericulture and Agricultural Processing, Government of A.P. on 22.01.2019.
- Unveiling of foundation stone of Seed Processing Unit& Storage Godowns at ARS, Bapatla was done by Hon'ble minister for Agriculture Sri Somireddy Chandra Mohan Reddy, the Hon'ble Minister for Agriculture, Horticulture, Sericulture and Agricultural Processing, Government of A.P. on 22.01.2019
- Foundation stones were laid by Sri Somireddy Chandramohan Reddy, Honb'le Minister for Agriculture, Horticulture, Sericulture and Agri-Processing on 06-02-2019 for the following works
- Central Instrumentation cell (NABARD RIDF XX & XXII funds), Seed godown, Agricultural Experimental Learning Programme Building, Girls Hostel & Boys Hostel at Naira, Research Building at Ragolu and seed godown and seed processing units at Amadalavalasa, Srikakulam Dist.
- Millets Processing & Value Added Products production centre at Agricultural Research Station, Vizianagaram.
- Technology Dissemination Centre, Research and Experimental Centre at Chintapalle, Visakhapatnam Dist.
- Post-Harvest Technology and Value Added Products Production Centre at KVK, Undi, West Godavari Dist.
- Foundation stones were laid by Sri Somireddy Chandramohan Reddy, Honb'le Minister for Agriculture, Horticulture, Sericulture and Agri-Processing on 13-02-2019 for the following works.
- Bhoomi Pooja (Laying foundation stone) of NABARD (under Tranche XXII) & RKVY Buildings at Lam, Guntur.
- Post-Harvest Technology Centre, Agricultural Machinery Exhibition Centre, Seed Godown and Soil Testing Centre at Kalikiri & Agricultural Mechanization Centre, Tirupati, Chittoor Dist.
- Agricultural Utensils Shed & Tomato Processing Unit at KVK, Banavasi
- Foundation stones were laid by Sri Somireddy Chandramohan Reddy, Honb'le Minister for Agriculture, Horticulture, Sericulture and Agri-Processing on 27-02-2019 for the following works.
- Seed Godown & Green House at ARS, Nellore.
- Seed Godown and Seed Processing Unit & Covered Threshing Floor at ARS. Thotapalli, Guntur.
- Agricultural Polytechnic Building and Students Hostel at Agricultural Polytechnic, Somasila, Sri Potti Sreeramulu Nellore Dist.
- Foundation stones were laid by the Hon'ble Vice-Chancellor, ANGRAU on 27-02-2019 for Experimental Centre, Seed Godown, Seed Processing, Renovated Meeting Hall & Renovated Guest House at ARS, Nellore

MoUs

- ANGRAU entered MoU with A.P. Police Housing Corporation Ltd., on 21.08.2018 for constructing civil structures sanctioned under

RKVY during 2017-18, Non-plan and ICAR plan in research/teaching and extension units of ANGRAU.

- ANGRAU entered MoU with University of Western Australia, Australia on 17-10-2018 and agreed to promote cooperation in exchange of scientists, technologists and students; exchange of germplasm and breeding material; exchange of scientific literature, information and methodology; exchange of scientific equipment as available and required in programme of common interest as may be mutually agreed upon and development and implementation of collaborative research projects, the areas and methodology
- An MoU was entered with Central Institute for Cotton Research (CICR), Nagpur on 21-01-2019 and agreed to have exchange of students for academic, research and training programmes.
- A.P. State Development Planning Society (APSDPS), Vijayawada 21-01-2019 Improving governance, strengthening of institutions, output and research in issues related to key performance indicators in agriculture and allied sectors in the state of A.P.
- Water And Land Management Training And Research Institute (WALAMTARI), Hyderabad 01-04-2019 for exchange of students for academic, research and training programmes.

Visitors

- Dr. Dilip Kumar Guntuku and his team of Scientists, IOWA State University, USA Visited and discussed with faculty & students on seed research and processing techniques on 22.06.2019.
- Sri B.M.Prasanna Kumar,Director, CGIAR Research Programme, Maize & Global Maize Programme, CIMMYT, Nairobi, Kenya participated in interaction meeting on Fall Army Worm in maize conducted by Research Wing of ANGRAU at the Seminar hall, APGC, Lam, Guntur on 27-09-2018 and delivered the lecture on "Fall Army Worm and its Management" and on activities of CIMMYT, Mexico on maize breeding and development.
- Dr. Jacqueline Hughes, DDG-Research, IRRI, Philippines, visited ANGRAU on 16-10-2018 and interacted with all the University Officers on collaborative activities.
- Dr. Kent J. Bradford, Interim Director, World food centre, College of Agricultural and environmental sciences, University of California visited the breeding stores, seed godown on 01-11-2018 and discussed with AICRP groundnut team about estimation of seed moisture content, safe seed storage methods and instruments for estimation of moisture content and relative humidity at RARS, Tirupati .

Foreign Tours for Participation in Seminars / Conferences / Workshops

- Six faculty members from the three Faculties of Agriculture participated in the overseas Conferences / Workshops / Seminars held in various foreign countries like Switzerland, Philippines and Israel .

I. INTRODUCTION

As per the APAU Act, 1963, Acharya N G Ranga Agricultural University (ANGRAU) was established on June 12, 1964 as "Andhra Pradesh Agricultural University" (APAU). Later, on November 7, 1996, the APAU was renamed after the noted Parliamentarian and Kisan Leader, Sri Gogineni Ranga Nayakulu (popularly known as N G Ranga) as "Acharya N G Ranga Agricultural University" as a mark of honor and respect on him. Subsequent to bifurcation of United Andhra Pradesh into Andhra Pradesh (AP) and Telangana State (TS) on June 2, 2014, the ANGRAU has been bifurcated on "Order to Serve Basis" into ANGRAU for residual AP and PJTSAU (Professor Jayashankar Telangana State Agricultural University) for the State of Telangana.

The ANGRAU is entrusted with the responsibility of generating and grooming students into this profession (Agricultural Education), formulating agricultural tactics that boost crop production and productivity (Research) and transferring technologies and other research outcomes to farmers and other stakeholders (Extension).

The ANGRAU is governed by the Board of Management comprising 21 members. The Vice Chancellor, by virtue of his post is a member and Chairman of the Board of Management. The Vice Chancellor is assisted by University Officers viz., Faculty Deans (Dean of Agriculture; Dean of Agril. Engg & Technology; Dean of Home Science), Dean of Post Graduation Studies, Dean of Student Affairs, Director of Experimental Stations, Director of Extension, Registrar, Controller of Examinations, Comptroller, University Librarian and Estate Officer in day to day University's administration. The Academic Council and Faculty Boards steers the academic matters of the University under the guidance of Vice Chancellor. The Research and Extension Programmes are formulated by the Research and Extension Advisory Council (REAC) under the Chairmanship of the Vice Chancellor.

The ANGRAU has three faculties namely Agriculture, Agricultural Engineering & Technology and Home Science. The University offers degrees in Undergraduate, Post Graduate and Doctoral Programs in various disciplines. The teaching mandates of ANGRAU are being carried out through twelve constituent colleges and six affiliated colleges. ANGRAU is the pioneer in introducing a few programs like RAWEP (Rural Agricultural Work Experience Programme) during the final year B.Sc. (Ag) program and diploma courses in various disciplines like two year Diploma courses in Agriculture, Organic Farming and Seed Technology Programs in local dialect (Telugu). A three year diploma course in Agricultural Engineering is also offered in English with the intention to impart training to grass root level technical workers for developing skilled manpower. Till date, a total of 40904 students, comprising 30413 graduates and 10491 post graduates have received degrees from ANGRAU.

The research wing of ANGRAU is ramified across the State and has 36 Research Stations including six Regional Agricultural Research Stations (RARS). The University has made outstanding contribution in research with a motto of making agriculture, a sustainable and profitable one. In this direction, ANGRAU has released thus far, 412 improved crop varieties/

hybrids. Some of these released varieties are claimed to be first of their kind and have gained global reputation and have contributed sizeably in boosting agricultural production of AP.

The Extension wing of ANGRAU is robust and the University claims first in the country in introducing DAATT Centres (District Agricultural Advisory and Technology Transfer Centres), popularly known as "Eruvaka Kendras" in all the 13 districts of AP. As of now, in the Extension wing, ANGRAU has 13 Krishi Vigyan Kendras (KVKs) and 13 DAATTCs. With the recent merging of DAATTCs into KVKs of respective districts, the Extension Wing is further strengthened in Lab to Land Program and in delivering Plant Production and Protection Techniques to farming community. A "Farmers' Call Centre" is also being operated successfully at University Head Quarters, which facilitates direct access to farmers to speak to Crop Experts and get ideas/solutions to farm problems instantaneously over wire. Overall, with the innovations in introducing diploma courses and DAATTC for the first time has sizably contributed to ANGRAU for winning the Best Institution Award-twice from the ICAR.

Against this backdrop of ANGRAU, this 55th Annual Report of ANGRAU showcases its worthwhile activities and significant achievements in Education, Research and Extension during the period from June 2018 to May 2019.

II. UNIVERSITY ADMINISTRATION

The Hon'ble Governor of Andhra Pradesh, Sri E Srinivasan Lakshmi Narasimhan is the Chancellor of the University. Next to the Chancellor, Vice-Chancellor acts as the Academic Head and Chief Executive of the University.

The organogram of the University is presented in Fig.1.

The University is governed by the following bodies:

(i) Board of Management

(ii) Academic Council and the Faculty Boards

(iii) Research and Extension Advisory Council

A. AUTHORITIES OF THE UNIVERSITY

1. Board of Management

The Board of Management (BoM) is the apex body of the University and makes policy decisions. The Vice-Chancellor is the Chairman of the Board of Management. The BoM comprises of representatives from State Legislature / Parliament (4), the Agro-industry (2) and the State Chamber of *Panchayat Raj* (1) as well as the Agricultural Scientific Community (1). Besides these, one representative from the Indian Council of Agricultural Research, three Members of the Academic Council of the University, Secretaries to Government from the *Panchayat Raj* and Finance Departments, Directors of State Departments of Agriculture and Animal Husbandry and Progressive Agriculturists (4), are also the members of the BoM of the ANGRAU.

Members of Board of Management

from 286th to 291th meetings of Board of Management

Chairman	**Dr V Damodara Naidu** Vice-Chancellor
Members	
Four Ex-Officio Members	**Sri K. S. Jawahar Reddy, I.A.S.** Principal Secretary to Government, Panchayat Raj Department
	Sri D. Muralidhar Reddy, I.A.S. Special Commissioner for Agriculture & Director of Agriculture
	Dr G. Somasekharam, M.V.Sc, Director of Animal Husbandry
	Sri K.V.V. Satyanarayana IRAS Special Secretary to Government & Hon'ble Member of Board of Management, ANGRAU, Lam, Guntur (from 287th to 291st Meeting of Board of Management only)

Other Members *ICAR Nominee*	**Dr M.B. Chetti** Assistant Director General (ADG), Agricultural Education Division, ICAR, New Delhi (for 286th and 287th Meeting of Board of Management only)
	Dr P.K. Agarwal, Assistant Director General (NASF), Hon'ble Member of Board of Management, ANGRAU, Indian Council of Agricultural Research (from 289th to 291st Meeting of Board of Management only)
Distinguished Agricultural Scientist	**Dr D.S. Koteswara Rao** Professor (Retd.), ANGRAU
Three Persons from Academic Council	**Prof. G.V. Nageswara Rao** Professor (Plant Pathology), Agricultural College, Rajamahendravaram
	Dr S.R. Koteswara Rao Professor & Head, Dept. of Entomology S.V. Agricultural College, Tirupati
	Prof. I. Bhavani Devi Professor & Special Officer, Institute of Agri. Business Management S.V. Agricultural College, Tirupati
Four Persons from Members of Legislative Assembly / Parliament	**Sri Kinjarapu Rammohan Naidu** Hon'ble Member of Parliament (Loksabha) (from 286th to 289th Meeting of Board of Management only)
	Sri Bobbili Chiranjeevulu Hon'ble Member of Legislative Assembly, Govt. of Andhra Pradesh (from 286th to 289th Meeting of Board of Management only)
	Sri B.C. Janardhan Reddy Hon'ble Member of Legislative Assembly, Govt. of Andhra Pradesh (from 286th to 290th Meeting of Board of Management only)
	Smt. Meesala Geetha Hon'ble Member of Legislative Assembly, Govt. of Andhra Pradesh from 286th to 291st Meeting of Board of Management only)

Four Persons from Progressive Agriculturists, of whom one shallbe a woman	**Sri Mekala Lakshmi Narayana** **Smt. Alluri Vijaya** **Sri Chapara Ganapathi Rao** **Sri T.V. Muralinatha Reddy** (from 286th to 289th Meeting of Board of Management only)
One Person from among the Members of the State Chamber of Panchayat Raj	**Sri P Rajasekhar** ZPTC, Mummidivaram, G. Vemavaram (V), Polavaram (M), East Godavari District
Two Persons from among Agro-industrialists and other Entrepreneurs, includingSelf-Employed Graduates	**Vacant**
Secretary	**Dr D Bhaskara Rao** Registrar

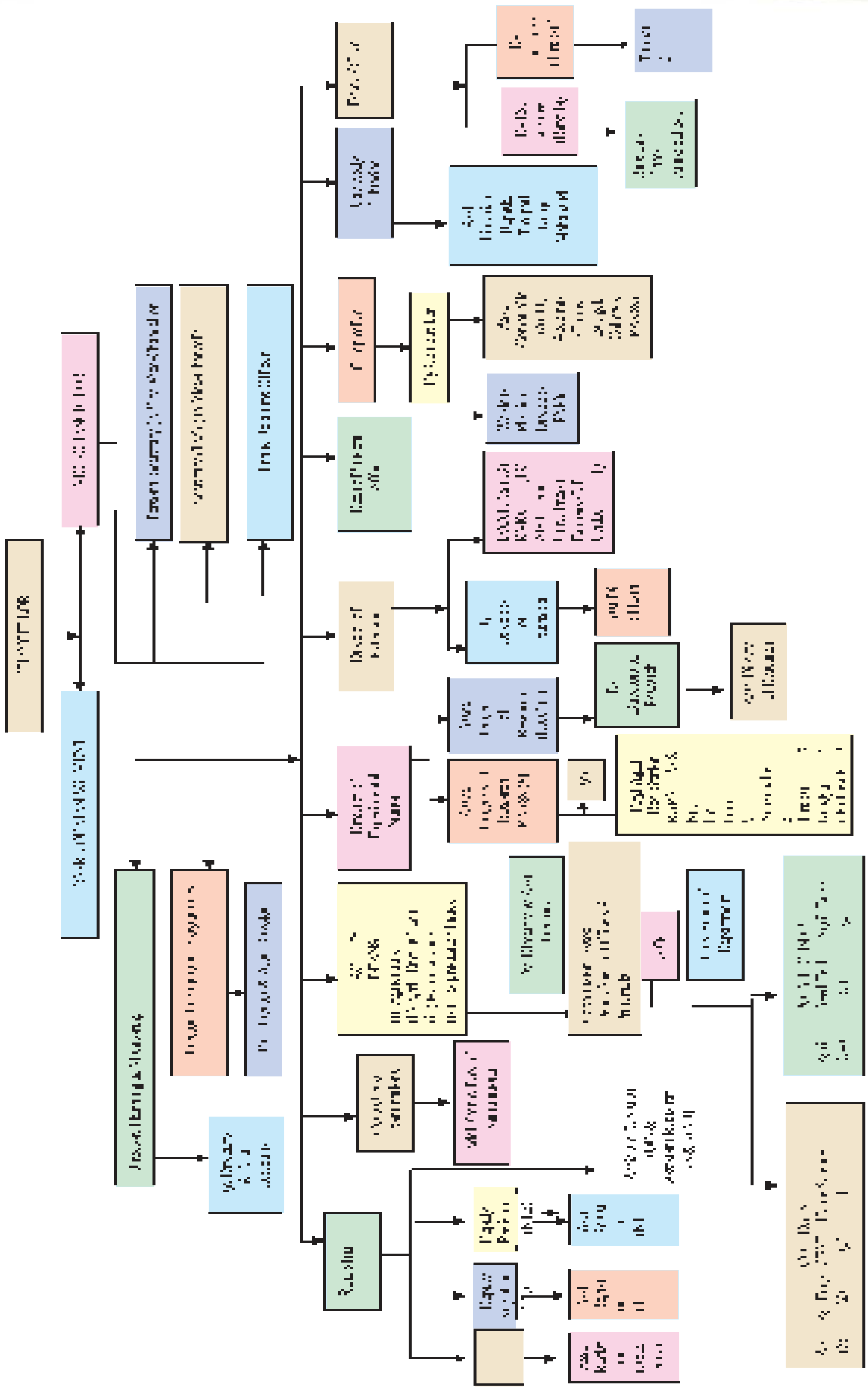

Fig. 1: ORGANOGRAM OF THE UNIVERSITY

2. Officers of the University

The list of University Officers for the period under report is given below

University Officers	
Vice-Chancellor	**V. Damodara Naidu**
Registrar	**Dr D. Bhaskara Rao**
Comptroller	**Dr A. Subrahmanyeswara Rao**
Dean of Postgraduate Studies	**Dr D. Balaguravaiah**
Dean of Agriculture	**Dr J. Krishna Prasadji** **Dr S.R. Koteswara Rao** (30.03.2019 onwards)
Director of Experimental Stations	**Dr N.V. Naidu**
Director of Extension	**Dr P. Ram Babu**
University Librarian	**Dr S.R. Koteswara Rao**
Controller of Examinations	**Dr A. Siva Sankar**
Dean of Agril. Engg. & Technology	**Dr K. Yella Reddy**
Dean of Home Science	**Dr L. Uma Devi**
Dean of Student Affairs	**Dr S.R. Koteswara Rao**
Estate Officer	**Sri P.V. Narasimha Rao**

3. Academic Council

The Academic Council is vested with the powers to implement and monitor all the academic programmes. The Vice-Chancellor is the Chairperson of the Council, which has Deans of Faculties, Directors of Experimental Stations, Director of Extension, University Heads of Departments and Professors as its members. In addition, the Council also has ten academicians representing different faculties nominated by the Vice-Chancellor and two representatives of the Board of Management.

Members of the Academic Council

Chairman	**Dr V. Damodara Naidu** Vice Chancellor
Ex-Officio Secretary	**Dr D. Bhaskara Rao** Registrar
Members	Vide Annexure I

4. Research and Extension Advisory Council

The *Research and Extension Advisory Council (REAC)*, headed by Vice-Chancellor with Director of Experimental Stations, Director of Extension, Associate Directors of Research of the six Agro-climatic Zones, three each from Innovative Farmers' Network, Agri-business Consortium, representatives from KVKs (Operated by NGOs) and special invitees representing the different regions of the State and two Eminent Scientists of Agriculture as members (Annexure II), reviews the functioning of centres in the state.

B. MEETINGS OF THE AUTHORITIES OF THE UNIVERSITY

1. Board of Management

The Board of Management of the ANGRAU met 6 times during the year under report. The dates and venues of the meetings are given below.

S. No.	No. of the Board Meeting	Date	Venue
1	286th	21.06.2018	Administrative Office, Lam, Guntur
2	287th	20.08.2018	Administrative Office, Lam, Guntur
3	288th	27.10.2018	Administrative Office, Lam, Guntur
4	289th	29.12.2018	Administrative Office, Lam, Guntur
5	290th	27.03.2019	Administrative Office, Lam, Guntur
		& 28.03.2019	
6	291st	27.04.2019	Administrative Office, Lam, Guntur

2. Academic Council

The Academic Council normally meets once in six months. The 100th meeting of Academic Council was held on the 15th June, 2018 at Lam, Guntur.

The 101st meeting of Academic Council was held on the 15th December, 2018 at Lam, Guntur.

3. Research and Extension Advisory Council (REAC)

The 48th REAC Meeting was held on 19th & 20th December, 2018 at Regional Agricultural Research Station, Tirupati.

C. FACULTY STRENGTH

The cadre-wise strength of teaching staff of the ANGRAU is shown in Table 1, while details of faculty working in various Colleges, Agricultural Research Stations and other Extension Centres including Administration are given in Annexure III.

Table 1: Faculty Strength in the ANGRAU during 2018-19

S. No.	Item	Professor		Associate Professor		Assistant Professor		Total	
		S	IP	S	IP	S	IP	S	IP
1.	Teaching	26	14	90	45	279	209	395	268
2.	Research	14	09	78	63	216	169	308	241
3.	Extension	-	-	13	13	119	84	132	97
4.	Administration	10	10	-	-	05	05	15	15
	Total	**50**	**33**	**181**	**121**	**619**	**467**	**850**	**621**

S – Sanctioned IP – In Position

Note: In-position includes faculty under Career Advancement Scheme also.

III. TEACHING

A. EDUCATION

1. Teaching Institutes

The Acharya N G Ranga Agricultural University offers both undergraduate and postgraduate programmes including doctoral programmes in the faculties of Agriculture, Agricultural Engineering & Technology and Community Science. The University has five Agricultural Colleges, one Advance Post Graduate Centre, one Institute of Agri-Business Management, fifteen Agricultural Polytechnics, one Agricultural Polytechnic (organic farming) and one Seed Technology Polytechnic under the Faculty of Agriculture, two Colleges of Agricultural Engineering, two Colleges of Food Science & Technology and two Agricultural Engineering Polytechnics under the Faculty of Agricultural Engineering & Technology and one College of Community Science under the Faculty of Community Science.

The organogram of teaching institutes in the University is depicted in Fig.2. The list of Colleges and Polytechnics with their location, year of establishment and courses offered is given in Table 2.

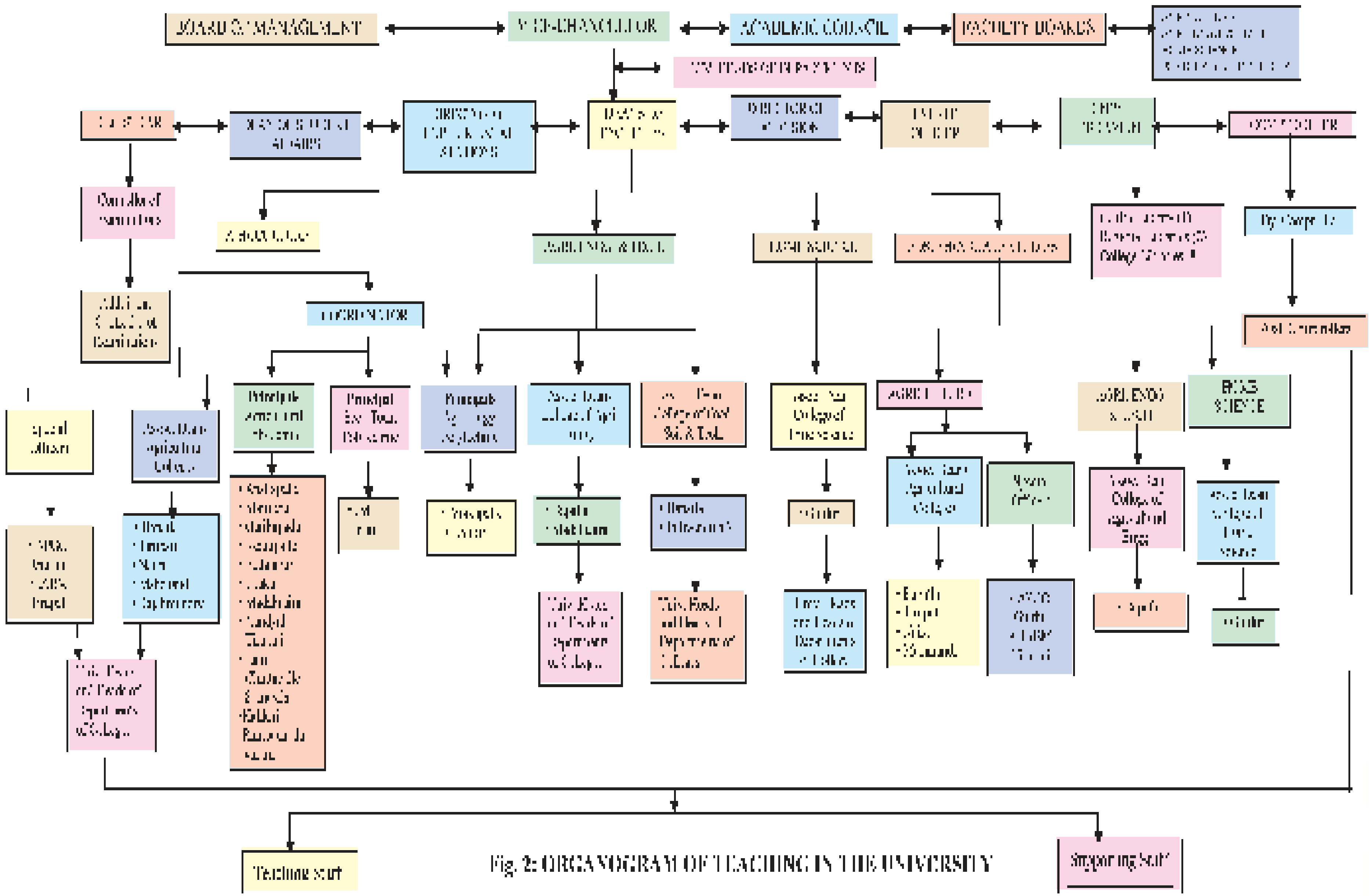

Fig. 2: ORGANOGRAM OF TEACHING IN THE UNIVERSITY

Table 2. Teaching Institutes of the University

S. No.	Teaching Institute with Location	Year of Establishment	Name of the Associate Dean / Principal	Courses Offered
1.	Agricultural College Bapatla – 522 101 Guntur Dist.	1945	Dr. D. Lokanadha Reddy	B.Sc. (Ag.) M.Sc.(Ag.) Ph.D. (Ag.)
2.	S V Agricultural College Tirupati – 517 502 Chittoor Dist.	1961	Dr. P. Ramesh Babu	B.Sc. (Ag.) M.Sc.(Ag.) Ph.D. (Ag.)
3.	Agricultural Collège Naira – 532 185 Srikakulam Dist.	1989	Dr. P. V. Krishnayya	B.Sc. (Ag.) M.Sc. (Ag.)
4.	Agricultural College Mahanandi- 518 502 Kurnool Dist.	1991	Dr. B. Narendra	B.Sc. (Ag.) M.Sc. (Ag.)
5.	Agricultural College Rajamahendravaram – 533 103 East Godavari Dist.	2008	Dr. G. V. Nageswara Rao	B.Sc. (Ag.)
6.	Advanced Post- Graduate Centre, Lam, Guntur - 522034, Guntur Dist.	2015	Dr. K. L. Narasimha Rao	M.Sc. (Ag.) M.Sc.(H.Sc.) Ph.D. (Ag.) Ph.D. (H.Sc.)
Agricultural Polytechnics				
1.	Agricultural Polytechnic Regional Agricultural Research Station Maruteru – 534 122 West Godavari Dist.	1999	Dr. P. Munirathnam	Diploma in Agriculture
2.	Agricultural Polytechnic Regional Agricultural Research Station Anakapalle – 531 001 Visakhapatnam Dist.	1999	Dr. M. Bharatha Lakshmi (upto 26.06.2018) Dr.P.Jamuna (from 20.07.2018)	Diploma in Agriculture
3.	Agricultural Polytechnic Podalakur– 524345 SPS Nellore Dist.	2005	Dr. D. Kodandarami Reddy (upto 27.06.2018) Dr.P.Sujathamma (from 21.07.2018)	Diploma in Agriculture
4	Agricultural Polytechnic Reddipalli– 515001 Anantapuramu	2005	Dr. K. Bhargavi	Diploma in Agriculture

S. No.	Teaching Institute with Location	Year of Establishment	Name of the Associate Dean / Principal	Courses Offered
5.	Agricultural Polytechnic Utukur – 516 003 YSR Dist.	2005	Dr. G. Karuna Sagar	Diploma in Agriculture
6.	Agricultural Polytechnic Garikapadu – 521175 Krishna Dist.	2007	Dr. Y. Padma Latha	Diploma in Agriculture
7.	Agricultural Polytechnic Madakasira – 515 301 Anantapuramu Dist.	2007	Dr. C. Ramana	Diploma in Agriculture
8	Agricultural Polytechnic Regional Agricultural Research Station, Tirupati – 517 502 Chittoor Dist.	2011	Dr. P. Rajasekhar	Diploma in Agriculture
9.	Agricultural Polytechnic Regional Agricultural Research Station, Nandyal – 518 502 Kurnool Dist.	2011	Dr. M. Subba Rao	Diploma in Agriculture
10.	Agricultural Polytechnic Somasila, SPS Nellore Dist.	2012	Dr. M. C. Obaiah	Diploma in Agriculture
11.	Agricultural Polytechnic Kalikiri- 517234 Chittoor Dist.	2012	Sri. A. Subramanyam	Diploma in Agriculture
12.	Agricultural Polytechnic Rampachodavaram Rajahmundry – 533 103 East Godavari Dist.	2013	Dr. T. V. P. Rajendra Prasad	Diploma in Agriculture
13	Agricultural Polytechnic Jangameswarapuram, Gurajala-522415 Guntur Dist.	2015	Dr. N. Sambasiva Rao	Diploma in Agriculture
14	Agricultural Polytechnic Ghantasala (MD), Krishna (Dist.) - 521133	2016	Dr. K. Srinivasulu	Diploma in Agriculture
15	Agricultural Polytechnic Ramagiri, Ramagiri (Mandal), Anthapuram Dt.	2016	Dr. Y. Narasimhudu	Diploma in Agriculture

S. No.	Teaching Institute with Location	Year of Establishment	Name of the Associate Dean / Principal	Courses Offered
16	Agricultural Polytechnic (Seed Technology) Jangameswarapuram, Gurajala-522415 Guntur Dist.	2011	Dr. N. Sambasiva Rao	Diploma in Seed Technology
17	Agricultural Polytechnic (Organic Farming) Regional Agricultural Research Station, Chintapalle-531 111 Visakhapatnam Dist.	2016	Dr. G. Jogi Naidu	Diploma in Organic Farming
Faculty of Agricultural Engineering & Technology				
1.	College of Agricultural Engineering, Bapatla–522 101 Guntur Dist.	1990	Dr. A. Mani	B.Tech. (Ag. Engg.), M.Tech. (Ag. Engg.) Ph.D. (Ag. Engg.)
2.	College of Agricultural Engineering, Madakasira - 515 301 Anantapuram Dist.	2008	Dr. C. Ramana (upto 05.07.2018) Dr. P.V.K. Jagannadha Rao	B.Tech. (Ag.Engg.)
3.	College of Food Science & Technology, Bapatla–522 101 Guntur Dist.	2003	Dr. D. Vishnu Sankar Rao	B.Tech. (Food Technology)
4.	College of Food Science & Technology Pulivendula – 516 390 YSR Dist.	2008	Dr. S. Kaleemullah (upto 30.06.2018) Dr. D.D. Smith (from 01.07.2017)	B.Tech. (Food Technology)
Agricultural Engineering Polytechnics				
1.	Polytechnic of Agricultural Engineering, Kalikiri, Chittoor Dist.	2013	Sri A. Subramanyam	Diploma in Agricultural Engineering
2.	Polytechnic of Agricultural Engineering, Anakapalle, Vishakapatnam Dist.	2013	Dr. M. Bharatha Lakshmi (from 25.03.2018) Dr. P. Jamuna (from 20.07.2018)	Diploma in Agricultural Engineering
Faculty of Community Science				
1.	College of Community Science, Guntur	2013	Dr. L. Uma Devi	B.Sc. Community Science

2. Admission Strength and Out-turn of Students

During the academic year 2018-'19, a total of 1500 students were admitted in the University. Out of them, 725 were admitted in undergraduate courses, 149 in Masters, 50 in Doctoral programmes and 576 in diploma courses. Student enrolment by courses and year-wise is presented in Annexure IV and students strength in various colleges of the ANGRAU is shown in Annexure V.

A total number of 1413 students were admitted in to the Faculty of Agriculture, comprising of 726 in undergraduate courses, 149 in postgraduate programmes, 50 in doctoral programmes and 526 in diploma programmes. The Faculty of Agricultural Engineering & Technology comprised of 212 undergraduate students, 17 Masters students, 5 Doctoral students and 50 Diploma students, with the total student strength of 284. Community Science Faculty comprised of 70 undergraduate students, 13 postgraduate students and three doctoral students, with a total strength of 101.

A total number of 5574 students are on rolls of the University in different Undergraduate, Postgraduate, Doctoral and Diploma programmes. Out of them, 2308 were boys and 3266 were girls. The information pertaining to the number of students admitted, students enrolled and students out-turn during the year is given in Table 3.

Table 3. Admission Strength, Students on Rolls and Out-turn of Students under Various Programmes during the Year 2018-19

Degree	Faculty & Course	Intake Capacity	Students Admitted			Students on Rolls			Students Out-turn		
			Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Faculty of Agriculture											
Diploma	Diploma in Agriculture	520	[illegible]	281	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
	Diploma in Seed Tech	25	05	18	23	10	[illegible]	41	4	[illegible]	24
	Diploma in Organic Farming	25	06	18	24	13	[illegible]	[illegible]	09	4	23
	Total (Diploma)	570	209	317	526	426	645	1071	178	204	382
UG	B.Sc. (Ag.)	560	300	424	726	1190	1594	2784	318	325	643
PG	M.Sc. (Ag.)	119	39	95	135	92	177	254	70	85	155
	M.Sc. (ADM)	16	08	03	11	19	12	31	08	04	12
	Total (PG)	135	47	102	149	111	189	300	78	89	167
Doctorate	Ph.D. (Ag.)	37	24	26	50	64	79	143	15	25	40
Sub Total (Agriculture)		1302	581	869	1413	1791	2507	4298	590	613	1232
Faculty of Agricultural Engineering & Technology											
Diploma	Diploma in Ag. Engg.	66	[illegible]	[illegible]	[illegible]	72	[illegible]	[illegible]	37	37	34
UG	B.Tech (Ag. Engg.)	110	66	45	[illegible]	[illegible]	184	[illegible]	65	45	[illegible]
	B.Tech (Food Sci. & Tech.)	70	47	53	100	[illegible]	18	[illegible]	47	56	[illegible]
	Total (UG)	180	113	99	212	412	365	777	112	124	236
PG	M.Tech (Ag. Engg.)	13	09	08	17	15	3	[illegible]	06	3	2
Doctorate	Ph.D. (Ag. Engg.)	04	02	[illegible]	05	17	04	22	03	07	10
Sub Total (Agril. Engg.)		257	143	159	284	517	474	992	148	173	321
Faculty of Home Science											
UG	B.Sc. (Community Science)	83	-	[illegible]	[illegible]	-	[illegible]	[illegible]	-	[illegible]	[illegible]
PG	M.Sc. (Home Science)	12	-	15	13	-	3	13	-	0	10
Doctorate	Ph.D. (Home Science)	02		03	03		03	03			
Sub Total (Home Science)		97		101	101		285	285		45	45
Total (Diploma)		630	230	346	576	498	735	1233	205	231	436
Total (UG)		823	300	424	723	1602	2228	3830	430	484	914
Total (PG)		160	47	102	149	127	217	344	84	114	198
Total (Ph.D.)		13	24	26	50	81	86	167	18	32	50
GRAND TOTAL		1656	602	898	1500	2308	3266	5571	737	861	1598

Note: 1. ICAR and other States – 25% of seats in M.Sc. through All India Entrance Examination conducted by ICAR
2. Foreigners / ICAR Employees – 10% in M.Sc. / Ph.D. Courses

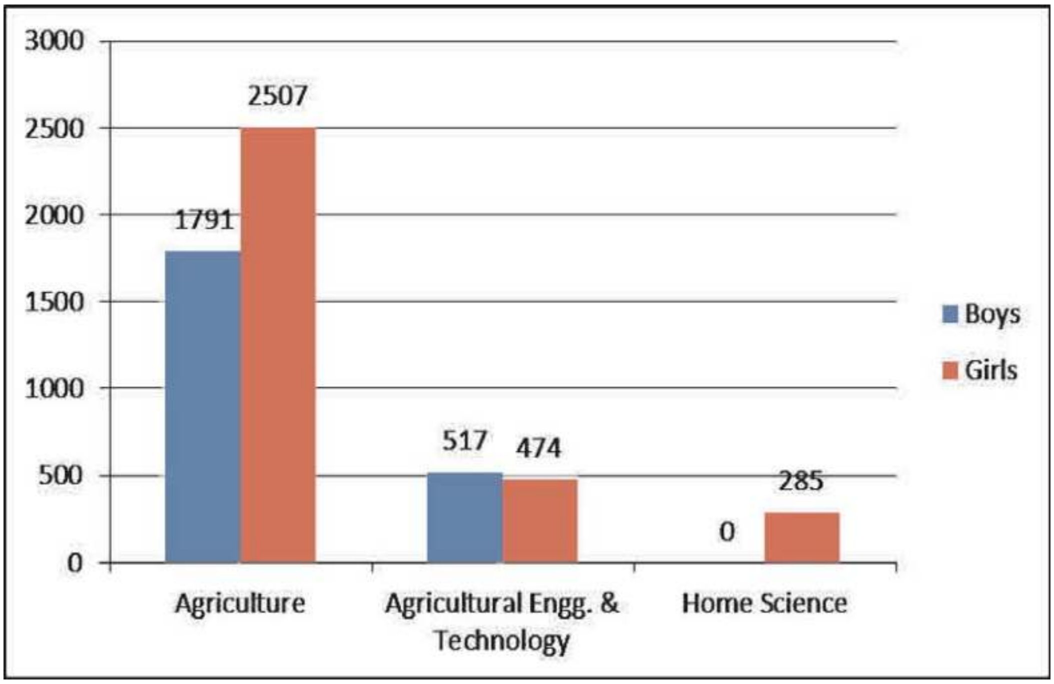

Fig. 3: Faculty-wise Students on Rolls

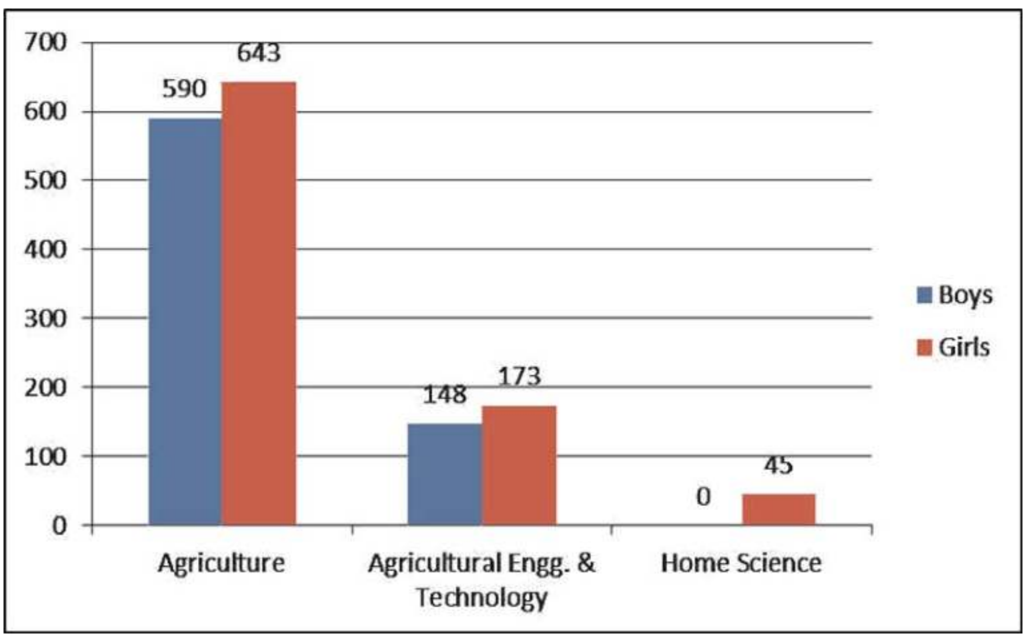

Fig. 4: Faculty-wise Students Passed

A total number of 1599 students comprising of 1233 in Agriculture, 321 in Agricultural Engineering & Technology and 45 in Community science faculties have passed out of the different portals of the University during the academic year 2018-'19.

In the Faculty of Agriculture, 643 undergraduates, 167 post graduates and 40 at doctoral level have passed. In addition, 335 students obtained their diploma in Agriculture, 23 in Organic farming and 24 students got diploma in Seed Technology.

Two hundred thirty six undergraduate, 21 postgraduate, 10 doctoral and 54 diploma students passed out in the Faculty of Agricultural Engineering and Technology. Thirty five under graduates and 10 post graduates obtained their degree in faculty of Community Science.

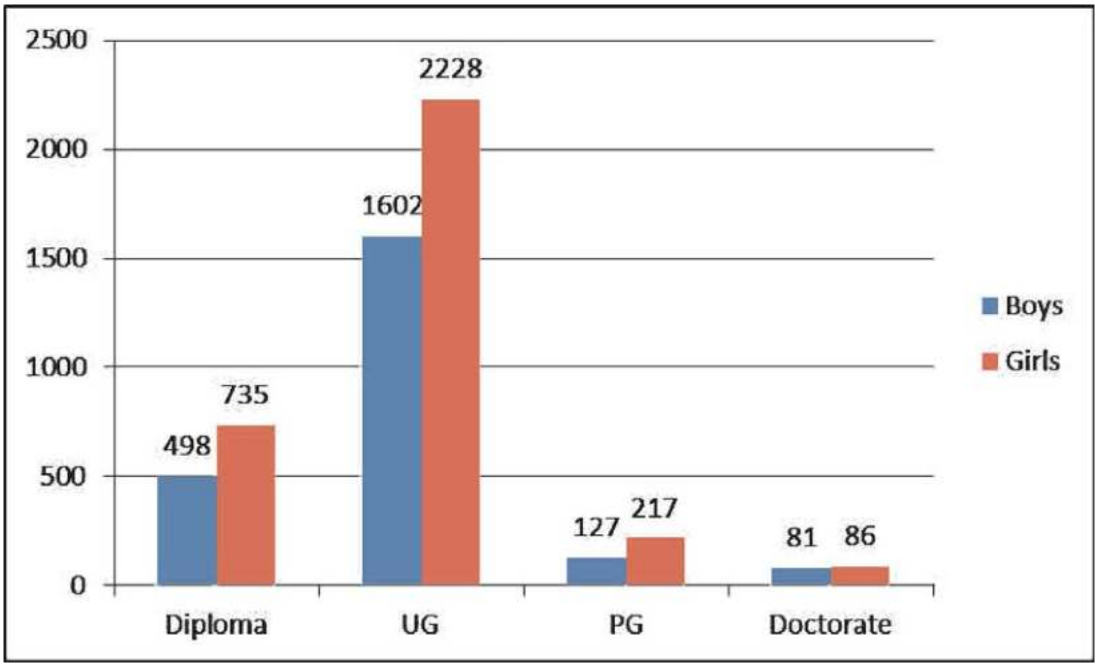

Fig. 5: Programme-wise Students on Rolls

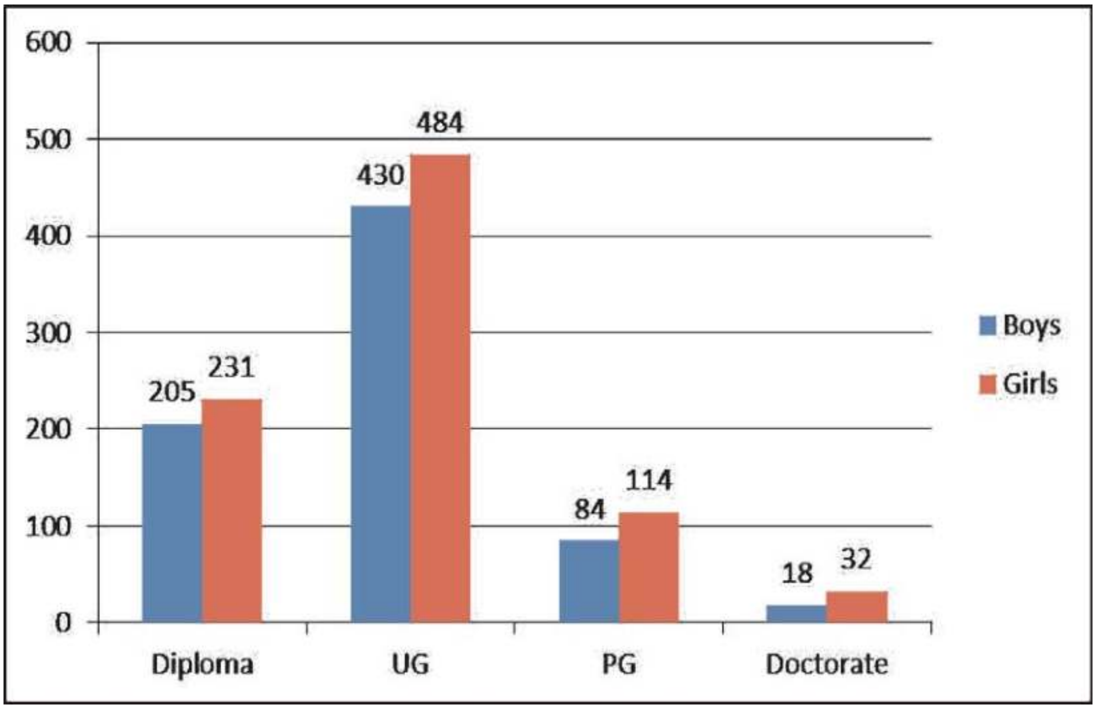

Fig. 6: Programme-wise Students Passed

3. Academic Excellence

Ninety three students of different colleges of ANGRAU qualified in ICAR- JRF/ SRF and GATE examinations. While 124 students obtained different fellowships, awards and medals during 2018-'19 as detailed below

S.No.	Name of the College	No. of ranks secured				
		ICAR-JRF	ICAR-SRF	GATE	Others	TOTAL
1	Agricultural College, Bapatla	09	04	-	-	13
2	S.V. Agril. College, Tirupati	13	02	-	-	15
3	Agril. College, Naira	02	01	-	CAT at IIBM, Bikaner -01	04
4	Agril. College, Rajamahendravaram	-	-	-	NAARM, ABM IRMA,ABM-02	02
5	College of Agril. Engg., Bapatla	-	-	13	CAT – 07 C MAT – 06 MAT – 01 IBSAT - 01	28
6	College of Agril. Engg., Madakasira	05	-	08	-	13
7	College of Food Science and Tech., Bapatla	-	-	05	-	05
8	College of Food Science and Tech., Pulivendula	-	-	01	APPGECET – 07 CAT - 01	09
9	College of Community Science, Guntur	02	-	-	-	02

4. Academic Initiatives

(i). B.Sc. (Ag.) - Rural Agricultural Work Experience Programme (RAWEP)

As a part of the regular curriculum, the final year B.Sc. (Ag.) students were placed in rural areas for one semester during *kharif* season, where each student was attached to one host farmer for practical learning with regard to crop production, crop protection, rural economics and also the dynamics of rural society.

Students' participation in RAWEP

(ii). B.Sc. (Ag.) - Agricultural Experiential Learning Programme (AELP)

As a part of the regular curriculum, the final year B.Sc. (Ag.) students, after the completion of RAWEP were placed in different areas of entrepreneurship, for one semester, wherein each student was attached to any one of the experiential learning units.






Students' participation in AELP

(iii). B.Tech. (Ag. Engg.) - In-plant Training

The final year students of B.Tech. (Ag. Engg.), Bapatla and Madakasira campuses were sent to different firms for practical learning.

(iv). B. Tech. (Food Sci. & Tech.) - In-Plant Training

The students of B. Tech. (Food Science & Technology) underwent In-plant Training at different Food Processing Companies all over India.

(v). B.Sc. - (Hons.) Community Science. - Rural Home Science Work Experience Programme (RHWEP)

Each student of the final year B. H. Sc. of College of Home Science, Guntur was attached to 6-8 households to teach rural women, youth and children in the identified areas of Home Science.

Students participation in "In-Plant Training"

(vi). B.Sc.(Hons.) Community Science - Experiential Learning Programme (ELP)

In Community Science, the Departments of Foods and Nutrition, Apparel and Textiles and Resource Management and Consumer Sciences have provided in-depth managerial and entrepreneurial skills to the students in the production, marketing and management through Experiential Learning Program in the areas viz., Tie and dye and Block Printing, Designing and Development of Multimedia products, Institutional canteen, Developmental assessment of children, Development of Teaching and Learning material for early childhood education centres and Interior Design Solutions etc.

The details of number of students, who attended the RAWEP / In-Plant Trainings/ RHWE programmes during the year are given in Table 4.

Table 4. Details of RAWE / In-Plant Training / RHWE Programmes

Name of the College and Degree Programme	No. of Students Attended	No. of Villages / Plants	No. of Host Farmers
Faculty of Agriculture			
Agricultural College, Bapatla	207	31	207
S.V. Agricultural College, Tirupati	126	16	126
Agricultural College, Mahanandi	77	15	77
Agricultural College, Naira	84	17	84
Agricultural College, Rajahmundry	42	08	52
Faculty of Agricultural Engineering & Technology			
College of Agricultural Engineering, Bapatla	69	11	11
College of Agricultural Engineering, Madakasira	32	08	32
College of Food Science & Technology, Bapatla	59	23	59
College of Food Science & Technology, Pulivendula	30	08	30
Faculty of Community Science			
College of Community Science	35	03	175

5. *Scholarships and Stipends*

The students of Acharya N G Ranga Agri. University were provided with large number of scholarships, fellowships and stipends sponsored by various agencies. The details are given in Table 5.

Table 5. Details of Scholarships and Stipends

S.No.	Name of the Scholarship	No. of Students Awarded	Amount in Rs. per Year
1	2	3	4
1	National Merit/ Talent Scholarship	73	27,90,400
2	Government of India Post- Matric Scholarship to Scheduled Castes	133	10,77,356
3	Government of India Post-Matric Scholarship to Scheduled Tribes	45	7,73,649
4	Government of India Post- Inter Merit Scholarship (Dist. Level) to SCs and STs.	26	2,32,325
5	Post Matric Scholarship to BC	90	6,20,187
6	Post Matric Scholarship to EBC	26	2,88,351
7	Minority Post Matric Scholarship	13	1,36,946
8	State Scholarship to Denoted Tribes	35	6,43,857
9	State Scholarship to Listed Backward Class	504	32,03,075
10	State Scholarship to Economically Poor Persons	52	6,33,797
11	Stipend to Post Graduate Students	25	16,00,000
12	Stipend to Ph. D. Students	-	-
13	Stipend to Under Graduate Students from Other States	-	-
14	Stipend to Agril. Officers studying M.Sc. (Ag.) Course	-	-
15	Stipend to VEOs studying B.Sc. (Ag.) Course	-	-
16	Stipend to VDOs studying B.Sc.(Ag.) Course	14	1,96,000
17	Dress and Book Allowance	718	4,28,600
18	Others, if any a) Bayer Fellowship (M.Sc.) (Ag.) b) Bayer Fellowship (Ph.D) (Ag.) c) ANGRAU Stipend	10 - 124	9,84,000 - 70,80,000
19	State Post – Matric Scholarship to BC-E	-	-
20	Inspire Fellowship for Ph.D. Students	01	3,43,999.92
21	Rajiv Gandhi Fellowship for Ph.D. Students	-	-

S.No.	Name of the Scholarship	No. of Students Awarded	Amount in Rs. per Year
22	State scholarship to Scheduled castes	49	6,32,211
23	State scholarship to Scheduled tribes	10	1,59,523
24	State scholarship to Backward castes	91	8,73,327
25	State scholarship to Minority	07	28,588
26	State scholarship to Kapu welfare Department	16	68.736
27	State Scholarship to EBC	42	5,44,976
28	ICAR – JRF Scholarship	06	1,51,680
29	ICAR – SRF Scholarship	39	9,96,000

6. Students Hostels :

The hostel facilities available in the colleges and the number of students accomodated in different hostels in all the campuses of the university are given in Table. 6.

Table 6. Campus-wise Hostel Accommodation

S.No.	Campus	No. of Hostels			No. of Students Accommodated		
		Boys	Girls	Total	Boys	Girls	Total
Faculty of Agriculture							
01	S.V. Agricultural College, Tirupati	04	01	05	366	21	387
02	Agricultural College, Bapatla	05	05	10	392	675	1,067
03	Agricultural College, Mahanandi	02	03	05	179	160	329
04	Agricultural College, Naira	02	02	04	210	120	330
05	Agricultural College, Rajamahendravaram	-	-	-	-	-	-
06	Advanced Post Graduate Centre	-	-	-	-	-	-
07	Institute of Agricultural Business Management	-	-	-	-	-	-
08	Agricultural Polytechnic, Maruteru	01	01	02	87	44	131
09	Agricultural Polytechnic, Anakapalle	01	01	02	37	64	101
10	Agricultural Polytechnic, Podalakur	-	01	01	-	24	24
11	Agricultural Polytechnic, Reddipalli	01	01	02	15	34	49
12	Agricultural Polytechnic, Utukuru	01	01	02	20	22	42
13	Agricultural Polytechnic, Kalikiri	-	01	01	-	36	36
14	Agricultural Polytechnic, Rampachodavaram	-	-	-	-	-	-
15	Agricultural Polytechnic, J.M.Puram	01	01	02	21	27	48
16	Agricultural Polytechnic, Madakasira	01	01	02	18	29	47

S.No.	Campus	No. of Hostels			No. of Students Accommodated		
		Boys	Girls	Total	Boys	Girls	Total
17	Agricultural Polytechnic, Chintapalli	RARS, Staff Quraters			06	06	22
18	Agricultural Polytechnic, Nandyal	RARS. Staff Quraters			19	22	41
19	Agricultural Polytechnic, Somasila	ARS, Staff Quraters			21	24	45
20	Agricultural Polytechnic, Garikapadu	ARS, Staff Quraters			28	41	69
21	Agricultural Polytechnic, Tirupati	Hostels of Ag. college			20	27	47
22	Agricultural Polytechnic,Gantasala	Tribal Welfare Department			25	46	71
23	Agricultural Polytechnic, Ramagiri	Boys at Sarvasuksha Abhiyan and girls at Dist. Sports Authority pavilion			23	19	42
24	Agricultural Polytechnic, (SST) J M Puram	Hostels of APT			19	22	41
25	Agricultural Polytechnic, (Org.F'ing) Chintapalle	RARS Staff quarters			07	16	23
Faculty of Agricultural Engineering & Technology							
26	College of Agricultural Engineering, Bapatla	01	01	02	136	122	258
27	College of Agricultural Engineering, Madakasira	01	01	02	83	53	136
28	College of Food Science & Tech., Bapatla	01	01	02	53	104	157
29	College of Food Science & Tech., Pulivendula	01	01	02	31	44	75
30	Polytechnic of Agricultural Engg. Kalikiri	-	01	01	-	39	39
31	Polytechnic of Agricultural Engg. Anakapalle	Farmers guest house RARS staff quarters			28	42	70
Faculty of Community Science							
32	College of Community Science, Guntur	-	-	-	-	-	-

B. RESEARCH PROJECTS OPERATED IN THE COLLEGES

The details of Research Projects operated at the Colleges during the year are given below.

1. Agricultural College, Bapatla

a. One ad-hoc project i.e., Breeder Seed Production in groundnut with an outlay of Rs.62.45 Lakhs was sanctioned by ICAR, New Delhi and under operation.

2. S.V. Agricultural College, Tirupathi

b. ICAR-NASF project i.e., Effective delivery of nutrients, insecticides & fungicides using nanoparticulates and its effect on growth and duptake in groundnut and chillies with an outlay of 111.34 lakhs for the year 2018-'20.

c. Project on causes and consequences of e-National Agriculture Market on the South Indian Agriculture

C. STUDENTS' RESEARCH

1. Agricultural College, Bapatla

Department of Agronomy

Studies on agronomic interventions for enhancing productivity of mustard in rice-fallows indicated that, PM-28 variety performed better than the remaining two varieties with good growth, yield attributes and higher yield, gross return, net return and return per rupee invested. Adoption of seed rate @ 12 Kg ha^{-1} was on par with 10 kg seed rate ha^{-1} in rice fallows. It was concluded that a seed rate of 10 Kg ha^{-1} was found optimum in rice fallows.

Under crop weather relationship studies in *rabi* sorghum, among the dates of sowing, second fortnight of September sowing recorded higher growth and yield of sorghum. Among the hybrids tested, Mahalakshmi recorded more growth and high yield and it was superior to CSH-25 and CSH-14. Higher values of all weather health indices viz., GDD, HTU, PTU, HUE, HtUE, PtUE, PTI and TPR were recorded with september second fortnight sowing. Step down regression for three Sorghum hybrids revealed that the minimum temperature, relative humidity and rainfall have significant effect on yield of sorghum hybrids. The correlation studies were found to be significant at 0.05% and 0.01% level of significance.

In studies on growth and yield of different castor hybrids at varying nitrogen levels, among the three hybrids tested, PCH-111 and GCH-4 recorded higher drymatter accumulation, yield attributes and castor bean yield compared to Western Maruthi. Application of nitrogen @ 120 kg N ha^{-1} resulted in maximum drymatter accumulation, yield attributes and castor bean yield. However, it was on par with 100 kg N ha^{-1}.

Evaluation of post-emergence herbicides in transplanted ragi revealed that lower weed density, weed drymatter accumulation and high weed control efficiency was obtained with application of ethoxysulfuron @18.75 g a.i.ha^{-1} and high grain yield and was on par with hand weeding @ 15,30 DAT and Oxadiargyl @ 80 g a.i.ha^{-1}. Among the herbicides studied, application of topramezone @ 20 g a.i.ha^{-1} and tembotrione @ 100 a.i.ha^{-1} resulted in complete crop stand loss showing that it was non selective to ragi.

In-situ rain water conservation practices like opening furrows in between rows helped in conserving the soil moisture and increased the rainfed bt cotton yield. Superior seed cotton yield and net returns were recorded with 125% RDF (150:75:75) with opening furrow for every row during last intercultural operation + foliar nutrition with 2% KNO_3 at square formation, flowering, and boll development stages or 125% RDF (150:75:75) + foliar nutrition with 2% KNO_3 at square formation, flowering, and boll development stages or 100% RDF (120:60:60)+ opening furrow for every row during last intercultural operation + foliar nutrition with 2% KNO_3 at square formation, flowering and boll development.

In nutrient management studies in sweet corn, application of 40 kg P_2O_5 ha^{-1} resulted in improved growth, fresh green matter and drymatter yield in the preceding sunnhemp green manure crop that added higher organic matter for the succeeding sweet corn crop and also increased the yield. Application of 20 kg N ha^{-1} to sweet corn as a succeeding crop to sunnhemp green manure was found optimum.

Hybrid pigeonpea response to planting geometry and nitrogen levels showed that, higher seed yield of pigeonpea hybrid ICPH-3762 was registered with adoption of closure plant geometry of 180 cm * 20 cm, irrespective of nitrogen application. Application of nitrogen at 60 kg ha^{-1} resulted in maximum seed yield, irrespective of planting geometry. However, optimum nitrogen level i.e., N @ 40 kg ha^{-1} is sufficient for achieving higher seed yield and better economic viability when sown at 180 cm * 20 cm

Integrated Nutrient Management in Pearlmillet *Pennisetum glaucum* indicated that application of poultry manure @ 1.25 t ha^{-1} + 50% RDN + *Azotobacter* and FYM @ 10 t ha^{-1} + 50% RDN + *Azotobacter* were found as suitable practices for realizing higher yield of pearl millet. Highest gross and net returns and returns per rupee investment were recorded with application of 50% RDN + 1.25 t ha^{-1} PM + *Azotobacter* in Krishna zone of Andhra Pradesh.

Application of 150% RDN (135 kg N ha^{-1}) was found optimum for realizing higher grain yield (5.60 t ha^{-1}) in medium duration rice varieties.The medium duration rice variety MTU-1153 performed better over other varieties by recording good yield besides economic returns

Results of efficacy of new post emergence herbicides in *rabi* maize revealed that application of post emergence herbicides tembotrione@ 100 g a.i.ha-1, topramizone @25 g a.i.$ha^{-1}$and nicosulfuron @ 700 ml ha^{-1} resulted in significant reduction of total weed density and weed dry weight as compared to weedy check and were comparable with hand weeded control. Higher weed control efficiency (84.85) and low weed index (5.30) was recorded with tembotrione @100 g a.i.ha^{-1} indicates broad spectrum of weed control in maize.

Studies on Crop Geometry and Nipping effects on Castor indicated that among different plant geometries, sowing castor at 60 cm * 30 cm gave highest yield. Maintaining two spikes in castor offer higher yields compared to maintaining single spike. Planting geometry of 60 cm * 30 cm with two spikes registered higher gross returns, net returns and returns per rupee investment.

Growth, yield attributing characters, quality parameters and yield of sesame crop were higher at a spacing of 30 cm * 10 cm under planting density and inm intervention studies in Sesame. Application of 25% RDF along with 5 t FYM ha^{-1}, 0.75 t PM ha^{-1} and 1.3 t sunnhemp green manuring exhibited maximum growth and quality parameters. Based on economic analysis, the highest gross returns, net reruns and B:C ratio were obtained with application of 25% RDF + 5 t FYM ha^{-1}, 0.75 t PM ha^{-1} and 1.3 t sunnhemp green manuring.

Phosphorus management through green manuring along with phosphate solubiliging bacteria (PSB) showed a significant response on growth and yield of rice. Application of green manuring + PSB with 50% RDP to rice and 50% RDP to succeeding sorghum was found to be optimum in terms of bio availability of phosphorus in soil and its accumulation in above ground bio mass of rice and sorghum. Residual effect of sources and levels of phosphorus can reduce the fertility requirement of rice – sorghum sequence there by saving 50% RDP in rice and 50% RDP in sorghum without compromising yield of both rice and sorghum.

Effect of Green Manuring and phosphorus levels in Rice - Blackgram Cropping Sequence revealed that green manure (Dhaincha) incorporation with 75 kg P_2O_5 ha^{-1} was more effective in realizing higher grain yield of rice, availability of nutrients and monetary benefits which were closely followed by green manure (Dhaincha) incorporation with 60 kg P_2O_5 ha^{-1}. Application of 100% RDP to blackgram crop during rabi is also essential for realizing higher seed yield and haulm yield of blackgram crop for obtaining optimum profits and soil fertility maintenance of both the crops involved in the system, 50% RDP may be sufficient for rice-blackgram sequence.

Phosphorus management in Rice- Groundnut Sequence revealed that, *in-situ* green manuring along with PSB application and *in-situ* green manuring alone in conjuction with inorganic fertilizer to rice in rice-groundnut sequence has significantly influenced the growth parameters, yield attributes and yield of rice as compared to inorganic fertilizer alone. Residual effect of *in-situ* green manure + PSB and 100 % RDP to preceding rice crop, was effective in increasing the succeeding groundnut pod yield and further, groundnut crop needs 50 % RDP for realizing higher yields. The higher net returns and returns per rupee investment were obtained with in-situgreenmanure + PSB, followed by in-situ green manure alone among phosphorous sources during kharif rice crop and higher net returns and returns per rupee investment were obtained with 50 % P level during *rabi* groundnut crop.

Department of Entomology

In studies on relative abundance of stem borer species infesting rice and management of rice yellow stem borer, *Scirpophaga incertulas* (Walker) (Crambidae: Lepidoptera), among 215 rice accessions screened, seven entries (IC No. 381538, 450535, 463380, 464140, 464186, 574807 and 578388) were promising with moderate resistance/ resistance to yellow stem borer both in terms of per cent dead-hearts and white ears. The promising rice genotypes were composed with low sugars, low free amino acids and high total phenols, proteins, proline and silica contents compared to susceptible checks.

Among different cultivation methods of rice (BPT 5204) *viz.,* normal transplantation, system of rice intensification (SRI), dry direct sowing, wet direct sowing and drum seeding during *kharif,* 2017 revealed the lowest mean per cent leaf damage by leaf folder was recorded in dry direct sowing (5.30%) and drum seeding (5.33%) methods and the highest (7.76%) in normal transplantation.

A field experiment was conducted in semi-dry system of rice and transplanted system of rice to observe the incidence of brown plant hopper, white backed plant hopper and their natural enemies. The results indicated that peak incidence of BPH was observed during 43rd SMW. The correlation between BPH population and sunshine hours showed significant positive correlation while minimum temperature and evening relative humidity showed significant negative correlation in both semidry system and in transplanted system of rice. The incidence of WBPH population was observed from 35th SMW and continued up to 40th SMW. The peak incidence of WBPH was observed during 39th SMW. During maturity stage of rice, the highest incidence of BPH population (22.40 hill^{-1}) was observed in RSDS + higher nitrogen and lowest BPH population (9.36 hill^{-1}) was observed in RSDS.

Studies on field screening of sorghum genotypes against shoot fly & stem borer and their management with aqueous organic extracts showed that, among the 30 evaluated genotypes, five, viz., IS 2205, I 33, IS 18551, Mahalakshmi and R-68 were found to be highly resistant. Ten genotypes *viz.,* ICSR 172, 4019, ICSR 96, NJ 2647, R-149, 73902-4-2-1, 73904-2-1, 81-52-4, 73902-4-1-2 and R- 91019 were found to be resistant. Thirteen genotypes 73902-2-1, 73902-8-2-2, NJ 2496, ICSR 98, 73904-1-1, 4109, 73911-3-2-30, 81-1-1, 73902-2-7, R-75, R-29, R-49, 73902-1-2-1 were identified as moderately resistant and the genotypes R-91014 and 4993 were found to be susceptible to shoot fly infestation in trems of dead hearts. The glossy, late flowering, medium plant height genotype ICSR 98 showed multiple resistance against shoot fly and stem borer which recorded moderate grain (1.76 t ha^{-1}) and fodder yields (4.35 t ha^{-1}).The highest grain yield recorded in genotypes 81-1-1 (3.52 t ha^{-1}) followed by 73902-4-1-2 (3.15 t ha^{-1}), 81-52-4 (2.87 t ha^{-1}) and R 29 (2.13 t ha^{-1}). Among the aqueous organic extracts, NSKE @ 5% recorded the highest yield of 1.67 t ha^{-1} with an increase of 81.81% yield over control and at par with chlorantraniliprole (1.86 t ha^{-1}).

Study was conducted on the influence of biotin binding proteins, avidin and streptavidin on the lethality and growth & development of

Callosobruchus maculatus Fabricius, *Tribolium castaneum* Herbst and *Corcyra cephalonica* Stainton and also on the grain/flour damage. Avidin at 5, 15, 30, 75 and 100 ppm; streptavidin 5, 20, 30, 75 and 100 ppm, spinosad 70 and 250 ppm against *C. maculatus* by pellet feeding method showed that the number of eggs laid were minimum (6 eggs) for four pellets treated with spinosad 250 ppm and streptavidin 100 ppm, followed by streptavidin 75 ppm (7.67 eggs), avidin 100 ppm (9.33 eggs), avidin 75 ppm (9.67 eggs) against 26 eggs in untreated control. The day of first adult emergence and development period was highly prolonged in avidin 100 ppm (81.33 days with one adult emergence) and streptavidin 75 (66th and 82.67 days) and 100 ppm (76 days with one adult emergence) against the untreated control with 36th day of first adult emergence and 55.33 days development period.

A total of 25 blackgram genotypes including six checks, were evaluated for their reaction against major insect pests *viz.,* whiteflies, thrips and spotted pod borer during *kharif* and *rabi*. Among them eleven genotypes (KU-17-114, KU-17-110, KU-17-113, KU-17-117, KU-17-118, KU-17-119, KU-17-120, KU-17-130, KU-17-134, KU-17-135 and PU 31) were grouped as less preferred genotypes, four genotypes (KU-17-123, KU-17-124, KU-17-127 and LBG 752) were moderately preferred genotypes whereas, the genotypes KU-17-111, KU-17-116, KU-17-121, KU-17-122, KU-17-128, KU-17-133, LBG 20, LBG 648, LBG 709 and LBG 933 were grouped as very highly preferred by whiteflies. The lowest population of thrips was recorded in KU-17-133. Based on the per cent pod damage the genotypes, KU-17-114, KU-17-130 and KU-17-134 were found resistant to spotted pod borer damage. Spinosad 45 SC recorded highest yield over other treatments as it recorded highest per cent reduction of whitefly, thrips and spotted pod borer. The incremental cost benefit ratio recorded was maximum in the treatment spinosad 45 SC (2.72). Among the indigenous products, NSKE 5% recorded highest yield (624.03 kg/ha) with an incremental cost benefit ratio of 1.35.

Field screening of groundnut genotypes against leaf miner, *Aproaerema modicella* Deventer and its management with insecticides revealed that groundnut leaf miner started from 33rd SW (6.8 plant^{-1}) to 42nd SW (5.6 plant^{-1}) and the peak infestation of leaf miner was noticed at 36th SW (15.2 plant^{-1}), whereas, during *rabi*, the incidence was observed from 51st SW (0.3. plant^{-1}) to 8th SW (0.4 plant^{-1}) and the peak infestation was noticed at 3rd SW (8.3 plant^{-1}). Newer insecticidal combination product, *viz.,* spirotetramat + imidacloprid 150 OD @ 1 ml l^{-1} was found significantly effective against leaf miner with 84.18% larval mortality with highest pod and fodder yield of 2.15 and 2.66 t ha^{-1} respectively, followed by flubendiamide and cyantraniliprole. quinolphos was found to be least effective against leaf miner with less mortality.

Department of Genetics & Plant Breeding

Phenotypic evaluation and marker-trait associations (MTAs) in a subset of 395 indica MAGIC linPhenotypic evaluation and marker-trait associations (MTAs) in a subset of 395 indica MAGIC lines along with the identification of QTLs for yield and yield component traits indicated that, all the genotypes showed significant differences for all the characters.High heritability and high genetic advance was exhibited by number of panicles per plant, number of grains per panicle, 1000-grain weight (g) and grain yield per plant (g).High heritability and moderate genetic advance was exhibited by plant height at maturity (cm) and panicle length (cm) whereas days to 50% flowering exhibited low heritability and low genetic advance. WAS through TASSEL revealed 3,55,85,956 of nucleotides in the DNA of indica MAGIC lines of rice. Six QTLs for days to 50% flowering, four QTLs for plant height at maturity, three QTLs for number of panicles per plant, four QTLs for number of grains per panicle, three QTLs for panicle length, four QTLs for 1000-grain weight and two QTLs for grain yield per plant were identified.

In studies on hybrid vigour and inbreeding depression in CMS based Pigeonpea (*Cajanus cajan* (L.) among the parents, the lines ICPB 2047 and ICPB 2048, the testers ICPL 87119 and ICPL 20108 and among the hybrids, ICPH 3481, ICPH 2363 and ICPH 3496 showed high mean performance for pods per plant and seed yield per plant indicating the role of additive genes in governing the inheritance of these traits. The magnitude of heterosis was high for plant height, primary branches, pod clusters per plant and seed yield per plant whereas, for pod length, pod width, seeds per pod and test weight it was very low. The hybrids ICPH 3481, ICPH 4503, ICPH 2438, ICPH 3496 and ICPH 2363 exhibited significant heterosis in desirable directions for seed yield over standard check and most of the traits. Inbreeding depression for days to 50% flowering, maturity, pods per plant, seeds per pod and seed yield per plant showed less significant difference. 9 out of 16 hybrids exhibited significant inbreeding depression for primary branches.

Evaluation of cotton hybrids for yield, yield contributing characters and quality traits (*Gossypium hirsutum* L.) revealed that among 62 genotypes (42 F1's + 17 parents), the analysis of variance showed significant differences for all the characters studied indicating high degree of variability in the material. High heritability coupled with high genetic advance as per cent of mean was observed for number of bolls per plant, boll weight seed index, lint index, lint yield and seed cotton yield per plant. The character association and path analysis revealed that plant height, number of sympodia per plant, number of bolls per plant, boll weight, seed index, micronaire value and lint yield were found to have significant positive association with seed cotton yield per plant both at phenotypic and genotypic levels indicating their importance in direct selection.The estimates of GCA and SCA variances revealed the predominance of non-additive gene action in the inheritance of days to 50% flowering, number of monopodia per plant, number of sympodia per plant, boll weight, ginning outturn, seed index, lint index, 2.5% span length, micronaire value and bundle strength. The GCA effects of the parents revealed that none of the parent recorded significant gca effects for all the characters.

The analysis of variance revealed significant differences among the 20 rice genotypes (15 hybrids and 5 checks) for all the 15 characters studied indicating the presence of sufficient genetic variability. The genetic parameters revealed that moderate to high variability and high heritability coupled with high genetic advance as per cent of mean were for grain yield per plant (g), number of total grains per panicle and water uptake suggesting the predominance of additive type of gene action. The correlation studies revealed that the traits, plant height and number of total grains per panicle had significant positive association with grain yield at both phenotypic and genotypic levels. Path coefficient analysis revealed that the characters viz., days to maturity, number of productive tillers per plant, number of total grains per panicle, milling percentage, water uptake and kernel elongation ratio showed positive direct effect and positive correlation with grain yield per plant. Similarly, head rice recovery percentage and L/B ratio showed negative effect and negative correlation with grain yield per plant.

Genetic studies on yield and quality attributes in grain sorghum (*Sorghum bicolor* L.)" was carried on 50 genotypes for 13 yield and quality characters. Analysis of variance indicated the existence of significant differences among the genotypes for all the characters. The result of genetic parameters revealed that moderate to high PCV, GCV, high heritability coupled with high genetic advance was observed for all the characters studied except total carbohydrate content, suggesting the predominance of additive type of gene action. Correlation and path revealed that characters *viz.,* panicle length, 1000-seed weight, protein content, fat content, crude fibre content and water absorption capacity had high heritability and positive correlation with yield. The quality characters *viz.,* total carbohydrate content, total phenol content, total antioxidant activity and free amino acid content had negative association with grain yield. Both analysis and Ward's method grouped the 50 sorghum genotypes into eight clusters indicates the presence of considerable genetic divergence among the 50 genotypes studied. Principal component analysis identified four principal components (PCs), which contributed 73.76% of cumulative variance.

Genetic diversity and combining ability studies in rice (*Oryza sativa* L.) conducted on 37 genotypes indicated among the 18 clusters, cluster I was the largest comprising of 14 genotypes representing collections from different centres of the country. Maximum intra-cluster D^2 value was recorded for cluster XVIII. Further, highest inter-cluster distance was noticed between cluster XVI and XVII, indicating genotypes from these clusters were highly divergent meriting their consideration in selection of parents from these clusters for hybridization. Milling percentage was noticed to contribute maximum, followed by days to 50 per cent flowering, number of grains panicle^{-1}, 1000-Seed weight and head rice recovery percentage.

The investigation on genetic divergence and association analysis of yield and quality characters in sugarcane (*Saccharum officinarum*L.)' in twenty five sugarcane genotypes for sixteen characters, the D^2 analysis grouped 25 genotypes of sugarcane under study into six clusters with maximum number of fifteen genotypes in cluster I followed by cluster VI with four genotypes, cluster II with three genotypes and cluster III, cluster IV and cluster V each comprising single genotype. The character juice sucrose per cent at 300 DAP showed maximum contribution towards genetic divergence followed by fibre per cent at 300 DAP, brix per cent at 300 DAP and single cane weight at harvest. Based on good per se performance for majority of yield contributing characters and juice quality characters, genotype 93 V 297 from cluster III may be used in hybridization with genotypes 2002 V 48 and 2008 V 257 from cluster VI, genotype 2010 V 32 from cluster II and genotypes 81 V 48, 83 V 15, 91 V 83, 2003 V 46 and 2007 V 127 from cluster I.

The investigation entitled "Development and evaluation of medium duration test cross hybrids in rice *(Oryza sativa L.)*" was on 52 genotypes. In principal component analysis, the cumulative variance of 56.631 % of total variation for eight characters was explained by three principal components of which PC 1, PC 2 and PC 3 contributed 24.478 %, 17.544 % and 14.609 %, respectively with eigen value > 1. In hierarchical cluster analysis (Ward's method) genotypes were grouped into eight clusters based on the genetic divergence studies. Among the 8 clusters, cluster IV was the largest comprising of 13 genotypes (AM 621, CM 302, AM 638, L 564, BM 397, CM 307, SM 8, AM 641, AM 645, BM 390, BM 386, 2615-28-2-2 and CM 313). The analysis of variance (ANOVA) of 135 genotypes (2 lines, 43 testers, 86 hybrids and 4 checks) for yield and yield attributing characters revealed the presence of significant differences among genotypes for all the characters studied. Among the testers AM 620, AM 621, AM 622, BM 382, BM 384, 2615-28-2-2, HR 1-6, HR 1-10, HR 1-11 and SM 13 were observed to be good combiners with high per se performance for grain yield per plant and other yield component characters. Significant and desirable sca effects, in addition to high per se performance was noticed in seven hybrids for yield and yield related components.

In studies on variability for nutritional and biochemical quality parameters in coloured rice genotypes (*Oryza sativa* L.), 26 rice genotypes were evaluated to obtain information on the nature and extent of variability, heritability, genetic advance as per cent of mean, correlation and the magnitude of direct and indirect effects of yield and physicochemical, nutritional and biochemical quality characters on grain yield The analysis of variance revealed significant differences among the genotypes for all characters The results of correlation and path studies revealed that positive direct effects coupled with positive correlation coefficients panicle length, plant height, ear bearing tillers per plant, test weight and fertility %, along with amylose content, protein content, total starch content, total phenol content, total antioxidant activity, flavonoid content, Zn content, Fe content, glycemic index and rapidly digestible starch exhibited positive correlation with grain yield suggesting simultaneous improvement of these traits with grain yield and simple selection of all the above traits would bring improvement to grain yield in rice.

The genetic divergence and character association studies in molakolukulu rice (*Oryza sativa* L.) the analysis of variance revealed significant differences among the 25 genotypes for majority of the characters studied indicating a high degree of variability in the material.The results of D^2 analysis grouped 25 molakolukulu rice genotypes into six clusters. Out of 25 characters studied gel consistency followed by amylose content, kernel elongation ratio, and water uptake contributed maximum towards divergence.Correlation studies at phenotypic level revealed that the traits filled grains per panicle and flag leaf breadth were found to possess significant association in desirable direction with grain yield per plant. Among the quality traits, alkali spreading value exhibited high positive significant association with amylose content. Path analysis revealed that number of filled grains per panicle and flag leaf breadth showed positive significant association and positive direct effect on grain yield per plant. Among the quality traits, alkali spreading value showed positive significant association and positive direct effect on amylose content.

Investigations on heterosis and combining ability in 56 (45F1's+ 10 parents) intra- specific hybrids of american cotton (*Gossypium hirsutum* L.) disclosed that based on overall performance (per se performance, sca effects and standard heterosis) the crosses *viz.*, SCS-1207 × GSHV-177, GSHV-177 × L1231 and SCS-1207 × PBH-13 were found to be promising for seed cotton yield per plant and its components along with few fibre quality traits *viz.,* micronaire value and uniformity ratio.

Divergence studies in Rice Fallow Black gram (*Vigna mungo* (L.)Hepper) have expressed high heritability coupled with high genetic advance in 45 blackgram genotypes for 13 characters was observed for plant height, number of branches per plant, number of clusters per plant, number of pods per plant, seed yield per plant and biological yield per plant. This indicated additive gene action. Genetic divergence studies by using Mahalanobis' D^2 statistics and Wards minimum variance method, 45 genotypes are grouped into 7 clusters. Based upon the divergence studies, crosses may be attempted between the genotypes of cluster IV and cluster VII, cluster VI and VII and cluster I and VII to obtain better recombinants. Out of 12 characters studied, 100 seed weight followed by days to 50 % flowering contributed maximum towards divergence. Days to 50% flowering, plant height, number of branches per plant, number of pods per plant, pod length and biological yield per plant exhibited high positive direct effects on yield and hence simultaneous selection of these characters will ultimately result in improvement of yield in blackgram.

Stability analysis of 26 promising rice genotypes for planting methods showed that the analysis of variance (ANOVA) for planting methods, namely, transplanting, SRI and wet direct seeding methods revealed highly significant differences among the genotypes for all characters studied. The environment + (genotype x environment) interaction was observed to be significant for all the traits studied. The results on environmental indices revealed transplanting method to be most congenial for 1000 seed weight, HRR and L/B ratio, while SRI method was noticed to be conducive for plant height, ear bearing tillers per plant, panicle length, filled grains per panicle, grain yield per plant, hulling and milling per cent, while, wet direct seeding was found to be congenial for early flowering and maturity. stability parameters, namely, mean (X˜), regression coefficient (bi) and deviation from regression coefficient (S˜2di) revealed the genotypes, MTU 1010, MTU 1075, MTU 1121, MTU 1210, MTU 1224, NLR 3042 and NLR 34449 to be high yielding, stable and widely adaptable. The genotypes MTU 1224, MTU 1075, MTU 1210 and MTU 1121 were identified as potential genotypes suitable for cultivation across the planting methods prevalent in the state of Andhra Pradesh.

Heterosis and combining ability studies of ratooning in rice (*Oryza sativa* L.) indicated that the analysis of variance studies in both main crop and ratoon crop revealed high degree of variability in the material High heritability and high genetic advance as per cent of means were observed for total number of tillers per plant, number of grains per panicle, leaf area index at maximum tillering stage, water uptake, gel consistency, alkali spreading value, amylose content and grain yield per plant both in F1 main crop and it's ratoon crop, revealed the role of additive gene action. MTU 1001, MTU 1121 and BPT 3291 as good general combiners for number of vegetative buds and total number of tillers as percentage of main crop tillers. Among the 28 cross combinations, the crosses, MTU 1001 × MTU 1061, MTU 1001 × MTU 1140, MCM 100 × MTU 1064 and MCM 100 × MTU 1140 in F1 main crop; and MTU 1001 × MTU 1140, MCM 100 × MTU 1140 and MTU 1140 × MTU 7029 in F1 ratoon crop expressed high sca effects with high per se performance for grain yield per plant.

In heterosis, combining ability and stability analysis studies for yield and quality traits in hybrid rice (*Oryza sativa* L.) disclosed that the analysis of variance of 77 genotypes (three A lines, 18 R lines, 54 hybrids and two checks) showed significant differences among the lines, testers and hybrids evaluated at different locations for all the characters under study. High heritability coupled with high genetic advance was observed for no. of filled grains per panicle^{-1}, total number of grains panicle^{-1} and test weight suggested the role of additive gene action. None of the lines and testers were found to exhibit significant gca effects for all the characters studied. The line, IR-68897A expressed significant gca effects for grain yield plant^{-1}, test weight (large grain size) and panicle length. The testers NLR 3041 and MTU 1001 recorded significant positive gca effects for grain yield plant^{-1}, total no. of grains panicle^{-1} and no. of filled grains panicle^{-1} and significant negative gca effects for test weight (fine grain) for NLR 3041.

The study was under taken on genetic analysis of yield and yield components and screening of mungbean yellow mosaic virus resistance (MYMV) in Urd bean *Vigna mungo* L. Hepper) on 300 genotypes. High heritability coupled with high GAM was recorded for plant height, number of clusters per plant, numbers of pods per plant, leaf area, SPAD, chlorophyll content and seed yield per plant. This indicates the preponderance of additive gene action. Diversity analysis using Mahalanobis D^2 and PCA resulted in 11 different clusters. The genotypes, P 1070, MBG 207 and TU 94-2 were found to be best for YMV resistance and hence they are used in majority of the crosses. The correlation and path analysis revealed that number of pods per plant, number of clusters per plant, plant height, 100 seed weight, number of seeds per pod and days to maturity had true relationship by establishing significant positive associations and positive direct effects on seed yield per plant. Heterosis is desirable negative direction for days to 50% flowering, days to maturity and MYMV incidence along with positive heterosis for seed yield per plant was recorded in the crosses LBG 20 x P 1070 and LBG 752 x P 1070.

Department of Soil Science & Agricultural Chemistry

Studies on soil health as influenced by different rice fallow cropping systems revealed that improvement in physical, chemical and biological parameters of the soil after harvest of *kharif* rice was higher in 50% recommended dose of nitrogen + 25% N through FYM+ 25% N through neem cake + *Azospirillum* and phosphorus solubilising bacteria @ 2.5 kg ha^{-1} application. Application of Integrated Nutrient Management to preceding rice crop, increased all rabicrop yields by 25-30% when compared to 100% RDF treatment. All the soil properties were significantly improved by the rice - blackgram cropping system irrespective of main treatments. On the other hand, the rice - maize cropping system had given the highest rice grain equivalent yield (RGEY), net monitory returns, benefit cost ratio, production use efficiency, protein equivalent yield (PEY).

Under carbon sequestration and soil health under long term soil fertility management studies in rice – rice cropping system, application of 100% recommended dose of fertilizers in combination with $ZnSO_4$ and FYM @ 5 t ha^{-1} enhanced the SOC content. Application of fertilizer NPK, either alone or in combination with FYM maintained active or slow release pools of Carbon, sequestered Carbon and improved soil quality and productivity. The improvement in chemical and biological parameters of the soil at different growth stages of rice was higher in the treatment involving application of 100 % RDF + $ZnSO_4$ + FYM @ 5 t ha^{-1} followed by 50 % NPK + 50 % N through FYM. So FYM can be used as the alternate source to reduce the inorganic fertilizer application. Application of 100% RDF + $ZnSO_4$ + FYM @ 5 t ha^{-1} is a better option, for sustaining soil quality and crop productivity. The highest enzyme activity was observed with application of 100 % RDF + $ZnSO_4$ + FYM @ 5 t ha^{-1} (*kharif* and *rabi*) during both the years of study and it was significantly superior over other treatments.

Studies on use of exogenous compounds and crop residues for salinity tolerance in maize indicated that the plants were found to exhibit enhanced osmoregulation with foliar sprays in the order KNO_3, proline and humic acid in any combination by maintaining higher proline, total sugars, low Na+/K+ and higher Ca++ /Mg++. Among foliar sprays, KNO_3 was found to have a superior effect followed by proline and least effect was exhibited by humic acid treatment in overall performance of crop. The integrated use of crop residues and inorganic fertilizers resulted in significant improvement of water holding capacity, organic carbon and available nutrients status of soil.

Assessment of ground water quality for irrigation in East Godavri District disclosed that in pre and post-monsoon seasons in all mandals of East Godavari district majority of the underground water samples had pH between 6.5 to 7.5 *i.e.,* nuetral and EC between 0.75 to 2.25 dS m^{-1} *i.e.* high salinity. As per CSSRI classification 62.3, 20.9, 4.1, 1.3, 4.1, 4.1 and 3.2 per cent of water samples in East Godavari district during pre-monsoon season were classified under good, marginally saline, saline, high SAR saline, marginally alkali, alkali and high alkali categories, respectively. Likewise, during the post-monsoon 73.1, 11.7, 1.9, 0.9, 3.5, 5.4 and 3.5 per cent of waters were classified under good, marginally saline, saline, high saline, marginally alkali, alkali and high alkali categories, respectively.

Taxonomic studies on soils of Thotapalli ayacut area of North Coastal Region of Andhra Pradesh showed the overall classification of all the six profiles were up to family level *i.e.,* Profile 1: Fine loamy, mixed, isohyperthermic, Typic Haplustalf; Profile 2: Fine loamy, kaolinitic, isohyperthermic, Typic Haplustults; Profile 3: Fine loamy, mixed, isohyperthermic, Typic Ustochrepts; Profile 4: Clayey, montmorillonitic, isohyperthermic, VerticUstochrepts; Profile 5: Fine loamy, mixed, isohyperthermic, Typic Ustochrepts and Profile 6: Clayey, montmorillonitic, is hyperthermic, Chromic Haplustert.

In the direct sown rice application of zinc and iron either to soil or foliar along with recommended dose of fertilizers resulted in enhanced level of number of grains per panicle, grain and straw yield which were significantly higher than individual applications. Application of $ZnSO_4$ and $FeSO_4$ (soil, foliar application along with recommended dose of fertilizers) significantly increased zinc and iron content in plant parts over 100 percent recommended dose of fertilizer. Application of RDF + $ZnSO_4$ @ 50 kg ha^{-1} + $FeSO_4$ @ 25 kg ha^{-1} through soil recorded significantly higher N, P, K, Zn, Fe, Mn and Cu uptake over application of application of RDF. Application of $ZnSO_4$ and $FeSO_4$ either soil or foliar along with recommended dose of fertilizers significantly increased available zinc and iron content status in soil over 100 per cent RDF.

In integrated nitrogen management studies for enhancing the maize productivity, drymatter, grain yield, stover yield and nutrient uptake of maize were high with application of 100% recommended dose of nitrogen, which was at par with the application of 75% recommended dose of nitrogen + 25% nitrogen through vermicompost. Application of organic sources recorded more biological activity when compared application of only inorganic fertilizers. Application of 75% of recommended dose of nitrogen with 25% N through vermicompost was effective in improving the yield of maize crop and saving 25 % of chemical fertilizers. Application of different levels of nitrogen, vermicompost, FYM and bio fertilizers resulted in significant difference in availability of major nutrients in the harvest soil, whereas non-significant difference was observed in the availability of micro nutrients.

The results of sustaining soil health and productivity of sweet corn through nutrient management indicated that application of 100 per cent N, P and K inorganically recorded maximum yield potential of sweet corn followed by integration of 50 per cent recommended dose of fertilizers along with organic manures (FYM/ liquid biofertilizers/ beejamrutham and jeevamrutham). Integration of 25 per cent recommended dose of fertilizers, N, P and K liquid biofertilizers each @ 1.5 l ha^{-1} and cow based liquid organic manures (beejamrutham and jeevamrutham) recorded highest enzyme and maximum colony forming units of bacteria, fungi and actinomycetes and it was on par with the integration of cow based liquid organic manures.

Response of blackgram to Zinc and Iron fertilization in calcareous soils revealed that the plot receiving 44 mg kg^{-1} zinc sulphate+ foliar spray of ferrous sulphate + zinc sulphate and yhe plot receiving 22 mg kg^{-1} zinc sulphate + foliar spray of ferrous sulphate + zinc sulphate were superior over other treatments in plant height, chlorophyll content, drymatter accumulation, no. of pods per plant, haulm yield and seed yield. The treatmental influence on uptake of all nutrients (N, P, K, S, Zn, Fe, Mn and Cu) by haulm and seed was positive and significant. Seed quality parameters like protein content and bio-availability of zinc and iron were significantly hastened. Zinc and iron fertilization resulted in significant increase of available zinc and sulphur.

Studies on evaluation of source and method of zinc application on growth & yield of maize (*Zea mays* L.) disclosed that the combined methods (seed priming + soil and seed priming + foliar) of zinc application had a significant influence on growth, yield and quality of maize over individual soil and foliar applications. On the other hand, individual seed priming had no significant influence on growth and yield of maize. RDF + seed priming @ 2% $ZnSO_4$ + foliar application of 0.2% $ZnSO_4$ registered significant increase in yield and yield attributes over RDF alone and RDF + seed priming @ 2% $ZnSO_4$. The highest zinc content and nutrient uptake by stover and kernel was obtained with RDF + seed priming @ 2% $ZnSO_4$ + foliar application of 0.2% $ZnSO_4$ which was significantly superior over other treatments. Growing maize with combined seed priming @ 2% $ZnSO_4$ and foliar application of 0.2% zinc sulphate along with recommended dose of fertilizers was found to be more economical with highest Benefit cost ratio of 2.37.

Department of Crop Physiology

Physiological role of silicon nutrition on yield of rice (*Oryza sativa* L.) indicated that. silicon applied either through soil or foliar modes increased the Pn, stomatal conductance, leaf area and SPAD value of rice leaves, and this increase was more with soil application. Among the stages, Pn, stomatal conductance and leaf area were highest in mid-reproductive stage, irrespective of time and form of silicon application. Further silicon application reduced the transpiration rate at all stages, more with soil application.

Effect of micronutrients on physiology of growth, nodulation, nutrient uptake and yield in blackgram (*Vigna mungo* (L.)) showed that, plant height, branch number, leaf area, nodule number, nodule weight, RWC of leaves, drymatter of total plant and organs, CGR, RGR, NAR, Chlorophyll pigments, NPK content & uptake increased more in combination treatments than individual application. Increase in internal CO_2 concentration and decrease in transpiration rate was obtained with all treatments, but stomatal conductance and photosynthetic rate responded positively with combined application. Leghaenmoglobin content, urease activity in leaves and nodules and protein content in seed increased in all micronutrient treatments.

In studies on effect of seed pre - treatment and foliar application of zinc on growth, physiological parameters and yield of mungbean (*Vigna radiata* L.) under water stress disclosed that, as the concentration of zinc increases, growth and yield of mungbean plants were also increased. Among the zinc treatments, foliar spray of zinc @ 500 ppm at 30 DAS is the most effective treatment in increasing all the morphological and physiological traits. Apart from these, it also increased the antioxidant metabolites viz., total chlorophyll and carotenoid contents and antioxidant enzyme *viz.,* superoxide dismutase activity and osmolyte proline accumulation in munbean. It also enhanced the yield and yield attributes. Zinc foliar spray @ 400 ppm at 30 DAS and seed pre – treatment with zinc @ 0.075% before was next best option for improvement of growth and yield attributes.

A field experiment entitled "Studies on senescence and remobilization of nutrients in rice" was carried to study and characterize the leaf and panicle senescence and remobilization of nutrients during senescence. From the results it can be concluded that, the per cent degradation of chlorophyll and antioxidant enzyme activities in six cultivars were more in third leaf than second and flag leaf, which is characterized as sequential mode of leaf senescence; the dry weight and amylase activity in panicle axis of MTU-1010 was low at 28 DAA compared to that of remaining cultivars, which indicates panicle senesced earlier in MTU-1010 compared to that of other cultivars. Remobilization of carbohydrates from culms was found to be greater in MTU-1001 compared to that of other cultivars.

Department of Agricultural Extension

A Study on Ict Tools Usage by the farmers in Anantapur District indicated that majority (73.34%) of farmers had medium level of attitude followed by high attitude (15.00%) and low (11.66%) level of attitude towards ICTs for agriculture which leads to majority (64.16%) of the farmers had medium level of ICT utilization followed by low level of utilization (19.17%) and high (16.67%) level of ICT utilization. The study expressed that, high cost of ICT gadgets like smart phones, computers etc.(I rank) was the major constraint, which was followed by high cost of servicing charges of ICT gadgets (II rank) lack of sufficient skills in usage of ICT tools by rural communities (III rank) lack of uninterrupted power supply (IV rank) lack of servicing centres of ICTs in villages (V rank) were the major problems expressed by the farmers.

A study on Perception of Rural Youth towards Agriculture as an occupation in Srikakulam District depicted that more than one third of (37.50 %) of rural youth had small land holdings, followed by those coming under medium (31.66%) and large (18.34%) categories. Where as, 12.50 per cent belonged to marginal category of land holdings.The major occupation of the rural youths were reported that one fourth (25.00%) of rural youth engaged in Agriculture +Animal husbandry, followed by those coming under Agriculture (22.50%), Agriculture + labour + Animal husbandry (19.18%), Agriculture + labour work (13.33%), Agriculture + Service (13.33%), and Agriculture + business (6.66%) categories. The major constraints encountered by the rural youth were high cost of cultivation, inadequate availability of labor, low returns, pests and diseases problem, inadequate power supply, inadequate and untimely supply of fertilizers, lack of remunerative prices, inadequate irrigation facilities, inadequate training programmes, under employment, adequate and untimely supply of seed, lack of proper guidance and destruction of crops by wild boars.

A study on tenant farmers of *Bt* cotton in Guntur district revealed that little more than one third (35.00%) of the *Bt* cotton tenant farmers leased 1.1 to 2.0 hectares of land, followed by up to 1.0 hectares (28.33%), 2.1 to 3.0 hectares (23.33%), 3.1 to 4.0 hectares (7.50%) and above 4.0 hectares (5.84%), which leads to the majority

(60.80%) of the *Bt* cotton tenant farmers had low annual income from Rs. 12, 307-71, 691, followed by medium annual income of Rs. 71, 692-1, 31, 076 (31.67%) and high annual income of Rs. 1, 31, 077-1, 90, 462 (7.50%). The major constraints faced by the *Bt* cotton tenant farmers were inadequate financial assistance from banks (100.00%) ranked first, followed by non availability of crop insurance for tenant farmers (99.17%) ranked second, high interest rates by private money lenders (90.00%) ranked third, high rents for the lands leased (83.33%) ranked fourth and non-availability of the loan waiver scheme for tenant farmers (80.83%) ranked fifth.

Department of Plant Pathology

Among 55 kharif blackgram genotypes screened for their reaction to Alternaria leaf spot, none of the genotypes was found resistant. eight genotypes were moderately susceptible, three genotypes were susceptible and rest of the genotypes were highly susceptible. Similarly, none of the genotypes was found resistant among twenty five *rabi* blackgram genotypes screened. Only one genotype was moderately susceptible and rest of the genotypes were found highly susceptible. Maximum reduction of disease was recorded with two sprays of trifloxystrobin + tebuconazole @ 0.05% (25.30%) equivalent to 64.94% disease reduction over control followed by two sprays of azoxystrobin @ 0.05% (26.52%) equivalent to 63.24% disease reduction over control . The highest yield (1.10 and 1.12 t ha^{-1}) and B:C ratio (2.32 and 2.36) were obtained with trifloxystrobin + tebuconazole @ 0.05% in both *kharif* (64.20%) and *rabi* (59.41%) 2017-18 respectively, over unsprayed check.

A survey conducted in farmers' and research station fields to assess the occurrence of fungal foliar leaf spot diseases in cotton revealed *Corynespora* leaf spot (0-33%) followed by *Alternaria* (0-17%) and *Bipolaris l*eaf spots (0-4%), *Myrothecium* (0-9%), *Phomopsis* (0-8%), *Macrophomina* (0-5%) and *Bipolaris* leaf spots (0-3%). Leaf spot due to *Phomopsis* was observed in the farmers' field for the first time in Guntur district, Andhra Pradesh. *In vitro* interaction between fungal foliar pathogens of cotton revealed that the fungus *M. roridum* (5.94%) to be least influenced in its mycelial growth when tested with other leaf spot pathogens, followed by *A. alternata* (21.96%) and *C. cassiicola* (25.58%) while, *Bipolaris* sp. (57.52%), *M. phaseolina* (47.02%) and *Phomopsis* sp. (42.24%) were highly inhibited by other fungi tested. In plants inoculated with *A. alternate* + *C. cassiicola* + *M. roridum* there was significant reduction in phenols (0.37 mg g^{-1}), total protein (4.72 mg g^{-1}), and peroxidases (0.21 Ä abs^{-1}min-1g^{-1}) in upper leaves tested and in lower leaves reduction in total proteins (3.24 mg g^{-1}) was observed.

Among six groundnut genotypes assessed, late leaf spot disease, resistant cultivar Kadiri Harithandra had highest leaf thickness (271.55 μm), highest trichome density, higher stomatal frequency and stomatal dimensions on abaxial surface of leaf compared to adaxial surface, lowest number of stomata (103.13 per mm2), lowest stomatal length (22.95 μm) and the lowest width (11.92 μm). In susceptible genotype Narayani, leaf area was highest (3362.50 mm2).Biochemical parameters such as total phenols (2.43 mg/g), peroxidise (1.68 Abs/min/g) and polyphenol oxidase (1.88 Abs/min/g) were higher in resistant genotype Kadiri Harithandra. Correlation studies between severity of late leaf spots and weather parameters during rabi 2017-18 revealed that age of the crop (r = 0.908*) and relative humidity at morning (r = 0.411*) were significant and positively correlated with PDI whereas maximum temperature (r = - 0.385*), minimum temperature (r = - 0.644*) and relative humidity at evening (r = - 0.388*) were significant and negatively correlated with PDI.. Late sowing is more preferred than early sowing to avoid leaf spot in groundnut.

Studies on the role of structural and biochemical defense components against blackgram powdery mildew (*Erysiphe polygoni* d. C.) indicated that significant negative correlation occurred between powdery mildew severity and morphological characters of different genotypes, leaf area of middle leave ('r'= -0.766), leaf thickness of upper ('r'= -0.879), middle ('r'= - 0.907) lower leaves ('r'=-0.881), trichome density on adaxial surface of upper ('r'= -0.889), middle ('r'= - 0.968), lower ('r'= -0.906) and on abaxial surface of upper ('r'= - 0.952), middle ('r'= - 0.899), and epicuticular wax of upper ('r'=-0.943), middle ('r'= - 0.951) and lower ('r'= - 0.976) showed significantly negative correlation with powdery mildew severity, where as stomatal frequency on adaxial surface of upper ('r'= 0.905), middle ('r'= 0.843), lower ('r'= 0.935) and on abaxial surface of upper ('r'= 0.942), middle ('r'= 0.929), lower ('r'= 0.916) leaves were positive correlation with disease severity. Biochemical compounds such as phenols, peroxidase and phenylalanine ammonia lyase were higher in moderately resistant genotype PU-31. Phenol content in inoculated plants was negatively correlated with disease severity.

Mean disease incidence of chickpea root rot caused by *Rhizoctonia bataticola* varied from 1.63 to 5.09 per cent with the lowest and the highest incidence in Sattenapalli mandal of Guntur dt. and Martur mandal of Prakasam dt. Maximum disease severity ratings (8.28, 7.66) were observed in plants grown at temperature of 35OC to 40OC.. The disease incidence increased with decrease in soil moisture and 20% soil moisture was highly congenial for disease development In different in vitro studies, the efficacy of bioagents on mycelial growth of *R. bataticola* revealed that fungal bioagents to be highly effective compared to bacterial bioagents. Out of ten, eight test fungicides i.e., captan, hexaconazole, tebuconazole, carbendazim, propiconazole, pyraclostrobin and mancozeb had inhibited 100 per cent mycelial growth of *R. bataticola*.

Studies on edaphology, epidemiology and management of stem rot of groundnut caused by *Sclerotium rolfsii* sacc. showed that stem rot disease incidence was found to ranging from 2.1 to 15.3% and severity from 2.1 to 15.1%, with the highest mean stem rot incidence (12.0%) and severity (11.7%) in Ananthapuram district and the lowest incidence (4.6%) and severity (4.4%) in Chittoor district. Distinct variation was observed in colony dispersion, colour and sclerotial colour. Sandy soil, sandy + red and sandy + black soils were found conducive for groundnut stem rot development. Moisture holding capacity at 40% and 60% was found optimum for stem rot development. Although stem rot incidence was recorded at pH ranging from 5.0 to 8.0, pH between 5.0 and 6.0 was found to be optimum for stem rot infection in ground nut. *Trichoderma asperellum* isolate showed the maximum inhibition of *S. rolfsii* on PDA. Isolate E among the 11 *Bradyrhizobium* sp isolates was found to have the maximum inhibitory effect on *S. rolfsii* and the best compatibility with *T. asperellum* isolate. Diammonium phosphate, ammonium sulphate, poultry manure, gypsum and neem cake were found to inhibit *S. rolfsii* growth on PDAIn both pot culture and field experiments, treatment involving integration of seed treatment with *T. asperellum* + *Bradyrhizobium* sp, gypsum soil application twice as basal and 30 DAS, poultry manure soil application twice as basal and 45 DAT, neem cake with *T. asperellum* soil application at 45 DAT and spray application of tebuconazole 0.1% twice at 30 and 60 DAS gave the best control with the lowest incidence and severity.

Department of Agricultural Economics

In study on the dynamics of Agricultural Development in Andhra Pradesh, the growth rate during reform period was more compared to pre-reform period. The overall growth rate during the study period was 5.3 per cent for both GSDP and NSDP. The share of agricultural workers in total rural work force increased from 1971 (79.34%) till 1991 (81.37%) and then reduced in 2001 (75.15%) and 2011 (62.36%). The results of the Chow test revealed the presence of structural break. The results of regression analysis by including dummy variables technique for slope parameters - agricultural land, labour and capital regressed on agricultural GSDP, during pre-reform period, the land and agricultural labour factors are significant at one per cent level showing significant influence on agricultural GSDP. The results of regression analysis by including dummy variables technique for slope parameters - agricultural land productivity, labour productivity and capital productivity regressed on agricultural GSDP, during pre-reform period, all of them showed significant effect on agricultural GSDP.

An economic analysis on impact of climate change on pulse crops in Andhra Pradesh expressed that the results of compound growth rate indicated that from 1996-2015, production and yield of redgram, bengalgram, blackgram and greengram were positive and that of the area of red gram and bengalgram were positive whereas, for greengram and blackgram it was negative. The results of instability analysis indicated that the highest instability in area was recorded in redgram and lowest instability in bengalgram. The highest instability in production was recorded in red gram where as for yield it was highest in bengalgram .The lowest instability in production and yield was recorded in blackgram. The study revealed that among the thirteen districts of Andhra Pradesh, Anantapur district was very highly vulnerable and East Godavari district was less vulnerable during period I (1986-1995) and period II (1996-2005), whereas in period III (2006-2015) the Anantapur district was very highly vulnerable and Nellore was less vulnerable. Ricardian regression model for yield of bengalgram, greengram and blackgram indicated that the coefficients of rabi maximum temperature, area, farming experience, extension services were showing a significant influence on yield whereas, in case of redgram, kharif maximum temperature, kharif maximum temperature square, kharif rainfall and kharif rainfall square, area, farming experience and extension services were significantly influencing the yield of redgram. About 36.25 per cent of the farmers perceived decrease in rainfall over the years and more than three-fourth of the farmers, perceived an increase in temperature over the years.. Lack of knowledge and lack of sufficient credit facilities were identified as the major constraints for adaptation of strategies against climate change. Farmers opined that introduction of drought tolerant and heat resistant varieties (73.33 per cent) were the most important intervention required for pulse growing farmers, with provision of adequate and timely institutional credit for crop production.

Results of an economic analysis of farmers' indebtedness in Visakhapatnam district revealed that credit supply by institutional agencies to the total agriculture had increased. The share of commercial banks and co-operative banks had increased, whereas, other banks had decreased. Significance of dummy variable for loan waiver scheme in the analysis of factors responsible for indebtedness of farmers shows that there is significant difference between beneficiaries and non-beneficiaries. The impact of Loan waiver scheme on lending agencies: institution wise showed that over dues of the debt waived borrowers and debt relieved borrowers were higher in commercial banks than co-operative banks. While, in borrowers the overdue was higher in debt relieved borrowers than debt waived borrowers. The major constraints in repayment of debt were adverse climatic conditions, small size of land holdings, rising cost of cultivation, high rate of interest etc.The role of cooperative sector vis-à-vis commercial sector is low. This needs immediate strengthening of co-operative institutions on war-footing. The adverse climatic factor was the major factor in non-repayment of debt, hence, government should take necessary measures to speed-up the compensation mechanism, as all crop loanees are insured.

In economic viability studies of tenant farmers in Srikakulam district, the average cost of cultivation for rice per ha was Rs.58,292, in case of Rice fallow pulses it was Rs.21,333. For Rabi sesamum the cost of cultivation was Rs.29,660. For Maize, the total cost of cultivation was Rs. 59,273. Sesamum and maize were the most profitable crops among them. The major constraints faced by the respondents were LEC fail to serve the purpose of credit, beneficiaries of the Government are the actual owners not the tenant farmers, indebtedness, small size of the holding, timely unavailability of the inputs. For ensuring viability of tenant farmers, creation of job opportunities in rural areas along with suitable policy support for development of livestock sector and other allied activities.

Indebtedness is the major problem prevailing, as LEC cards were not accepted to provide the credit to the tenant farmers. The benefits from the government are not reaching the tenant farmers, so there is a need for providing crop insurance schemes to the tenant farmers also.

Economic analysis of post-harvest losses in Chickpea in Prakasam District showed that total estimated quantity of post harvest losses in Prakasam district was 7.36 lakh quintals (7.35 per cent). Economic loss of post harvest losses in Prakasam district was estimated to be Rs. 441.78 crore. Harvesting losses were maximum because of shattering of the grain caused by delay in the harvesting. The analysis of economic impact of post harvest losses on chickpea farmers revealed that all explanatory variables together were explaining only 44.3 per cent of variation. With the increase in harvesting, threshing and marketing losses, per hectare income decreases. Late harvesting, unavailability of timely labour, improper machine condition, timely unavailability of machines, unfavourable weather at the time of drying and unavailability of right floor for drying are the major constraints faced by farmers in minimizing post harvest losses. Educating and training the farmers on post-harvest operations would greatly help in reducing the post-harvest losses in pulses. Harvesting machinery may be made available at subsidized prices to the farmers so as to facilitate timely harvesting of crop.

Among the different variable costs the cost of human labour was the major cost component with an amount of Rs. 17,950 per hectare accounting for 24.03 per cent of total cost component on pooled farmers. Gross income exhibited a direct relationship with the farm size and it was of the order of Rs. 85,120, Rs. 95,900, Rs. 1,01,388.7 and Rs. 94,080 on small, medium, large and pooled farmers respectively. The analysis of relationship between MSP, wholesale price and farm harvest price showed a positive relation, with significant regression coefficients and a high value of R2. The farmers expected prices were found to be higher than the previous year MSP. However, the increase in expectation has been narrowing down over time. The major constraints faced by farmers in production were marginal size of holding leading to lesser production with a mean score of 64.18, lack of drainage facilities (61.24).

A Study on performance of Farmer Producer Organizations in Krishna district revealed that the performance of FPOs increased with the increase in the efficiency of FPO by 12 per cent. Market share which was a measure of profitability showed that the profitability of FPOs increased by 42 per cent, Equity to assets ratio (EAR) was 147 which showed that the FPOs were having strong equity base to sustain their business and improve their performance. The various suggestions given for improving the functioning of FPOs are awareness among the people should be built up with the help of scientists, Government has to provide financial support, credit and input provision to farmers, providing storage facilities, business done on commission basis and reducing the transportation cost.

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Agronomy

In zinc and iron fortification studies, the productivity and quality of sweet corn was increased with foliar application of 0.5% $ZnSO_4$ + 0.2% $FeSO_4$ at booting and silking along with RDF (N P_2O_5 and K_2O 180:60:50 kg ha^{-1}).

Among the organic weed management practices tried, the lowest density and dry weight of all categories of weeds with higher weed control efficiency were recorded in paddy straw mulch 5 t ha^{-1} applied plots followed by sunflower water extract spray 15 l ha^{-1} twice at 15 and 30 DAS. The same organic weed management practices recorded the highest stature of growth and yield parameters including pod yield of groundnut.

Integrated Nutrient Management studies indicated that combined application of 75% RDF + PM (Poultry Manure) @ 2 t ha^{-1} + *Azospirillum* @ 5 kg ha^{-1} + PSB @ 5 kg ha^{-1} to pearlmillet was the most efficient integrated nutrient management practice for the better growth, yield, quality, economics and soil fertility status.

Studies on sustainable productivity of maize through organic, inorganic and bio-fertilizers revealed that higher productivity of maize as well as economic returns could be realized with 100% recommended dose of nutrients through fertilizers i.e. 180-60-50 kg N, P_2O_5 and K_2O ha^{-1}. Application of 50% RDF + FYM @ 5 t ha^{-1} + *Azospirillum* @ 5 kg ha^{-1} + PSB @ 5 kg $ha^{-1}$was economically viable along with maintenance of soil biological activity and fertility for the sustenance of soil ecology.

The highest gross returns, net returns and benefit cost ratio were obtained when crop sown during 1st FN of January which was significantly superior to other times of sowing summer fodder sorghum. CSV 32 F variety recorded significantly higher returns.

Studies on production potential of fingermillet with organics and bio-fertiliser consortium disclosed that the highest grain and straw yield of fingermillet were obtained with seed treatment with Ghana jeevamritham + soil application of jeevamritham in combination with liquid biofertiliser consortium (STG + SAJ + LBFC) and recommended dose of fertilisers: 60-30-20 N, P_2O_5 and K_2O kg ha^{-1} in combination with liquid.

Zinc fortification for grain quality and yield showed that the performance of finger millet in terms of productivity and profitability was found to be higher with 100% RDF through inorganics + soil application of $ZnSO_4$ @ 50 kg ha^{-1}. Keeping in view of sustainable soil fertility, application of 75% RDF through inorganics + 25% RDF through FYM + soil application of $ZnSO_4$ @ 50 kg ha^{-1} seems was also performed nearly equal with that of 100% RDF through inorganics + soil application of $ZnSO_4$ @ 50 kg ha^{-1}.

Among the individual production factors for climate resilience excluding of nutrients application from full package of practices caused substantial reduction in pod yield, kernel yield and oil yield followed by excluding of weed management and non practicing of in-situ soil moisture conservation. Significantly the highest pod yield reduction (-35%) was observed when nutrients were not applied to groundnut crop and excluding of weed management (-27%) followed by non practicing of in-situ moisture conservation (-21%). Control (only improved cultivar without any input) recorded significantly the lowest pod yield kernel yield and oil yield in groundnut.

Maize-maize cropping sequence is economically feasible and sustainable option recording higher net returns and B : C ratio. The investigations revealed that application of 250 kg N and 60 kg P_2O_5 ha^{-1} during *kharif* season and 125% recommended dose of N and P either with or without incorporation of residues of previous season during *rabi* along with recommended dose of potassium was found to be the optimum fertilizer schedule for maize - maize cropping sequence.

The bedding material comprised of either soil with pressmud cake or soil with vermicompost in 70:30 ratio can be recommended as media for tray nursery raising for Mechanized System of Rice Intensification (MSRI) as they were comparable in growth parameters and were significantly better over soil with farmyard manure (70:30) and soil alone. Application of 160 kg N ha^{-1} and 40 kg P_2O_5 ha^{-1} can be recommended for rice under high soil phosphorus build up for realizing higher yields and returns under Mechanized System of Rice Intensification (MSRI).

Soil Science & Agricultural Chemistry:

In characterization of clay nano particles in red and black soils of Andhra Pradesh, electron microscopy showed curved and matted flakes in black soils of Garikapadu, Kambaladinne and Maruteru, while that of Lam farm, Rajamahendra-varam, Garikapadu have shown a combination of spiny and flocculating flakes. The red soils of Anakapalli have shown curved and matted flakes while that of Rekulakunta, Vizianagaram, Tirupati and Utukur have shown a combination of spiny and flocculating flakes.

Soil fertility maps were also prepared for M/s Prudential sugar factory zone in Chittoor district of Andhra Pradesh for various parameters such as pH, EC, organic carbon, available macronutrients (N, P and K), secondary nutrients (Ca, Mg and S) and micronutrients (Zn, Fe, Cu and Mn) under GIS environment using ArcGIS. In the Prudential sugar factory zone the major soil constraints identified were strongly alkaline in reaction (643 ha), low organic carbon (3183 ha), nitrogen (5346 ha), K_2O (2903 ha) and deficiency of Fe (2943 ha) and Mn (2543 ha).

Sewage water samples were medium to high in pH, low to medium in EC, high in organic carbon, low to medium in N, low to medium in P, medium to high in K and low to medium in Ca, Mg and Na. However, the micronutrients such as Fe, Zn, Mn and Cu were within the permissible limits in sewage water samples. The heavy metals such as Cr, Ni and Pb were within permissible limits except Cd, which exceeded the permissible limit in straw and grain samples of rice crop. The heavy metals in straw and grain samples were in the order of Pb > Ni > Cd > Cr.

Split application of Nitrogen based on crop demand is found useful instead of providing large quantity of nitrogen which is prone to various losses in the soil resulting in low N use efficiency and lower yields. The benefit - cost ratio was also high (3.32) followed by the dynamic N management approaches as compared to other practices evaluated in the study. It is clear from the study that the LCC, SPAD and Green seeker based nitrogen application can be recommended rather than blanket application of fertilizers. The timely and synchronized application of nitrogen as per requirement of crop at different stages of crop growth can give better yields rather than single application of fertilizers.

The morphological, physical and chemical properties of Brahmanakotkur watershed soils in Kurnool district revealed that the CEC values were low to medium and exchange complex was dominated by Ca2+ followed by Mg2+, Na+ and K+ ions. The soils were classified as Typic Haplustert, Sodic Haplustert, Typic Calciustert, Leptic Calciustert, Lithic Haplustept, Typic Haplustept and Lithic Ustorthent. Further, the study revealed considerable variations in morphological, physical and chemical properties of soils as they were developed from different parent materials and landforms. The application of organic matter through green manuring or application of crop residues was highly essential not only to improve the soil properties but also to achieve sustainable productivity.

Extension Education

Marketing behaviour of groundnut farmers in Ananthapuram district indicated that majority of the farmers had medium level of marketing behaviour .The analysis of profile characteristics indicated that majority of the farmers were middle aged, educated upto middle to high school, possessed less than 2.5 acres of land with medium farming experience, annual income, extension contact and social participation. The partial regression co-efficient values implied that annual income, material possession and extension contact were the most important variables that contributed to most of the variation in the marketing behaviour of groundnut farmers.

Studies on produciton constraints of rice cultivation in Kurnool district disclosed that major production constraints expressed by rice farmers in order were lack of custom hiring centers followed by involvement of middle men, scarcity of labour during peak periods, high cost of labour, epidemics of pests and diseases, weed infestation, high cost of FYM / chemical fertilizers, lack of skill in operating machinery, lack of proper storage facilities, cultivation to irrigated dry crops, distress sale, imbalanced application of fertilizers, lack of processing facilities at local level, low labour productivity and high rental charges of farm machinery during peak season.

Assessment of agri - input Delaers role in Transfer of Technology in Telengana explained that more than three fifth of the agri-input dealers had medium level knowledge followed by low knowledge level and high knowledge level. More than half of the agri-input dealers have perceived medium role followed by high role and low role in transfer of technology.The major problems perceived by agri-input dealers in rank order were late repayment by the farmers, lack of knowledge in maintaining stock book and sales register of the products, high transportation charges, low margin for different agri-inputs, crop failure due to natural calamities, lack of management skills in trade, lack of capital for establishment and maintenance, lack of technical knowledge about different brands of product, active ingredients and dose.

Adoption of Production Recommendations of Maize in Mahmudi Raqi District of Kapisa Province of Afghanistan showed that majority of the farmers had medium extent of adoption of production recommendations of maize.The analysis of profile characteristics of the farmers indicated that majority of the farmers engaged in maize cultivation are, young lliterate, small farmers with medium farming experience, mass media exposure, extension contact, social participation, scientific orientation, economic orientation, innovativeness, achievement motivation and deferred gratification.

In Studies on Women Entrepreneurship through Self Help Groups in Andhra Pradesh, it was found that two thirds (65.83%) of the women entrepreneurs had neutral to unfavorable entrepreneurial behavior. Only one third (34.17%) of the women entrepreneurs had moderate to high entrepreneurial behavior. Majority of the women entrepreneurs were in middle age, illiterates, had medium level of experience in SHG, medium level of annual income, social participation, mass media exposure, extension contact and did not receive training with medium innovativeness, decision making ability, achievement motivation and value orientation.

Out of 37 Indegenous Agricultural Practices (IAPs) on groundnut, more than 50 per cent of the respondents adopted 9 IAPs completely and 7 IAPs partially and 21 IAPs were not adopted by more than 50 per cent of the respondent.Out of 28 IAPs on redgram, more than 50 per cent of the respondents adopted 8 IAPs completely and 4 IAPs partially and 16 IAPs were not adopted by more than 50 per cent of the respondents.

Plant Pathology:

In studies on development of feasible techniques for the management of *Caryedon serratus* Olivier in groundnut, among the 12 different bins and bags evaluated against groundnut bruchid, magic cover, triple layered polythene bag and plastic bin were proved as effective barriers. Aluminium and steel bins were also recorded lower damages to the produce. Highest oviposition, adult emergence and pod damage were noticed in cloth bag and earthen pot. Out of 52 genotypes/ varieties tested against groundnut bruchid, the genotypes i.e., K1677, K2075 and Dharani were categorized as least susceptible while the genotypes / varieties K1501, K1800, K1802, K1811, K1813, K1847, K2074, TCGS1073 and TCGS1330 were categorized as highly susceptible based on the ovipositional preference, adult emergence, per cent pod damage (both by count and weight) and weight loss.

Under evaluation of certain insecticides against *T. absoluta* on tomato leaves during rabi 2016-17 and 2017-18, it was found that the highest mean per cent reduction over untreated control was recorded in chlorantraniliprole (61.17%) treated plot followed by cyantraniliprole (58.64%) and emamectin benzoate (52.87%) while lowest was recorded in fenvalerate (28.24%) followed by lambda cyhalothrin (30.29%) and imidacloprid (33.22%) treated plots and also recorded the lowest mean per cent infestation on fruits in chlorantraniliprole (18.51%) treated plot followed by cyantraniliprole (25.30%), flubendiamide (26.37%) and emamectin benzoate (29.53%).

Studies on biology and its predatory potential of *Nesidiocoris tenuis* (Reuter) (Hemiptera : Miridae) on *T. absoluta*, and evaluation of different *trichogrammatids* against *T. absoluta* indicated that the feeding potential of *N. tenuis* was recorded on eggs, first, second and third instar larvae of *T. absoluta* . The mean predatory potential of I, II, III, IV and V instar nymphs of *N. tenuis* on egg, I, II and III instar larvae of *T. absoluta* was 1.25, 0.75, 0.25 and 0.25; 1.50, 1.25, 1.25 and 0.75; 2.50, 2.00, 1.75 and 1.00; 2.75, 1.50, 1.50 and 0.75 and

3.25, 1.25, 1.25 and 0.50, respectively. Average consumption capacity of the predatory adult on eggs, I, II and III instar larvae of tomato pinworm was 4.25, 1.00, 1.00 and 0.50, respectively.The nymphs and adult of *N. tenuis* preferred eggs, I, II, III larval stages of *T. absoluta*, with great preference to eggs. The third instar nymph of the predator showed the greatest effect on both first instar and second instar larvae of *T. absoluta* when compared to other nymphs and adults of *N. tenuis*. The fourth larval instar and pupal stage of *T. absoluta* was not preferred for feeding by *N. tenuis*. Trichogramma achaeae was the most effective species in parasitising the eggs of *T.absoluta*.

Evaluation of oil based formulations of *Nomuraea rileyi* (Farlow) against *Spodoptera litura* (Fabricius) showed that rice bran oil with 0.2g spores and 0.1ml triton-X 100 oil formulation recorded highest larval mortality of 78-91 per cent followed by liquid paraffin with 0.2g spores and 0.1ml triton-X 100 and heavy grade mineral oil with 0.2g spores and 0.1ml triton- X 100 oil formulation which recorded 74-89 and 69-86 per cent respectively. In the field also, rice bran oil with 0.2g spores and 0.1ml triton-X 100 oil formulation recorded highest per cent larval reduction of 82 per cent at 20 days after treatment. Liquid paraffin with 0.2g spores and 0.1ml triton-X 100 and heavy grade mineral oil with 0.2g spores and 0.1ml triton-X 100 oil formulations also stood as next best treatments.

Among all insecticides evaluated on cocoons of *S. maculipennis*, acephate was detrimental to cocoons of *S. maculipennis* which recorded least adult emergence of 26.67% and reduced adult longevity of 1 day. Emamectinbenzoate and flubendiamide were safer to *S. maculipennis* which recorded highest adult emergence of 93.33% in both the chemicals and adult longevity of 3.83 and 3.67 days respectively.

Influence of planting densities and sowing dates on incidence of insect pests of cotton in scarce rainfall zone and management with novel insecticides revealed that monocrotophos 36% SL @ 1.6 ml l^{-1}, flonicamid 50% WDG @ 0.3 g l^{-1}, sulfoxaflor 75% WG @ 1.5 ml l^{-1} and pymetrozine 50% WG @ 0.4 g l^{-1} were effective in reducing the leafhopper population and also recorded higher yields Whereas chlorantraniliprole 18.5% EC @ 0.3 ml l^{-1}, chlorpyriphos 20% EC @ 2.5 ml l^{-1} and thiodicarb 75% WP @ 1.0 g l^{-1} were effective in reducing green boll damage and open boll damage at harvest by pink bollworm and also gave higher yields.

Studies on preference of *Callosobruchus maculatus* Linnaeus on various chickpea varieties and its management with edible oils disclosed that the genotypes with differential reaction had affected the biology of test insect. The resistant genotypes NBeG-49 and NBeG-47 recorded lowest number of eggs, lessper cent adult emergence, less mean development period and growth index over the susceptible genotypes NBeG-458, NBeG-399 and JG-11. The edible oils used in the study indicated that all the oils *viz.,* groundnut, mustard, sesamum, olive, rice bran and sunflower were effective at 1ml g^{-100} seed concentration which recorded less number of eggs, less per cent adult emergence, mean development period and high oviposition inhibition percentage. Among them groundnut and mustard oils were effective at 0.5ml g^{-100} seed. The oils and concentration levels had effect on seed germination. All the oils were recorded less germination percentage over control (70.00%).

Under taxonomic studies on leafhopper fauna associated with graminaceous crop ecosystems in Rayalaseema region, ten leafhopper species were collected identified and described in sugarcane crop ecosystem. The leafhopper fauna collected from sugarcane includes, *Balclutha saltuella* (Kirschbaum), *Balclutha thea* (Kirschbaum), *Cicadulina bipunctata* (Melichar), *Doratulina speciosum* (Distant), *Empoascanara defecta* (Dworakowska), *Empoascanara indica* (Datta), *Exitianus indicus* (Distant), *Maiestas breviculus* (Dash and Viraktamath), *Nephotettix nigropictus* (Stal) and *Nephotettix virescens* (Distant). In finger millet crop ecosystem, thirteen leafhopper species *viz., Balclutha incisa* (Kirschbaum), *Balclutha saltuella* (Kirschbaum), *Balclutha thea* (Kirschbaum), *Batracomorphus angustatus* (Osborn), *Chiasmus alata* (Pruthi), *Cicadulina bipunctata* (Melichar), *Cofona spectra* (Distant), *Doratulina speciosum* (Distant), *Empoascanara indica* (Datta), *Exitianus indicus* (Distant), *Maiestas acuminatus* (Dash and Viraktamath), *Maiestas dorsalis* (Motschulsky) and *Maiestas vulgaris* (Dash and Viraktamath) were collected, identified and described.

Field evaluation of nano based biopesticides against *S.litura* larvae resulted in the highest mean per cent reduction of 73.72 in CaO based B.bassiana talc formulations, followed by 68.44 per cent in CaO based *N.rileyi* broken rice formulations.

Studies on the genetic diversity of gall midge population across Andhra Pradesh and Telangana revealed that gall midge population in Chittoor showed a closer genetic relation with the gall midge population from Nellore with a similarity coefficient of 0.75 while, the populations from Warangal was placed in second cluster through the dendrogram based on UPGMA. The population from Jagtial was placed in separate cluster indicating that it is distantly related to the gall midge populations in other two clusters.

Agricultural Economics:

Economic analysis of onion prices in major markets of India indicated that the annual increase in prices of onion was found to be the highest in Lasalgaon market (7.33 Rs/qtl) whereas it was the lowest in Kurnool market (6.22 Rs/qtl). Bangalore and Kurnool were found to be statistically significant at 1 per cent level of significance. In these three markets, the contribution of time to change in prices was to the tune of 19 per cent to 26 per cent as indicated by adj-R2. Price volatility results revealed that there was high volatility in onion prices in Lasalgaon market as the sum of alpha and beta values were 0.99 next followed by Bangalore (á+â = 0.94) and Kurnool (á+â = 0.93) during the period from 2004 to 2017. These values were very closer to one, indicated that the volatility shocks were quite persistent in these markets.

In tenant farming viability studies in Nellore district, the total cost of cultivation per hectare for *kharif* paddy, *kharif* groundnut, *rabi* paddy, *rabi* groundnut and *rabi* blackgram was Rs 1,03,855.56, Rs 95,661.65, Rs 1,19,115.57, Rs 1,13,576.77 and Rs 47,041.44 on owner cum tenant farms respectively and it was Rs 95,368.06, Rs 87,843.95, Rs 1,11,775.97, Rs 1,04,471.36 and Rs 44,021.86 on the tenant farms for the corresponding crops.The net income was Rs 33,187.93, Rs 34,275.85, Rs 33,858.52, Rs 39,873.22 and Rs 4,898.55 from the cultivation *kharif* paddy, *kharif* groundnut, *rabi* paddy, *rabi* groundnut and *rabi* blackgram respectively on owner cum tenant farms and the respective values for tenant farms were Rs 41,820.54, Rs 42,506.05, Rs 41,204.03, Rs 49,803.64 and Rs 5,420.04. The returns per rupee of investment were estimated at Rs 0.31, Rs 0.35, Rs 0.28, Rs 0.35 and Rs 0.10 on owner cum tenant farms and Rs 0.43, Rs 0.48, Rs 0.36, Rs 0.47 and Rs 0.12 on tenant farms for the crops under study.

A study on efficiency of tenant farming in Chittoor district showed that the net income was Rs 61,375.06, Rs 71,475.70, Rs 30,836.52, Rs 59,282.01, Rs 74,129.06 and Rs 74,723.53 from the cultivation of *kharif* groundnut, *kharif* paddy, *kharif* tomato, sugarcane, *rabi* groundnut and *rabi* paddy respectively on owned farms and the respective figures for tenant farms were Rs 63,921.66, Rs 61,429.45, Rs 43,910.02, Rs 63,711.01, Rs 82,348.69 and Rs 59,785.62. The returns per rupee of expenditure were estimated at Rs 0.59, Rs 0.68, Rs 0.16, Rs 0.24, Rs 0.73 and Rs 0.42 on owned farms and Rs 0.62, Rs 0.54, Rs 0.23, Rs 0.27, Rs 0.84 and Rs 0.33 on tenant farms for the crops under study respectively. Plant protection chemicals, manures and human labour were the factors which exhibited relatively higher potential for increased output on tenant farms.

Agribusiness Management :

Efficiency of public distribution system in Andhra Pradesh divulge that, the purchasing pattern of poverty line basket items revealed that average household purchase of rice per month were 37.89

kgs and 38.34 Kgs in rural and urban areas respectively. About 13.3 per cent of the rural households were purely dependent on PDS rice in rural area compared to 4.7 per cent in urban area. Of the total average rural household purchases of rice per month, the average quantity consumed from PDS purchases was 4.11 kgs (10.85%) and open market purchases accounted for 20.19 kgs (53.28%).

Studies on impact of solar pumpsets on farm economy in Ananthapur district indicated that 100 per cent of farmers with solar pumpsets were growing mango orchard, whereas the rest of the farmers who still depended on rainfall confined to mono-cropping of groundnut in Kharif. The average land holding of solar farmers was 3.26 ha and it was 3.12 ha. for non-solar farmers. Cost of establishing solar farms on mango orchards was found to be Rs.62,792.34 as on current rates where as the commercial cost of cultivation of mango on solar farms was Rs.76,928.73 ha^{-1} during current period. The family expenditure pattern of solar and non-solar farmers showed Rs.3,31,388 and Rs.3,17,081 per household per annum respectively. With the family expenditure being more or less closer for the selected two groups of the farmers, the savings did not show much of a deviation between the two categories of the farmers. The amount of savings generated by the two categories of the farmers stood at Rs.32,702 and Rs.31,504 per annum respectively.

In Kisan Credit Cards, credit was allocated mainly to cost of cultivation and post harvest expenses like marketing expenses involved in moving the produce from farm to market. In issuing of KCC the share of commercial banks is high compared to cooperative and regional rural banks. KCC scheme mainly focused on the crop insurance and different aspects related to crop failure than the personal insurance to the beneficiary. Among different factors that were affecting the adoption of KCC by the farmers, land holdings was given first rank with a mean score (70.38) followed by farming experience with a mean score of 69.33 and the least rank was associated with difficulty in withdrawal with a mean score of 35.35.

Impact of mutually aided co-operative society (MACS) in Ananthapur district revealed that the gross income realized on MACS farms was slightly higher with Rs. 71,195 as against Rs. 70,697 on non-MACS farms. Net income too exhibited similar trend, with MACS recording Rs. 24,312 against Rs. 22,998 by non-MACS groundnut farms. The major factors influencing the member participation in MACS analyzed using Garrett's rank technique were subsidized seed from Accion Fraterna (A.F), avoiding middlemen while disposing the produce.

In sugarcane the gross income realized was higher with Rs. 201250 as against Rs. 139745 on paddy farms and Rs. 115187.50 on maize farms. Net income too exhibited similar trend, with sugarcane farms recording Rs. 35279.14 against Rs. 34525.14 on paddy farms and Rs. 31901.04 on maize farms. Model village tobacco farms were better off in respect of overall technical efficiency (OTE- 76 per cent) and pure technical efficiency (PTE- 88 per cent), while, general farms were relatively better off in respect of scale efficiency (SE- 87 per cent). Between tobacco farms and other major crop farms, tobacco farmers were better off regarding all efficiency i.e. OTE, PTE and SE.

Economic analysis of tobacco nursaries and vegetable production under shade nets in Vinukonda region of Guntur district showed that the total cost of cultivation per hectare of european cucumber was Rs. 2,61,816.20. The price per quintal was Rs. 1325.01. European cucumber farms realized a gross income of Rs. 3,96,034.38. The net income was high with Rs. 1,34,218.08. The total cost of cultivation per hectare of capsicum was Rs. 1,38,020.38. The price per quintal was Rs. 2400.23. Capsicum farms realized a gross income and net income of Rs. 2,10,764.64 and Rs. 72,744.36 respectively. The total cost of cultivation per hectare of cabbage was Rs. 83,150.47. The price per quintal was Rs. 730.02. Cabbage farms realized a gross income and net income of Rs. 1,63,211.21 and Rs. 80,060.74 respectively.

Economic analysis of oil palm production and processing in East Godavari disclosed that the total costs incurred to produce one tonne oil was Rs. 51915.35. The gross and net returns worked out to be Rs. 68,950 and Rs. 17034.65 per tonne of palm oil respectively. Availability and quality of raw material were major processing constraints faced by the oil palm processing industry. Brand image was the most preferred attribute of the Ruchi Gold palm oil. Price was the next attribute to catch the consumer's attention and then taste element. Colour and aroma were the other attributes that influenced the consumers' choice.

The analysis of price spread in onion marketing revealed that the producer was getting higher share of consumer's rupee in Channel I (80.29 per cent) than that of Channel II (58.1 per cent). The same trend was observed in the case of groundnut also, where the producer was getting higher share of consumer's rupee in Channel I (80.71 per cent) than that of Channel II (78.4 per cent). Major problem putforth by both FPO farmers and non-FPO farmers was labour shortage during the crop growth period. Pests and diseases was another problem as ventilated by 70 per cent of FPO farmers and 72.5 per cent of non-FPO farmers.

Under financial performance of food processing companies, companies like Brittania Industries Limited, ADF Foods Industries Limited, Glaxo SmithKline Consumer Healthcare Limited, Kwality Limited, Prabhat Dairy Limited, SKM Egg Products Export (India) Limited,Tasty Bite Eatables Limited, Nestle India Limited, DFM Foods Limited, Manpasand Beverages Limited, Heritage foods Ltd, Umang Dairies Ltd and Parag Milk Foods Ltd were categorised as high performing companies for the year 2015 (as overall factor scores were 5.356, 4.898, 3.096, 2.511, 2.215, 1.840, 1.395, 0.922, 0.896, -0.013, -0.470, -0.644 and -0.845(greater than or equal to median value of -0.845) and also for 2016 (overall factor scores were 9.762, 5.991, 4.904, 4.691, 3.846, 3.549,3.529, 3.512, 2.528, 2.167, 1.433, 1.083 0.676 and -0.274(greater than median value of -0.411).

Buying behavior of the farmers in Guntur district disclosed that majority of farmers got information regarding pesticides from private dealers, purchased pesticides from private dealers, depended on credit purchases, opted to take credit from others if credit sales were not available, favoured low priced brands when prices changed, turned to other branded products during non-availability of required pesticides and felt that they did not mind changing the brand or dealer according to the situation. Intensity of pest and disease was the major factor influencing quantity of pesticides application and brand selection. Farmers' level of satisfaction was high with the product availability with dealer and distance of pesticides dealer shops.

Studies on price behavior of soybean in Maharastra state divulged that the annual increase in prices of soybean was found to be highest in Latur market (Rs.14.49 /qtl), whereas lowest in Higanghat market (Rs.12.85 /qtl). In all these markets, the contribution of independent variable time to the change in prices was to the tune of 73 to 77 per cent.

Agricultural College, Mahanandi

Agronomy

Efficacy of different herbicides in transplanted rice scarce rainfall zone of A.P indicated that application of Bisparibac sodium in combination with hand weeding at 20 and 40 DAT resulted in higher growth yield economics of rice production

Sowing of blackgram on 1st fortnight of October and the variety PU-31 has performed better over rest of the dates varieties of sowing.

Genetics and Plant Breeding Department

Diversity analysis in foxtail millet, revealed that germplasm accessions SiA 3340, SiA 3447, SiA 3396 and SiA 3397 may be used as potential parents in breeding programmes.Higher estimates of genetic variability parameters for number of productive tillers / plant and culm branches indicated simple selection strategies for them may contribute to genetic improvement.Association studies indicated that direct selection for traits - Plant height and flag leaf blade length lead to crop improvement.

Genotypes MTU 1064, MTU 1081, PD 10 and NLR 4002 were identified promising for most of yield and nutritional traits. Direct selection of 1000 grain weight, kernel L/B ratio, number of filled spikelets per panicle, harvest index and SCMR improve grain yield and quality in rice.

College of Agricultural Engineering, Bapatla

Dept. of Soil and Water Engineering

Irrigation Water Resources Management of Command Area of Bapatla Channel

The command area of Bapatla channel is 6548.27 ha. Command area map was generated using Arc GIS. The total water demand (TWD) of major crops grown in command area was calculated for 5 years (2012-13 to 2016-17) in two seasons.

IWRMMOD (Irrigation Water Resources Management Model) was developed in the form of a computer program using PHP (Personal Home Page), which was simply mixed with HTML codes. In the IWRMMOD, seven forms were developed in the input data, i.e. crop, climate, canal water supply, canal hydraulics, special needs including efficiencies, groundwater supply and drain water use. Eight forms were involved in evaluation module namely Consumptive use, ET0 (Reference evapotranspiration), ER (Effective rainfall), Seepage loss, CWSF, GIR (Gross irrigation requirement), TWD, GWU, and also three output module forms like WUE, IE and TWS were developed. IWRMMOD was provided mainly demand-based daily water releases for reducing the gap between canal supplies and demands and to help irrigation engineers, agronomists and agro-meteorologists in planning, operation and management of irrigation systems efficiently.

Development of Web based Water Resources Interface for Command Area of Guntur Channel

Guntur channel is selected as study area to determine the availability and quality of surface and ground water resources in a command area and to estimate water demand of all sectors of water use. Total dissolved solids, Bicarbonates were exceeded the acceptable limit during both the seasons. Sodium exceeded the acceptable limit of BIS, and is unsuitable for drinking purpose. SAR during post and pre-monsoon were found to be <10 meq/l and channel water is suitable for irrigation purpose. The concentration of EC in ground water was found to be higher at tail end area villages Parthipadu recorded EC >15 dS/m during post and pre-monsoon seasons. pH values in post and pre-monsoon were ranged from neutral to alkaline. Water quality indices namely SAR revealed that 28% of samples in post monsoon and in 20% of samples fall under excellent category. RSC of 76% samples in post monsoon and 56% samples in pre-monsoon were found to be safe for irrigation purpose. Water quality index of ground water in Guntur channel command area showed that 80% and 92% of samples during post and pre-monsoon were found to be unsuitable for drinking.

Web application was developed to give information about water resources availability and quality in command area of Guntur channel. Sustainable measures for better utilization of water in command area of Guntur channel were also suggested.

Development of Irrigation scheduling for Drip Irrigated Campsicum Poly House

An attempt was made to develop irrigation scheduling using Aqua Crop and Pan evaporation method. It is revealed that using Aqua Crop model can predict the accurate amount of water requirement which is very helpful to save the large amount of water. Optimum net water requirement with Aqua Crop 6.0 model is predicted i.e., 562.6 mm The total water consumed was 281.3, 421.9, 562.5 and 562.6 mm in the polyhouse with drip irrigation in 0.5, 0.75, 1.0 ETC and 1.0 ETC in open field, respectively. The water use efficiency in the drip irrigation scheduled at 0.75 ETC recorded maximum water productivity (11.62 kg $ha^{-1}mm^{-1}$) followed by drip irrigation scheduled at 1.0 ETC (10.77 kg $ha^{-1}mm^{-1}$), 0.5 ETC (10.38 kg $ha^{-1}mm^{-1}$) and open field (0.77 kg $ha^{-1}mm^{-1}$) recorded very less. Though the fruit yield is realized at higher level of drip irrigation 1.0 ETC, the water productivity realized was less (9.19 kg ha^{-1} mm^{-1}) when compared to lower levels of drip irrigation schedules. Cost of cultivation of capsicum under polyhouse is Rs.6285 and for the open field cultivation is Rs.4085.

Assessment of Hydro-Meteorological Drought Effects on Groundwater Resources in Anantapuram District

Based on the research work carried out, the major conclusions drawn like deciles were computed for the long historical rainfall data of 30 years over Anantapuramu district and historical drought events were identified which fall under the deciles 1-2 and 3-4. It is evident from the results that there were 12 drought events (1990, 1992, 1994, 1995, 1997, 2002, 2003, 2004, 2006, 2011, 2014 and 2016) in the period 1988-2017. The analysis of SPI-1 month showed that severe drought occurred in two mandals, moderate drought occurred in 15 mandals and 46 mild droughts. The analysis of SPI-6 month showed that 27 mandals had extreme drought conditions, 33 mandals had severe drought conditions and 3 mandals had moderate drought conditions. The analysis of SPI-12 month showed that 37 extreme, 20 severe, 4 moderate drought conditions in Anantapuramu district.

Studies on Hydraulic Performance of Raingun and its Evaluation

Mobile rain gun system was developed to supply the irrigation to the field where the electricity is not available to pump the water. It was evaluated to calculate the fuel consumption, discharge, pressure developed and maximum radius of throw by the system with 24 hp mini tractor and 38 hp tractors. The evaluation of mobile rain gun system attached to the tractor revealed that fuel consumption was 3 l h^{-1} for mini tractor and 4.2 l h^{-1} for 38 hp tractor and discharge is 16 lps for mini tractor and 21 lps for 38 hp tractor. Cost of operation for irrigating with raingun per hectare with 24 hp mini tractor is Rs 1388/- and with 38 hp tractor is Rs 1237/-

The performance of rain gun irrigation system is similar to the sprinkler irrigation system except following parameters. The uniformity coefficient of the rain gun system is 64 % and the sprinkler system is 84 %. Pod yield for the raingun irrigation system is 3.10 t ha^{-1} and sprinkler system is 3.34 t ha^{-1}. The water use efficiency of raingun system is 21.14 kg/ha-mm and sprinkler system is 22.79 kg/ha-mm.The results revealed that the radius of throw of rain gun increases with operating pressure and riser height.

Hydro-solute transport modeling in mole drainage systems with soil oxygenation for control of waterlogging in black soils

Using, the theory of Hooghoudt's equation with additional assumptions for mole drainage spacing design, the mole drain spacing was designed to be 2 and 3m and for sensitivity analysis purpose, 4 and 5m spacing mole drains were also studied. The surface drainage co-efficient (overland flow) is found different from the mole drainage co-efficient (preferential flow of abstraction) and the new method adopted in the present study can be used in future. The mole drainage systems could handle larger drainage coefficient such as 55.6 mm d-1 as in case of Kapileswarapuram.Hooghoudt's equation was employed successfully for the design of mole drain spacing without considering the equivalent depth concept in this study. The hydraulic conductivity of the vertisol changed upon installation of mole drains from 0.3 to 0.5 m d-1 and bulk density decreased. Mole drains laid at 0.4m depth with 2and 3m spacing could handle the maximum drainage flow depth of 46.1 mm d-1 of abstraction in 19.8 and 29.0 h respectively and the same was evacuated by 0.5m depth with 2and 3m could in 24.4 and 35.7 h from the sugarcane fields.

Dept. of Processing and Food Engineering

Freeze Drying Characteristics of mushrooms

Freeze-drying of mushroom slices was investigated, in which 2, 4, 6 and 8 mm thick mushroom slices were dried at various heating plate temperatures of 10, 20, 30 and 40 °C. Freeze drying of mushroom slices took place entirely in falling rate period. Moisture content, moisture ratio and drying rate decreased continuously with an increase in the heating plate temperature and decrease in the slice thickness. Increase in slice thickness resulted in higher bulk density (0.1524 g cm-3), firmness (8.98 N), water activity (0.311), shrinkage (5.32%), ascorbic acid (25.95 mg/100 g) and protein content (31.02%), but, lower porosity (79.85%) and rehydration ratio (2.89). The increase in heating plate temperature resulted in increase in rehydration ratio (6.3067), porosity (89.31%), firmness (8.98 N) and colour change, but, decrease in shrinkage (1.8%), bulk density (0.07 g cm-3), ascorbic acid (16.18 mg/100 g), protein (24.58%) and dietary fibre content (16.23%).

Plate 4.1 Mushroom slices (a) Fresh (b) Freeze dried and (c) Rehydrated

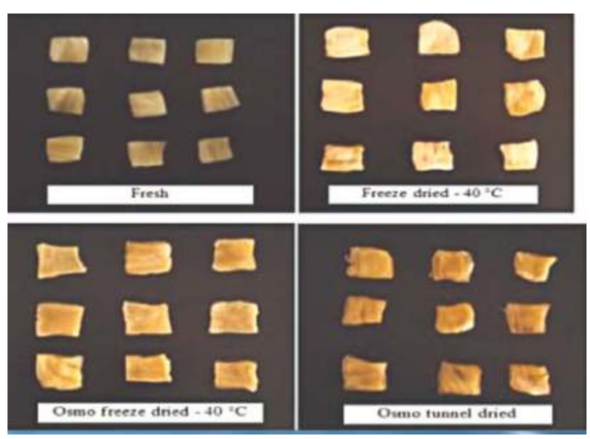
Development and Testing of a Gherkin Grader

Grader was developed and fabricated based on the grading specification requirement of the exporters and engineering properties of gherkins. Grading efficiencies for grade1, 2, 3 and 4 ranged from 83.3% to 93.7%, 79.2% to 92.0%, 83.3% to 95.0% and 83.3% to 97.2%, respectively at all feed rates and at all rope speeds at zero degree longitudinal slope. There was a general decrease in grading efficiency with increase in longitudinal slope. Highest grading efficiency was obtained for grade 4 and least grading efficiency was achieved for grade 2 at all rope speeds, feed rates and longitudinal slopes. Among all combination of operational variables, grader performance at 500 kg/h feed rate, 15 m/min rope speed and with zero longitudinal slope was found to be the best with grading efficiency 93.48%, 90.99%, 95.50% and 97.22% for grade 1, 2, 3 and 4 respectively. An overall efficiency of 94.3% was obtained corresponding to these operational variables. The cost of operation per ton of gherkins graded was Rs 423/-

Gherkin Grader

Studies on Drying Kinetics and Quality Attributes during Osmo- Freeze drying of Jackfruit (*Artocarpus heterophyllus*) Bulbs

The optimized process parameters were osmotic solution concentration of 60 °B, solution temperature of 56 °C and immersion time of 137 min with a maximum water loss of 30.58 % and minimum solid gain of 8.15%. The optimized jackfruit bulb slices were freezed in a blast freezer at -20 °C and dried in a freeze dryer at plate temperatures of 20-40 °C. Drying characteristics were determined for jackfruit bulb slices dried in the freeze dryer. The osmotically dried samples dried in solar tunnel dryer, solar dryer, cabinet tray dryer and freeze dryer were evaluated with fresh jackfruit bulb slices based on ascorbic acid content, appearance, colour, hardness, odour, overall acceptability, rehydration ratio and taste. The osmo freeze dried jackfruit bulb slices were the best due to added taste impregnated by osmotic dehydration process and overall consumer acceptability.



Studies on Ultrasound Assisted Extraction of Rice Bran Oil

To improve the oil quality, aqueous enzymatic extraction was used and to improve the yield, combination of ultrasound and aqueous enzymatic extraction of rice bran oil was investigated.

Among the four concentrations of three enzymes, 270 U of cellulase gave highest oil recovery (35.22%). Ultrasound treatment period of 30 min with 60 s on and 5 s off timings gave highest recovery of 88.15%. Ultrasound assisted aqueous enzymatic extraction of oil has a substantially lower content of free fatty acid (1.496 mg KOH/g) than that of conventionally (hexane) extracted oil (2.692 mg KOH/g). The peroxide value of the oil obtained from ultrasound assisted aqueous enzymatic extraction of rice bran oil was little higher (1.567 meq/ kg of oil) than the peroxide value of conventionally (hexane) extracted oil (1.220 meq/kg of oil). Ultrasound-assisted aqueous-extracted oil had a lower content of colouring substances (15Y+2R) than hexane extracted oil (20Y+2.8R) and viscosity of ultrasound assisted aqueous enzymatic extraction of rice bran oil (39.03 cP) was almost similar to that of conventional (hexane) extraction of oil (39.20 cP).

Fresh rice bran

Mixture of rice bran with water and enzymes before extraction

Detoxification of Jatropha Kernel Meal to utilize as Aqua-Feed

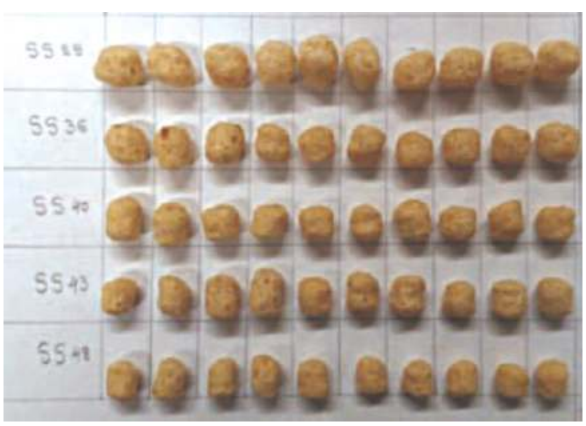
Four different samples, i.e., raw, defatted, one-time mechanically oil expressed and two-times mechanically oil expressed samples were prepared from jatropha kernels. These samples were subjected to three treatments, namely, chemical, UV radiation and biological treatment for detoxification. Chemical treatment involved heating the samples with 90% methanol and 4% NaOH twice. UV treatment was done by subjecting the samples to UV radiation for 30 min in a closed chamber with UV light intensity of 53.4 mW/cm2. For biological treatment, strain *Pseudomonas aeruginosa* was used. Chemical treatment was found to be most effective in reduction of toxins and all the toxins were found within acceptable limits to be utilized as aqua-feed. In chemically treated kernel meal, phorbol esters were found to be in range of 0.034-0.052 mg/g, lectin in the range of 0.082-10.766 mg/g, trypsin inhibitor in the range of 10.100-11.350 mg/g, phytate in the range of 0.248-0.577% and saponins in the range of 0.004-0.010%. Biological treatment was also effective in reduction of all toxins, except phytate and hence, biologically treated samples were not used in aqua-feed preparation. In biologically treated kernel meal, phorbol esters were found to be in range of 0.051-0.102 mg/g, lectin in the range of 0.497-14.815 mg/g, trypsin inhibitor in the range of 9.194-12.657 mg/g, phytate in the range of 1.097-2.994% and saponins in the range of 0.005-0.011%. It was also observed that temperature during solvent extraction and mechanical oil expression had an effect in reducing lectin, trypsin inhibitor and phytate content. Pellets prepared from chemically detoxified kernel meal having lowest oil content resulted in highest strength of 70.93 N, i.e. defatted sample.

Aqua-feed pellets prepared from chemically treated samplea) Raw, b) Defatted, c) One-time mechanically oil expressed and d) Two-times mechanically oil expressed

Processing of Cereal - Legume based fortified blended foods using extrusion

High protein FBFs using binary blends of corn-soy (CS) and sorghum-soy (SS) were developed with the aim of replacing expensive animal source protein with plant protein and to explore reduction in sugar content in FBFs. While maintaining the nutrition and Bostwisck flow range, binary blend formulations were made nutritionally similar for both CSB and SSB with protein (19 g) and energy density (393-398 kcal) per 100 g. Pilot scale single screw extruder was used to produce extrudates for further drying, grinding and blending. Extrudates of CS blends resulted in specific mechanical energy (SME) of 317.58-423.98 kJ kg-1 and was higher than extrudates of SS blends which had SME of 193.58-234.16 kJ kg-1. both CS and SS extrudates, expansion ratio (ER) showed significant difference ($P<0.05$). ER was negatively correlated to piece density (PD) and bulk density (BD). Final viscosity (78.5 to 175.5 cP) of SS after Rapid Visco Analysis were found to be lower than CS (128.5 to 185.5 cP) due to lower re-association of starch granules in SS than CS. WPC80 (for control sample only), oil, vitamin and mineral premix and different levels of sugar were added to prepare FBFs, both CSB and SSB. At 20% solids concentration, Bostwick flow values (6.5-9.5 cm min-1) of CSB were found to be lower than SSB (14.0-23.0 cm min-1) at different formulations. All SSB formulations and only CSB with 10% sugar addition were able to meet USDA flow requirements. The study showed that SSB could achieve the nutritional and flow requirements even without WPC and sugar, while CSB needed addition of 10% sugar to achieve the flow rate within the stipulated standards. The industry will greatly benefit due to the option of alternate inexpensive cereal-legume blends with better nutritional and flow profile compared to existing products.

Extrudates of corn soy formulations



Extrudates of sorghum soy formulations

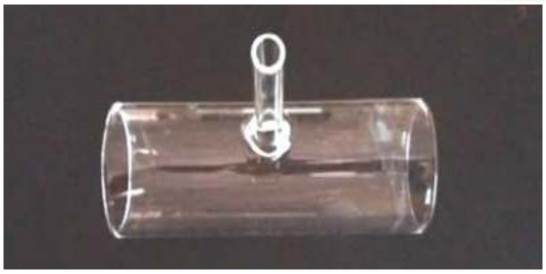
Development of an Ohmic Heating system for Pasteurization of Grape (*Vitis vinifera* L.) Juice

Ohmic heating is an electrical resistance heating resulting from the passage of electrical current through food materials offering some resistance. Instant and uniform heat is generated which results uniform temperature distribution, especially for liquid foods. Grapes are rich sources of polyphenolic compounds, antioxidants, and many nutraceuticals which demonstrates a wide range of health benefits. It is very much liked and demanded by the consumers. This research work was undertaken to develop an ohmic heating system for pasteurization of grape juice and to investigate the effect of ohmic heating on quality of grape juice.

Grape juice was pasteurized by four levels of voltage gradients (10, 20, 30 and 40 V cm^{-1}) at four levels of heating temperatures (55, 65, 75 and 85^{o}C) holding for 1, 3 and 5 min. Then pasteurized juice samples were kept for storage for 21 days at refrigerated condition. Changes in physico-chemical, microbial and sensory properties during storage were evaluated and statistically analyzed. It was observed that temperature and heating rate of grape juice increased linearly with the voltage gradient. Heating rate observed was the highest for 40 V cm^{-1} at 75°C. Electrical conductivity of grape juice linearly increased with temperature and voltage gradient. Maximum value of electrical conductivity of grape juice was 0.81 S m^{-1} at 30 V cm^{-1} at 85°C. Bubbling was observed at 75°C at 40 V cm^{-1}. The pH, TSS, reducing sugar, total sugar, total solid content observed increased significantly as the voltage gradient, heating temperature and holding time increased ($p<0.05$). Sensory evaluation of pasteurized grape juice indicated that (appearance, colour, flavour, taste and overall acceptability) of grape juice were not affected by voltage gradient levels but significantly decreased with increase in heating temperature and holding time and storage period. System performance coefficient (SPC) of developed ohmic heating system was observed in the range of 0.57-0.99. System performance coefficient decreased as voltage gradient and heating temperature increased. For pasteurization of juice at 85 oC with voltage gradient 30 V cm-1, SPC was 0.73, which was found reasonable. Treatment 30 V cm-1:85 oC:5 min was found best for pasteurization of grape juice by ohmic heating on overall quality basis.

Grape juice with T36 treatment

Grape juice with T45 treatment



Ohmic heating chamber

Development of On-Farm Paddy Dryer Coupled with a Gasifier

An on-farm paddy dryer coupled with gasifier was developed to dry the paddy. Performance evaluation of gasifier revealed that briquette requirement rate was low at air flow rates of 20 to 25 m3 h-1 but it was observed by that increasing of air flow rate, feed demand rate was also increased up to 35 m3 h-1 and decreased with increase of further air flow rate. It was observed that, the flame height ranged from 130 mm to 60 mm. The flame temperature was 174 °C for 30 mm size briquette at 35 m3 h-1 air flow rate. The maximum gas production of 32.14 m3 h-1 (average) was observed for 30 mm briquette at 30 m3 h-1 air flow rate. For 30 mm size of briquettes the gas yield ranged from 1.41 to 2.11, 1.46 to 2.57 and 0.94 to 2.44 m3 kg-1, respectively. It was observed that, to bring down from initial moisture content of 25% (w.b) to a final moisture content of 12.6% (w.b.), drying time took 13 h at 45 °C drying air temperature, 9 h at 52.5 °C and 8 h at 60 °C, respectively. The overall thermal efficiency of the developed dryer found to be 46.83%. The average heat utilization factor was found to be 0.86, 0.69 and 0.46 for drying air temperatures 45, 52.5 and 60 °C, respectively. The average values of coefficient of performance for on-farm paddy dryer coupled with a gasifier was found to be 0.5, 0.3 and 0.4 for drying air temperatures of 45, 52.5 and 60 °C, respectively. Benefit cost ratio for developed on-farm paddy dryer coupled with a gasifier was found to be 1.36.

A low capacity sorghum flaking machine was developed with a capacity of 100-120 kg/h. The yield of flakes obtained for different treatments was more at 60 rpm roller speed than at 80 rpm.

Studies on flaking of Sorghum and development of a Low Capacity Machine

The flakes processed at 60 rpm roller speed were expanded more and white in colour than at 80 rpm. More yield obtained by roller flaking of soaked or steamed grain, roasted by open pan than by machine roasting. Higher moisture contents of open pan roasted grain which are above 30% (wb) as compared to machine roasted grains which are below 25% (wb) have contributed for the flakes with better expansion and higher yield. Sorghum grains processed by steaming and roasting treatment resulted in light brownish coloured and hard textured flakes compared to flakes processed by soaking and roasting treatment. Sorghum grains processed by soaking and roasting than steaming and roasting resulted in flakes with better sensory scores for various attributes. Sensory score for various attributes was more sorghum flakes processed at 60 rpm roller speed rather than at 80 rpm roller speed. Optimized process and machine parameters based on the highest yield (93.27%) and overall acceptability of sorghum flakes were 36 h soaking time, pan roasting at 125±2 ºC, roller flaking at 60 rpm with 0.1 mm gap between the rollers. It was possible to store sorghum flakes safely for four months in PP packaging material.

Low capacity sorghum flaker

Dept. of Farm Machinery and Power Engineering

Standardization of operational Parameters of Fogger Nozzles for Uniform Spray Distribution and Reduced Drift

The swath width of coverage increased with increase in pressure from 1 to 2 kg cm^{-2} and height of operation from 50 to 150 cm. The highest width of coverage was observed as 228 cm for spinning disc, 230.33 cm for four head and 133.33 cm for single head nozzle with 2 kg cm^{-2} pressure and 150 cm height of spray nozzle. Highest discharge at 2 kg cm^{-2} pressure and 150 cm height of operation was observed as 0.46l/min for spinning disc, 0.7 l/min for four head and 0.64 l min^{-1} for single head nozzle. The coefficient of variation also increased with increase in pressure from 1 to 1.5 kg cm^{-2} and decreased from 1.5 to 2 kg cm^{-2} and also increased with increase in height of operation. The effect of wind speed on spray uniformity was less with spinning disc nozzle when compared with single head and four head nozzles. Least coefficient of variation of 29.59, 37.52 and 78.23% was observed for spinning disc, single head and four head nozzle, respectively at 1.4 m s-1 wind speed. The operating parameters were standardized as operating pressure of 1.5 kg cm^{-2}, height of operation of 50 cm and wind speed of 1.4 m s-1 for three fogger nozzles namely single head, four head and spinning disc nozzles for better performance.

Design and Development of a Protray Vacuum Seeder for Crop Nursery

It was observed that nozzle orifice size of 0.51 mm at 80 and 60 mm of Hg suction pressure had highest seed singles pickup (%) for all the seeds. Four different vacuum inlet locations were made to select best location of inlet such that it gives maximum percent of singles. Performance was evaluated with optimized parameters 0.69, 0.60 and 0.51 mm at single pressure (80 mm of Hg) for flat seed (chilli seed) and round seed (knol-khol).

Highest per cent of singles were observed with 0.51 mm orifice size. It was observed that vacuum inlet provided at one corner of pipe had maximum percent of singles as 91.33%, doubles, triples and missings as 2.67% and 96.67% pickup for knol-khol seed. It was also observed that per cent singles, per cent doubles, per cent triples, per cent missings and per cent pickup were 74, 17.33, 5.33 and 6.67 % for chilli seeds respectively. The capacity of protray vacuum seeder was 100 protrays per hour.

Plate. Dibbler cum pro-tray vacuum seeder

Investigation on Parameters Affecting the Design and Development of 4-Wheel Drive Tractor Mounted Paddy Transplanter

The VST Mitsubishi Shakti 4-wheel drive 22 hp tractor and China make Yanji 8-row paddy transplanter were identified for design and development of 4-wheel drive tractor mounted paddy transplanter with Planting speed of 120-250 rpm was considered to obtain optimum hill to hill spacing. The highest average missing hills, floating hills, buried hills and damaged hills were obtained as 24.3 and 29.3, 6.1, and 6.5 per cent, 10.1 and 7.5 per cent for P1G3 and P2G3 PTO and gear combinations respectively.The highest grain yield was 6.17 t ha^{-1} for P1G2 and lowest grain yield was obtained as 2.41 t ha^{-1} for P2G3 of PTO and gear combinations respectively. The total cost of operation of 4-wheel drive tractor mounted paddy transplanter was ₹ 4898 per hectare. Cost benefit ratio was about 2.61

Plate : View of 4-wheel drive tractor mounted paddy transplanter at head land during transplanting operation

Design and development of high clearance unit in small tractor for cotton crop

The existing clearance of the small tractor was increased with developed high clearance unit using mild steel as a structure. The tractor was lifted up to height of 1.4 m using front and rear legs of front axle and rear axle. The dynamic analysis of the tractor with weeding and spraying unit was studied and found that, the tractor is in stable condition during operation up to a depth of 10 cm.

It was found that the location of centre of gravity of tractor is 1.9 m from the ground surface. The critical speed of tractor is 2.55 ms-1 and the front and rear wheel reactions are about 208.5 kg and 796.5 kg respectively at maximum depth of operation. It was observed maximum weeding efficiency 93% and lower draft force 76 kg for blade (plain blade with one side sharpened) at an angle of 150. Similarly for entire crop period 199.64 man-hours were also saved with high clearance tractor compared to the manual method.

Plate: High clearance sprayer

Design Development and Performance Evaluation of Punch Planter for Maize in Rice Fallows

The mean punch spacing's of 10, 16, 24, 35 and 53 cm were obtained in different gear and PTO lever positions. The seed miss index increased with the increase of punch planter speed and it was observed that in sandy clay loam soil, seed miss index was increased from 9.6% to 13.9% and 7.5% to 10.8% for 24 cm punch spacing and for type1 and type 2 punches, respectively, as the speed increased 0.8 to 1.7 kmh^{-1}. In case of 16 cm punch spacing, it was observed that seed miss index was increased from 9.3 to 13.3% and 9.0 to 13.0% for type1 and type 2 punches, respectively, as the speed increased 0.8 to 1.7 kmh-1. The effective field capacity and field efficiency were observed to be 0.07, 0.12 and 0.15 ha h^{-1} and 77.33, 74.25 and 75.33% at forward speeds of 0.8, 1.3 and 1.7 kmh^{-1}, respectively. The fuel consumption was obtained as 1.20, 1.48 and 2.14 l h^{-1} at operating speeds of 0.8, 1.3 and 1.7 kmh^{-1} respectively. The total fixed costs of sowing maize with developed prototype punch planter with mini tractor and punch planter were ₹ 53.0/- and ₹ 35.0/- and variable costs ₹ 233.0/-, ₹ 18.0/- per hour, respectively. The total operating cost of the punch planter with mini tractor was found to be ₹ 339/- per hour. There was a saving of 50%, 58.3% and 66.0% in terms of manpower, time of operation and cost of operation, respectively due to use of punch planter than traditional manual sowing.

Plate: Sowing of maize with proto type punch planter in rice fallows

Design and Development of Tractor Operated Groundnut Combine for Harvested Crop

The designed collecting unit was provided with a rake angle of 600. The highest lateral conveying efficiency of 92.40% was obtained at a combination of 10 cm - 1.59 km h^{-1}- 1.19 ms-1. The highest vertical conveying efficiency of 92.56% was obtained at a combination of 10cm - 1200- 1.19 ms-1. The effective field capacity was 0.122 ha h^{-1} with an average fuel consumption of about 4.67 l h^{-1}. The threshing efficiency of the developed groundnut combine was 82.54% compared to wet pod thresher because of slow feeding of the crop into the thresher from the trough. The operation of groundnut combine resulted in 74.92 % saving in cost when compared to conventional method of manual collecting and hand stripping. It was also concluded that, the number of hours required for operating the developed combine harvester was 6.67 machine hours + 16 man hours which was least compared to conventional method of collecting and threshing was 200 h. It was observed that the output capacity of the thresher was 216.6 kg h^{-1} and the broken pod loss was 1.27%. The threshing capacity was 83.58% and the cleaning efficiency was 81.68%.

Plate: Field evaluation of developed groundnut combine

D. STUDENTS' ACTIVITIES

1. National Cadet Corps (NCC)

As many as fifteen students of the ANGRAU obtained 'C' certificates and thirty five students got 'B' certificate in NCC during the year 2018-19. The NCC Camps attended by the students during the year are detailed in the Table 7.

Students participation in NCC

NCC Students participated Independence Day Celebrations CAE, Bapatla

Table 7. NCC Camps Attended by the Students

Name of the Colleges	Camp	Venue	Date	No. of Cadets Attended
Agricultural College, Bapatla	-	-	-	-
S.V. Agricultural College, Tirupati	Combined Annual Training Camp (CATC-XIII)	Chittoor	17.10.2018 to 26.10.2018	20
S. V. Agricultural College, Tirupati	Army Trekking Camp (ATC)	NCC Nagar, Tirupati	20.10.2018 to 27.10.2018	15

2. NSS Activities

The NSS volunteers of various colleges actively participated in NSS Camps during the year. The NSS activities included planting of ornamental and tree plants, sanitation programmes, awareness programmes on Health & Hygiene and AIDS, blood donation programmes, vaccination to animals, rodent control, parthenium eradication in public places and Clean & green programmes, etc. The NSS special camps of about seven days duration were organized for the students of all the final year Undergraduate and Diploma programmes. The details of the NSS special camps attended by the students during the year 2018-'19 are shown in Table 8.

Table 8. NSS Camps Attended by the Students

Name of the College	Camp	Venue	Duration of Special Camp		No. of Students
			From	To	Attended
Faculty of Agriculture					
Agricultural College, Bapatla	NSS Special Camp	Gummadidurru	30.10.2018	05.11.2018	100
	NSS Special Camp	Sivarampuram	31.10.2018	06.11.2018	150
S. V. Agricultural College, Tirupati	Special Camp	Kothasanambatla, Chandragiri Mandal, Chittoor District	09.11.2018	15.11.2018	133
Agricultural College, Naira	NSS Special Camp	Thandyamvalasa and Bhyri Villages	24.10.2018	30.10.2018	85
Agricultural College, Mahanandi	NSS Special Camp	Bukkapuram Village of Mahanandi Mandal	12.11.2018	18.11.2018	73
Agricultural College, Rajahmundry	NSS Special Camp	Unguturu, West Godavari	22.10.2018	28.10.2018	50
	NSS Special Camp	Nidigatla, East Godavari	12.11.2018	18.11.2018	50
Faculty of Agricultural Engineering & Technology					
Dr. NTR College of Agril. Engg., Bapatla	NSS Special Camp	Pandurangapuram Village	08.02.2019	14.02.2019	69
College of Agricultural Engineering, Madakasira	NSS Special Camp	Chandhakacherala , Village, Madakasira Mandal Anantapuramu Dist.	24.02.2019	02.03.2019	147
Dr. NTR College of Food Science and Technology, Bapatla	NSS Special Camp	Pinniboinavari Palem	21.02.2019	27.02.2019	59
College of Food Science and Technology, Pulivendula	NSS Special Camp	Brahmanapalli Village	30.12.2018	05.01.2019	26
College of Home Science, Guntur	NSS Special Camp	Thakkelapadu Village of Jaggayyapeta mandal	06.02.2019	12.02.2019	27

Awareness Programme by NSS

Swatch Bharat Programme by NSS

Land preparation for lawn making

Soil preparation for planting oranamental plants

NSS Special Camp

Land preparaton for lawn making

Blood donation by NSS volunteers

Swatch Bharat Programme by NSS

NSS Special Camp Inauguration

Swatch Pakhwada Programme

Swatch Pakhwada Programme

1. Sports, Games, Cultural and other Activities

Eight students of Agricultural College, Bapatla participated in XIX All India ICAR Inter Agricultural Universities meet 2018-'19 held at Punjab Agricultural University, Ludhiyana from 02.01.2019 to 05.041.2019.

Agricultural College, Bapatla conducted ANGRAU 1st Phase Inter Collegiate Sports, Games, Cultural and Literary meet 2018-'19 from 3rd to 6th October, 2018.

Mr. T. Edwin Blessy, BA 16-038 & S.V. Rajeswari BA 18-241 won the Men and Women Athletic individual championship in intramural competitions 2018-'19 and also received Dr. Balineni Cash Prize of Rs.5,000/- each.

Third Phase of Inter collegiate Sports and games for Girls held at S.V.Agricultural College,Tirupati from 22.10.2018 to 24.10.2018

S.V.Agricultural College ,Tirupati got the over all championship of games for girls for the year 2018-'19.

Cultural and Literary Meet championship was presented to S.V.Agricultural College,Tirupati for the year 2018-'19.

Mr. K. Chakravarthi (4th year), S. Rammohan Reddy (3rd year) and K. Kiran (1st year), B. VenkataDattamma, 2nd year, P. Sowmya, 3rd year and Miss. G.D. Umadevi, Ph.D 3rd year have participated in 19th All India ICAR Games and Sports meet held at Punjab Agricultural University, Ludhiana from 2nd January to 5th January, 2019.

Five students were selected for ANGRAU contingent to participate in XIX All India Inter Agricultural University Sport meet-2019 to held at PAU, Ludhiana from 02.01.2019 to 05.01.2019.

Students *viz.*,Ms.Y. Aswini Teja, NA.2018-009, Mr.K. Vara Prasad, NA.2015-092, Shaik Sazid, NA.2015-079, Mr.P. Viswaraj, NA.2016-177, Sri G. Nehru, NA.2015-051 of Agril. College, Naira participated in XIX All India Agricultural University Sports and Games Meet 2018-'19 from 2-5th Jan. 2019 at Punjab Agricultural University, Ludhiana.

The Students of Agricultural College, Rajamahendravaram (29 students) have participated in I phase of Intercollegiate Sports and Games meets 2018-'19 held at Agricultural College, Bapatla from 01.10.2018 to 05.10.2018.

The Students of Agricultural College, Rajamahendravaram (17 students) have participated in II phase of Intercollegiate Sports and Games meets 2018-'19 held at Agricultural College, Naira from 12.10.2018 to 14.10.2018. Shuttle team won the runner up.

Three students from College of Agricultural Engineering, Bapatla participated in XIX All India Inter-Agricultural University meet held at Punjab Agricultural University, Ludhiana from 02-05th January, 2019.

One student from College of Agricultural Engineering, Bapatla bagged State level 4th position in All India Essay Writing 2018 organized by Shri Rama Chandra Mission.

Six students from College of Agricultural Engineering, Madakasira participated in XIX All India Inter-Agricultural University meet held at Punjab Agricultural University, Ludhiana from 02-05th January, 2019.

Mr. P. Bhanu Taja , Ch. Ramya and G. Propulla Sri from College of Food Science and Technology, Bapatla participated in XIX All India inter University Sports and Games meet , 2018-'19, from 2nd -5th January,2019 held at PAU, Ludhiana.

Mr. G.Ranjeeth represented Shot put, Discus & Javelin Throw; Mr. K.Naveen, has represented High Jump from College of Food Science and

Technology, Pulivendula for ANGRAU at XIX All India Inter Agricultural Universities meet held at Punjab Agricultural University, Ludhiana from 2nd to 5th January 2019.

Five students from Home Science College, Guntur participated in essay writing competitions conducted by Heartfulness Meditation Ramachandra Mission, SVN colony, Guntur on topic " A Mind of logic is like a knife all blade that makes the hand bleed that uses it" and won the prizes.

Twenty two students from ANGRAU have participated in XIX All India Inter-Agricultural Universities Youth Festival held at Sardarkrishinagar Dantiwada Agricultural University (SDAU), Sardarkrishinagar, Gujarath from 03-07th February, 2019.

Sports Day Inauguration by Hon'ble Vice-Chancellor

Inauguration of Basket Ball and Tennis Court by Hon'ble Vice-Chacellor

Winning Team with Prizes

Winning Team with Prizes

Winning Team with Prizes

Drama performance by the students

4. Students' Counseling and Placement Cell :

The Students' Counseling and Placement Cells are functioning in all the Colleges and Polytechnics of the University. They are acting as liaison between the University Colleges and the public & private sector organizations / institutes that are in need of graduates/diploma holders.

During this year, the campus interviews were held by several organizations and a total of 129 students got placed in different public and private organizations. The list of firms in which the students got placement is shown in Table 9.

Table 9. Student Placements during 2018-'19

Name of the Organization	Name of the Post	Number of students placed
Agricultural College, Bapatla		
IBPS (Banks)	Rural Development Officer	02
VST Industries	Leaf Supervisor	03
Bayer Crop Sciences	Marketing Officers	11
Dasarath Prasad Fertilizers	Marketing Executives	04
Shefa Agricare	Sales Officers	06
ITC	Leaf Supervisor	02
S.V. Agricultural College, Tirupati		
Godfrey Philps India Limited	NA	02
Syngenta Foundation India	NA	01
Gayathri foundation	NA	03
IIFCo	NA	01
Rallis India Limited	NA	03
Dasarath Fertilizers Pvt Limited	NA	03
Zuvari Fertilizers Limited	NA	06
ITC Limited	NA	02
ShreejaMahila Milk Producers Company	NA	07
Agricultural College, Naira		
M/s. Coromandel Int. Ltd.,*Campus placement*	-	02
M/s. Dow- Dupont	-	02
M/s. Godrej Agrowet	-	01
M/s. Nuziveedu seeds	-	02
M/s. Bayer	-	01

Name of the Organization	Name of the Post	Number of students placed
Agricultural college, Rajahmundry		
ZBNF	National Farming Fellow	06
Aenaphyll Innovatives India (P) Ltd.,	Marketing Trainers	03
Dashrath Prasad Fertilisers Pvt. (Ltd.)	Marketing Officers	03
College of Agricultural Engineering, Bapatla		
Mahindra & MahindraTractors, Hyderabad	Work Engineer	02
SHAKTIMAN, Hyderabad	Field Officers	02
DHAN Foundation, Madurai	Field Officers	10
SUJAY Irrigation, Bangalore	MI Engineers & Sales Officers	05
Mahindra and Mahindra, Vijayawada	Sales Promote Executive Officer	04
TAFE, Vijayawada	Field Officers	05
Sundaram finance Pvt., Ltd, Chennai	Sales Promote Executive Officer	04
E-commerce	-	02
College of Agricultural Engineering, Madakasira		
HDFC Bank	Retail Agri. Relationship Manager	03
Premier Irrigation Ltd.,	Design Engineer	01
Rural Development Trust(RDT)	Field officer	01
Sundaram Finance	Marketing Manager	06
Pydah College of Engineering, Kakinada	Teaching Assistant	02
Sri Vinayaka Diploma in Agriculture, Sadum, Pileru, Chittoor Dist.	Teaching Assistant	02
College of Food Science & Technology, Bapatla		
ITC , Guntur	Quality Manager	01
Premium ingredients, Chittoor	Quality Manager	01
Kamala consumer care Rang Reddy	Quality Manager	01
Pepsi co Ltd Sanga Sanga, Telangana	Quality Manager	01
College of Food Science & Technology, Pulivendula		
Ravi Foods Groups, Hyderabad	NA	05

5. Equipment Purchased by Different Colleges during the Year 2018-'19

The details of equipment purchased by different colleges which costs more than Rupees One lakh per item are furnished in Table 10.

Table 10. Major Equipment Purchased during the Year in different Colleges Costing more than Rs. 1.00 lakh per item.

S. No.	Institution	Equipment	Cost (Rs.)
01	Agricultural College, Bapatla	Desktop computers (5 No.)	1,61,000
02		Thermomixer	2,67,152
03		Quantum Sensor with Data Logger	1,29,299
04		Hot Air Ovens	1,64,997
05		Spectrometer Grain Analyzer	17,58,750
06		Thermal Cycler (PCR/Master Cycler)	7,20,761
07		Tissue Lyser	2,86,776
08		Quant Studio 3D Core Digital Droplet PCR System	26,28,236
09		DNA Cross linker	1,47,000
10		Electroporator	2,59,875
11		Leaf Image Analysis system	4,89,936
12		Pyranometer	1,46,510
13		2D Electrophoresis unit	18,54,300
14		-80 Degree Freezer	7,78,235
15		Fume Hood	1,86,200
16		Wall Table	12,93,600
17		Plant Stress Meter	4,98,091
18		Portable Photosynthetic Meter	21,25,236
19		Single Distillation Apparatus	58,653
20		Laboratory Trolleys	2,01,780
21		Autoclave Vertical	3,59,100
22		3L In Situ Sterilizable Glass Vessel Fermentor	9,16,650
23		Potter Spray Tower	6,41,603
24		Image Processing software – 5 user	9,49,200
25		Plant Canopy Analyzer	2,99,250
26		Water Potential Meter	8,82,000
27		Digital Electronic Balance Internal 220g	1,50,675
28		BOD Incubator	10,97,250

S. No.	Institution	Equipment	Cost (Rs.)
29		Micro Pipette	1,61,589
30		Automatic N Estimation	2,38,350
31		Rotary Vacuum Evaporator	2,85,180
32		Magnetic Stirrer with Hot Plate	1,60,000
33		Elisa Reader with Microplate Washer	6,16,902
34		10 KV UPS	22,22,023
35		Laboratory Hot Air Oven	3,85,035
36	Agricultural college, Naira	Computers	1,98,460
37		Duel Desks	4,89,300
38		Display system	1,83,660
39		Accessories for Smart Class Rooms	1,79,340
40		100 lit capacity of R.O/UV system	2,99,720
41	Agricultural College, Mahanandi	Developed new conference hall in college	7,54,000
42		Libra Chairs (to Department heads)	1,50,000
43		Steel Almarahs (18)	3,78,000
44		Cell perfect super deluxe chairs(50)	1,22,000
45		Interactive White Board(05)	2,80,000
46		Iron Cots(50)	2,61,000
47		Island work table of 6X5X3' for Agronomy laboratory(02)	1,44,000
48	College of Agricultural Engineering, Madakasira	Reversible MB plough (2 Bottom)	1,08,160
49		Shaktiman Rotovator (42 Blade) HD	1,19,896
50		Valasamani Multi Crop Thresher VMT5540-G	5,15,840
51		John Deere Tractor 5310 (55HP) including Accessories	10,59,136
52		Anantha Groundnut Planter (Tractor drawn) – 4 no.s	2,74,800
53		Groundnut Harvester (Raised bed)	2,02,550
54		Mobile Shredder	2,18,400
55		Electric motorized groundnut decorticator with higher capacity	1,10,000
56		Paddy Transplanter	2,70,400
57	College of food Science and Technology, Bapatla	CC TV Cameras Cables & Fixtures	3,91,265

S. No.	Institution	Equipment	Cost (Rs.)
58	College of Food Science and Technology, Pulivendula	9 No's of Desktop computers (i5 processor, windows 10 – 64 bit, 16 GB Ram) 55,200/- (each)	4,96,800
59	College of Home Science, Guntur	Lenovo all in one computers	2,39,784

E. UNIVERSITY LIBRARY

ANGRAU Library System and Management

The ANGRAU Library System is having 11 libraries in its fold including the University Library located at the head-quarter in Lam, Guntur. The main motto of the libraries is to accomplish its task of reaching to wider user community, comprising of teachers, scientists, extension specialists and students. All the ANGRAU libraries hold rich collection in agriculture and allied sciences which comprises of Books, Periodicals, Back-Volumes and Reports etc. Apart from print resources the e-Resources are being made available through online. The University Library also focuses on electronic delivery of information and library resources accessible through web & local area network.

The ANGRAU libraries function under the overall supervision of the University Librarian. The Regional Libraries and the College Libraries are run by the Assistant Professors (LIS) under the administrative control of the Associate Deans in their respective colleges. In a nutshell, the ANGRAU University library has very rich collections print and non-print documents *viz.* of books, e-books, e-journals, databases such as J-Gate Agriculture and Biological Sciences (CeRA), KrishiKosh, DELNET, EPRF Agricultural database, Indiastat.com and many more. All the library e-Resources are being made available through EZProxy and RemoteXs remote access to various colleges, research stations, polytechnic colleges, DAATT centers and kvks of ANGRAU for the benefit of students, scientists, teachers and research staff.

After bifurcation of the ANGRAU, Library system consists of the following centers.

University Library : Lam, Guntur

Regional Libraries :
1. Agricultural College, Bapatla
2. S.V. Agricultural College, Tirupati

College Libraries :
1. Agricultural College, Naira
2. Agricultural College, Mahanandi
3. Agricultural College, Rajahmundry
4. Dr. NTR College of Agricultural Engineering, Bapatla
5. College of Agricultural Engineering, Madakasira
6. Dr. NTR College of Food Science & Technology, Bapatla
7. College of Food Science & Technology, Pulivendula
8. College of Home Science, Guntur

In addition, every Polytechnic College is provided with Library facilities for the benefit of the students and teachers. These libraries are maintained by Officer-in-charge, Library.

OBJECTIVES

- To collect, maintain and make accessible all books and journals of Agriculture and allied subjects to the Scientific and Students community.
- To procure, consolidate and make accessible all types of documents in the principal areas of Agriculture and associated subjects of importance to the University.
- To maintain resource house of information on the continuing research and development in Agriculture and allied areas in the University.
- To interact with the associated institutes in the country for effective e-resource sharing and document delivery service.
- To participate in Agricultural Library and Information Networking at the Regional, National and International levels.

Components of the Library

Books and Periodicals: All the libraries together continued to receive over 374 Indian and 51 Foreign Periodicals in Agriculture and allied sciences. In addition, 4200 books and about 375theses have been added during the year. All the libraries have a separate reference book collections viz., dictionaries, encyclopedias, almanacs, etc.

Book Bank Scheme: The ANGRAU libraries are providing important books under special Book Bank Scheme for the benefit of SC, ST and BC students. Special text-book collection has been built up at each campus. All the libraries have procured good number of titles and increased the collection for the benefit of the students.

Reference Section: The reference section of the library houses the reference books which are meant to provide quick and accessible information on any particular topic. Reference books include topics that are intended to guide researchers in their studies. Each copy of book recommended by Teachers & Students will be kept for reference purpose. Reference material is not meant for circulation.

Competitive Examination Cell: A separate competitive examination cell has been established at all the ANGRAU campuses for the benefit of those students who are appearing for various competitive examinations for the better placement position and higher studies. This section provides the useful material required for the aspirants of ICAR Examinations, ASRB, ARS, ICAR-JRF/ NET, UPSC, APPSC, GMAT, TOEFL, GRE, IELTS,BSRB Bank Exams and all other competitive exams.

Newspaper Section: The University library subscribes to 8 daily newspapers in different languages viz. Telugu and English which covers National and Regional News. All the college libraries subscribe to daily newspapers in different languages.

Visitors: During this period, a total of 1,17,181 numbers of visitors utilized the library services in all the campuses of the ANGRAU Libraries. The regular membership of the libraries including teachers and students was 5847.

Library Services

Reprographic Services: The photocopying facilities available in all the campuses have been put to maximum use and nearly 2,61,778 copies were provided to the library users during the year. It is also generated an income of Rs.3,85,379/- from all the ANGRAU libraries.

Exchange of University Publications: The University Library distributes 48 copies of

ANGRAU Journal of Research to various National and International institutes. On exchange, the University Library receives foreign and Indian publications.

Library In-House Publications: The ANGRAU University Library is bringing out the following publications regularly for the benefit of Teachers, Scientists, Extension Specialists and Students.

Sl.No.	Name of the Publication	Periodicity	Form
1.	ANGRAU Theses Abstracts	Yearly	Print and softcopy
2.	ANGRAU Library Bulletin	Half Yearly	Print and softcopy

Digital Library Service

The digital library infrastructure facilities viz., interactive digital board, computers with the latest configuration, internet facility, etc., are fully strengthened in existing libraries as well as established digital libraries in new Colleges to utilize the electronic information i.e. CeRA, Indian journals.com with full text journals, Krishi Kosh, Indiastat, CRC, Netbase e-Books, CAB e-Books, Elsevier e-Books, etc. for the improvement of academic and research programmes. All the ANGRAU libraries are equipped with sufficient number of computers with latest configuration and U.P.S. facility, printers, etc. to access the e-Resources and also to browse the Internet. The Internet facility is available in all the campuses of the ANGRAU libraries.

Resources / Online Resources

The ANGRAU University Library has subscribed e-Resources / Online Resources to provide the latest information to the teachers, scientists, extension specialists and students, etc., to meet their research and educational information needs.

- **Consortium for e-Resources in Agriculture (CeRA):** The ICAR has provided consortium online e-Resources service called CeRA (Consortium for e-Resources in Agriculture) under NAIP project from 2008 onwards. It is providing access to nearly 6051 journals in Agriculture and allied disciplines. The user ID and Passwords have been circulated to all the colleges of the University, Research Stations and also to all the patrons of the University to utilize the e-Resources effectively.
- **IndiaStat - Statistical Database:** Indiastat.com is an authentic storehouse for socio-economic statistics about India. It provides statistical data, current happenings with a statistical approach and articles from scholars on subjects of social and economic importance, etc.
- **e-Books Taylor and Francis:** The ANGRAU University Library has purchased more than 210 CRC Net Base e-Books on Agriculture and allied sciences, which can be accessed through I.P. and on User ID and Password basis. The e-Books are very much useful to the teachers, scientists, extension specialists and students to browse the important content on Agricultural and allied sciences.
- **e-Books CABI:** The ANGRAUUniversity Library has purchased CAB e-Books on perpetual basis and on DVD, which has unlimited access from the year 2000 and provided access to all the ANGRAU Colleges via I.P. range and on User ID and Password basis. The user ID and Password are circulated to all the Colleges and Research Stations in the University. e-Books are useful for the teachers, scientists and students to browse important

Agricultural content by sitting anywhere, anytime and these will improve the quality of research and save lot of precious time of the students, teachers and researchers.

- **Arts and Science Publication e-Books:** 810 e-Books on Agricultural Science provide the comprehensive and reliable content that researcher's need, the accessibility and searchability that researchers want, which alone cannot be available in print sources. All the ANGRAU Colleges can access via I.P. range and on User ID and Password basis.
- **J-Gate Agriculture and Biological Sciences**: It provides access to 1985 online e-Journals Portal called J-Gate Agriculture and Biological Sciences for the year 2018-19 (which covers data from 2001 to 2018).
- **AgriCat:** AgriCat is the Union Catalogue of the holdings of 12 major libraries of the ICAR Institutes, Deemed Universities and SAUs. It has been created with the partnership of OCLC WorldCat. The ANGRAU University Library is also a member library in AgriCat / WorldCat and contributed nearly 35,000 bibliographical records.
- **KrishiKosh:** KrishiKosh is an Institutional Repository under National Agricultural Research System (NARS). The repository of knowledge in agriculture and allied sciences, having collection of old and valuable theses, books, records and various documents spread all over the country in different libraries of Research Institutions and State Agricultural Universities (SAUs).ICAR Open Access Policy has implemented in ANGRAU and 758 M.Sc. and Ph.D. Theses were uploaded in the KrishiKosh Repository after embargo period of one year from 2014 onwards.
- **DELNET:** Developing Library Network (DELNET)DELNET provides access to more than 1.75 crore bibliographic records of books, journals, articles, CD's etc. The internet Library Loan/document Delivery Services are one of the most popular services of DELNET. The main objectives of DELNET are to promote resource sharing among the Member-Libraries by collecting, storing and disseminating information by offering networking services to users.
- **EzProxy Remote Login Server:** The ANGRAU University Library has implemented EzProxy middleware software to provide remote access to web-based licensed resources offered by the library. The EzProxy server authenticates library users against local authentication authorization. It enables to access all the Library subscribed online resources in a single platform and to download full text articles through EzProxy server without any IP Address.

ACADEMIC ACTIVITIES

PGS-501 Library Services Course: Offering PGS-501, Non-Credit Library and Information Services Course to the PG and Ph.D. Students. The main objective of the course is to educate the users on how to access resources of library, search strategies, online educational resources etc.

Orientation Programme: University libraries are conducting Orientation Programmes for newly admitted U.G., P.G and Ph.D students about the library system, rules and regulations, access to library facilities and services.

Awareness Programmes on e-Resources: The University Library is regularly conducting training cum and awareness Programmes on e-Resources on accessing online information resources viz., CeRA, CABI, CMIE, e-Books, e-Journals, Databases etc. for the benefit of Scientists, Teachers, Students and Extension Specialists.

Table 11 : Library facilities and services for the year 2018-2019

S. No	Name of the Library	Books		e-Resources		Theses		Periodicals Subscribed		Membership		Books Issued	No. of Readers Visited	No. of Internet Users	No. Of Xerox Copies Exposed	Income Generation (Rs.)
		Number added during the Year	Total	e-Journal	e-Books	Number Added during the year	Total	Indian	Foreign	Number Added during the year	Total					
1.	University Library, [illegible]	315	2734	80	810	100	758	32	–	17	85	688	9671	581	[illegible]	[illegible]
2.	Regional Library, Bapatla	361	[illegible]	--	--	71	3054	65	6	[illegible]	317	6798	[illegible]	294	[illegible]	[illegible]
3.	Regional Library, Tirupati	962	21,734	--	--	71	4153	114	35	219	649	4563	43444	1134	20,142	[illegible]
4	Agricultural College Library, Naira	628	13959			2	31			137	57	2095	10,341	2215	[illegible]	[illegible]
5.	Agricultural College Library, Mahanandi	531	[illegible]	--	--	4	19	37	–	102	412	6051	8475	110	15,731	[illegible]
6.	Agricultural College, Rajamahendravaram	112	3961	--	--	--	--	--	–	75	175	1621	1381	135	–	--
7.	Dr. NTR Agricultural Engineering College Library, Bapatla	488	11596	--	--	17	91	11	6	102	1180	9175	[illegible]	387	2273	[illegible]
8.	Agricultural Engineering College, Madakasira	111	6178	--	--	--	--	19	21	11	138	1101	16,792	167	12,346	[illegible]
9.	Dr. NTR College of Food Science & Technology Library, Bapatla	139	8771	--	--	--	--	15	–	60	163	[illegible]	765	--	2573	[illegible]
10.	College of Food Science & Technology, Pulivendula	115	2576					29		47	136	2221	[illegible]	452	45047	44,558
11.	College of Home Science, Guntur	67	855	--	--	--	--	17	–	72	307	162	4658	--	575	[illegible]
	TOTAL	4200	1,84,710	80	810	375	5119	374	51	1213	5817	45,199	1,15,181	5505	2,61,776	3,85,379-00

Table 12. Statement showing the brief Annual Statement for the Period from 01-04-2018 to 31-3-2019

S.No	Name	Added	Total
1	Books	4200	1,34,740
2	Foreign Periodicals	—	51
3	Indian Periodicals	—	374
4	Theses	375	7119
5	Membership	1213	5847
6	No. of Users Visited	—	1,71,181
7	Issue of Books	—	47,199
8	Xerox	—	2,61,778
9	Internet Users	—	8705
11	Total Collection of Amount	—	3,85,379-00

F. INTERNATIONAL PROGRAMMES

The ANGRAU established a centre to facilitate International Programmes under the control of the Director International Programmes in 2005. The Centre serves as an internal and external liaison for the University, providing a source of assistance to faculty, administrators and students and enhancing their ability to pursue and develop international activities and initiatives. The ANGRAU promotes the process of actively partnering with the International Universities and Organizations to effectively utilize and apply the University's knowledge, resources and expertise to mutually address the needs and problems facing global society today.

During the period under report, the Centre took up the following activities.

- Identified collaborative research projects with the institutes abroad
- Stimulated the Faculty and Students to apply for various International Fellowships
- Coordinated the participation of Faculty in overseas programmes
- Coordinated the visits of foreign delegations

The details of participation of ANGRAU Faculty in various overseas programmes and the visits of foreign delegations to the University during the period under report are given in detail in Table 12a and 12b.

Table 13. PARTICIPATION OF FACULTY IN OVERSEAS PROGRAMMES

S. No.	Name of the Faculty	Programmes attended	Period	Place
1	Dr. M. Sunil Kumar Scientist (Agronomy), GTC, Lam	Attended training programme on MapScape-Rice under ANGRAU-Govt. of Andhra Pradesh-IRRI collaborative research project on "Satellite based Rice Monitoring System for Andhra Pradesh" at SARMAP, Purasca, Switzerland	23rd Sep, 2018 to 13th Oct, 2018	Switzerland
2	Dr. B.V.S.Prasad Professor & Univ. Head (FPT), College of Agricultural Engineering, Bapatla	Participated in the International training course on **"Feeding the Future: Food Safety and Technology in Times of Global Change"** held at the Robert H. Smith Faculty of Agriculture, Food & Environment, The Hebrew University of Jerusalem, Rehovot, Israel.	7th to 26th October, 2018	Israel
3	Dr. K. Uma Devi Assistant Professor (Agrl. Economics), O/o Dean of Agriculture, ANGRAU, Admn. Office, Lam, Guntur	Participated in the International training course on **"Agricultural and Natural Resource Economics Changes in the Era of Globalization"** held at the Robert H. Smith Faculty of Agriculture, Food & Environment, The Hebrew University of Jerusalem, Rehovot, Israel.	5th to 23rd November, 2018	Israel
4	i. Dr. M. Sunil Kumar Scientist(Agronomy), GTC, Lam ii. Dr. P.V. Geetha Sireesha, Scientist (Soil Science), GTC, Lam iii. Dr. U. Vineetha Sr. Scientist (Agronomy), ARS, Nelloreiv. iv. Dr. Mohan Vishnu Vardhan, Scientist (Pl. Breeding), ARS, Vijayarai.	Attend the training programme on ORYZA Crop Modelling in Los Banos, Philippines under ANGRAU-Govt. of Andhra Pradesh-IRRI Collaborative Research Project on "Satellite based Rice Monitoring System for Andhra Pradesh".	22nd to 26th April, 2019	Philippines
5	Dr. P.V .Geetha Sireesha Scientist (Soil Science), GTC, Lam	Visited IRRI headquarters to attend hands-on training on MAPScape-Rice software under ANGRAU-Govt. of Andhra Pradesh-IRRI Collaborative Research Project on "Satellite based Rice Monitoring System for Andhra Pradesh".	from 29th April to 03rd May, 2019	Philippines

Table 14. MoU with different National Institutions and International Universities

S. No.	MoU with	Date of MoU	Areas of understanding
1	University of Western Australia, Australia	17-10-2018	The Parties hereby agree to promote cooperation in the field : a) Exchange of scientists, technologists and students; b) Exchange of germplasm and breeding material; c) Exchange of scientific literature, information and methodology; d) Exchange of scientific equipment as available and required in programme of common interest as may be mutually agreed upon. e) Development and implementation of collaborative research projects, the areas and methodology
2	Central Institute for Cotton Research (CICR), Nagpur	21-01-2019	An exchange of students for academic, research and training programmes.
3	A.P. State Development Planning Society (APSDPS), Vijayawada	21-01-2019	Improving governance, strengthening of institutions, output and research in issues related to key performance indicators in agriculture and allied sectors in the state of A.P.
4	Water And Land Management Training And Research Institute (WALAMTARI), Hyderabad	01-04-2019	An exchange of students for academic, research and training programmes.
5	Jigjiga University, Ethiopia	Is in process	Sent to Department of Agricultural Research and Education (DARE), Ministry of Agriculture & Farmer's Welfare, Govt. of India, New Delhi for approval.
6	Ethiopian Somali Region Pastoral And Agro-Pastoral Research Institute (ESoRPARI)	Is in process	Sent to DARE for approval
7	Mississippi State University (MSU), USA	Is in process	Sent to DARE for approval
8	New Mexico State University (NMSU), USA	Is in process	Sent to DARE for approval

Table 15. Visit of foreign delegations to ANGRAU

S. No.	Name	Purpose	Date
1	Dr. Dilip Kumar Guntuku and his team of Scientist, IOWA State University, USA	Interaction with faculty & students on seed research and processing techniques.	22-06-2019
2	Sri B.M.Prasanna KumarDirector, CGIAR Research Programme, Maize & Global Maize Programme, CIMMYT, Nairobi, Kenya	Participated in interaction meeting on Fall Army Worm in maize conducted by Research Wing of ANGRAU at the Seminar hall, APGC, Lam, Guntur and delivered the lecture on "Fall Army Worm and its Management" and on activities of CIMMYT, Mexico on maize breeding and development.	27-09-2018
3	Dr. Jacqueline Hughes DDG-Research, IRRI, Philippines	Visited ANGRAU to interact with all the University Officers on collaborative activities.	16-10-2018
4	Dr. Kent J. BradfordInterim Director, World food centre, College of Agricultural and environmental sciences, University of California	Visited the breeding stores, seed godown and discussed with AICRP groundnut team about estimation of seed moisture content, safe seed storage methods and instruments for estimation of moisture content and relative humidity at RARS, Tirupati.	01-11-2018

Awards received:

- Dr. T.N.V.K.V. Prasad, Principal Scientist (Soil Physics), RARS, Tirupati has received an **Australian Endeavour Ambassador Award-2018** from Australian High Commissioner to India.

IV. RESEARCH

Of the three major functional components of the University, research is by far the largest component of the University's functions in terms of manpower engaged and funds utilized through several projects including ICAR, *Rashtriya Krishi Vikas Yojana* (RKVY), NABARD, Department of Biotechnology (DBT), Department of Science & Technology (DST), paid up trials and seed production etc.

The University continued its research efforts in Agriculture, Agricultural Engineering & Technology, Home Science and allied fields with the renewed vigour and commitment for improving the production and economic status of the farmers of the Andhra Pradesh State in particular and contributing for food security of India in general.

The research activities of the University in the faculties of Agriculture and Agricultural Engineering & Technology and also in Home Science to some extent are being carried out at 36 Research Stations including six Regional Agricultural Research Stations spread over in 13 districts of the entire state of Andhra Pradesh.

The organogram of research in the University is depicted in Fig. 7. The Agro-climatic zone-wise list of research stations of the University and their functions, the list of ICAR Coordinated research projects and the List of projects under *Rashtriya Krishi Vikas Yojana* are given in Annexures VI, VII and VIII, respectively.

The research activities of the University mainly focus on crop improvement, crop production, crop protection, climate resilient agriculture, post-harvest management and farm mechanization aspects for adoption by the farming community for overall increase in agricultural production and reducing cost of cultivation besides solving location specific problems. Research is also carried out in basic sciences, which is supportive to applied research. On-farm research is conducted for evaluation and refinement of newly developed technologies under farmers' field conditions.

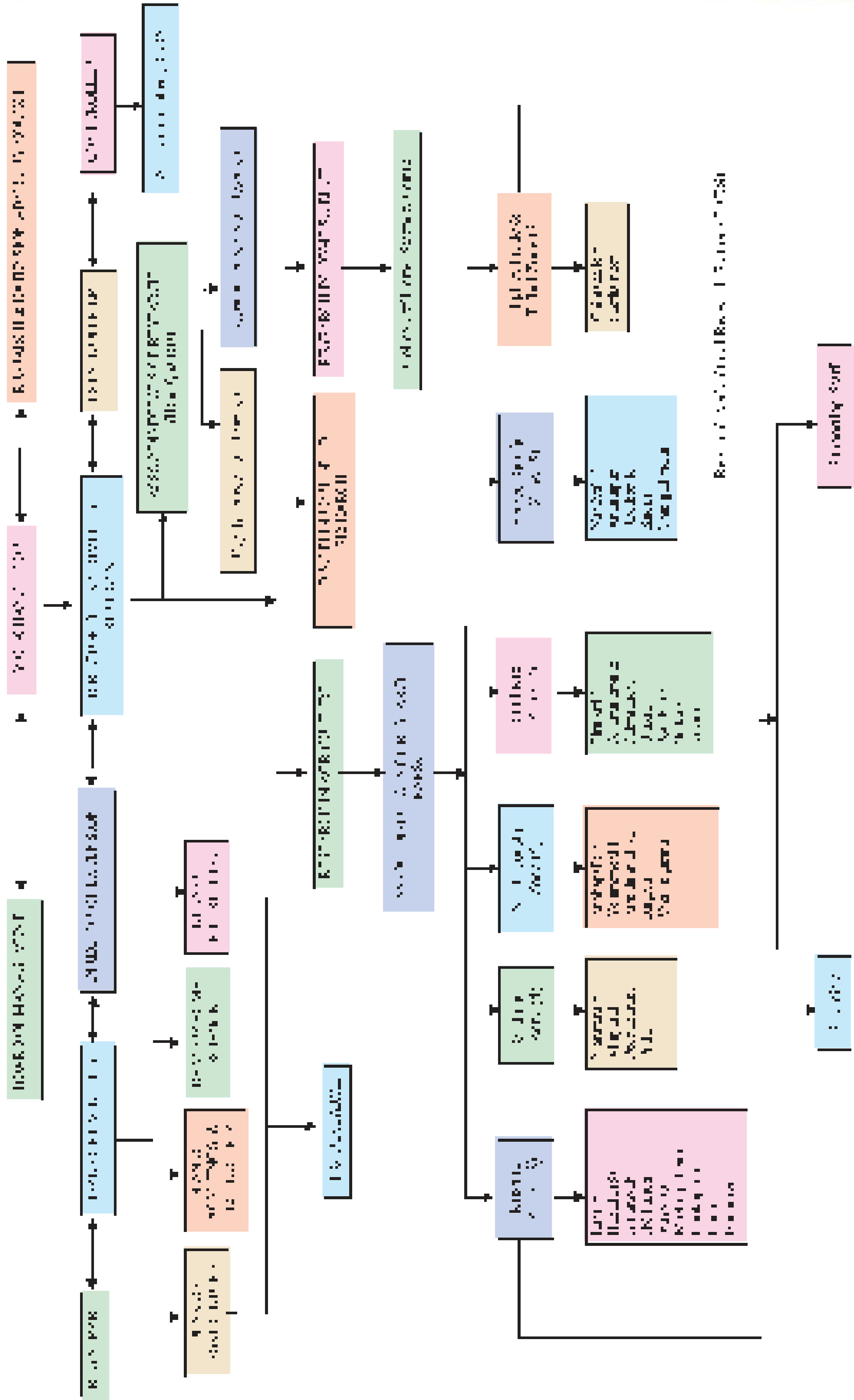


Fig 7. Organogram of Research in University

SEASONAL CONDITIONS AND CROP PERFORMANCE

A rainfall of 456.6 mm was received in the State of A.P. during the South West Monsoon period of 2018-19 as against the normal rainfall of 556.0 mm with a deficit of 18%. There was a deficit of 58% in the North East monsoon period as only 124.1 mm rainfall was received as against the normal rainfall of 296.0 mm during the period. Winter period recorded 10.2 mm rainfall as against the normal rainfall of 15.7 mm. Rainfall recorded during summer period was 40.8 mm as against normal rainfall of 98.3 mm. During 2018-19, the state received an average total rainfall of 631.7 mm as against normal rainfall of 966.0 mm, deficit being 35 %. The rainfall was more deficit in Prakasam (57%), Kurnool (56%) and Nellore (55%) districts of the State. Season wise normal and actual rainfall received in Andhra Pradesh for the year 2018-19 was given in annexure I. Rice, which is predominantly irrigated crop was grown in an area of 23.86 lakh ha (16.26 lakh ha in *kharif* and 7.60 lakh ha in *rabi*) during 2018-19. During rabi, rice crop recorded 53.29 lakh MTs production with a productivity of 7.01 t ha^{-1}. Increase in *rabi* productivity resulted in high rice production in the state (139.46 lakh MTs). Significant increase in the production of rice during *rabi* season together with productivity improvement in some of the crops was through adoption of best management practices largely contributed to this improved production. Maize grown in 3.56 lakh ha (2.31 lakh ha in rabi) recorded an average productivity of 6.92 t h^{-1}. Total production during *kharif* and *rabi* season put together was 24.68 lakh MTs. Redgram, an important *kharif* pulse crop was grown in an area of 2.92 lakh ha. Total production in the state was 2.28 lakh MTs. During rabi, bengalgram, blackgram and greengram were grown in 4.77, 4.40, 1.70 lakh ha, respectively. The total pulse production during the year 2018-19 was 16.40 lakh MTs. Productivity of all pulses was increased during 2018-19 as against the previous year.

Groundnut crop was sown in an area of 9.23 lakh ha during *kharif* 2018. Drought prevailed during the season in major groundnut growing areas resulted in low pod yields in *kharif* (1.11 t ha^{-1}). The rabi yields were improved to the tune of 2.67 t ha^{-1} with a total production of 12.82 lakh MTs. The total area and production of oilseed crops were 11.87 lakh ha and 13.93 lakh MTs during the year 2018-19. Cotton, an important commercial crop of the state was sown in an area of 5.86 lakh ha and 21.0 lakh bales of lint was produced in the state. The gross cropped area during 2018-19 was 68.32 lakh ha as against 74.45 lakh ha in 2017-18. The area, production and productivity of major crops in Andhra Pradesh for the year 2018-19 are annexed in II.

Season and district wise normal and actual rainfall received and area, production and productivity of major crops in Andhra Pradesh for the year 2018-'19 are given in table 16 and table 17.

Table. 16
District wise and Monsoon wise rainfall received in Andhra Pradesh: 2018-2019

S. No.	District	South - West Monsoon (mm) (June – September 2018)			North - East Monsoon (mm) (October – December 2018)		
		Normal	Actual	% Dev	Normal	Actual	% Dev
01	Srikakulam	705.7	767.1	9	276.0	233.2	-16
02	Vizianagaram	692.7	628.0	-9	245.8	137.7	-44
03	Vishakapatnam	712.5	681.3	-4	297.2	141.3	-52
04	East Godavari	768.1	801.3	4	305.4	132.1	-57
05	West Godavari	792.0	890.7	12	239.4	112.6	-53
06	Krishna	685.1	643.3	-6	393.4	128.9	-67
07	Guntur	525.8	396.6	-25	228.9	86.1	-62
08	Prakasam	388.3	223.1	-43	393.7	103.3	-74
09	SPSR Nellore	331.4	173.7	-48	661.4	283.0	-57
10	YSR Kadapa	439.4	285.4	-35	395.4	167.7	-58
11	Kurnool	393.6	202.3	-49	251.0	65.2	-74
12	Anantapuramu	338.4	212.7	-37	155.3	49.8	-68
13	Chittoor	455.1	263.8	-42	149.6	36.9	-75
	Andhra Pradesh	556.0	456.6	-18	296.0	124.1	-58

S. No	District	Winter Period (mm) (Jan. and Feb. 2019)			Summar Period (mm) (March to May 2019)			Annual Rainfall (mm) 2018-2019 (Jan. 2019 to May 2019)		
		Normal	Actual	%Dev	Normal	Actual	%Dev	Normal	Actual	%Dev
01	Srikakulam	25.9	0.5	-98	154.0	112.6	-27	1161.6	1113.4	-4
02	Vizianagaram	25.5	0.5	-98	166.7	73.7	-56	1130.7	839.9	-26
03	Vishakapatnam	22.3	1.3	-94	170.2	93.4	-45	1202.2	917.3	-24
04	East Godavari	19.7	7.4	-62	124.5	42.4	-66	1217.7	983.2	-19
05	West Godavari	17.7	15.2	-14	104.0	8.5	-92	1153.1	1027.0	-11
06	Krishna	15.8	23.0	46	83.2	13.7	-84	1177.5	808.9	-31
07	Guntur	18.4	9.8	-47	79.9	18.5	-77	853.0	511.0	-40
08	Prakasam	16.3	8.5	-48	73.2	40.6	-45	871.5	375.5	-57
09	SPSR Nellore	19.9	12.2	-39	67.8	18.9	-72	1080.5	487.8	-55
10	YSR Kadapa	12.1	10.2	-16	87.0	32.2	-63	933.9	495.5	-47
11	Kurnool	3.4	10.8	218	51.6	31.1	-40	699.6	309.4	-56
12	Anantapuramu	2.9	11.8	307	55.7	45.5	-18	552.3	319.8	-42
13	Chittoor	4.6	15.2	230	61.2	37.0	-40	670.5	352.9	-47
	Average of Andhra Pradesh	15.7	10.2	-35	98.3	40.8	-58	966.0	631.7	-35

Table 17
Area, Production and Productivity of major crops in Andra Pradesh (2018-2019)

S.No.	Area (In Lakhs ha.)			Yield (Kg/ha.)			Production (In Lakh M Ts)		
	Kharif	Rabi	Total	Kharif	Rabi	Total	Kharif	Rabi	Total
1. Paddy	16.26	7.60	23.86	5300	7010	5845	86.17	53.29	139.46
2. Wheat	0.00	0.00	0.00	0	0	0	0.00	0.00	0.00
3. Jowar	0.42	1.20	1.62	1747	2770	2506	0.73	3.32	4.05
4. Bajra	0.45	0.05	0.50	1924	1924	1924	0.87	0.10	0.97
5. Maize	1.25	2.31	3.56	4680	8134	6924	5.85	18.83	24.68
6. Ragi	0.30	0.05	0.35	1168	1170	1168	0.35	0.06	0.41
7. Minor Millets	0.35	0.05	0.39	1100	1374	1133	0.38	0.06	0.44
8. Coarse Grains	2.77	3.66	6.43	0	0	0	8.19	22.37	30.56
9. Bengalgram	0.00	4.77	4.77	0	1373	1373	0.00	6.55	6.55
10. Redgram	2.87	0.05	2.92	782	892	784	2.24	0.04	2.28
11. Greengram	0.55	1.70	2.25	695	820	790	0.38	1.39	1.78
12. Horse gram	0.88	4.40	5.20	1002	986	988	0.80	4.34	5.14
13. Other Pulses	0.25	0.27	0.52	680	654	667	0.17	0.18	0.35
14. Groundnut	9.23	0.95	10.19	1113	2670	1258	10.28	2.54	12.82
15. Sesamum	0.33	0.35	0.69	450	364	406	0.15	0.13	0.28
16. Castor	0.50	0.02	0.52	621	1000	636	0.31	0.02	0.33
17. Sunflower	0.11	0.23	0.34	850	1068	999	0.09	0.25	0.34
18. Soybean	0.05	0.00	0.05	1765	527	1754	0.10	0.00	0.10
19. Other Oilseeds	0.00	0.09	0.09	0	780	780	0.00	0.07	0.07
20. Cotton (lint*)	5.81	0.05	5.86	609	594	609	20.82	0.19	21.00
21. Mesta (**)	0.06	0.00	0.06	1700	0	1700	0.60	0.00	0.60
22. Chillies	1.31	0.22	1.53	4896	4263	4804	6.41	0.95	7.35
23. Tobacco	0.04	0.90	0.94	2433	2565	2559	0.10	2.31	2.41
24. Sugarcane	1.20	0.00	1.20	81771	0	81771	97.97	0.00	97.97
25. Turmeric	0.20	0.00	0.20	8664	0	8664	1.72	0.00	1.72
26. Onion	0.26	0.08	0.34	18317	19800	18660	4.84	1.57	6.41
27. Coriander	0.00	0.01	0.01	0	590	590	0.00	0.01	0.01
Total Cropped area	42.78	24.54	68.32						

(#) Mesta production in lakh bales of 180 kgs.
Source: Directorate of Economics & Statistics, AP

AGRICULTURE

Crop improvement is one of the major mandates through development of superior varieties/hybrids with high yielding ability, resistant to biotic and abiotic stresses in tune with the changing needs and climate is a continuous process. During the period 2018-19, nine improved crop varieties, two each in rice (Bapatla Mashuri BPT 2295; Panduranga - MCM 100), sugarcane (Swarnamukhi - 2005T16/CoT0367; Ranga - 2009V127/ CoV15-0356), jowar (Nandyala Pachha Jonna - NJ 2446; Nandyala Tella Jonna - NJ 2647) and one variety each in ragi (Tirumala - PPR 1012), blackgram (Ghantasala Minumu-1- GBG 1) and groundnut (Dheeraj - TCGS 1073) were developed and released from ANGRAU at state level. One pearl millet variety was notified and released by the Central Sub-Committee on Crop Standards Notification and Release of Variety for Agricultural Crops in 2018 as "Central Pearl Millet Variety ABV 04" at national level during 2018.

Crop Varieties/ Hybrids released during 2018-19 at State

RICE

Variety : BPT 2295

Parentage : Bapatla Mashuri

Duration : 150-155 days

Season : *kharif* (Single cropped areas)

Reaction to pests, diseases and abiotic stresses : Resistant to blast and BPH

Average yield : 6.5 to 7.0 t ha^{-1}

Salient features : Tolerant to saline & water logged conditions. Non-lodging, medium slender translucent grain with excellent cooking quality.

RICE

Variety : MCM 100

Popular name : Panduranga

Parentage : MTU 1042/MTU 1

Duration : 140-145 days

Season : *kharif*

Reaction to pests, diseases and abiotic stresses : Tolerant to leaf blast, brown spot and sheath rot and stem borer and BPH Tolerant to salinity

Average yield : 5.5-6.0 t ha^{-1}

Salient features : Non-lodging, semi-dwarf, fertilizer responsive and non-shattering, possesses good cooking quality.

JOWAR

Variety : NJ 2446

Parentage : Selection from pamuru local

Duration : 115-125 days

Season : *kharif, maghi and rabi*

Reaction to pests, diseases and abiotic stresses : Drought tolerant, moderately tolerant to stem borer

Average yield : 25-32.5 q ha^{-1}

Salient features : Highly responsive to nitrogenous fertilizer. Suitable for alternate and/ or contingent cropping systems in rainfed areas.

RAGI

Variety : PPR 1012

Parentage : AE 3077 X Ratnagiri

Duration : 120-125 days

Season : *kharif, rabi and summer*

Reaction to pests, diseases and abiotic stresses : Tolerant to all the three types of blast and drought

Average yield : 30-35 q ha^{-1}

Salient features: Lengthy and large ear heads with tips incurved fingers. Purple pigmentaion on leaf juncture, nodes and glumes. High fodder yielder, good grain quality. Medium bold, copper brown colour with high calcium.

JOWAR

Variety : NJ 2647

Parentage : CS 3541 X NJ 2401

Duration : 95-100 days

Season : *maghi/ rabi*

Reaction to pests, diseases and abiotic stresses : Moderately tolerant to stem borer and drought

Average yield : 37.5-62.5 q ha^{-1}

Salient features: Non-lodging type. High consumer preference. Good

quality straw with palatability.

BLACK GRAM

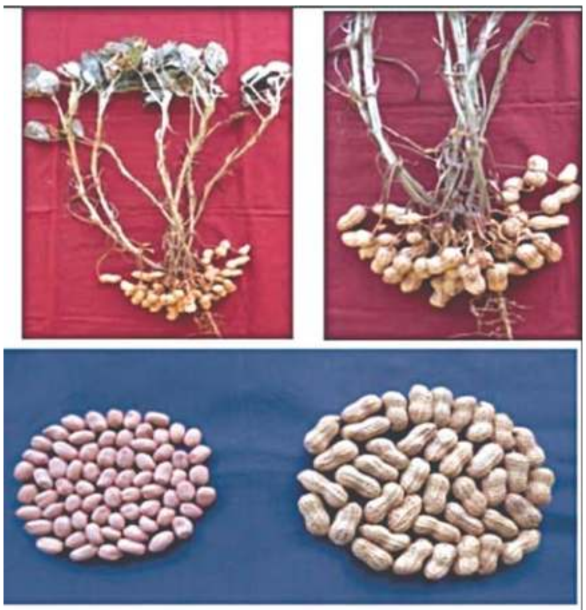
Variety	: GBG1
Parentage	: LBG 685 X PU 31
Duration	: 70-75 days
Season	: *kharif, rabi and summer*
Reaction to pests, diseases and abiotic stresses	: Resistant to YMV
Average yield	: 17 - 18 q ha^{-1}

Salient features: Resistant to Mungbean Yellow Mosaic Virus. Photo- insensitive and erect plant type.

GROUNDNUT

Variety	: TCGS 1073
Parentage	: Narayani × Jal 30
Duration	: *kharif -105*-110 and rabi -110-115 days
Season	: *kharif /early kharif/rabi*
Reaction to pests, diseases and abiotic stresses	: Water use efficient and heat tolerant. : Less susceptible to PBND/ PSND, leaf miner & jassids
Average yield	: *kharif* : 25-26, rabi : 35-37 q ha^{-1}

Salient features: Eighty percent kernel bold with 30-40 count, Spanish bunch, 100-seed weight: 50-70g, oil content: 48-49 %, protein content : 24.5 %, SMK: 82 %, Shelling out-turn: 73 -80 %, Suitable for table purpose.



SUGARCANE

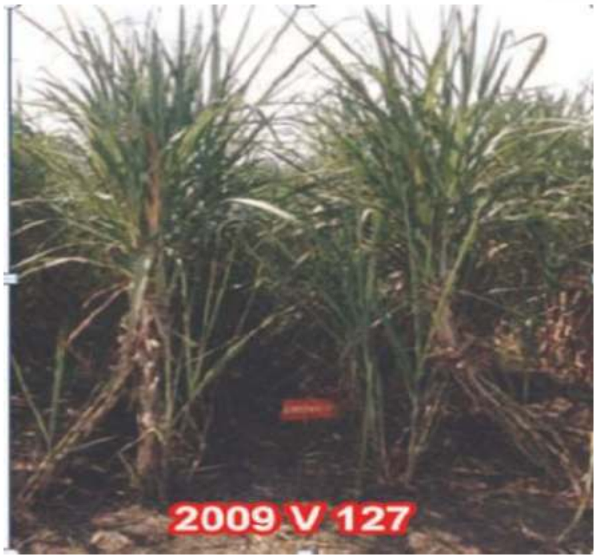
Variety	: 2005T16/ CoT 0367
Parentage	: CoH 110GC
Duration	: Early (10 Months)
Season	: November-March
Reaction to pests, diseases and abiotic stresses	: Tolerant to red rot (Cf419, Cf671, Cf261)

and whip smut. Tolerant to drought and salinity

Average cane yield : 100-110 t ha^{-1}

Salient features: Suitable for good quality jaggery making, mechanical harvesting, irrigated and limited irrigated conditions

SUGARCANE



Variety	: 2009V127/ CoV15-0356
Parentage	: CoA 92081 (87A298) GC
Duration	: Early (10 months)
Season	: December - January
Reaction to pests, diseases and abiotic stresses	: Tolerant to red rot (Cf419, Cf671, Cf997) and smut
Average yield	: 120-130 t ha^{-1}

Salient features: Suitable for irrigated, rainfed, water logged and saline soil conditions.

BAJRA

Variety	: ABV 04
Parentage	: ICMB 99555 X ICMB 99111
Duration	: 85-90 DAYS
Season	: *kharif*
Reaction to pests, diseases and abiotic stresses	: Resistant to downy mildew, smut and blast diseases and tolerant to drought
Average grain yield	: 1.5 to 2.5 q ha^{-1}

Salient features: Medium maturing, medium height, panicles are thick and compact with grey coloured obovate shaped bold sized seed, suitable for rainfed conditions.ABV 04 is recommended for large-scale cultivation in the rainfed conditions of kharif season of Maharashtra, Karnataka, Andhra Pradesh, Telangana and Tamil Nadu states and being rich in Iron (70.0 ppm) and Zinc (63.0 ppm), it helps in nutritional security and to overcome anemic conditions especially in poor people of tribal areas.

CULTURES COMPLETED MINIKIT TESTING AND READY FOR RELEASE
CEREALS AND MILLETS

APRRI & RARS, Maruteru

In OYT (under Late & Salinity conditions), among the 23 rice entries evaluated against local checks during *Kharif* , nine entries recorded significantly superior yield over the superior check, MTU 1061 (6.03 t ha^{-1}). The entries MTU2374-116-1-2-1 (7.08 t ha^{-1}), MTU 2364-126-2-7-1 (7.02 kg/ha) and, MTU 2374-90-2-2-1 (6.99 t ha^{-1}) were the best performing entries..

In PYT, out of 20 entries (including checks) evaluated, three entries *viz*., MTU 2299-51-1-1-3 (6.69 t ha^{-1}), MTU 2531-63-2 (6.08 t ha^{-1}), MTU 2263-7-4-2 (6.07 t ha^{-1}) recorded significantly superior yield than the best check, MTU 1061 (5.37 t ha^{-1}).

In AYT, fourteen entries along with two checks were evaluated. Five entries, MTU2223-29-2-1-1 (6.79 t ha^{-1}), MTU2293-8-2-1 (6.645 t ha^{-1}), MTU 2222-26-4-3-3 (6.26 t ha^{-1}, HR OYT L 8 (6.20 t ha^{-1}) and MTU 2613-33-1-1 (6.11 t ha^{-1}) were significantly superior over the best check MTU1061 (5.46 t ha^{-1}).

In Multi Location Trial, 20 entries were evaluated along with one common check and one local check. Among them six entries *viz.,* MTU2091-14-2-1-1 (6.29 t ha^{-1}), MTU2101-30-2-1-1 (6.12 t ha^{-1}), MTU2201-34-2-3-2 (6.11 t ha^{-1}), MTU2139-7-1-1-1 (6.03 t ha^{-1}), MTU2244-39-20-4 (5.91 t ha^{-1}) and MTU2164-60-1-1-1 (5.83 t ha^{-1}) recorded superior grain yield than the common check MTU1061 (5.35 t ha^{-1}).

In Multi Location Trial – Salinity-normal, among the 17 entries along with two parents and one tolerant check were evaluated, four genotypes *viz.,* DST37-21-1 (4.79 t ha^{-1}), DST36-108-1 (4.61 t ha^{-1}), DST6-96-9 (4.56 t ha^{-1}) and DST6-96-16 (4.46 t ha^{-1}) recorded superior yield over tolerant check MTU1061 (4.43 t ha^{-1}).

In Multi Location Trial - Salinity (low EC-3.05), two entries DST36-108-1(4.84 t ha^{-1}) and DST38-15-3-1 (4.76 t ha^{-1}) recorded significantly superior yield over the tolerant check MTU 1061 (4.27 t ha^{-1}) while ten entries recorded superior yield over the recurrent parent MTU1010.

In Multi Location Trial - Salinity (high EC-7.50), four entries *viz.*, DST38-15-3-1 (4.23 t ha^{-1}), DST36-108-1 (4.16 t ha^{-1}), DST8-4-4 (4.05 t ha^{-1}), and DST37-97-2-1(3.98 t ha^{-1}) recorded significantly superior yield than the tolerant check MTU1061 (3.59 t ha^{-1}).

In OYT (Medium duration) among the 24 entries under study, MTU 2658-34-2-1 (6.59 t ha^{-1}), MTU 2658-13-1-1 (6.34 t ha^{-1}) and MTU 2657-45-1-1 (6.33 t ha^{-1}) recorded significantly higher grain yield than the check variety MTU 1075 (5.64 t ha^{-}).

In Advanced Yield Trial (Medium), the entries MTU 2613-25-1-4 (6.02 t ha^{-1}), MTU 2613-31-1-1 (5.89 t ha^{-1}), MTU 2387-2-2-1-1 (5.89 t ha^{-1}) recorded higher yield in comparison with local check MTU 1075 (5.56 t ha^{-1})

In Multi Location Trial (Medium), MTU 2613-25-1-1 (6.39 t ha^{-1}), MTU 2414-5-1-1-1-1 (6.07 t ha^{-1}) and RM 135-33-1-2-1 (6.05 t ha^{-1}) recorded significantly higher grain yield in comparison with local check MTU 1075 (5.34 t ha^{-1})

In MLT-Early, out of 22 entries tested the entry MTU 2385-187-1-1-1 recorded highest grain yield of 7.30 t ha^{-1} followed by NLR 3238 (6.26 t ha^{-1}). The checks MT 1121 and MTU 1010 recorded 5.63 t ha^{-1} and 5.29 t ha^{-1} respectively.

Twenty two entries (including check) were evaluated in the trial AYT-Early. Out of them, the entry MTU 2513-11-5-1-1 recorded highest grain yield of 7.51 t ha^{-1} followed by MTU 2578-56-1 with 7.21 t ha^{-1} respectively. While the local checks MTU 1121 and MTU 1010 recorded 5.75 t ha^{-1} and 5.54 t ha^{-1} grain yield.

In Multi Location Trial (Slender grain) – Early-Midearly, MTU 2331-19-1-1-2 (6.03 t ha^{-1}), MTU 2274-1-3-1 (5.39 t ha^{-1}) and MTU 2513-24-2-2 (5.24 t ha^{-1}) recorded significantly highest grain yield compared to local check, NLR 34449 (4.22 t ha^{-1}).

In Multi Location Trial (Slender grain) – Medium-Late, MTU 2411-74-1-1-1 (6.05 t ha^{-1}), MTU 2347-87-1-1-1 (5.91 t ha^{-1}) and NLR 3418 (5.71 t ha^{-1}) recorded significantly highest grain yield in comparison with local check, BPT 5204 (4.63 t ha^{-1}).

One entry MTU 2433-1-3-1 (5.06 t ha^{-1}) performed better than the best check MTU 1140 (4.71 t ha^{-1}) in AYT-SDW.

Multi LocationTrial (submergence) at Ramannaplem flash floods for 10 days + stagnant flooding of 50 cm water depth for 20 days at tillering stage, MTU 1232 (4.53 t ha^{-1}), MTU 1231 (4.54 t ha^{-1}) performed better than recurring parent MTU 1075 (1.90 t ha^{-1}) and best check MTU 1140 (4.07 t ha^{-1}).

Multi LocationTrial (submergence) at Mondepulanka under stagnant flooding of 30-50 cm water depth for one month at tillering stage, Sub1 introgressed line of Pushyami, MTU 1232 (5.05 t ha^{-1})expressed higher yield than recurring parent MTU 1075 (4.32 t ha^{-1}) and also best check MTU 1140 (4.71 t ha^{-1}).

Multi LocationTrial (submergence) at Maruteru under complete submergence for 2 weeks at 21 DAT followed by stagnant flooding of 30-50 cm water depth till harvesting stage, MTU 1232 registered higher yield of 3.40 t ha^{-1} followed by MTU 1231 (2.64 t ha^{-1}) than recurring parent MTU 1075 (0.109 t ha^{-1}) and best check MTU 1140 (2.60 t ha^{-1}).

Whereas Multi Location Trial (submergence) under normal condition at Maruteru, three entries MTU 1231 (5.51 t ha^{-1}), MTU 2244-39-20-1 (5.47 t ha^{-1}) and MTU 2186-2-2-1-1 (5.43 t ha^{-1}) were found to be significantly superior over best check MTU 1140 (5.05 t ha^{-1}). Sub1 introgressed lines of MTU 1075 MTU 1231, MTU 1232 are found on par with recurring parent, MTU 1075 in respect of grain yield.

In AYT-Early during *rabi*, the top entries are 2645-39-4-1, 2651-24-1-1 and MTU 2576-61-1-2 with 6.79, 6.64, 6.64 t ha^{-1} grain yield, while the check entry MTU 1121 recorded 6.14 t ha^{-1}.

In Multi Location Trial (*rabi*) –early, out of 20 entries tested the entry MTU 2553-52-1-1 recorded highest grain yield of 7.39 t ha^{-1} followed by MTU 2513-24-2-2 and RM 129-7-2-1-1 with 7.28 and 7.28 t ha^{-1} respectively, whereas the check entry MTU 1121 recorded 6.77 t ha^{-1}.

444 germplasm lines were maintained and multiplied during *Kharif* 2018.

Among the three treatments of natural farming experiment, highest head rice recovery is observed in ICM whereas highest brokens in Palekar method. The kernel L/B ratio is more in case of Palekar method which is due to fineness of grain. Regarding cooking quality traits, the rice from natural farming treatment requires more water for cooking than ICM and Palekars method. With respect to chemical quality traits *viz.,* Alkali spreading value (gelatinization temperature) and Amylose (%) all three treatments require high temperature for cooking with intermediate amylose content. The gel consistency of all three treatments are high which comes under soft texture.

MLT cultures pertaining to early, medium and late duration, slender grain - early & mid early and medium and late, salinity are analysed for physical (grain dimensions and milling traits) and cooking quality traits.

In Multi Location Trial (*rabi*)-Early, the entry MTU 2274-8-1-1 had shown highest head rice recovery of 72.9% followed by MTU 2253-52-1-1 (69.82%). The entry MTU 2514-48-2-1 requires 142.5 ml^{-g} water for cooking. All entries had shown >3.5 volume expansion ration. The entry MTU 2344-60-21-1 and MTU 2515-42-1-3 showed highest elongation ratio of 1.78. The amylose content is in intermediate range.

In Multi Location Trial -Medium, the entry RM 135-33-1-2-1 and MTU 2404-25-2 recorded head rice recovery of 68%. The entries NLR 3559 and NDLR 10 are short slender and fine whereas remaining entries have medium sender grains. The MTU 2411-40-3-3-1 required more water for cooking among the 20 entries tested. The entry MTU 2222-26-1-1-2 (2.16) elongated more followed by MTU 2347-156-2-1-1-1 (2.13). The amylose content of most of the entries are in intermediate range.

In Multi LocationTrial -Late, out of 20 entries evaluated for quality, three entries BPT 2854, NDLR 14, UTR 187 have fine grains with > 3 kernel length / breadth ratio. Highest water uptake is found in MTU 2101-30-2-1-1 followed by MTU 2547A-96-7-17-1 (247.5ml). The grains of JMP 178 elongated more than other cultures. The entries L 606, MTU 1061, MTU 2547A-96-7-17-1 have high alkali spreading values indicating that these entries cook at lower temperatures (<700C). The amylose content of most of the entries are in intermediate range.

In Advance Variety Trial 1- Late, only one entry *viz.,* IET26948 (PRNP 48) (5.92 t ha^{-1}) recorded numerically superior yield when compared to the zonal check MTU 1075 (5.76 t ha^{-1}).

In Advanced Varietal Trial 1 (Irrigated Medium), the entries WGL 1021 (6.96 t ha^{-1}), PHI-17104 (6.88 t ha^{-1}) and MTU 1216 (6.84 t ha^{-1}) recorded significantly higher grain yield in comparison with the local check MTU 1075 (5.88 t ha^{-1}).

In Advanced Varietal Trial 2 (Irrigated Medium) the entries OR 2573-15 (6.78 t ha^{-1}) and WGL 697 (5.67 t ha^{-1}) recorded higher grain yield in comparison with the local check MTU 1075 (5.44 t ha^{-1}).

In Advance Variety Trial 1-Early transplanted, five entries *viz.,* IET26803 (RP 6221-HHZ 8-SAL9-DT2-Y2) (4.36 t ha^{-1}), IET25713(LP-1621 (Hybrid)) (4.19 t ha^{-1}), IET24914 (JKRH-2154 (Hybrid)) (4.06 t ha^{-1}), IET26763 (TRC 2017-11)(3.97 t ha^{-1}) and IET26771 (NVSR2103) (3.94 t ha^{-1} had recorded significantly superior yield over the hybrid check, US314 (3.51 t ha^{-1}).

In AVT-1-Biofortification nine entries were evaluated. Out of them the entry 3801 and 3809 recorded highest grain yields of 5.55 t ha^{-1} and 5.33 t ha^{-1} respectively.

In Advanced Varietal Trial 1- Medium Slender grain, one entry IET27118 (MTU1263) (5.65 t ha^{-1}) recorded numerically higher grain yield in comparison with the zonal check ADT49 (5.59 t ha^{-1}).

In Advanced Varietal Trial 2- Medium Slender grain, only one entry IET26263 (MTU1239) (6.51 t ha^{-1}) recorded significantly superior yield over the national check BPT5204 (5.19 t ha^{-1}).

In AVT (Rain fed Shallow Low land) three entries MTU 1221 (4.34 t ha^{-1}), MTU 1230 (4.22 t ha^{-1}), OR2420-3 (3.92 t ha^{-1}) performed better than the local check MTU 1064 (3.28 t ha^{-1}) among 17 entries tested.

In AVT NIL sub, entry CR 3933-17(3.54 t ha^{-1}) found to be significantly superior than recurring parent (RP) prathikhsya (0.49 t ha^{-1}), CR 3932-7 showed better performance with the yield of 3.40 t ha^{-1} than RP pooja (2.19 t ha^{-1}), CR2532-40 (2.74 t ha^{-1}) expressed higher yield than RP Sarla (0.63 t ha^{-1}), Sub1 introgressed line of MTU 1075 *i.e.,* MTU 1231 (2.18 t ha^{-1}) found to be significantly superior than recurrent parent MTU 1075 (0.31 t ha^{-1}) under complete submergence of two weeks followed by stagnant flooding of 20-50 cm water depth.

In low phosphorous tolerance trial, RPbio4919-B-B-NSR 86 (10.10 t ha^{-1}) performed well under 50% P with phosphorous use efficiency of 23.95 % than the positive check Swarna (8.13 t ha^{-1}) with PUE of 16.4% among 17 entries tested.

In Nitrogen use efficiency trial, five entries CR3511-1-1-1-4-1 (8.36 t ha^{-1}) , MTU 1286 (8.19 t ha^{-1}), CR 3783-3-2-1-1-1-1-2 (7.75 t ha^{-1}), RP6252-300-217-3-6-4-21-10 (7.00 t ha^{-1}), RP 6252-300-17-2-7-14-6-6 (6.80 t ha^{-1}) have recorded higher yield than the check Vardhan (5.70 t ha^{-1}, NUE 48.36%) under 50% N among 13 entries tested with Nitrogen use efficiency of 39.75%, 51.48%, 48.36%,35.06%,46.09% respectively).

In IHRT-E, hybrids, NPH X1 (6.52 t ha^{-1}), RNC 7081 (6.50 t ha^{-1}) and LP 18201 (6.47 t ha^{-1}) recorded superior grain yield.

In IHRT-ME, hybrids MTU HR 2100 (7.24 t ha^{-1}) and RNC 7047 (7.04 t ha^{-1}) recorded significantly superior yield than the local check variety MTU 1121 (6.21 t ha^{-1}).

Out of 22 entries evaluated only two entries recorded >5 t ha^{-1} grain yield in IRRI-INDIA Harvest Plus MET during *kharif* 2018. They are HP MET 2 with 5.51 t ha^{-1}and HP MET 20 with 5.11 t ha^{-1}. The polished rice samples have been sent to IRRI Hub in ICRISAT for estimation of zinc in rice kernels.

In Global rice array project during *rabi* 2019, a total of 383 entries (Antenna Panel: 54 and Reference Panel: 325) were evaluated during *rabi* 2018-19. Among them three entries IR 93344: 23-B-16-22-8-1RGA-2RGA-1-B-B, IR 93328: 23-B-23-11-17-1RGA-2RGA-1-B-B and IRRI147 recorded highest grain yields of 9.56, 9.24 and 9.10 t ha^{-1} respectively.

In IRRI-INDIA Harvest Plus MET 22 entries were evaluated during *rabi* 2018-19. Among them three entries HP MET 15, 14 and 2 recorded highest grain yields of 7.32, 7.46 and 8.10 t ha^{-1} respectively. The average grain yield of the trial is 5.94 t ha^{-1}.

Rice Research Unit, Bapatla

In Advanced Yield Trial- Late, among the 11 entries along with one check evaluated, eight of them exhibited significantly superior grain yield over local check BPT 5204. Among these, BPT 2938 (6.59 t ha^{-1}) followed by BPT 2946 (6.53 t ha^{-1}) and BPT 2932 (6.52 t ha^{-1}) recorded highest grain yield whereas the local check BPT 5204 recorded 5.12 t ha^{-1} grain yield.

In Aavanced Yield Trial - Medium, 13 entries along with two checks were evaluated and the results revealed that BPT 3032(7.45 t ha^{-1}), BPT 3031 (7.13 t ha^{-1}) and BPT 3049 (6.80 t ha^{-1}) recorded significant yield superiority over MTU 1001 (5.59 t ha^{-1}).

In Multi Location Trial - Late, 22 entries along with one check were evaluated. Among the entries tested, MLT-L-615 (7.06 t ha^{-1}) followed by MLT-L-612 (7.64 t ha^{-1}) and MLT-L-622 (7.47 t ha^{-1}) top most entries recorded significant yield superiority over the local check MLT-L-620(BPT 5204) (5.93 t ha^{-1}). MLT-L-608 was not included due to poor germination.

In Multi Location Trial - Medium, 22 entries along with one check were evaluated. The results revealed that MLT-M-574 (7.82 t ha^{-1}) followed by MLT-M-582 (7.63 t ha^{-1}) and MLT-M-578 (7.47 t ha^{-1}) manifested significant yield superiority over the local check MLT-M-595 BPT 3291 (5.08 t ha^{-1}).MLT-M-579 and MLT-M-585 were not included due to poor germination.

In MLT-Sg, 18 entries along with one check were evaluated. Among these, MLT-Sg 382 (7.33 t ha^{-1}) followed by MLT-Sg-394 (6.97 t ha^{-1}) and MLT-Sg-389 (6.89 t ha^{-1}) showed significant yield superiority over the check MLT-Sg-387,BPT 5204 (5.73 t ha^{-1}).

In AVT-1-NIL (YC) trial, 41 near isogenic lines for various traits *viz.,* drought, submergence, salinity, blast, BLB and grain yield were evaluated along with their recurrent parents in RBD with two replications. The performance of entries was compared with their recurrent parent. Among these, two entries *viz.*, RP 6280 Patho-9-12-9 (5.59 t ha^{-1}) followed by RP 6279 Patho-6-1-13 (5.25 t ha^{-1}) significantly out yielded their recurrent parent Swarna (3.59 t ha^{-1}).

Out of the nine entries evaluated in Advanced Variety Trial–2 Medium slender, one entry, ARRH-7576 (6.50 t ha^{-1}) significantly out yielded the National check 2, BPT 5204 (5.43 t ha^{-1}). Other entries which recorded superior grain yield include RP 6112-SM-M-93-3-2-3-4-3 (6.19 t ha^{-1}) followed by MTU 1239 (MTU II 369-72-4-1-1-1) (6.07 t ha^{-1}).

Three hundred and fifty germplasm lines collected from various research stations including local germplasm collections are being maintained at ARS, Bapatla.

Agricultural Research Station, Machilipatnam

Eighteen entries were evaluated in Advanced Varietal Trial in comparison with CST 7-1 as check. Among them fourteen entries recorded significantly superior yield compared to the check The entry OYT 106 (MCM 106-2-10-1) recorded superior grain yield of 6.11 t ha^{-1} followed by OYT 116 (MCM 116-5-1-2) with 5.03 t ha^{-1}, as against the check CST 7-1 (2.20 t ha^{-1}).

Among twenty entries tested in Multi Location Trial for saline tolerance in comparison with MCM 103 as a check. The entry MCM 127 recorded significantly high grain yield (4.53 t ha^{-1}) followed by DST 6-96-9 (4.39 t ha^{-1}), while the check MCM 103 recorded 4.37 t ha^{-1}grain yield.

Eighteen early duration rice cultures were evaluated in Multi Location Trial (Early) with NLR 34449 as check. Out of the 18 test entries, MTU 2344-60-2-1-1 (1.45 t ha^{-1}), BPT 2620 (1.40 t ha^{-1}), MTU AST 2-5-29-5(0.79 t ha^{-1}), MTU AST 2-5-29-5 (0.74 t ha^{-1}) are the top yielders.

The trial was laid out with 61 test entries received from Indian Institute of Rice Research, Hyderabad with MTU 1061 as check. Out of the 61 cultures, eleven entries recorded significantly superior yield. The entry 2331 recorded 4.65 t ha^{-1} of grain yield followed by 2312 with 4.10 t ha^{-1}, while the check MTU 1061 recorded 2.76 t ha^{-1} of grain yield.

The Advanced Varietal Trial with saline tolerant entries was laid out with 19 test entries received from Indian Institute of Rice Research, Hyderabad with MTU 1061and BPT 5204 as checks. Out of the 19 entries, two cultures recorded significantly superior yield. The entry 2211 recorded 5.32 t ha^{-1} of grain yield and ranked No. 1 followed by 2209 with 3.33 t ha^{-1} while the check MTU 1061 recorded 2.76 t ha^{-1} of grain yield.

Regional Agricultural Research Station, Nandyal

In Advanced Yield Trial (Medium), twelve entries were studied during *kharif* 2018. Among them six entries, AYT M 11 (1.03 t ha^{-1}), AYT M 02 (9.36 t ha^{-1}), AYT M 08 (8.99 t ha^{-1}), AYT M 04 (8.83 t ha^{-1}), AYT M 06 (8.72 kg/ha) and AYT M 01 (8.64 t ha^{-1}) showed highly significant grain yield over the check, NDLR 7 (7.61 t ha^{-1}).

Among the 20 entries evaluated in Multi Location Trial, fourteen entries *viz.,* MTU 2274-8-1-1 (9.03 t ha^{-1}), RM 136-33-1-2-1 (8.72 t ha^{-1}), MTU 2513-24-2-2 (8.72 t ha^{-1}), MTU 2223-5-2-2-1-1 (8.65 t ha^{-1}), MTU 2553-52-1-1 (CE 497) (8.60 t ha^{-1}), MTU 2514-48-2-1 (8.58 t ha^{-1}), MTU AST 2-1-26-4 (8.29 t ha^{-1}), MTU 2385-187-1-1-1 (8.18 t ha^{-1}), RM 129-7-2-1-1 (8.09 t ha^{-1}), MTU 2503-29-1-2 (7.96 t ha^{-1}) recorded significantly higher yield than check MTU 1156 (6.89 t ha^{-1}).

In Multi Location Trial (Medium), 22 entries were evaluated for yield and yield attributes. Among the 22 entries, only one entry, MTU 2613-25-1-1 (9.23 t ha^{-1}) recorded significantly higher yield over the check MTU 1075 (8.18 t ha^{-1}) and local check NDLR 7 (8.05 t ha^{-1}).

In Multi Location Trial (Long duration) 22 entries were evaluated for yield and yield attributes. Among them eight entries *viz.,* RM104-9-1-1-1 (6.36 t ha^{-1}), MTU2201-34-2-3-2(5.96 t ha^{-1}), MTU2244-39-20-4 (5.96 t ha^{-1}), MTU 2139-7-1-1-1 (5.94 t ha^{-1}), MTU2091-14-2-1-1 (5.91 t ha^{-1}), MTU2101-30-2-1-1 (5.83 t ha^{-1}), MTU1061 (5.80 t ha^{-1}) and UTR187 (5.67 t ha^{-1}) recorded significantly higher yields over local check BPT 5204 (5.07 t ha^{-1}) and only one entry RM104-9-1-1-1 (6.34 t ha^{-1}) recorded significantly higher yield over common check MTU1061 (5.80 t ha^{-1}).

In an experiment on Organic Farming Research in Rice grown on Vertisols under K.C. Canal ayacut, Organic practice recorded 3.84 t ha^{-1} of grain yield which is 39% less compared with inorganic rice cultivation (6.32 t ha^{-1}). Where as the economics of organic rice practices cost was Rs 26140/- ha^{-1}against Rs 51620/- ha^{-1} in inorganic rice practices. Similarly C:B ratio 1:1.47 with organic practices and 1:2.0 in inorganic practice.

Agricultural Research Station, Jangamaheswarapuram

During *kharif,* 2018-19, twelve entries were evaluated in Preliminary Yield Trial. Out of which seven entries recorded significantly superior yield over the check. Among these, the entry JMP-61 showed highest yield of 6.56 t ha^{-1} followed by entries JMP-22 (6.55 t ha^{-1}), JMP-35 (6.53 t ha^{-1}) and JMP-48 (6.50 t ha^{-1}) compared to check BPT 5204 (5.36 t ha^{-1}).

A total of 14 entries were evaluated in Advanced Varietal Ttrial during Kharif, 2018-19. Out of which five entries recorded significantly superior yield over the check. Among them, the entry JMP-153 was recorded highest yield of 6.63 t ha^{-1} followed by JMP-178 (6.41 t ha^{-1}), JMP-132 (6.40 t ha^{-1}) and JMP-124 (6.36 t ha^{-1}) compared to common check BPT 5204 (4.96 t ha^{-1}).

Agricultural Research Station, Nellore

Out of thirteen entries tested in Advanced Varietal Trial (Late) against three checks, the entry NLR 3548 (7020 t ha^{-1}) recorded significantly superior yield over the best check NLR 33892 (6.14 t ha^{-1}). However the bets entries from the trial were NLR 3545 (6.11 t ha^{-1}), NLR 3595 (6.05 t ha^{-1}) and NLR 3542 (5.96 t ha^{-1}).

Out of Twelve entries tested against three checks in Advanced Variety Trial (Mdium), four entries recorded significantly superior yield over the best check NLR 34449 (4.51 t ha^{-1}). The culture MDT 6 x NLR 34449-5876-36-3-1 (4.86 t ha^{-1}), MDT 6 x NLR 34449- 5876-21-1-5-1 (4.81 t ha^{-1}) and MDT 6 x NLR 34449 -5876-7-2-2 (4.76 t ha^{-1}) were found to be the top three best entries.

Eighteen entries were evaluated against local check NLR 33892 in Multi Location Trial (Late). Among them the entries L616 (6.47 t ha^{-1}) and L606 (5.97 t ha^{-1}) recorded significantly superior yield over the best check NLR 33892(5.09 t ha^{-1}).

Out of seventeen entries tested in Multi Location Trial (Slender), three entries *viz.,* SG 394 (4.67 t ha^{-1}), SG 382 (4.62 t ha^{-1}) and SG 379 (4.52 t ha^{-1}) recorded good yields than the rest of the entries.

Agricultural Research Station, Utukur

In preliminary yield trial, out of 31 entries tested, seven entries UTR 83-1 (9.64 t ha^{-1}), UTR 202 (9.29 t ha^{-1}), UTR 257 (9.13 t ha^{-1}), UTR 256 (9.11 t ha^{-1}), UTR 253 (8.78 t ha^{-1}), UTR 250 (8.75 t ha^{-1}), UTR 269 (8.65 t ha^{-1}) recorded significantly higher grain yields best check NDLR 7 (7.38 t ha^{-1}).

Out of 22 entries tested in Multilocation trial (long duration) , 10 entries recorded significantly higher grain yield against the check L 620 (7.03 t ha^{-1}). The entries *viz.,* L 622 (9.10 t ha^{-1}), L 623 (8.89 t ha^{-1}), L 610 (8.47 t ha^{-1}), L 617 (8.46 t ha^{-1}), L 613 (8.43 t ha^{-1}), L 608 (8.18 t ha^{-1}), L 612 (8.01 t ha^{-1}), L 609 (7.99 t ha^{-1}), L 618 (7.81 t ha^{-1}), L 615 (7.79 t ha^{-1}) recorded significantly higher grain yields against the check L 620.

In preliminary yield trial (mid-late duration), out of 20 entries tested, eight entries UTR 234 (9.67 t ha^{-1}), UTR 239 (9.52 t ha^{-1}), UTR 199 (9.24 t ha^{-1}), UTR 212 (9.24 t ha^{-1}), UTR 260 (9.22 t ha^{-1}), UTR 250 (9.91 t ha^{-1}), UTR 252 (8.57 t ha^{-1}) and UTR 228 (8.54 t ha^{-1}) recorded significantly higher grain yields against best check NLR 40054 (7.20 t ha^{-1}).

In Multilocation trial (mid-late duration), out of 22 entries tested, 13 entries *viz.,* M 581 (9.22 t ha^{-1}), M 593 (8.16 t ha^{-1}), M 582 (7.96 t ha^{-1}), M 574 (7.84 t ha^{-1}), M 592 (7.78 t ha^{-1}), M 589 (7.74 t ha^{-1}), M 583 (7.72 t ha^{-1}), M 586 (7.39 t ha^{-1}), M 579 (7.19 t ha^{-1}), M 588 (7.11 t ha^{-1}), M 576 (6.70 t ha^{-1}), M 587 (6.94 t ha^{-1}) and M 578 (6.85 t ha^{-1}) recorded significantly higher grain yields against best check M 584 (6.15 t ha^{-1}).

Out of 18 entries tested in Multilocation Trial (slender rice grain type), entries SG 378 (8.36 t ha^{-1}), SG 385 (7.46 t ha^{-1}), SG 389 (7.42 t ha^{-1}), SG 392 (7.37 t ha^{-1}), SG 386 (7.20 t ha^{-1}) and SG 383 (7.17 t ha^{-1}) recorded significantly higher grain yields against best check SG 387 (6.26 t ha^{-1}).

Under development of high yielding varieties in early duration group, ten entries were tested against three checks in preliminary yield trial.

Among them two entries UTR 240 (8.83 t ha^{-1}) and UTR 266 (8.82 t ha^{-1}) recorded significantly higher grain yields over best check RNR 15048 (7.46 t ha^{-1}).

Agricultural Research Station, Ragolu

In Preliminary Yield Trial during Kharif 2018, eighteen entries including two checks were evaluated. Among these, three entries *viz.,* PYT 9 (7.17 t ha^{-1}), PYT 10 (7.16 t ha^{-1}) and PYT 12 (7.15 t ha^{-1}) were significantly out yielded the best check RGL 2537 (5.98 t ha^{-1}). Fourteen numerically out yielding entries over the check MTU 1001 were promoted for further evaluation in Advanced Yield Trial.

A total of nineteen entries including check were evaluated in Multilocation yield trial-Late, out of which the entry, L 618 registered high yield of 10.08 t ha^{-1} followed by L 612 (9.41 t ha^{-1}) and L 605 (9.38 t ha^{-1}) compared to check RGL 11414 (8.00 t ha^{-1}).

In Multilocation yield trial-Medium during kharif 2018, nineteen entries including one check were studied, out of which the entry, M 588 topped the list with a yield (8.84 t ha^{-1}) followed by M 595 (8.76 t ha^{-1}), M 589 (8.72 t ha^{-1}) and M 583 (8.71 t ha^{-1}) compared to the check RGL 2538 (7.21 t ha^{-1}).

In Multilocation yield trial-Early during *kharif* 2018, twenty entries including one local check were studied. Among the entries tested twelve entries *viz.,* E 531, E 541, E 528, E 532, E 542, E 536, E 529, E 540, E 533, E 526, E 524 and E 530 were significantly out yielded the local check RGL 1880.. The entry E 531 stood first with an yield potential of 9.51 t ha^{-1}, while the local check (RGL 1880) has recorded 5.71 t ha^{-1}

In Multilocation Yield Trial –Slender grain early and mid early during *kharif* 2018, twelve entries including one local check were studied. Among the entries tested six entries *viz.,* SGE 372, SGE 376, SGE 368, SGE 365, SGE 374 and SGE 366were significantly out yielded the local check BPT 5204.. The entry SGE 372 stood first with an yield potential of 7.58 t ha^{-1} while the local check (BPT 5204) has recorded 4.61 t ha^{-1}.

In Multilocation Yield Trial –Slender grain Medium and Late during *kharif* 2018, eighteen entries including one local check were studied. Among the entries tested thirteen entries *viz.,* SGM 382, SGM 379, SGM 389, SGM 394, SGM 384, SGM 378, SGM 392, SGM 385, SGM 377, SGM 386, SGM 391, SGM 383, and SGM 388were significantly out yielded the local check BPT 5204. The entry SGM382 recorded high yield potential of 8.33 t ha^{-1} compared to the local check (BPT 5204) has recorded 4.61 t ha^{-1}

In Advanced Variety Trial- I- Irrigated Medium, fourteen entries including local check were studied. Among the entries tested, ten entries were numerically excelled the local check. The entry 1401 has recorded superior yield of 8.37 t ha^{-1}, followed by 1407 (8.29 t ha^{-1}) and 1409 (7.85 t ha^{-1}) have numerically out yielded the local check, MTU 1001 (7.22 t ha^{-1}).

In Advanced Variety Trial -2- Irrigated Medium, seven entries were tested, out of which the entries *viz.*, 1301 (8,60 t ha^{-1}) significantly out yielded the check MTU 1001 while the entry 1305 (8.21 t ha^{-1}) numerically out yielded the local check, MTU 1001 (7.42 t ha^{-1}).

In Advanced Variety Trial (Near Isogenic lines-Yield control) during *kharif* 2018 forty eight entries were evaluated against one standard.Out of which, seven entries were numerically out yielded the standard. The entry 4449 stood first with a yield potential of 7.87 t ha^{-1} when compared to the check MTU 1001 which recorded 6.84 t ha^{-1}.

Crop Production

APRRI & RARS, Maruteru

Study on Net work experiment on Natural Farming during *Kharif,* 2018 revealed that, more root length of 10.52 cm and more shoot length of 42.24 cm at the time of planting as well as 136.96 cm at the time of harvest were recorded in ICM plot. But more root length at the time of harvest was reported in Palekar method (18.50 cm) followed by Natural farming treatment (18.48 cm) compared to ICM plot (18.30 cm) during *Kharif,* 2018. Similarly higher number of tillers, panicle count, panicle length, panicle weight and higher grain yield was recorded in ICM plot compared to natural farming plot as well as Palekar method plot. The magnitude of increase in grain was under ICM (ANGRAU) practice was 29.97% compared to natural farming and 33.88% compared to Palekar method.

The three years of study from 2016-17 to 2018-19 indicated that, mean grain yield difference of 28.3% was observed during *Kharif* and 39.1% during rabi and also considering both seasons mean grain yield difference of 34.1% was observed in natural farming treatment as compared to ANGRAU-ICM package treatment. This is mainly due to insufficient nutrients supply to the crop during various stages especially at active nutrient requirement stages like tillering and PI stages.

Studies on nutrient response on selected AVT-2 rice cultures under high and low input management revealed that, the performance of IET 25269 under AVT-2 late cultures recorded significantly higher grain yield of (6.74 t ha^{-1}) followed by NDR 8002 check variety (5.99 t ha^{-1}) at 100% NPK fertilization. Similar trend was followed with 150% NPK fertilization (6.96 t ha^{-1} and 6.18 t ha^{-1}) respectively least/lesser grain yield was reported with Salivahana under both fertilizations.

Studies on nutrient response on selected AVT-2 rice cultures under high and low input management revealed that, among AVT-2 medium slender cultures, IET 26263 recorded higher grain yield of 6.55 t ha^{-1} followed by IET-25793 with 6.38 t ha^{-1} under 100% NPK fertilization.

Studies on nutrient response on selected AVT-2 rice cultures under high and low input management revealed that, AVT-2 Bio-fortified cultures IET 26383 registered higher grain yield of 5.31 t ha^{-1} closely followed by IET 26375 with 5.24 t ha^{-1}. Response with higher fertilization of 150% NPK recorded more grain yield compared to normal 100% NPK dosage.

Studies on nutrient management for higher productivity in different rice establishment methods (mechanized transplanting, wet direct seeded rice using Drum seeders, transplanting, (puddled soil) revealed that Machine transplanting recorded significantly higher grain yield of (6.09 t ha^{-1}) which is on par with manual planting (5.49 t ha^{-1}) but superior over direct sowing method. Among nutritional treatment, higher dose of 150% RDF recorded significantly higher grain yield of (6.78 t ha^{-1}) followed by 100% RDF (5.81 t ha^{-1}). LCC based application registered lowest grain yield of 4.39 t ha^{-1} among all treatments.

Studies on residue management in organic rice based cropping systems revealed that crop residue management in organic based cropping system in rice- rice cropping system during *kharif* indicated that application of 100% RDF recorded maximum grain yield 5.6 t ha^{-1} which was on par with the application of 150% N through crop residue (75% N) and vermicompost (75% N) and significantly higher than control. Straw yield followed the same trend. During rabi 2018-19, grain yield and straw yield was maximum with recommended dose of fertilizers which was significantly higher than application of rice residue 75% N along with vermicompost 75% N.

Studies on evaluation of different crop establishment methods for paddy varieties during *Kharif,* 2018 revealed that, highest grain yield of 4.93 t ha^{-1} was recorded with manual transplanting followed by Bengal method of planting (4.48 t ha^{-1}). Among varieties, MTU 1075 responded well and recorded 4.69 t ha^{-1} followed by MTU 1061 with 4.53 t ha^{-1}. During *rabi*, 2018-19, among the methods of planting, direct sowing with drum seeder performed better (320 t ha^{-1}) followed by manual planting method (2.53 t ha^{-1}). Among the rabi varieties, MTU 1156 performed better with 3.00 t ha^{-1} followed by MTU 3626 (2.86 t ha^{-1}). The less yields during rabi season realized due to terminal moisture stress at grain filling and grain hardening stages.

Studies on efficacy and evaluation of liquid bio-fertilizers in paddy during *kharif,* 2018 revealed that, 100% RDF in combination with liquid bio-fertilizers (N, P & K) recorded higher yield of 5.98 t ha^{-1} which is on par with 100 % RDF treatment (5.83 t ha^{-1}) and 75% RDF in combination with liquid bio-fertilizers (N & K) with 5.73 t ha^{-1}). Similar trend was also noticed with straw yield.

Agricultural Research Station, Ragolu

In a trial on organic rice during *kharif* 2018, grain yield of 7.80 t ha^{-1} was recorded with application of NPK @ 120-60-50 kg ha^{-1} + $ZnSo_4$ @ 50 kg ha^{-1} with the variety Srikurma (RGL 2332) whereas organic production practices gave 6.57 t ha^{-1} and green manuring + application of NPK @ 80-60-50 kg ha^{-1} (INM approach) gave inorganic practices recorded 7.10 t ha^{-1} and all the treatments were at higher than Control (No fertilizer or manurial application) which recorded the lowest yield of 5.56 t ha^{-1}.

During *kharif* 2018, in the trial on weed management for organic rice production, the results indicated that weed count at active tillering stage was significantly lowest with hand weeding at 20 and 40 DAS followed by summer ploughing followed by green manuring followed by 3 weeks puddling interval + one cono weeding at 15 DAT + Need based hand weeding at 40 DAT and at Panicle Initiation stage was the lowest with hand weeding at 20 and 40 DAS which was on par with all other treatments except Weedy check. Weed dry weight at both stages of observation followed almost similar trend as that of weed count .Weed control efficiency (WCE) was highest with hand weeding at 20 and 40 DAS followed by 3 weeks puddling interval + one cono weeding at 15 DAT + Need based hand weeding at 40 DAT at both stages of observation..Grain yield was highest with hand weeding at 20 and 40 DAS which was on par with all the treatments except summer ploughing, summer ploughing followed by greenmanuring, summer ploughing followed by greenmanuring followed by 3 weeks puddling interval and weedy check. Net returns and benefit cost ratio were the highest with summer ploughing followed by greenmanuring followed by 3 weeks puddling interval + Need based hand weeding (Rs.64480 and 1.56) followed by summer ploughing followed by greenmanuring followed by 3 weeks puddling interval + conoweeding twice.

In studies on rice based cropping systems during *kharif* 2018, highest grain yield of 7.89 RGL 1880 was realized with long duration paddy M3-RGL-2332 followed by M2- MTU-1001(5.96 t ha^{-1}) and M1- RGL 1880 (3.42 t ha^{-1}) clearly indicating that yield increased with increase in duration of paddy. During *rabi*, the highest rice equivalent yield (19.60 t ha^{-1}) was recorded by sweet corn sown after medium duration rice which was significantly superior to all the treatments and their interaction was also significant over all the other treatment combinations followed by Sweet corn after short duration rice (17.89 t ha^{-1}).

During *kharif,* 2018 the results on a trial on enhancing productivity of rice-pulse system under different crop establishment methods revealed that highest grain yield (6.23 t ha^{-1}) and number of panicles per square meter (158) were recorded with drum seeding as compared to normal transplanting.However, weed count and weed dry matter were higher with drum seeded paddy.

Agricultural Research Station, Nellore

Nutrient requirement for optimum yield of rice in early *kharif* (2018) revealed that highest grain yield was obtained with application of nitrogen @160 kg N ha^{-1} (4.70 t ha^{-1}) which was on par with 120 kg N ha^{-1} (4.62 t ha^{-1}), phosphorous @ 60 kg P_2O_5 t ha^{-1} (4.69 t ha^{-1}) which was on par with 30 kg P_2O_5 ha^{-1} (4.66 t ha^{-1}) and potassium @ 80 kg K_2O ha^{-1} (4.81 t ha^{-1}). Highest grain yield of 6.65 t ha^{-1} was obtained when N: P_2O_5:K_2O was applied @ 120:60:80 kg ha^{-1} during early *kharif* (*Edagaru*/summer) season).

Nutrient requirement for optimum yield of rice in early *kharif* 2018 studies for three years indicated that the highest grain yield was recorded with application of nitrogen @ 160 kg N ha^{-1} (5.62 t ha^{-1}) which was on par with 120 kg N ha^{-1} (5.62 t ha^{-1}), phosphorous @ 30 kg P_2O_5 ha^{-1} (5.52 t ha^{-1}) and potassium @ 60 kg K_2O ha^{-1} (5.53 t ha^{-1}) which was on par with 80 kg K_2O ha^{-1} (5.42 t ha^{-1}).

Network experiment on natural farming in rice revealed that, highest grain yield was obtained with ANGRAU- ICM practice (6.10 t ha^{-1}) followed by Sahaja mariyu sendriya vyavasaya vidhanalu (SSVV) by Department of Agriulture (1.92 t ha^{-1}) and ZBNF (Palekar's concept) (1.59 t ha^{-1}).

During *rab*i 2018, highest grain yield was recorded with MTU1010 (6.62 t ha^{-1}) which was on par with NLR34449 (6.46 t ha^{-1}) and the lowest grain yield was recorded with BPT 5204 (4.25 t ha^{-1}) under machine transplanting. Among the age of seedlings tested, there was no significant difference in grain yield (5.71-5.92 t ha^{-1}). There was no significant interaction between varieties and age of seedlings.

Studies on effects of nanoparticulate delivery of zinc on the productivity of rice in black soils and zinc bio-fortification during *rabi*,2018 indicated that highest grain yield of 5.08 t ha^{-1} was recorded with RDF + soil application of $Znso_4$ which was onpar with RDF + foliar application of nanoscale ZnO 1 g l^{-1} at 21 & 60 DAT (5.05 t ha^{-1}) and RDF + foliar application $ZnSO_4$ 2 g l^{-1} at 21 & 60 DAT (5.02 t ha^{-1}). The lowest grain yield was recorded in control plot (1.63 t ha^{-1}).

Regional Agricultural Research Station, Anakapalli

Paddy Dry Direct Seeding (DDS) with total mechanization (sowing with seed drill, pre-emergence spray of pretilachlor @ 500ml ac^{-1} + post emergence spray of bispyribacsodium @ 100 ml ac^{-1}, power weeding, mechanical harvesting and threshing / winnowing fan, seed processing) recorded an average grain yield of 4.82 t ha^{-1} with an increase of 18.47% when compared to farmers practice (4.11 t ha^{-1}).

Regional Agricultural Research Station, Nandyal

In an experiment on organic farming research in rice grown in vertisols under K.C. Canal ayacut, organic practice recorded 3.84 t $ha^{-1}$of grain yield which is 39% less compared with inorganic rice cultivation (6.32 t ha^{-1}). The economics of organic rice practices cost was Rs 26140/- ha^{-1} against Rs 51620/- ha^{-1} in inorganic rice practices. Similarly C:B ratio 1:1.47 with organic practices and 1:2.0 in inorganic practice.

In the experiment on Plant Sensor based diagnostic information for real time nitrogen management in rice crop, the highest grain yield was recorded with SPAD directed N application (7.09 t ha^{-1}) followed by LCC based N application (6.72 t ha^{-1}). The lowest yield was recorded in control (3.75 t ha^{-1}).

Agricultural Research Station, Utukur.

The variety BPT-5204 recorded higher number of grains per panicle compared to to NDLR-7.Among the nitrogen levels tested, significantly higher grain yield (6.67 t ha^{-1}) was recorded with application of 200 kg N ha^{-1} where as significantly higher straw yield (10.14 t ha^{-1}) was recorded with the application of 240 kg N ha^{-1}. Interaction between varieties and nitrogen levels was not significant.

Agricultural Research Station, Bapatla

Among different sources and time of phosphorus applications, phosphorus application through DAP @ 60 kg ha^{-1} + 25 kg P_2O_5 ha^{-1} through DAP at maximum tillering stage treatment recorded significantly higher grain yield (5.92 t ha^{-1}) and straw yield (7.64 t ha^{-1}) when compared to all other treatments. The lowest grain yield (5.33 t ha^{-1}) and straw yield (6.58 t ha^{-1}) was recorded with the application of phosphorus @ 60 kg ha^{-1} in the form of SSP as basal application treatment. There is no significant difference in harvest index among different sources and time of phosphorus application.

Studies on the long term effect of organics and inorganics on soil properties and rice productivity indicated that there is a significant difference was observed in grain yield and straw yield of rice between inorganic and organic treated plots. The highest grain (5.16 t ha^{-1}) and straw yield (5.65 t ha^{-1}) was observed in inorganic treatment compared to organic treated plots. The data indicated that there is a significant difference was observed in nitrogen content and protein content of rice in inorganic and organic treated plots. The highest nitrogen content (1.34%) and protein content (7.93 %) was recorded in inorganic treatment plot.

Crop Protection

Insect Pest Management

Rice Research Unit, Bapatla

In population dynamics studies, maximum light trap catches of yellow stem borer moths (28 No.) were noticed in 41st standard meteorological week (SMW),. Leaf Folder moths (28 No.) in 46th SMW. In case of BPH maximum number (942) were found in 36th SMW (first week of September), WBPH (123 No.) on 47th SMW, ZZLH (98 No.) in 52nd SMW and GLH (121 No.) found maximum in 47th standard week. In case of natural enemies, maximum no. of 9840 of mirid bugs were noticed in 45th standard week during the year 2018-19. the correlation studies revealed that yellow stem borer, BPH, GLH and grasshoppers showed positive correlation with temperatures (max. and min). Leaf folder, ZZLH, wasp, spider, dragon fly and coccinilid have negative correlation with temperatures (max. and min) WBPH and mirid bugs showed negative correlation with maximum temperature and positive correlation with minimum temperatures.

Different cultivation systems of rice indicated that the normal transplanting recorded highest yield of 4.83 t ha^{-1} compared to other treatments. The yield in other treatments was statistically on par with each other.

Among the combinations tested, DPX-RAB 55 recorded 51.73 per cent reduction of WBPH over control, spinetoram 6% + methoxyfenozide 30% and spinetoram 6% + methoxyfenozide 30% + Baan recorded 79.05 per cent deduction of BPH over control and spinetoram 6% + methoxy-fenozide 30% + Baan recorded 66.23 per cent reduction of leaffolder damage over untreated control. Highest yield of 6.66 t ha^{-1} was recorded in spinetoram 6% + methoxyfenozide 30% + Baan treatment and followed by DPX-RAB 55 + Baan (6.46 t ha^{-1})

Studies on botanical insecticide evaluation revealed that eucalyptus oil and lemon grass oil recorded a maximum reduction of 71.42% of WBPH. Where as dinotefuron and Rynaxypyr recorded 57-14 percent reduction of BPH over control. Maximum of 55.08 percent reduction of leaf folder damage was recorded in Rynaxypyr treatment followed by Eucalyptus oil treatment (52.68%). Rynaxypyr treatment recorded highest yield of 5.14 t ha^{-1} followed by Dinotefuron (4.97 t ha^{-1}) .

The results on effect of ecological engineering of plant hoppers reveals that 14.38 per cent yield increase was noticed in EEPM plot when compared with farmers practice. In case of plant hoppers, both BPH and WBPH population was high in EEPM plot. The mirid bug population was also high in EEPM plot.

APRRI & RARS, Maruteru

Out of 408 National Screening Nursery-1 (NSN-1) entries screened against mixed population of plant hoppers, 12 entries recorded '1' score , 49 entries recorded "3" and 95 entries recorded "5" score on 0-9 SES scale

A total of 692 entries screened against mixed population of plant hoppers National Screening Nursery-2 during *kharif* 2018. Out of them 279 entries were promising. Out of which, 10 entries recorded '1' score, 100 entries recorded "3" and 169 entries recorded "5" score on 0-9 SES scale

Among 23 entries screened against planthoppers under Multiple resistance screening trial (MRST), 5 entries recorded "3" score and

3 entries recorded "5" score on 0-9 SES scale

In Gall midge screening trial (GMS), out of 61 entries screened against gall midge, 1 entry recorded '0' score and 21 entries recorded '1' score on 0-9 SES scale

Out of 104 NHSN entries screened against mixed population of plant hoppers in National Hybrid Screening Nursery (NHSN), 8 entries scored "1" score, 13 entries scored "3" score and 27 entries scored "5" score 0-9 SES scale

In Botanical Insecticides Evaluation Trial (BIET), Rynaxypyr @ 0.3ml l^{-1} was found effective against stem borer and gall midge followed by neemazal @ 2.0 ml l^{-1} and cedar wood oil @ 2.0 ml l^{-1}. Dinotefuran (Token) @ 5g l^{-1} found effective against plant hoppers followed by camphor oil @ 2ml l^{-1} and cedar wood oil @ 2 ml l^{-1}

Among different combinations of insecticides and fungicides tested during *kharif* 2018, Spinetoram 6% + methoxyfenozide 30% + Hexaconazole @ 0.75 + 2.0 ml was found effective against stem borer. The insecticide and fungicide combination Triflumezopyrim + Hexaconazole @ 0.48 + 2.0 ml against plant hoppers and sheathblight and recorded higher grain yield.

Studies on population dynamics of insect pests of rice through light trap catches during *rabi* 2018 indicated that maximum light trap catches of stem borer were at 10th SMW and again in 15th to 16th SMW. Peak catches of gall midge was observed from 13th SMW to 15th SMW.Activity of plant hoppers increased progressively from 11th SMW to 15th SMW.

Studies on evaluation of ecological methods to manage plant hoppers revealed that the BPH population was more in farmers practice plot compared to EEPM plots (384.8 hill^{-1} Vs 276.2 hill^{-1}). There was no significant difference in recording yield between EEMP and farmers practice plots.

Studies on the population dynamics of planthoppers in rice, the brown planthopper has shown positive correlation with temperature (maximum and minimum) and relative humidity (morning and evening) while negative correlation with rainfall during *kharif* 2018. White backed planthopper has showed positive correlation with temperature (maximum and minimum) and evening relative humidity while negative correlation with rainfall and morning relative humidity during *kharif* 2018. Highly significant positive correlation was observed between current week field population of BPH and light trap catches of BPH during current week during *kharif* 2018 and a non-significant positive correlation between light trap catche and field population of WBPH during *kharif* 2018.

Network project on natural farming in rice, the incidence of stem borer in terms of per cent dead hearts (DH) was below 1 per cent in all the three treatments *viz.,* integrated crop management, natural farming and natural farming (Palekar method) treatments. But the damage caused by stem borer in terms of white ears (WE) was significant in ICM and NF as well as ICM and NF (Palekar method). ICM plot recorded significantly lowest per cent white ears (2.94%) followed by natural farming (8.05%) and natural farming (Palekar method) (8.01 %). The natural enemies *viz.,* mirid bugs and spiders recorded was high in ICM plot than Natural Farming (DOA) and Natural Farming (Palekar) methods. The magnitude of increase in grain yield under ICM (ANGRAU) practice was 29.97% compared to natural farming and 33.88% compared to Palekar method.

Agricultural Research Station, Nellore

Seasonal incidence of insect pests of rice reveled that peak yellow stem borer catches (108 moths) were recorded during 41st std week. Peak gall midge catches (170) were recorded at 41st std week.. Peak leaf folder catches (379) were recorded at 42nd std. week.

The field incidence during early *kharif* severe leaf mite incidence was noticed high ranged from 7.94 to 100 % during 27th to 31st standard weeks. During *kharif*, maximum leaf folder (11.77%) incidence was recorded at 45th std week, maximum gall midge (4.9%) incidence was recorded at 46th std week and maximum stem borer (26.9%) incidence was recorded at 43rd std. week. During *rabi,* pest incidence was negligible except for gallmidge with 9.47 per cent incidence during 11th std wk.

Efficacy of entomopathogenic fungus, *Beauveria bassiana* commercial formulation in combination with potassium silicate against rice leaf folder indicated that potassium silicate as foliar spray at two times followed by application of *B. bassiana* found to be effective in controlling the leaf folder incidence compared to *B. bassiana* spray alone. Maximum reduction (25.18 %) in leaf folder incidence was found with spraying of Si @ 80 mg l^{-1} at 2 wks after transplantation and at active tillering stage followed by *B. bassiana* @ 1.3 x 106 conidia ml^{-1}application, compared to *B. bassiana* spraying alone (12.86 %).

Agricultural Research Station, Ragolu

In gallmidge screening trial, sixty one (61) entries along with resistant and susceptible checks were screened during *kharif,* 2018 . Among them, three entries *viz.,* JGL 34594, SKL 07-08-720-6 and SKL 07-08-720-6 (0%) were found resistant to gall midge at 30 DAT & 50 DAT whereas high virulence of gall midge was observed on JGL 33037 (24.60%), WGL -1153 (25.18%) and WGL During *Kharif*, 2018, high virulence of gallmidge biotype-4 was observed on susceptible donor, Purple (16.73%SS) whereas zero incidence was recorded in resistant donor, Aganni.

During *kharif,* 2018 zero incidence of silver shoots were observed in BPT 2795, Suraksha and Sinna sivappu and 5.88% SS were recorded in KAUPTB 0627-2-14 at 30 DAT. At 50 DAT, two cultures *viz*., Sinna Sivappu recorded nil incidence of gallmidge and 1.27% of DH and RP 2068-18-3-5 recorded 4.27% SS & 1.71% DH and found as multiple resistance cultures .

Among 408 NSN -1 entries screened, two entries *viz.,* NSN-1-165, 174 found resistant to gallmidge and NSN-1-58 found promising to stem borer.

Among nine insecticides tested, spray of spinetoran 6% + methoxyfenoxide 30% @ 0.75 ml + hexaconazole @ 2ml l^{-1} of water effectively reduced the incidence of gallmidge (1.01%), stem borer (2.28%) and sheath blight (6.91%) and recorded superior grain yield (5.98 t ha^{-1}) compared to untreated control(2.55% SS, 5.75%, 11.54% & 4,51 t ha^{-1}). However, incidences of all the insect pests were below ETL but the incidence of white ears and sheath blight were above ETL at harvest.

During 2018-19, the peak catches of GLH (82 $week^{-1}$) during 39th standard week (last week of September, 18) , BPH & WBPH (261 & 191 $week^{-1}$) during 44th standard week (last week of October, 18), gallmidge (901 $week^{-1}$) during 45th standard week (1st week of November, 2018), yellow stem borer (53 moths $week^{-1}$) and leaf folder (30 adults $week^{-1}$) during 50th standard week of (2nd week of December, 18) were observed. Correlation studies between insect pests and weather parameters revealed that minimum & maximum temperatures, rainfall and evening relative humidity showed negative correlation with yellow stem borer and leaf folder moth catches whereas maximum temperature showed positive correlation and rainfall showed negative correlation with planthopper population

Agricultural Research Station, Utukur

Studies on seasonal incidence and population dynamics of insect pests of rice revealed that in first date transplanted rice (04.08.18), peak per cent incidencen of gall midge (19.61%) in 39th standard week and BPH $hill^{-1}$ was 2.12 in 43rd standard week. In second date transplanted (16.08.18) peak per cent damage of gall midge (20.44%) and BPH $hill^{-1}$ was 5.14 in 43rd standard week. In third date transplanted (12.09.18) peak per cent damage of gall midge (21.42%) in 45th standard week and BPH $hill^{-1}$ was 5.36 in 47th standard week.

Agricultural Research Station, Seethampeta

During *kharif* 2018, in light trap catches peak incidence of yellow stem borer adult moth population (1.0 No.) in 41st. week (08th to 14th October), Plant hoppers (BPH/WBPH) population per week (46.5 No.) in 42nd. week (15th to 21st October), Leaf hopper population per week (29.7 No.) in 45th. week (5th to 11th November) was found and after words the incidence was reduced. In case of natural enemies mirid bug population was higher (33.5 No.) in 45th. week (5th to 11th November). Both maximum temperature and morning relative humidity had significant negative influence on green leafhopper, plant hoppers (BPH/ WBPH), mirid bug and wasps. Morning relative humidity had significant negative influence on Yellow Stem Borer.

During the crop period *kharif* 2018 among the natural enemies mirid bug population was highest ranged between 10.0 to 16.0 hill^{-1} at 60 to 105 days after transplantation (DAT), Among the paddy insect pests, BPH population crossed the ETL and the peak incidence was recorded (21.9 No. hill^{-1}) at 75 days after transplantation, followed by WBPH (17.8 No. hill^{-1}) at 60 DAT.

Disease Management

APRRI & RARS, Maruteru

Among the 1805 entries screened for leaf blast resistance, 64 entries *viz*., Br. No. 3504, 3505, 3511, 502, 2004, 2008, 2009, 2010, 2011, 2021, 3603, 3604, 3606, 3611, 3615, 1304, 1310, 1311, 4011, 3802, 3804,3805 and 1102 *etc.,* were found to show resistant reaction of 1 under NSN 1; while, 20 entries *viz.,* Br. no. 605, 612, 633, 406, 411, 417, 430, 1910, 1916, 3901, 1734, 1755, 207, 924, 925, 3712, 3716, 3745, 2104, 2358 have recorded resistant reaction of 1 under NSN-2. One entry *viz.,* OHRT-148 has recorded resistant reaction of 1 under Plant breeding entries, while, two entries CSR-TPB-31 and MTU 1003 recorded score 1 under previous resistance cultures.

Among 2016 entries screened for sheath blight resistance, four entries under NSN 2 *viz*., Br. No. 606, 609, 4237, 3703), one entry (ALSG 287) under Plant breeding entries and one entry (116) under previous resistance cultures were found to show resistant reaction of 3. While, twenty entries *viz.,* (Br. No.3516, 1409, 301, 302, 312, 313, 315, 2208, Swarnadhan, 4423, 4424, 4436, 4456, 4460, 4462, 4464, 4467, 4470, 5004, 5015 under NSN-1, 58 entries under NSN-2, one entry under NHSN (961) recorded score 5.

Out of 2016 entries screened for bacterial leaf blight resistance, one entry *viz.,* (Br.no.5015) under NSN-1, one entry (1816) under NSN-2, (905) under NHSN and five entries (4306, 4308, 3739, 3749 and 3750) under DSN, CL 404 under plant breeding entries recorded score 5.

Among the new fungicides tested for sheath blight, Azoxystrobin 18.2% + difenoconazole 11.4% @ 1.0 ml l^{-1} was found effective in controlling the sheath blight incidence and severity (11.04% & 12.51%) followed by Azoxystrobin 11% + Tebuconazole 18.3% @ 1.5 ml l^{-1} (13.99% & 15.60%) compared to the control plot (87.02% & 57.46%).

Studies on integrated disease management of sheath blight, bacterial leaf blight and blast indicated that low sheath blight severity and incidence (44.69 % & 51.57%) was recorded with incorporation of FYM in nursery plot, seed treatment, application DAP, FYM + Trichoderma in the main field, cleaning of bunds, using 75% recommended dose of fertilizers, granular insecticide application and need based fungicide spray compared to the control plot (50.13% & 65.00%).

Studies on microflora associated with grain discolouration in rice (*kharif* & *rabi*) revealed that the per cent discolouration was increased with increase in storage period. The percent discoluration was minimum in MTU 1187, RDR 763 (4.2%), NLR 34449 (4.7%), MTU 1156 (5.1%), MTU 1121 (5.7%), MTU 1210 and MTU 1153 (6.1%), respectively three months after harvest.

Agricultural Research Station, Nellore

A total of 618 ANGRAU rice cultures were screened against rice diseases during late *kharif.* Among which 262 cultures were resistant and 195 cultures were moderately resistant to Bacterial leaf blight; 211 cultures were resistant and 189 cultures were moderately resistant to neck blast; 119 cultures were resistant and 394 cultures were moderately resistant to Sheath rot.

A total of 618 entries were screened against leaf blast disease during *rabi*. Out of which 113(OL 82, BM1109, BM1110, BM1118, BM1134 and BM 1191 were recorded 2 score rest is 3 score) entries were found to be moderately resistant to the disease.

Integrated management *i.e.* soil application of *T. asperellum* + FYM + GM recorded least percent of incidence 11.87 and highest grain yield (5.80 t ha^{-1}) whereas in control treatment (i.e. without any *Trichoderma*, manures and sprays) incidence 69.45 % and lowest yield of 3.78 t ha^{-1} recorded. Mean incidence of the disease in *Trichoderma* treated main plot is 31.78 and in without *Trichoderma* treated plot 41.00%.

Effect of selected essential oils on location specific rice diseases revealed that among the treatments carbendazim @1gm l^{-1} recorded leaf PDI of 33.66 followed by clove oil with PDI of 47.03 %, which is at par with rest of essential oils in controlling the blast and in untreated control it is recorded 69.29 %.

1.2 Maize

Crop Improvement

Maize Research Centre, Vijayarai

Among 90 maize single cross hybrids evaluated, the hybrid, VH182304 achieved higher cob yields (4.4 kg) and grain yields (3.3 kg) and it showed early days to 50% anthesis and silking (54 days & 56 days respectively).

Out of 35 maize hybrids evaluated, the hybrids, VH152907 and VH112650 recorded higher grain yields (4.7 kg) and cob yields (6.6 kg) and it showed early days to 50% anthesis and silking (53 days & 55 days respectively).

Evaluation of single cross maize hybrids reveralld that out of 40 maize hybrids evaluated, the hybrid, KH14764 recorded higher grain yield (4.4 kg) and cob yield (6.1 kg) and it showed early days to 50% anthesis and silking (52 days & 54 days respectively).

As a part of germplasm collection, 154 inbred lines were collected (92 inbreds from ARS, Peddapuram and 65 inbreds from CIMMYT-India, Patancheru) during 2018-19 and are being maintained regularly the station.

Agricultural Research Station, Peddapuram

The test hybrid PHM 1801 was nominated for evaluation in IVT during *kharif* 2018 under AICRP-Maize. The entry ranked 3*rd* with an average yield of 9.72 t ha^{-1}.

In NIVT early, out of 36 entries evaluated, the entry, IMHVS-003 recorded significantly superior grain yield (9.34 t ha^{-1}) over check hybrid DKC 7074 (8.06 t ha^{-1}).

In NIVT medium, out of 78 entries evaluated, CMH 08-292 (8.30 t ha^{-1}) recorded numerically superior grain yield over check DHM 121 (7.34 t ha^{-1}).

In NIVT late, out of 63 entries evaluated, PM181042 (10.11 t ha^{-1}) recorded numerically superior grain yield over check hybrid CMH 08-287 (9.30 t ha^{-1}).

In AVT I & II Early, 7 entries were evaluated out of which, JH31947 (5.60 t ha^{-1}) recorded superior grain yield over check hybrid DKC 7074 (5.31 t ha^{-1}).

In AVT I & II medium, out of 10 entries evaluated none of the entries recorded superior grain yield over check hybrid BIO9544 (8.42 t ha^{-1}). However, entry ADV 140235 (8.34 t ha^{-1}) recorded higher grain yield compared to others.

In sweet corn evaluation trial, out of 11 entries evaluated, the entry SUZI260 (8.52 t ha^{-1}) recorded superior fresh cob yield over the check hybrid MISTHI (7.74 t ha^{-1}).

In baby corn evaluation trial out of 8 entries evaluated, AH7188 (8.35 t ha^{-1}) recorded superior baby corn yield over the check VL Baby corn (4.64 t ha^{-1}).

Out of 9 entries evaluated in pop corn evaluation trial REHPC 2015-2 recorded higher corn yield (3.79 t ha^{-1}) over VL Amber pop corn

(3.17 t ha^{-1}). Out of 27 QPM hybrids evaluated, QPMH-41 (7.30 t ha^{-1}) recorded higher grain yield over the check hybrid HQPM7 (7.27 t ha^{-1}).

Crop Production

Maize Research Centre, Vijayarai

Studies on response of *kharif* maize to different planting windows and nitrogen levels indicated that sowing maize during first and 2nd fortnight of June found to be ideal to achieve higher yields. Data on yields indicatesd that 1st July planting resulted significantly higher yields and it was on par with the 2nd date of sowing. Sowing maize beyond 2nd fortnight of July resulted in significant yield reduction in maize.

Studies on different chemical weed management practices in *kharif* maize revealed that pre emergence application of Atrazine @ 1.0 Kg *a.i* ha^{-1} followed by post emergence application of Topramazone @ 25 g *a.i* ha^{-1} found to be a good combination in efficient weed control in maize. The data on weed count and weed biomass indicates that significant reduction in grasses and reduction in broad leaved weeds was observed in post emergence application of topramazone herbicide.

Studies on response of Maize hybrids to different levels of nitrogen application during *rabi* 2018-19 revealed that among different popular maize hybrids, the hybrids *viz.,* DKC 9120 (9.04 t ha^{-1}) followed by NK 6607 (8.41 t ha^{-1}) gave higher grain yield as compared to other hybrids. Though higher grain yield of 9.03 t ha^{-1} was obtained with application of 320 Kg N ha^{-1}, it was found on par with application of 240 Kg N ha^{-1} (8.66 t ha^{-1}).

Studies on influence of weather parameters on growth and yield of *rabi* Maize of 2018-19 indicated that sowing of maize during first FN of November gave significantly higher grain yield of 8.60 kg ha^{-1} as compared to sowing of maize during first FN of December (7.46 t ha^{-1}) or 2nd fortnight of December (7.10 t ha^{-1}) or first FN of January (6.83 t ha^{-1}) but found to be on par with sowing of maize during second FN of November (7.99 t ha^{-1}).

Regional Agricultural Research Station, Chintapalle

In studies on influence of natural farming on soil properties, crop protection and Production of quality produce of Maize-Rajmash Cropping System indicated that growth and yield parameters were superior in integrated cop management method than the organic and natural farming practices. The crop growth of maize was very poor under organic farming followed by natural farming practice. ICM package has recorded 76.4% and 56.3% higher maize yields over organic and natural farming practices respectively, after raising preceding exhaust crop (maize).

Regional Agricultural Research Station, Tirupati

During *rabi*,2018 the crop geometry of 60 cm x 20 cm (83,333 pl ha^{-1}) of maize resulted in the highest green cob yield (19.55 t ha^{-1} with net returns of Rs.2,28,221 ha^{-1}. Application of 250–90 – 60 kg N, P_2O_5 & K_2O ha^{-1} recorded the highest green cob (19.16 t ha^{-1}) and fodder yield (33.8 t ha^{-1}) and net returns Rs. 2,19,560 ha^{-1} and B:C ratio 3.14 was comparable with 200 – 80 – 55 kg N, P_2O_5 & K_2O ha^{-1}.

During *rabi,* 2018 the highest maize grain equivalent yield was recorded with with maize (p) / blackgram (2:2) (3.65 t ha^{-1}) on par with maize(p)/ groundnut (2:2) (3.44 t ha^{-1}) followed by maize (p) / greengram (2:2) (3.25 t ha^{-1}). However the highest net returns were obtained with maize (p) / blackgram (2:2) followed by sole maize at 60 cm x 20 cm.

Crop protection

Insect Pest Management

Maize Research Centre, Vijayarai

Studies on seed treatment against stem borers in maize revealed that highest yield (8.33 t ha^{-1}) was observed with the seed treatment of Thiamethoxam 30 FS @ 10.0 ml kg^{-1} seed which is on par with Thiamethoxam 30 FS @ 8.0ml kg^{-1} seed (8.22 t ha^{-1}) during *rabi*, 2018-19.

During *kharif,* highest yields were recorded in second date of sowing i.e, first F.N of July which is on par with second F.N of july and significantly different from other treatments. During *rabi*, 2018-19, highest infestation of Fall Army Worm was noticed in first F.N of January sowings (91.335) and lowest infestation of Fall Army Worm (FAW) was noticed in second F.N of October (35.25).

Studies on evaluation of insecticides against FAW of maize during *rabi,* 2018-19 revealed that lowest percent infestation by FAW was noticed in novaluron 10 EC (3.79) treated followed by spinosad 45SC (4.74), spinotoram 11.7SC (6.63) and novaluron + emamectin Benzoate (6.28).

Studies on evaluation of biorationals against FAW of maize during *rabi,* 2018-19 shows that percent infestation by FAW was lowest with *Nomuraea rileyi* (33.51) followed by *Beaveria bassiana* (47.65) and *Bacillus thuriengensis* (54.3).

Studies on evaluation of whorl application of insecticides against FAW of maize during *rabi,* 2018-19 indicatd that percent infestation by FAW was lowest with chlorantraniliprole 4G followed by poisinous bait using thiodicarb. Highest percent reduction over control (%ROC) was noticed in chlorantraniliprole 4G (79.91) followed by poisonous bait with thiodicarb (70.90).

Regional Agricultural Research Station, Anakapalle

In biological control studies on maize stem bore, release of *Trichogramma chilonis* @ 100,000 ha^{-1} release^{-1} at 15, 22 and 29 days after seedling emergence at 7- 10 day interval resulted in 100 per cent reduction in *Chilo partellus* damage ; 35.47 percent reduction in *Sesamia inferens* damage and 9.2 percent reduction in *Spodoptera frugiperda* damage and registered higher yields (3.05 t ha^{-1}) compared to farmers practice (2.88 t ha^{-1}).

In an observational trial on fall army orm during *kharif* 2018 indicated that the fall army worm was effectively controlled with emamectin benzoate 5SG @ 0.4 g l^{-1} two sprays at 35 days and 45 days after sowing in August, 2018 + pheromone traps @ 4 traps acre^{-1} from 50 days after sowing in September, 2018 was effectively controlled with total larval mortality (27.7%) within 24 hours of treatment and cob damage was nil as the field. Cob yield recorded was 68.3'000/ha^{-1}.

1.3 Sorghum

Crop Improvement

Regional Agricultural Research Station, Nandyal

NTJ-5 (NJ 2647) white grain sorghum and N-15 (NJ 2446) yellow grain sorghum were released by SVRC, Andhra Pradesh during the year 2018.

In sorghum Advanced Yield Trial, the entries NJ-2668, NJ 2662, NJ 2664, NJ 2652, NJ 2663 and NJ-2667 recorded highest grain yield of 4.98 t ha^{-1}, 4.89 t ha^{-1}, 4.88 t ha^{-1} , 4.37 t ha^{-1} , 4.31 t ha^{-1} and 4.10 t ha^{-1} respectively over the check variety, NTJ-2 (3.34 t ha^{-1}) whereas the entries NJ 2668 and NJ 2664 has recorded on par fodder yields i.e.,13.89 t ha^{-1} and 13.27 t ha^{-1} respectively with NTJ 2 (10.19 t ha^{-1}) indicating the potentiality for both grain and fodder. However, the entries NJ- 2658, NJ- 2655 and NJ-2666 were observed to be significantly superior in fodder yield (14.51 t ha^{-1} – 15.74 t ha^{-1}) over check variety, NTJ-2 (10.19 t ha^{-1}).

In the experiment on physiological characterization of maghi dual purpose sorghum genotypes for drought tolerance under rainfed conditions, among the genotypes screened for drought tolerance, maximum plant height was recorded in NJ2635 (282.0 cm), leaf area in NJ 2647 (3465 cm^2), higher relative water content in 5242-2 at 30 and 60 days after sowing and higher grain yield was recorded in RSV -912 (4.68 t ha^{-1}), followed by 5242-2 (4.42 t ha^{-1}).

In the Preliminary evaluation of diverse sorghum germplasm for rabi adaption traits, among the entries higher stay green score was recorded in PVR-947, CSV-22R., RSV-2124, RSV-1837, higher leaf area index in CRS-70, RSV-2124, CRS-

73, M-35-1 and VJV-109. Higher relative water content was recorded in EP-89, EP-94, Phule-Suchitra, RSV-2197and RSV2124 and higher grain yield was recorded in EP-89, CRS-69, RSV-2124 and RSV-1921.

Agricultural Research Station, Vizianagaram

In Initial and Advanced Sweet sorghum Varietal and Hybrid Trial (IAVHTSS) *kharif* (IAVHTSS), significant differences were observed for total fresh biomass and grain yield among twenty genotypes tested including one hybrid sweet sorghum check, CSH 22 ss, two varietal sweet sorghum checks, CSV 19 ss & CSV 24 ss and one grain sorghum check, CSV 17; but of the entries surpassed the hybrid check, CSH 22 ss for fresh biomass (37.9 t ha^{-1}) and grain yield (2.04 t ha^{-1}).

Crop Production

Regional Agricultural Research Station, Nandyal

In a study on enrichment of organic source of fertilizer in rabi grain sorghum, significantly higher grain yield (4.51 t ha^{-1}) and net returns (Rs. 86,010/- ha^{-1}.) were recorded with 100% RDF enriched with vermicompost [100 kg vermicompost ha^{-1} + 11.25 kg $ZnSO_4$ ha^{-1} + 11.25 kg $FeSO_4$ ha^{-1}] as compared to 100 % RDF (3.87 t ha^{-1}).

In a study on response of different sorghum genotypes to fertilizer levels, sorghum hybrid CSH 15R (4.81 t ha^{-1}) has recorded higher grain yield followed by CSV 22R, M 35-1, CSH 13R, SPV 2468 and CSV 29R with a significant disparity among them, while 100% RDF has recorded significantly higher grain yield.

Seed treatment with Azospirillum @ 2 ml and PSB @ 4 ml kg^{-1} seed in addition to 100 % RDF has recorded significantly higher grain yield (4.04 t ha^{-1}) of *rabi* grain sorghum as compared to powder form of bio-fertilizers.

In a study on response of pre-release varieties of sorghum (NJ 2647 and NJ 2446) to different levels of fertilization, yield attributes *viz.*, panicle length, panicle weight, 1000 seed weight and grain yield were significantly higher in NJ 2647 (4.28 t ha^{-1}) and NJ 2446 (2.90 t ha^{-1}) as compared to NTJ-2 (3.42 t ha^{-1}) and N-14 (2.65 t ha^{-1}), respectively. Among the fertilizer doses, significantly higher yield attributes and grain yield were recorded at 125% RDF which was on par with 100% RDF.

Effective weed control in *rabi* grain sorghum was observed with the application of pre-emergence herbicide atrazine @ 800 g ha^{-1} and post-emergence application of tembotrione @ 50 g ha^{-1} at 30 DAS or post emergence application of atrazine @ 800 g t ha^{-1} at 30 DAS).

Regional Agricultural Research Station, Tirupati

Under optimization of sowing window for summer fodder sorghum cultivars, fodder sorghum sown during 1st FN of February produced maximum green and dry fodder (25.83 and 10.33 t ha^{-1}) which is on par with the crop sown during 2nd FN of January as well as 2nd FN of February. Crop sown early during January 1st FN recorded lowest green and dry fodder yield compared to other dates of sowing. Among the varieties tried CSV 32F recorded maximum green and dry fodder compared to other two varieties CSV 21F and CSV 32F.

Regional Agricultural Research Station, Lam

Evaluation of post emergence herbicides for selectivity and weed management in sorghum revealed that, hand weeding @ 20 & 30 DAS recorded the highest grain yield (4.97 t ha^{-1}) and was followed by atrazine @ 0.60 kg ha^{-1}/ha followed by hand weeding at 20 DAS (4.80 t ha^{-1}.). Herbicide treatments recorded lesser yield when compared to two hand weedings but were significantly superior to weedy check.

Crop Protection

Insect Pest Management

Regional Agricultural Research Station, Nandyal

Insecticides, Profenophos 40 EC+ Cypermethrin 4 EC @ 500 ml $acre^{-1}$, Nuvan @ 200 ml + Emamectin Benzoate 5 SG @ 80 g $acre^{-1}$, Rynaxypyr 18.5 SC @ 80 ml acre^{-1}, Poison bait (10 + 1 + 1 + 0.1) with rice bran + jagerry +Thiodicarb 75 SP @ 20 kg acre^{-1}), Spinosad 45 % SC @ 70 ml acre^{-1} &Bt 127 Formulation @ 600 ml acre^{-1} recorded the best management of Fall Army Worm *(spodoptera frugipeda)* over control with 34.4, 32.7, 31.6, 30.7, 27.3 & 22.5% at 20 days after sowing.

1.4 Pearlmillet (*Bajra*)

Crop Improvement

Agricultural Research Station, Vizianagaram

In Multi Location Yield Trial (MLT), significant grain yields were recorded among 12 cultures tested for grain yield. None of the entries surpassed PHB 3 for grain yield (3.86 t ha^{-1})

Agricultural Research Station, Perumallapalle

Among thirty seven entries evaluated in Initial Hybrid Trial – medium duration during *kharif,* 2018, none of the entries was significantly superior in grain yield to the checks. The mean grain yield of test entries ranged from 1.86 t ha^{-1} (AHB-1398) to 4.01 t ha^{-1} (BLPMH-108). Only one hybrid, *viz*. BLPMH-105 (4.01 t ha^{-1}) recorded 7.3 % higher grain yield over best check 86M01 (3.74 t ha^{-1}). Straw yield ranged from 11.50 t ha^{-1} (RHB-259) to 22.89 t ha^{-1} (TNBH-16335).

In Multi Location Trial (MLT) four experimental hybrids and 3 experimental varieties along with 4 checks were evaluated. Only one hybrid, *viz*. ABH 15 (4.07 t ha^{-1}) recorded 5.0 percent higher grain yield over the best check, PHB 3 (3.88 t ha^{-1}) along with early flowering (46 days). Straw yield ranged from 1.56 t ha^{-1} (ABH-1) to 2.94 t ha^{-1} (ABV-05).

Agricultural Research Station, Ananthapuram

A new pearl millet variety "Ananthapuramu Bajra Variety – 04" (ABV - 04) developed at AICRP on Pearl Millet, Agricultural Research Station (ARS), Ananthapuramu, was notified and released by the Central Sub-Committee on Crop Standards Notification and Release of Variety for Agricultural Crops in 2018 as **"Central Pearl Millet Variety ABV 04".** ABV 04 is a dual purpose variety with high grain and stover yield and it is recommended for commercial cultivation for zone B comprising of Maharashtra, Karnataka, Andhra Pradesh, Telangana and Tamil Nadu states under rainfed conditions of *kharif s*eason

Among the 37 hybrids tested in Initial Hybrid Trial (Medium), entry IHT 232 (Pusa 1801) recorded 2.15 t ha^{-1} grain yield and ranked first followed by IHT 202 (KHB 105) (2.03 t ha^{-1}) and IHT 218 (PB 1813) (2.04 t ha^{-1}).

In Initial Hybrid Trial (Late) the results indicated that among the 35 hybrids tested the entry IHT 301 (NBH 5929) recorded 2.04 t ha^{-1} grain yield and ranked first followed by IHT 305 (HYMH-4006) (1.56 t ha^{-1}) and IHT 314 (TNBH-16307) (1.37 t ha^{-1}).

Results of released Hybrid and Varietal Trial indicated that the hybrid Kaveri Super Boss recorded highest grain yield (1.53 t ha^{-1}) followed by 86M86 (1.50 t ha^{-1}) and Pratap (MH 1642) 1.47 t ha^{-1}.

In Multi-Location Trial of Pearl Millet Hybrids and Varieties three entries performed well among eleven entries, ABH 6 ranked first for grain yield (1.29 t ha^{-1}) followed by ICMV 221 (1.25 t ha^{-1}) and PHB 3 (1.18 t ha^{-1}).

The AICRP on Pearl Millet at Ananthapuramu successfully conducted 10 Front Line Demonstrations during *kharif* 2018 in Anantha-puramu district of Andhra Pradesh to encourage the farmers in Pearl Millet cultivation. The results showed 21.55 % increase in grain yield and 22.81 % increase in fodder yield in improved practice (Hybrid Pearl Millet – ABH-1) compared to that of farmers practice of cultivating local variety.

Crop Production

Regional Agricultural Research Station, Lam

Pre emergence application of atrazine @ 0.5 kg ha^{-1} followed by hand weeding @ 20 DAS (3.92 t ha^{-1}) and atrazine @ 0.5 kg ha^{-1} as pre emergence followed by metsulfuron methyl (10%) + chlorimuron ethyl (10%) @ 0.0015 kg ha^{-1} as post emergence (3.71 t ha^{-1}) have recorded high grain yield and found on par with that of two hand weedings at 20 and 30 DAS (4.12 t ha^{-1}) in respect of grain yield during *kharif,* 2017.

Regional Agricultural Research Station, Tirupati

Weed management studies in pearlmillet during *Kharif* showed that hand weeding twice at 20 and 40 DAS recorded lowest weed density and dry weight as well as the highest weed control efficiency and higher grain and straw yield, which was on par with pre-emergence application of atrazine @ 750 g *a.i* ha^{-1} + one hand weeding at 30 DAS. Higher net returns (Rs, 22038/ha) and B:C ratio (2.33) were obtained with pre-emergence application of atrazine @ 750 g *a.i* ha^{-1} + one hand weeding at 30 DAS (2.33) followed by POE of chlorimuron ethyl + metsulfuron-methyl @ 4 g a.i. ha^{-1} (Rs.18534/- ha^{-1} and 2.21 respectively).

1.5 Fingermillet (*Ragi*)

Crop Improvement

Agricultural Research Station, Perumallapalle

Ragi variety, PPR 1012 was released in the name of Tirumala in state varietal release committee during 2018.

Entry PPR 1080 was promoted to advance testing in MLT and co-ordinated trials. The entries PPR 1082, PPR 1094 and PPR 1104 were promoted to multilocation testing in A.P. and Telengana during 2019-20.

A total of 300 finger millet germplasm lines were evaluated during *rabi* 2018-19 for yield and yield contributing traits and were maintained for crop improvement programme.

Among the eleven entries tested in Multi Location Trial including three checks (Vakula, Godavari and Srichaitanya) during *kharif* 2018.the enty PPR 1082 (4.98 t ha^{-1}) was the highest grain yielder which is significantly superior to the check Godavari (4.23 t ha^{-1}).

Eleven entries were tested in Multilocation trial including three checks (Vakula, Godavari and Srichaitanya). The entry VR 1099 (3.73 t ha^{-1}) recorded highest grain yield followed by VR 1110 (3.60 t ha^{-1}) which was on par with the best yielding check Vakula (3.33 t ha^{-1}).

Among 25 entries tested in Advanced Yield trial including check, Vakula during *rabi* 2018-19 only one entry PPR 1132 (3.11 t ha^{-1}) recorded significantly higher grain yields as compared to the check Vakula (2.62 t ha^{-1}).

In Advanced varietal trial I & II (AVT I & II), thirteen entries were tested against five checks during *kharif* 2018. Entries WN 585 (6.17 t ha^{-1}) and PR 1511 (6.09 t ha^{-1}) recorded significantly higher grain yields as compared to the best yielding check PR 202 (5.59 t ha^{-1}).

Agricultural Research Station, Vizianagaram

In evaluation of ragi under Advanced Varietal Trial I & II (South Zone), eighteen entries including one local check, Sri Chaitanya (VR-847) were tested during *kharif,* 2018. Among them, VR 1101 recorded highest significant grain yield (4.27 t ha^{-1}) compared to national check, GPU 67 (3.03 t ha^{-1}) while the local check, Sri Chaitanya (VR-847) recorded 2.74 t ha^{-1} only.

In evaluation of ragi under Preliminary Yield Trial, fourteen entries were tested including three local checks, Sri Chaitanya (VR 847), GPU 45 and VL 352. Among all entries tested, six were of late duration group, four were of medium group and one is of early duration group. Among late group, VR 1144 (3.95 t ha^{-1}) has recorded significant higher grain yield compared to Sri Chaitanya (2.90 t ha^{-1}) while VR 1138 (4.32 t ha^{-1}), VR 1130 (4.00 t ha^{-1}) and VR 1131(3.60 t ha^{-1}) compared to GPU 45 (2.69 t ha^{-1}) whereas in early group, VR 1125 (3.49 t ha^{-1}) recorded significant higher grain yield compared to VL 352 (2.58 t ha^{-1}).

In Advanced Yield Trial, among nine entries evaluated, the entries VR 1112 (4.16 t ha^{-1}) and VR 1110 (4.11 t ha^{-1}) had significantly out yielded the local check, Sri Chaitanya (3.25 t ha^{-1}). VR 1115 (3.92 t ha^{-1}) and VR 1117 (3.55 t ha^{-1}) recorded significant higher grain yields compared to Vakula (2.43 t ha^{-1}).

Among eleven cultures tested against one local check, Sri Chaitanya (VR 847) in Multi Location Trial, significant grain yields were recorded by VR 1112 (3.94 t ha^{-1}), PPR 1080 (3.93 t ha^{-1}), while the local check recorded 2.99 t ha^{-1} grain yield.

In evaluation of finger millet for Fe and Zn content, FM 1986, FM 1918, VR 1099 and FM 1883 recorded more than 80 mg kg^{-1} Fe content and FM 1918, FM 1986, VR 1101, VR 1099 and FM 2065 recorded more than 50 mg kg^{-1} Zn content while the check, Sri Chaitanya recorded 27.08 mg kg^{-1} and 25.89 mg kg^{-1} Fe and Zn content respectively.

Agricultural Research Station, Peddapuram

Entry PR 1639 (3.38 t ha^{-1}) which was evaluated in the IVT under AICRP on small millets ranked fourth with an overall yield advantage of 2.5% over best check in the south zone over 15 locations on all India level during *kharif* 2018. The entry PR 1511 has recorded 4.54% yield advantage over medium duration check GPU 45 (3.11 t ha^{-1}) tested over 15 locations and two seasons on all India level.

Thirteen promising entries of finger millet were evaluated in Advanced Yield Trial for yield and lodging resistance in which PR 1643 (4.62 t ha^{-1}) performed 7.8% superiority over the best check PR 202 (4.28 t ha^{-1}).

In the preliminary yield trial, among 13 promising entries tested, the entry PR 1506 (4.61 t ha^{-1}) recorded 7.05% superior yield over best check GPU 67(4.30 t ha^{-1}).

Crop Production

Agricultural Research Station, Vizianagaram

Response of pre release finger millet varieties to different levels of fertilizer under rainfed conditions during *kharif*, 2018 revealed that grain yield (2.47 t ha^{-1}) and straw yield (6.27 t ha^{-1}) were significantly higher in 125% RDF and it was on par with 100% RDF. Among the varieties, duration of FMV-1103 (114 days) was 13 days earlier than FMV-1104 (127 days). Highest grain yield was obtained in pre release variety FMV-1103 (2.87 t ha^{-1}) compared to FMV-1104 and national (GPU 45 & GPU-67) and local check (PR-202) varieties.

Studies on chemical weed management studies in finger millet under rice fallow condition during *rabi*, 2018-19 indicated that pre emergence application of bensulfuron methyl + pretilachlor 3 kg ha^{-1} followed by post emergence application of penoxsulam 12.5 g a.i. ha^{-1} resulted in higher weed control efficiency (89.8%) followed by halosulfuron (72.1%) at 40 DAS. Grain yield was significantly high in weed free plot (4.62 t ha^{-1}) and it was closely followed by penoxsulam 12.5 g a.i. ha^{-1} (4.56 t ha^{-1}) and bispyribac sodium @ 12.5 g a.i. ha^{-1} (4.09 t ha^{-1}).

Experimental results of 'Guli' method of finger millet cultivation during *rabi,* 2018-19 revealed that recommended spacing (30 cmx 10 cm) was found superior in terms of grain yield over Guli method (45cm x45cm) and normal planting at 45cm x 45cm. Pulling of wooden log over the crop has positive impact on plant ht (cm),tillers $plant^{-1}$, finger length (cm), plant dry wt (g), ear head weight (kg) $plot^{-1}$ and root dry weight (g).

Results of different NPK fertilizer levels in finger millet (variety, VR 847) showed that increase in the dose of recommended dose of N,P,K fertilizers (150% RDNP) had recorded 10.52% increase in grain yield (2.94 t ha^{-1}) over normal recommended dose (100% RDF) of N,P,K fertilizers (2.66 t ha^{-1}).

The experimental results of effect of organic manures on grain yield and quality of finger millet showed that the yield level in organic treatment plot (grain yield 2.34 t ha^{-1} and straw yield (7.27 t ha^{-1}) reached to that of inorganic treatment plot (grain yield 2.77 t ha^{-1} and straw yield 7.93 t ha^{-1}). Number of productive tillers per m^2 also on par with inorganic treatment.

Results of different fertilizers levels with multi-K (KNO_3) and without multi-K in finger millet (variety, VR 847) showed that increase in the dose of recommended dose of N,P,K fertilizers (150% RDF + 1% KNO_3) had recorded increase in grain yield (3.73 t ha^{-1}) followed by 150% RDF (3.59 t ha^{-1}).

Agricultural Research Station, Perumallapalle

During *kharif* in Fingermillet higher grain yield was recorded with champavathi when transplanted with 15 days or 21 days old seedlings with a spacing of 22.5 cm x 10 cm (3.68 t ha^{-1}) compared to vakula (2.86 t ha^{-1}).

Agricultural Research Station, Peddapuram

Response of prerelease finger millet varieties to different levels of NPK fertilizers under rainfed conditions during *kharif,* 2018 revealed that application of 125% RDF recorded significantly higher grain yield (3.20 t ha^{-1}) than lower levels. Among the finger millet varieties, significantly higher grain yield of 3.26 t $ha^{-1}$was recorded with PR1035 and was found to be on par with check PR-202 (3.19 t ha^{-1}).

Agricultural Research Station, Chithapalli

Effect of seedling age and crop geometry of finger millet under organic farming revealed that higher plant height (113.7 cm) was recorded with 25 days aged seedlings planted at 25 X 25 cm spacing. No.of productive tillers (7.24), length of finger (7.37 cm) were significantly higher with 25 days aged seedlings with 45 X 45 cm spacing adopted. Significantly higher yield (14.6 q ac^{-1}) was recorded with 25 days aged seedlings planted at 25 X 25 cm spacing under organic farming (application of vermicompost @ 2 t ha^{-1}) method.

Crop Protection

Disease Management

Agricultural Research Station, Perumallapalle

Among 235 entries tested for blast resistance,VR-1101,VR-1110, PPR-1080, PR-1643,PPR-1094, PPR-1103, PPR-1104 showed resistant reaction to neck blast and moderately resistant reaction to finger blast. The entries *viz.,* PCGF-45, 38, FM-IVT-21, PR-22, IE-3704 showed resistant reaction to both neck and finger blast.

Agricultural Research Station, Vizianagaram

Among 26 entries tested along with Resistant GE 4449 (NB- 10.2%, FB-11.8%) and susceptible check, Udurumalliga (NB- 80.0%, FB-79.5%) in Initial Varietal Trial, the lowest incidence of neck blast (13.0%) and finger blast (13.2%) were recorded in KMR 650 and highest (78.9%) and (78.9%) were recorded in PR 202. The lowest incidence of banded blight was recorded in RAUF-17 (26.9%).

In Advanced Varietal Trial (Early & Medium duration) of Ragi entries for important diseases that are endemic to the region, 19 entries were screened along with resistant GE 4449 (NB- 13.9%, FB-15.5%) and susceptible check, Udurumalliga (NB-83.3%, FB-83.0%). The lowest intensity of neck blast (16.5%) and finger blast (18.6%) was recorded in VR 1101. The lowest incidence of banded blight was recorded in VR 1101(25.6%).

Agricultural Research Station, Peddapuram

In Initial Varietal Trial, out of 24 entries screened, PR 202, VL 376 showed lowest score (0.0) followed by entry WN 591 (1.6). Highest disease score (4.0) was recorded in IIMRFM-8011-17.

In Advanced Varietal Trial 17 entries were screened in which checks PR 202 and GPU 67 showed lowest score of 1.0 followed by RAUF-1 (2.0) and WN 550 (2.0).

1.6 Foxtail Millet (*Korra*)

Crop Improvement

Regional Agricultural Research Station, Nandyal

Entries SiA 3159 (4.66 t ha^{-1}) and SiA 3220 (4.01 t ha^{-1}) were advanced in All India Coordinated Trials.

In yield evaluation trials SiA 4203 (4.14 t ha^{-1}), SiA 4215 (3.32 t ha^{-1}) and SiA 4217 (3.34 t ha^{-1}) were best performing entries.

The entries SiA 3223 (3.86 t ha^{-1}) and SiA 3159 (3.62 t ha^{-1}) were the best performing enties in Multi-location trial.

A total of 1037 foxtail millet germplasm lines were conserved and characterised for DUS traits.

Agricultural Research Station, Perumallapalle

Seven entries were tested in Multi location trial including checks during *Kharif* 2018. Among the tested entry, SiA 3274 registered highest yield (4.41 t ha^{-1}) followed by and SiA 3159 (3.99 t ha^{-1}) compared to check Suryanandi (3.64 t ha^{-1}).

Agricultural Research Station, Vizianagaram

In Advanced varietal trial, seventeen entries including one local check, SiA 3085 were tested during kharif 2018. Out of 17 entries, SiA 3220 (2.82 t ha^{-1}) and SiA 3274 (2.73 t ha^{-1}) recorded significantly higher grain yield compared to local check SiA 3085 (1.96 t ha^{-1}).

In Multi Location Trial significant grain yields were recorded among seven cultures tested against one local check, SiA 3222, the entry, SiA 3159 (3.05 t ha^{-1}) recorded highest grain yielding and superior to the check (2.45 t ha^{-1}).

Crop Production

Regional Agricultural Research Station, Nandyal

In a study on response of four pre-release varieties of foxtail millet *i.e.,* FXV 603, SiA 326, DHFT 109-3 and SiA 3156 to different levels of fertilization indicated that application of 100% RDF recorded higher grain yield (2.44 t ha^{-1}). Similarly pre-release variety FXV 603 recorded higher grain yield (2.35 t ha^{-1}).

In intercropping studies on millets with redgram, maximum millet grain equivalent yield was recorded with Foxtail millet + Redgram in 6:1 ratio (3.41 t ha^{-1}).

Crop Production

Pest Management

Regional Agricultural Research Station, Nandyal

In management *of Helicoverpa armigera* in foxtail millet, sprayng monocrotophos 36 SL @ 1.6 ml l^{-1} at 10 days after sowing has given 88.75 % reduction of larval population followed by chlorpyriphos 20 EC @ 2.5 ml l^{-1}. High yield was recorded in chlorpyriphos 20 EC (2.28 t ha^{-1}) with Incremental Benefit Cost Ratio of 7.0.

Disease Management

Regional Agricultural Research Station, Nandyal

In Initial Advanced Varietal Trial (FIAVT), blast ranged from grade 3 (DHFT 109-3, TNSi 354, IIMR FXM-3 and SiA3282) to grade 5.2 (SiA 3274) and downy mildew ranged from 2.6% (SiA 3282) to 7% (IIMR FXM-2).

In National Screening Nursery (NSN), blast incidence ranged from grade 3 (SiA3282) to grade 5(TNSi416) and downy mildew ranged from 2.7% (SiA3282) to 7.9% (TNSi 424).

Agricultural Research Station, Vizianagaram

In nursery screening of Foxtail millet, seventeen entries were screened for sheath blight along with resistant, Si A 3282 (12.8%) and susceptible check, Si A 3367(93.3%). Among them lowest disease intensity (63.4%) was recorded in NSN FX 9(TNSi 419) highest was recorded by NSN FX 7(TNSi 417) (92.4%).

1.7 Little Millet (*Sama*)

Crop Improvement

Agricultural Research Station, Perumallapalle

In Advanced Varietal Trial nineteen entries were tested against three checks during *Kharif* 2018. Among the tested entries, IIMRLM 8437-17 (2.21 t ha^{-1}) was the top yielder followed by GPUL 7 (1.98 t ha^{-1}) and DHLT 28-4 (1.81 t ha^{-1}) which were significantly superior to the high yielding check BL 6 (1.52 t ha^{-1}

Agricultural Research Station, Vizianagaram

In Initial and Advanced Varietal Trial (LIAVT), twenty four entries were evaluated including one local check, JK 36. Out of 24 entries, eight entries, *viz.,* OLM 18 (1.38 t ha^{-1}), GPUL 7 (1.37 t ha^{-1}) and IIMR LM 7162 (1.29 t ha^{-1}) recorded significantly higher grain yield compared to the early check, BL 6 (0-99 t ha^{-1}) and local check, JK 36 (0.91 t ha^{-1}).

Crop Production

Agricultural Research Station, Perumallapalle

During *kharif* under irrigated dry situation in transplanted sama crop higher grain yield was recorded with a spacing of 20 cm x 10 cm (1.36 t ha^{-1}). With regard to fertilizer doses 40-40-20- NPK ha^{-1} recorded higher grain yield (1.48 t ha^{-1}).

Crop Protecion

Disease Management

Agricultural Research Station, Vizianagaram

Among 24 entries screened against sheath blight in Initial and Advanced varietal trial along with resistant, RLM 208 (9.5%) and susceptible check, RLM 223 (95.3%). The lowest disease intensity (4.4%) was recorded in IIMR LM 8437-17 (LMV 534) and highest disease intensity (92.00%) was recorded in JK-8 and TNPSu 202 (LMV 537).

1.8 Barnyard millet (Ooda)

Crop Improvement

Agricultural Research Station, Vizianagaram

In Barnyard millet Initial and Advanced Varietal Trial (BIAVT), thirteen entries were evaluated along with one local check. The entries VMBC 331, TNEf 204 recorded significantly highest grain yield (2.0 t ha^{-1}) compared to the local check (1.60 t ha^{-1}).

Crop Protecion

Disease Management

Agricultural Research Station, Vizianagaram

In Nursery screening nursery of Barnyard millet for important diseases 12 entries were screened along with resistant, PRB 903 (28.4%) and susceptible check, LDR-1 (96.4%) for sheath blight in which NSN BM 1(PRB 903) was recorded maximum (95.7%) disease intensity. The lowest intensity was recorded (64.6%) in NSN BM 9(VL 264).

Regional Agricultural Research Station, Nandyal

In Barnyard millet Initial Advanced Varietal Trial, less leaf blight (grade 6) is noticed in DHBM 19-7, VL 254, TNEf 204, TNEf 301. Head smut ranged from 8.2% (TNEf 204) to 39.3% (DHBM 93-3).

1.9 Proso millet

Agricultural Research Station, Vizianagaram

Crop production

Studies on integrated approach for enhancing seed yield and quality indicated that application of 125 kg Neem cake + 1250 kg Vermi compost ha^{-1} or 12.5 tons FYM ha^{-1} + 100% RDF + 2% Borax spray recorded significantly high seed yield (0.98 t ha^{-1}). Among different priming methods, seed priming with 20% liquid *Pseudomonas fluorescence* has resulted in highest grain yield (0.76 t ha^{-1}) followed by seed priming with 2% KH_2PO_4 and hydro priming.

Crop Protection

Among 15 entries screened for sheath blight, along with Resistant, TNPM 230 (18.6%) and Susceptible check, Nilavour Local (98.6%) in the Initial and Advanced varietal trial, the lowest disease intensity (85.40%) was recorded in TNPm 252 (PMV 451) and highest disease intensity (93.2%) was recorded in GPUP 27(PMV 448) and TNPm 247(PMV 444).

In Nursery screening trial, among 10 entries screened against sheath blight along with resistant, TNPM 230 (18.0%) and susceptible check, Nilavour Local (96.0%) lowest sheath blight intensity (45.00%) was recorded in NSN PM 8(TNPm -318) and highest disease intensity (93.4%) was recorded in NSN PM-1(TNPm -311).

2.0 Kodo millet

Crop production

Agricultural Research Station, Vizianagaram

Results of integrated approach for enhancing seed yield and quality indicated that grain yield obtained with the treatment 125 kg Neem cake +

1250 kg Vermi compost ha^{-1} or 12.5 tons FYM ha^{-1} + 100% RDF + 2% Borax spray (4.18 t ha^{-1}) was significantly high.

Among different priming methods, seed priming with 20% Liquid *Pseudomonas fluorescence* has resulted in highest grain yield (2.87 t ha^{-1}) followed by seed priming with 2% KH_2PO_4 (2.79 t ha^{-1}).

Crop Protection

Agricultural Research Station, Vizianagaram

In Initial and Advanced varietal trial, among 16 entries screened for sheath blight, along with resistant, RPS 755 (7.3 %) and 2 susceptible checks, RPS 727 (96.3%) and DPS-12 (97.0%), the lowest disease incidence (13.23%) was recorded in TNPSC 301 (KMV 552) and highest disease intensity (95.7%) was recorded in TNPSC 176 (KMV 542) and RPS 520 (KMV 546). while it was 97.0% in the check (RPS 727).

2. Pulses

2.1 Redgram

Crop Improvement

Regional Agricultural Research Station, Lam

Among 14 entries tested in Advanced Yield Trial, entry LRG 321 (1.15 t ha^{-1}) recorded significant superior yield over check LRG 52 (1.00 t ha^{-1}).

In Multi Locaion Trial, among 14 entries tested, the entry LRG 22 and LRG 275 (1.19 t ha^{-1}) followed by TRG 111 (1.17 t ha^{-1}) recorded higher yield against check Maruthi (1.16 t ha^{-1}).

Among 32 entries tested in Initial Varietal Trial (Medium), entry RPS 2007-105-1 recorded significantly superior yield (1.24 t ha^{-1}) over the check ICP 8863 (0.95 t ha^{-1}).

In Initial Varietal Trial (Medium early), among 16 entries tested entry PT0012 recorded significantly superior yield (1.07 t ha^{-1}) over the highest yielding check PRG 176 (0.87 t ha^{-1}).

In Advanced Varietal Trial 1 (Medium early), among 8 entries tested, entry KRG 33 recorded significantly superior yield (1.04 t^{-1}) over the highest yielding check TS 3R (0.92 t ha^{-1}).

Agricultural Research Station, Darsi

In Multilocation trial during *kharif* 2018 out of fourteen varieties tested, T2 (1.12 t ha^{-1}) has recorded maximum seed yield; whereas T4 recorded the lowest (5.08 t ha^{-1})

In Preliminary Yield Trial during *kharif* 2018, out of 8 varieties, LRG 52 (9.80 t ha^{-1}) has recorded maximum seed yield; whereas DRG 3 recorded the lowest (6.08 t ha^{-1})

Regional Agricultural Research Station, Tirupati

In Multilocation testing, TRG87 gave 12% increased yield (1.16 t ha^{-1}) over LRG-41.

In Advanced Varietal Trial, TRG-108, TRG-117, TRG-118 gave higher seed yield of 1.45, 1.44 and 1.35 t ha^{-1} in 162days respectively over check LRG-52 (1.20 t ha^{-1} in 175days.)

In Initial Varietal Tial, out of 17 entries tested, the entries TRG125 (1.59 t ha^{-1}), TRG130 (1.46 t ha^{-1}), and TRG132 (1.41 t ha^{-1}) with duration of 170 days gave significantly higher seed yield over check LRG-52(1.20 t ha^{-1}).

In Advanced varietal trial (ME), among 9 lines tested, TRG 604 gave significantly higher seed yield of 0.08 t ha^{-1} in 161 days, where as check ICPL8863 gave seed yield of 0.75 t ha^{-1}.

In Initial Varietal Tial (M), among 33 entries tested, one entry RG711 with duration of 209 days gave highest seed yield of 2.09 t $ha^{-1}$and other promising lines 730, 708, 720 recorded higher seed yield of 1.64,1.62 and 1.61 t ha^{-1}in 163 days duration, where as LRG52 gave seed yield of 1.27 t ha^{-1}in 179 days.

Agricultural Research Station, Anantapuramu

A total of 14 entries were evaluated for seed yield in Multi Location Trial in *kharif* 2018. The entry LRG-224 (0.38 t ha^{-1}) recorded high followed by LRG-229 (0.37 t ha^{-1}) compared to the check LRG-52 (0.25 t ha^{-1}).

Regional Agricultural Research Station, Lam

During 2018-19, performance of seven redgram genotypes was studied during *kharif* season. There was a significant differences between the varieties for plant height, number of branches, root length, root, stem, leaf, pod, total dry matter, SCMR, RWC, chlorophyll a, chlorophyll b, total chlorophyll, number of pods per plant, 100 seed weight, seed yield. Maximum seed yield was recorded in LRG 160 (1.67 t ha^{-1}) followed by LRG 52 (1.54 t ha^{-1}) compared to LRG 158 (1.31 t ha^{-1}).

Agricultural Research Station, Utukuru

Out of 14 entries tested, significant differences were found among the entries tested for yield and no entry was found to be significantly superior against the best check maruthi (0.88 t ha^{-1}). Entry LRG 208 (0.92 t ha^{-1}) was the top performer..

Agricultural Research Station, Vizianagaram

In Multi Location Trial, out of fourteen entries including one local check, LRG 41 were evaluated during *kharif,* 2018 for grain yield, the entry LRG 52 (1.72 t ha^{-1}) has recorded highest yield followed by BRG 2 (1.58 t ha^{-1}) and LRG 208 (1.50 t ha^{-1}) compared to the Local check, LRG 41 (1.23 t ha^{-1}).

Agricultural Research Station, Garikapadu

In a Multi Location Trial on redgram, among the 14 entries tested, LRG-229 recorded significantly higher yield (1.51 t ha^{-1}) which is on par with LRG-52 (1.47 t ha^{-1}).

Crop Production

Agricultural Research Station, Anantapuramu

In an experiment on growth and yield of dryland crops as influenced by subsoiling, there is no significant differences were found among subsoiling treatment in respect of pigeonpea equivalent yield. Among crops tested, clusterbean produced higher pigeonpea equivalent yield (0.36 t ha^{-1}) which is significantly superior to other crops and cluster bean crop only realized positive net returns, whereas, other crops realized negative net returns.

Conservation furrows were formed adjacent to every row of pigeonpea for insitu moisture conservation, highest pigeonpea equivalent yield was recorded with pigeonpea + pearlmillet (1:1) with conservation furrows. Maximum B: C ratio of 0.84 and highest RWUE was also recorded with pigeonpea + pearlmillet (1:1) with conservation furrows.

Regional Agricultural Research Station, Tirupati

During *Kharif*, 2018, redgram + groundnut (1:8) intercropping system was found to be remunerative with the highest redgram grain equivalent yield (1.71 t ha^{-1}) and net returns of Rs. 42078 ha^{-1} followed by redgram + fingermillet (1:8) with Rs. 41835 ha^{-1} under mechanized sowing for rainfed alfisols.

Rain water management in redgram based cropping system for climate resilience during *kharif,* 2018 revealed that among the different intercropping systems groundnut + redgram 7:1 recorded the highest redgram equivalent yield of 2.30 t ha^{-1} with higher net returns of Rs. 75,773 ha^{-1} followed by intercropping clusterbean + redgram in 5:1 ratio (redgram equivalent yield of 2.16 t ha^{-1} and net returns Rs. 21,692 ha^{-1} followed by tomato + redgram in 5:1 ratio with redgram equivalent yield of 1.71 t ha^{-1} and net returns Rs. 5,546 ha^{-1}) while lowest was recorded with cowpea + redgram in 5:1 ratio with redgram equivalent yield of 1.48 t ha^{-1} with net returns of Rs 50,505 ha^{-1}. Three years compiled data revealed that highest net income Rs. 62,777 ha^{-1} recorded with groundnut/redgram [7:1] with BC of 2.14 follwed by cowpea and redgram in 5:1 with net income of Rs. 22,803 ha^{-1} and BC of 1.68.

Regional Agricultural Research Station, Lam

In Natural farming trial with redgram, maximum plant height and dry matter production at all the growth stages was recorded in Integrated Crop Management (ICM) plot followed by Organic

& Sahaja vyavasayam and Palekar's concept. Yield attributes (pods plant^{-1}, seeds pod^{-1} and test weight (g)) were superior in ICM treatment than that of both Organic and ZBNF treatments. The redgram equivalent yield was higher in ICM plot (1.62 t ha^{-1}) than that of other two plots; Organic (0.73 t ha^{-1}) and ZBNF (0.56 t ha^{-1}). .

Agricultural Research Station, Utukuru

In studies on optimization of sowing window for varied duration redgram varieties, sowing of two varieties *viz*., LRG-41, LRG-52 was taken up at three different times during July to August first fortnight under rain fed conditions. There was no significant difference in number of pods per plant , pod length, seeds/pod and 100 seed weight and pod yield at different times of sowing i.e. July I fortnight, July II fortnight and August I fortnight. Among the varieties tested, LRG-52 recorded higher yield (1.01 t ha^{-1}) which was on par with LRG-41 (0.93 t ha^{-1}).

Agricultural Research Station, Darsi

Studies on physiological indices for drought tolerance in chickpea preceded by korra crop indicated that though solo crop of chickpea yielded high seed yield (0.93 t ha^{-1}), korra followed by chickpea crop obtained highest BC ratio (1.15) which is beneficial to farmer.

Effect of bio inoculants on growth, development and yield in chickpea under rainfed conditions revealed that the cumulative effect of *Rhizobium a*nd Beejamrutam improved the plant growth and nutrient uptake leading to significantly higher seed yield (1.03 t ha^{-1}) which is 17.4% higher than that of the control (0.86 t ha^{-1}) followed by rhizobium and trichoderma combination (0.99 t ha^{-1}).

Agricultural Research Station, Garikapadu

Studies on the quantity of water required for higher productivity in redgram under different methods of supplemental irrigation during *kharif* season revealed that providing 20 mm irrigation each at pre-flowering and pod filling stages (1.19 t ha^{-1}); 20 mm irrigation at pre-flowering (1.12 t ha^{-1}) and 10 mm each at pre-flowering and pod filling stages (1.11 t ha^{-1}) recorded higher seed yield in redgram. When irrigation water availability is more and growth of redgram doesn't facilitate for furrow irrigation, rain gun method can be adopted.

Crop Protecion

Insect Pest Management

Regional Agricultural Research Station, Lam

Among the different mid-early maturity group entries (AVT 1 & AVT 2) tested, the pod damage due to pod borer complex was low (18.9%) in WRGE 93(AVT 2 entry) and the crop yield was more in WRGE 121 (1.17 t ha^{-1}).

Among the different medium maturity group entries (AVT 1), the pod damage due to pod borer complex was low in LRG 52 (20.6%). However, the entry, RPS 2008-5 has recorded comparatively higher yield (9.58. t ha^{-1}) than rest of the entries.

The population of *H. armigera* was more (3.8 moths / trap / week) during 45th SMW (5-11 Nov.). Whereas, the peak population of *S. litura* was observed during 40th (1-7 Oct.), 49th (3-9 Dec.) and 1st (1-7 Jan, 2019) SMW with 101.0, 72.0 and 108.0 moths / trap / week, respectively. The peak larval population of *H. armigera, M. vitrata* and *S. litura* was observed during 47th, 49th and 42nd SMW with 4.8, 4.8 and 4.0 larvae plant^{-1}, respectively.

The insecticidal spray schedule consisting of chlorantraniliprole, followed by flubendiamide and dimethoate at 10 days interval starting from 50% flowering recorded less pod damage due to pod borer complex (14.09%) as against 55.12% in untreated control. However, when only bio-pesticides are considered, the bio-pesticide "AAVYA", followed by *Azadirachtin* 1500 ppm and *Bt. kurastaki* respectively recorded 24.87, 27.71 and 39.14% pod damage due to pod borer complex. The insecticidal schedule treatment, followed by bio-pesticide "AAVYA" and *Azadirachtin* respectively recorded 1.10, 0.98 and 0.93 t ha^{-1} yield over control (0.66 t ha^{-1}).

The pod damage due to pod borer complex in ICM adopted plots was 16.5%, followed by Palekar concept (31.5%) and DOA concept (38.7%). Similarly, the seed damage due to pod bugs was low in ICM adopted plot (13.5%), followed by Palekar concept (18.8%) and DOA concept (22.6%). The redgram equivalent yield obtained in ICM plots was 0.67 t ac^{-1}, where as it was only 0.29 t ac^{-1} and 0.26 t ac^{-1} in DOA concept and Palekar concept adopted plots respectively. The gross returns were more in ICM adopted plot (Rs. 38019/-), followed by DOA (Rs. 16530/-) and Palekar concept (Rs. 14763/-) adopted fields.

Regional Agricultural Research Station, Tirupati

In management of pod borer complex in redgram, one spray of Cyantraniliprole @ 0.3 ml l^{-1} at flowering stage was found to be effective in reducing the incidence of *Helicoverpa armigera* (6.36%) and pod fly (7.77%) followed by Chloratraniliprole @ 0.3ml l^{-1}. (*Helicoverpa*: 9.57% and pod fly 9.47%) and Thiodicarb 1 g l^{-1} of water (*Helicoverpa* : 11.81% and pod fly 12.65%) .

Screening of different varieties of pigeonpea (30 entries) against pod borer complex, at bud initiation stage, revealed that the incidence of *Maruca* was observed in RKPV 454-02 (15.6%), PRG-176 (10.9%), BDN 2014-2 (18.5%) and BAUPP 1522 (13.7%). At pod maturity stage, the least incidence of *Helicoverpa* damage recorded in GRG-150 (3.0%) followed by ICF8863 (4.0%), CRG 2015-17 (6.0%), BAUPP 12-22 (7.0%), BDN 2014-1 (8.0%) and Co-6 (9.0%). The least incidence of pod fly damage recorded in PT 0012 and BAUPP 15-22 (2.0%) followed by WRH and SKNP 1408 (3.0%), SKNF 1406, PA 535, CRG-201517, IBTDRG-3 (4.0%) , RVSA 28-1, RKPV 530-01 (5.0%), T9: RKPV 454-02, PRG-176 and BDN 2014-2 (6.0%).

Agricultural Research Station, Utukur

Population dynamics of pod feeding insect pests of pigeonpea in LRG-41, LRG-52 and TRG-108 varieties in three (July I FN and August I & II FN) different dates of sowing indicated that highest number of *Helicoverpa* larvae per plant was observed during third week of December in TRG-108 (1.58) followed by LRG-52 (1.36) and LRG-41 (0.65) in August I FN sown crop.*Maruca* spotted pod borer incidence was high during third week of December (51st Standard week) in LRG-41 (7.18 larvae plant^{-1}) followed by TRG-108 (1.58) and LRG-52 (2.02) in August I FN sown crop. Pod fly maggots and pupae were high during second week of January (2nd standard week) in LRG- 41 followed by LRG-52 and TRG-108 in August I FN sown crop.

Agricultural Research Station, Darsi

Seasonal incidence and dynamics of major insect pests in pigeonpea revealed that during *kharif* 2018, leaf hopper population reached a peak (2.40 hoppers leaves^{-3}) during 45th standard week. Occurrence of ash weevils (1.53 adults plant^{-1}) was at its peak during 46th, 49th & 50th standard week. Leaf webber population recorded its peak on 43rd standard week with 1.60 larvae plant^{-1}. *M. vitrata* and *H. armigera* peak incidence was recorded during 47th and 48th standard week with 0.60 and 1.00 larvae plant^{-1}, respectively. The male moth catches of *H. armigera* was maximum during 48th standard week with a mean catch of 3.20 males trap^{-1} week^{-1} and was positively co-related with the relative humidity.

Among the insecticides evaluated for management of pod fly at ten days of both first and second spray, imidacloprid (0.4 ml l^{-1}) + dichlorvos (1.0 ml l^{-1}) recorded 4.60 and 3.10 maggots pods^{-100} respectively with lowest pod damage and seed damage of 2.77 and 1.00 per cent followed by this was acephate (1.50 gm l^{-1}) + dichlorvos (1.0 ml l^{-1}) with 2.93 and 1.19 per cent of pod damage and seed damage respectively. Highest yield (6.96 t ha^{-1}) and C:B ratio (1:1.67) was obtained in the treatment imidacloprid (0.4 ml l^{-1}) + dichlorvos (1.0 ml l^{-1}) followed by acephate (1.50 gm l^{-1}) + dichlorvos (1.0 ml l^{-1}) with yield of 6.49 t ha^{-1} and C:B ratio of 1:1.57.

Agricultural Research Station, Garikapadu

The sequential applications of insecticides were evaluated against pod borers infesting redgram during *kharif,* 2018 and the results inferred that sequential application of Thiodicarb 75% WP at 50% flowering + Chlorantraniliprole 20 SC at Pod setting + Thiacloprid 21.7 SC at seed development stage had recorded lowest pod damage with 80.7, 93.8 & 85.2 per cent reduction over control with respect to gram pod borer, spotted pod borer and pod fly infesting redgram, respectively

2.2 Blackgram

Crop Improvement

Regional Agricultural Research Station, Lam

In Initial Varietal Trial during *rabi* 2018-19, the entry RU 18-20 recorded significantly higher seed yield of 1.66 t ha^{-1} compared to the best check TBG 104 (1.46 t ha^{-1}).

The entry RU 18-18 recorded highest seed yield of 1.37 t ha^{-1} compared to the best check TBG 104 (1.21 t ha^{-1}) in Advanced Varietal Trial-2.

Among 18 entries tested in Preliminary Yield Trial, the entry LBG 975 recorded highest seed yield of 1.42 t ha^{-1} followed by LBG 969 (1.38 t ha^{-1}), LBG 964 (1.37 t ha^{-1}) compared to the best check LBG 787 (1.22 t ha^{-1}).

In Advanced Yield Trial, 13 entries were tested in comparison with two check varieties. Out of which the entries LBG 946 (1.54 t ha^{-1}), LBG 933 (1.52 t ha^{-1}), LBG 944 (1.33 t ha^{-1}) and LBG 949 (1.23 t ha^{-1}) recorded significantly high seed yield compared to the best check PU 31 (0.72 t ha^{-1})

The entries LBG 918 (1.40 t ha^{-1}), LBG 932 (1.31 t ha^{-1}), LBG 904 (1.30 t ha^{-1}) and LBG 922 (1.25 t ha^{-1}) recorded significant high seed yield compared to best check LBG 787 (0.94 t ha^{-1}) among 12 entries tested in Multilocation trial.

Out of 16 entries tested during *rabi 2018* in Yellow Mosaic Virus and LCV resistant genotypes trial, the entries LBG 932 (1.23 t ha^{-1}), LBG 818 (1.22 t ha^{-1}), LBG 884 (1.15 t ha^{-1}) , LBG 922 (1.14 t ha^{-1}), LBG 904 (1.13 t ha^{-1}), LBG 944 (1.08 t ha^{-1}) recorded significantly higher seed yield compared to the best check PU 31 (0.81 t ha^{-1}).

Agricultural Research Station, Podalakur

In Multi Location Varietal Trial, out of fourteen entries evaluated during *rabi* 2018-19, the entry GBG 63 recorded the highest seed yield of 1.51 t ha^{-1} followed by LBG 932 (1.48 t ha^{-1}) and LBG 918 (1.43 t ha^{-1}.) compared to check LBG 787(1.38 t ha^{-1}.).

Agricultural Research Station, Ghantasala

A total of 180 blackgram germplasm lines are maintained at the research station.

The black gram entry GBG-12 was proposed for third year of the minikit testing and GBG 45 for first year of minikit testing during 2018.

Out of 24 entries tested in Preliminary Varietal Trial, the entry GBG 133 recorded significantly high yield of 1.41 t ha^{-1} followed by GBG 140 (1.31 t ha^{-1}) and GBG 139 (1.27 t ha^{-1}) compared to check LBG 752 (1.13 t ha^{-1}).

Fourteen entries were tested against two checks in during *rabi*, 2018 in Advanced Varietal Trial. Among them, the entry GBG 79 recorded highest yield of 1.62 t ha^{-1} followed by GBG 108 (1.44 t ha^{-1}) and GBG 109. (1.34 t ha^{-1}) compared to check LBG 752 (1.14 t ha^{-1}).

In Multilocation Trial conducted during *rabi* 2018-19 under rice fallow situation, among 14 entries tested, the entry GBG 99 recorded highest yield of 1.79 t ha^{-1} followed by GBG 58 of 1.54 t ha^{-1} and GBG 81 of 1.41 t ha^{-1} compared to LBG 787 (0.88 t ha^{-1}).

GBG 12

A Blackgram entry developed at ARS, Ghantasala station is under second year of minikit testing. It is a cross derivative of (1) LBG 17 X TU 94-2 (2) Resistant to MYMV (3) Seeds are medium bold, shiny black in colour (4) Days to maturity 75-80 days (5) Yield potential: 20-22 q/ha^{-1} (6) Suitable for mechanical harvesting

Regional Agricultural Research Station, Tirupati

DNA fingerprinting of blackgram pre release culture GBG1 and four check varieties *viz.,* LBG752, LBG623, IPU2-43, and PU 31 was carried out with both SSR and RAPD markers. The SSR markers resulted in monomorphic banding pattern and fingerprint profiles were developed RAPD markers OPS7, OPF16, OPC9, OPF9, OPN10 and OPN8 which distinguished the varieties under testing.

Agricultural Research Station, Utukur

Out of 14 entries tested in Multi Location Trial, significant differences were found among the entries tested for yield. Entry LBG 918 (1.70 t ha^{-1}) recorded significantly higher seed yield against the best check LBR 787 (1.29 t ha^{-1})

Agricultural Research Station, Ragolu

During *rabi* 2018-19, under rice fallow situation 14 entries were studied. Out of which the entry BG 12 has recorded higher seed yield of 0.83 t ha^{-1} followed by BG 11 (0.65 t ha^{-1}) and BG 5 (0.64 t ha^{-1}).

Agricultural Research Station, Amadalavalasa

Among fourteen entries tested in Multi Location Trial during *rabi,* 2018, the entry LBG 932 (1.46 t ha^{-1}) was found superior to the check variety LBG 787 (1.33 t ha^{-1}) in grain yields.

Crop Production

Regional Agricultural Research Station, Lam

Application of 125% RDF (0.90 t ha^{-1}) recorded significantly the higher grain yield than other two levels of fertilizers 75% RDF (0.73 t ha^{-1}) and 100% RDF (0.84 t ha^{-1}).

Application of FYM @5 t ha^{-1} recorded higher grain yield (0.84 t ha^{-1}) than without FYM (806 t ha^{-1}) and both are statistically not significant.

Biofertilizer inoculation with Rhizobium + LMn 16 recorded significantly higher grain yield (0.86 t ha^{-1}) than that of Rhizobium (0.79 t ha^{-1}) but on a par with LMn16 (0.81 t ha^{-1}).

Among the crop geometries tested, normal spacing of 30 cm x 10 cm recorded significantly the maximum grain yield (0.73 t ha^{-1}) than that of wider crop geometry (0.61 t ha^{-1}). Among the genotypes, the highest grain yield (0.83 t ha^{-1}) recorded by the genotype RUA-18-90 and it is significantly superior over rest of the genotypes (RUA-18-87: 0.73 t ha^{-1}; RUA-18-91:0.56 t ha^{-1}and RUA-18-89:0.56 t ha^{-1}).

Application of VAM @ 12.5 kg ha^{-1} + 100% P_2O_5 + crop residue mulching @ 5.0 t ha^{-1} recorded maximum grain yield (1.95 t ha^{-1}) compared to check plot (1.35 t ha^{-1}).

Agricultural Research Station, Utukur

Studies on application of different doses of potassium and sulphur indicated that significantly higher seed yield (1.60 t ha^{-1}) was recorded with application of 20 -75-20 -20 kg NPKS ha^{-1} and it was on par with 20-75-10 kg NPK (1.42 t ha^{-1}), 20-50-10-10 kg NPKS (1.45 t ha^{-1}), 20-75-10-10 NPKS (1.45 t ha^{-1}) and 20-50-20-20 Kg NPKS (1.49 t ha^{-1}).

Agricultural Research Station, Ghantasala

Marked reduction in weed density and dry wt. and increase in grain yield was observed in

Imazethapyr @ 50g *a.i.* ha^{-1} as post at 20 DAS, Aciflourfen sodium + clodinofop propargyl @ 140 + 70 g *a.i.* ha^{-1} at 20 DAS, Fomesafen + Fuzifop p butyl 220 + 220 g ha^{-1} at 20 DAS with or with out application of pendimethalin as post emergence. Highest net returns and benifit cost ratio recorded in Pendimethalin @ 1.0 kg *a.i* ha^{-1} as SMA followed by Aciflourfen sodium + clodinofop propargyl @ 140 + 70 g *a.i.* ha^{-1} at 20 DAS.

Crop Protection

Insect Pest Management

Agricultural Research Station, Utukur

Studies on evaluation of novel insecticides for their efficacy against sucking pests indicated that spinetoram 0.6 ml l^{-1} was effective at lower thrips population per plant (0.74) and recorded highest yield (1.53 t ha^{-1}) followed by spinosad (1.25) and cyantraniliprole (1.42). Spiromesifen 1 ml l^{-1} effectively reduced whitefly population (0.91) followed by diafenthiuron (1.65) and spinetoram (1.93).

Agricultural Research Station, Garikapadu

The IPM module assessed against major pests infesting blackgram during *kharif*, 2018 resulted in control of thrips, leaf hoppers and whiteflies by 65.2, 63.9 & 92.3 per cent reduction of mean population over control. The pod damage with respect to *Helicoverpa* and *Maruca* in IPM module recorded 56.1 & 64.5 per cent reduction over control, respectively.

Agricultural Research Station, Podalkur

Among the novel insecticides tested for management of sucking pests, spiromesifen was found superior in controlling the whitefly incidence followed by spinetoram. The cost benefit ratio was highest in the treatment used with spinetoram (1.88) which is on par with spiromesifen (1.86) followed by seed treatment with Imidacloprid (1.75) only.

Disease Management

Regional Agricultural Research Station, Lam

Out of 39 AVT & IVT blackgram entries screened against major diseases during *kharif*. A total of 33 entries were found resistant to MYMV. All the entries were found resistant to leaf curl/ bud necrosis virus. About 34 entries were found resistant to leaf crinkle virus. Three entries were found resistant to powdery mildew, none of them were found resistant to leaf spot diseases during the season.

Out of 16 blackgram IVT and AVT entries screened, 11 entries were found resistant to MYMV, all the entries were found resistant to leaf curl/bud necrosis, leaf crinkle virus, two entries were found resistant to powdery mildew, none of them were found resistant to leaf spots diseases during the season.

Among the entries screened P 716, P 12-80, P 12-87, P 12-30, P 12-72, P 12-78, BG 1, BG 2, BG 3, P 512, P 20, P 109, P 110, P 105, AYT 808, AYT 806, AYT 794, AYT 786, LBG 888, LBG 806, LBG 889, LBG 808, DKU 15-3, DKU 15-14, KUP 12-219, NUL 242, KUG 391, Pant U19, Pant U 13-14, IPU 12-22, IPU 11-6, TU 94-2, IPU 12-30 were found resistant to MYMV.

The entries KPU 16-84, KPU 16-56, KPU 16-62, KPU 16-79, KPU 16-67, KPU 16-68, KPU 16-69, KPU 16-70, Pant U 35, KUG 479, TU 40, LBG 904, LBG 950, LBG 958, LBG 960, LBG 943, LBG 946, LBG 948 were found resistant to MYMV, leaf curl and bud necrosis.

Seed treatment with imidacloprid @ 5ml kg^{-1} + foliar spray of trifloxystrobin + tebuconazole (Natio) @ 0.75 g l^{-1}, three sprays at 15 days interval recorded the lowest PDI (8.50) of *Alternaria* leaf spot and powdery mildew (20.93) and highest grain yield (1.51 t ha^{-1}) during *rabi* 2018-19.

Seed treatment with imidacloprid @ 5ml kg^{-1} + foliar spray of tebuconazole @ 1 ml l^{-1} recorded the lowest leaf spot (21.83) during *rabi* 2018-19. Seed treatment with imidacloprid @ 5ml kg^{-1} + foliar spray of hexaconazole @ 2 ml kg^{-1} and seed treatment with imidacloprid @ 5ml kg^{-1} + foliar spray of propiconazole @ 1 ml l^{-1} were on par.

During *kharif* season early sown (1st June to 15th July) blackgram was free from viral diseases.

During *rabi* season 25th Sept. to 15th Oct. sown blackgram was free from viral diseases in upland situation. In rice fallow 25th Nov. to 10th Dec. sown blackgram crop was free from viral diseases.

Agricultural Research Station, Utukur

In management of viral diseases in blackgram, seed treatment with imidacloprid 600 FS @ 5 ml kg^{-1} seed + 4 border rows of jowar + removal of virus infected plants + yellow sticky traps @4 ac^{-1} + spraying of diafenthiuron @ 1.25g l^{-1} at 30 & 45 DAS was found to be effective with lowest per cent disease incidence of bud necrosis (5.42 %) by recording highest yield of 1.27 t ha^{-1} with incremental cost benefit ratio of 1:18.06.

Agricultural Research Station, Garikapadu

The IPM module assessed against major pests infesting blackgram during *kharif*, 2018 resulted in control of thrips, leafhoppers and whiteflies by 65.2, 63.9 & 92.3 per cent reduction of mean population over control. The pod damage with respect to *Helicoverpa* and *Maruca* in IPM module recorded 56.1 & 64.5 per cent reduction over control, respectively.

2.3 Greengram

Crop Improvement

Regional Agricultural Research Station, Lam

In Initial Varietal Trial, the entries RM 18-4 (1.16 t ha^{-1}), RM 18-12 (1.09 t ha^{-1}), RM 18-9 (1.08 t ha^{-1}) recorded significantly higher seed compared to the local check LGG 460 (0.84 t ha^{-1}).

Among the entries tested in Preliminary Yield Trial, the entry LGG 657 recorded significant seed yield of 1.29 t ha^{-1} compared to local check LGG 460 (1.08 t ha^{-1}).

In Advanced Yield Trial, the entries *viz.,* LGG 600 (1.50 t ha^{-1}) and LGG 604 (1.43 t ha^{-1}) recorded significant superior seed yield compared to local check TM 96-2 (1.21 t ha^{-1}).

The entries viz., LGG 609 (1.60 t ha^{-1}), LGG 641 (1.44 t ha^{-1}), LGG 610 (1.42 t ha^{-1}) recorded superior seed yield than local check TM 96-2 (1.31 t ha^{-1}) in Multilocation Trial.

In Evaluation of MYMV & LCV resistant genotypes Trial, the check LGG 460 (1.22 t ha^{-1}) recorded highest seed yield, however, the entries viz., LGG 655 (1.11 t ha^{-1}), LGG 607 (1.07 t ha^{-1}) and LGG 645 (1.02 t ha^{-1}) were on par with the high yielding check entry.

Agricultural Research Station, Ghantasala

The test entry GGG 4 recorded highest grain yield of 1.28 t ha^{-1}followed by GGG-20 of 1.05 t ha^{-1} and check variety TM 96-2 (1.04 t ha^{-1}) in Preliminary varietal Trial.

In Multilocation Trial, the test entry LGG 641 recorded highest yield of 1.04 t ha^{-1} fallowed by LGG 609 of 0.94 t ha^{-1} and LGG 608 of 0.94 t ha^{-1}.

The entry RFM 18-07 recorded highest yield of 0.90 t ha^{-1}followed by the check variety LGG 460 (0.89 t ha^{-1}) and RFM 18-04 (0.87 t ha^{-1}) in Ricefallow mungbean initial varietal trial during *rabi*, 2018.

Agricultural Research Station, Podalakur

In Multi location varietal trial during *rabi* 2018-19, out of nine entries evaluated, the entry LGG 609 (1.01 t ha^{-1}) significantly out yielded the best check IPM 2-14 (0.55 t ha^{-1}) followed by LGG 641 (0.96 t ha^{-1}) and LGG 630 (0.81 t ha^{-1}).

Regional Agricultural Research Station, Tirupati

Among ten mungbean entries tested in Multi location varietal trial during *rabi,* the entries GG18-10 and GG 18-7 are YMV free and gave higher seed yield of 1.71 and 1.69 t ha^{-1} in 75-80 days as against best check IPM2-14 (1.52 t ha^{-1}).

In IVT and AVT, fourteen entries were evaluated during *rabi* 2018. Among them six entries found significantly superior over check IPM 2-14(0.78 t ha^{-1}).The entry RM18-10 recorded highest seed yield of 1.10 t ha^{-1} followed by RM 18-4 (1.01 t ha^{-1}).

Agricultural Research Station, Garikapadu

During *rabi,* 2018 among 9 entries tested, the enty LGG 607 has recorded highest seed yield (0.92 t ha^{-1}) followed by IPM 2-14 (0.91 t ha^{-1}), LGG 641(0.89 t ha^{-1}) and LGG 460 (0.89 t ha^{-1}).

Agricultural Research Station, Ragolu

During *rabi* 2018-19, under rice fallow situation, out of 9 entries studied, the entry GG 4 has recorded higher seed yield of 0.56 t ha^{-1} followed by GG 5 (0.44 t ha^{-1}) and GG 3 (4.28 t ha^{-1}).

Agricultural Research Station, Amadalavalasa

A total of nine entries were evaluated in Multi Location Trial during *rabi* 2018. The entry LGG 609 (1.74 t ha^{-1}) recorded superior grain yield over the check variety LGG 460 (1.68 t ha^{-1}).

Crop Production

Regional Agricultural Research Station, Lam

Among the fertilizer doses, 125% RDF recorded significantly the maximum grain yield (1.14 t ha^{-1}) than 75% RDF (0.94 t ha^{-1}) and 100% RDF (1.10 t ha^{-1}) doses. Application of FYM had no significant influence on grain yield (1.01 t ha^{-1}) than without FYM (1.04 t ha^{-1}). Inoculation with *rhizobium* recorded higher grain yield (1.06 t ha^{-1}) than LMn16 (1.01 t ha^{-1}) however, combined inoculation of *rhizobium* + LMn16 recorded superior grain yield (1.10 t ha^{-1}).

Agricultural Research Station, Peddapuram

Studies on effect of nanoscale zinc oxide particles on the productivity of green gram and zinc bio- fortification during *kharif,* 2018 revealed that foliar application of Nano Zinc @ 2g l^{-15} at 25 and 40 DAS recorded significantly higher grain yield (1.50 t ha^{-1}) than control.

Crop Protection

Pest Management

Regional Agricultural Research Station, Lam

The new chemicals such as diafenthiuron 50 % WP @ 1.25 g l^{-1}, spiromesfin 240% SC @ 1.25 ml l^{-1}, pyriproxyfen 10 EC, sulfoxaflor 24 EC @ 1.0 ml l^{-1} and flonicamid 50 WP @ 0.3 g l^{-1} and were found effective against thrips up to 10 days and found superior over clothianidin 50 WDG @ 0.1 g/l, spinosad 45 SC @ 0.3 ml l^{-1} and thiamethoxam 25% WG @ 0.3 g l^{-1}.

Adoption IPM practices such as Seed treatment with imidacloprid 600 FS @ 5.0 ml kg^{-1} seed, sowing of maize as guard crop in four rows around the greengram, installation of yellow sticky traps and blue sticky traps for each @ 20 $acre^{-1}$, foliar application of neem oil 10000 ppm @ 1.5 ml l^{-1} at 20 DAS and need based application of insecticides In IPM module realised B:C ratio 2.70:1 as against 2.26:1 in farmers practice (Weekly application of insecticides).

Disease Management

Regional Agricultural Research Station, Lam

Out of 60 AVT and IVT greengram entries screened against leaf curl, leaf crinkle, YMV, leaf spots and powdery mildew diseases. 57 entries were found resistant to MYMV and leaf crinkle virus, all the entries were found resistant to leaf curl and bud necrosis virus except one entry, 11 entries were found resistant to powdery mildew.

Out of 62 greengram entries screened from National Genetic Stock Nursery (NGSN) 55 entries were found resistant to MYMV. A total of 49 entries were found resistant to leaf curl/ bud necrosis virus, all the entries were found resistant to leaf crinkle virus, 12 entries were found resistant to powdery mildew disease. None of them were found resistant to leaf spot diseases.

Based on natural field screening, the genotypes *viz*., PM 14-19, PM 14-1, PM 14-3, PM 14-5, PM 14-11, PM 14-9, PM 14-16, PM 14-13, PM 14-17, PM 14-12, PM 14-2, GG 1, GG 4, LGG 577, LGG 578. LGG 606, LGG 607, LGG 609, LGG 605, LGG 597, IPM 14-9, IPM 14-22, OUM 11-5, HUM 16, IPM 205-7, PM 14-3, IPM 99-125, KM 2342, PDM 139, Pant M 5, SML 668, SML 832 were found resistant to MYMV.

The entries *viz*.,:KPM 16-49, KPM 16-16, LGG 630, LGG 627, LGG 628, LGG 608, LGG 649 were found resistant to MYMV, leaf curl and bud necrosis.

Seed treatment with imidacloprid @ 5ml kg^{-1} + foliar spray of trifloxystrobin + tebuconazole (Natio) @ 0.75 g l^{-1}, three sprays at 15 days interval recorded the lowest PDI (11.44) of *Cercospora* leaf spot and powdery mildew (3.22) and highest grain yield (1.04 t ha^{-1}) during *kharif* 2018-19 followed by seed treatment with imidacloprid @ 5ml kg^{-1} + foliar spray of difenconazole @ 1 ml l^{-1} recorded the lowest PDI (3.66) of powdery mildew during *kharif*, 2018-19.

During *kharif,* 2018, early sown (1st June-15th June) crop was completely free from viral diseases. During *rabi* also, early sown (25th Sept-15th Oct.) crop was completely free from viral diseases. In rice fallows 25th Nov.-10th Dec. sown greengram was free from viral diseases.

2.4. Bengalgram

Crop Improvement

Regional Agricultural Research Station, Lam

In Multilocation Trial on desi chickpea genotypes, the entry BeG-18-1 and BeG-18-5 recorded highest seed yield of 2.71 t ha^{-1} followed by BeG-18-4 (2.56 t ha^{-1}).

In Advanced Varietal Trial (Rainfed), the entry C 18281 recorded highest seed yield of 2.78 t ha^{-1} followed by C 18285 (2.40 t ha^{-1}).

In Multilocation Trial on kabuli chickpea genotypes, the entry BeG 18-8 recorded highest seed yield of 2.78 t ha^{-1} followed by BeG-18- 11 (2.22 t ha^{-1}).

In Advance Varietal Trial (kabuli + extra large seeded), the entry C 18351 and C 18358 recorded highest seed yield of 1.92 t ha^{-1} followed by C 18356 (1.76 t ha^{-1}) and C 18357 (1.74 t ha^{-1})

Regional Agricultural Research Station, Nandyal

Minikit testing

NBeG 452, a high yielding Desi chickpea line was tested under third year minikit.

NBeG 458, a high yielding bold seeded Kabuli chickpea line was tested in farmers' fields as third year minikit.

NBeG 471, a high yielding Kabuli line was tested in farmers fields (first year minikit). Another line NBeG 776, a high yielding Desi line and tolerant to wilt, suitable for mechanical harvesting was also tested in farmers fields (first year minikit testing).

Three promising entries *viz.,* N BeG 738 (AVT I Desi SZ), N BeG 810 (AVT I Kabuli + ELSK NWPZ), N BeG 810 (AVT I Kabuli + ELSK WCZ) and NBeG 786 (AVT I DTIL) were promoted to advance yield trials during 2018-19.

Eight promising entries *viz.,* N BeG 857, N BeG 798 (IVT Desi), N BeG 620 (IVT Late sown), N BeG 778 (IVT Rainfed), N BeG 723, N BeG 810 (IVT Kabuli + ELSK), N BeG 776, N BeG 779 (IVT MH) were contributed for testing in coordinated trials (IVT) during 2018-19.

The compiled data of three locations in Multi Location Trial indicated that the entry NBeG 699 has recorded the highest yield of 2.32 t ha^{-1} with 7.2% yield increase over best check NBeG 3 (2.16 t ha^{-1}).

In Multi Location Trial (Kabuli) six entries were tested against three checks. The pooled data from three locations revealed that the entry NBeG 810 recorded the highest yield of 2.11 t ha^{-1} with 10.12% yield advantage over best check Vihar.

Eight entries were tested along with two checks NBeG 49 and JG 11 in Advanced Yield Trial (Desi). Based on pooled data of 2017-18 and 2018-19, three entries NBeG 773 (1.78 t ha^{-1}) and NBeG 1014 (1.71 t ha^{-1}) and NBeG 1237 (1.67 t ha^{-1}) recorded high yield with yield increase of 14.8, 9.8% and 7.6% respectively over NBeG 49 (1.55 t ha^{-1} kg/ha).

In Advanced Yield Trial II (*kabuli*) six entries were tested against KAK 2 and Vihar. Based on pooled data of 2017-18 and 2018-19, NBeG 1010 (1.42 t ha^{-1}) was promising with 15.3% yield advantage over best check KAK2 (1.23 t ha^{-1}).

The entry NBeG 399 is a high yielding extra-large seeded (>40 g/100 seed) *kabuli* chickpea.

In AICRP trials of 2014-2017, NBeG 399 recorded average yield of 1.77 t ha^{-1} with a yield advantage of 24.4%, 25.8%, 15.8%, respectively over checks. In large scale demonstrations, in farmers holdings during 2014-15 and 2016-17, NBeG 399 exhibited yield advantage of 20.8% (1.38 t ha^{-1}) over *kabuli* varieties (1.11 t ha^{-1}).

The entry NBeG 452, a high yielding *desi* chickpea line is in second year minikit testing. It recorded 20 % higher yield (1.41 t ha^{-1}) over JG 11 (1.20 t ha^{-1}) in first year minikit testing.

The entry NBeG 458, a high yielding bold seeded *kabuli* chickpea entry is in second year minikit testing. It recorded 18 % higher yield (1.11 t ha^{-1}) over KAK2 (0.94 t ha^{-1}) in first year minikit testing.

Eight promising entries *viz.,* NBeG 776 (advanced varietal trial 1 Desi (NEPZ), 738 (advanced varietal trial 1 Desi) NBeG 779 (advanced varietal trial Rainfed), NBeG 806, (advanced varietal trial 1 *Desi* (Late sown), NBeG 440 (advanced varietal trial 1 *Kabuli*) and NBeG 506, NBeG 786 and NBeG 1004 (advanced varietal trial 1 DTIL)) were promoted to advance yield trials during 2017-'18.

Pooled data of MLT Bengalgram (Desi), from four locations *viz.,* Lam, Darsi, Podalkur and Nandyal revealed that NBeG 779 (1.93 t ha^{-1}) and NBeG 776 (1.88 t ha^{-1}) registered high yield and were on par with best check JG11 (1.85 t ha^{-1}).

Bengalgram (extra-large seeded kabuli), Multi Location Trial, pooled data from four locations indicated that, the entry NBeG 833 was superior (1.74 t ha^{-1}) followed by NBeG 837 (1.70 t ha^{-1}) and N BeG 829 (1.67 t ha^{-1}). These entries recorded 16.4, 11.5 and 9.8 per cent higher yield respectively than the large seeded check MNK 1 (1.52 t ha^{-1}).

In advanced yield trial II desi, based on pooled data of 2015-16 and 2017-18, six entries NBeG 699 (1.75 t ha^{-1}), NBeG 873 (1.70 t ha^{-1}), NBeG 698 (1.66 t ha^{-1}), NBeG 816 (1.66 t ha^{-1}), NBeG 690 (1.66 t ha^{-1}), NBeG 817 (1.64 t ha^{-1}) were found promising with yield advantage of 11.2 to 18.5 per cent over JG 11 (1.48 t ha^{-1}).

Crop Production

Regional Agricultural Research Station, Nandyal

In different conservation tillage methods studied for the possibility of establishing chickpea after foxtail millet, conventional tillage has recorded higher grain yield (1.44 t ha^{-1}) and it was on par with reduced tillage (1.24 t ha^{-1}).

Among the different varieties tested for optimization in productivity of chickpea genotypes amenable to mechanical harvesting under different planting geometry, NBeG 47 recorded higher grain yield (1.53 t ha^{-1}).

In an experiment to study the response of bengalgram varieties to irrigation and phosphorous levels, higher grain yield (1.82 t ha^{-1}) was recorded with irrigation compared to without irrigation (1.40 t ha^{-1}). The entry NBeG 49 recorded higher grain yield (1.77 t ha^{-1}) when compared to NBeG 119 (1.46 t ha^{-1}). Different Phosphorus levels did not influence grain yield.

In a study on effect of foliar nutrition on chickpea to mitigate midseason drought in rainfed vertisols, the highest seed yield of 2.26 t ha^{-1} was recorded in foliar spray with 2% urea (2 sprays) at 35-40 and 55-60 DAS along with STBF followed by spraying of 19:19:19 along with STBF (1.97 t ha^{-1}) and D.A.P @ 2% along with STBF (1.98 t ha^{-1}) compared to basal application of N, P and S and no spray (1.57 t ha^{-1}).

Studies on response of chickpea to zinc and iron in rainfed vertisols revealed that, the highest grain yield of 2.22 t ha^{-1} was recorded with foliar spray of $ZnSO_4$ @ 0.2% and iron sulphate @ 0.5% at 35-40 DAS along with basal appilcation of N, P and S which was on par with basal application of N, P_2O_5, S, $ZnSO_4$ @ 50 kg ha^{-1} along with foliar spary of iron sulphate @ 0.5% at 35-40 DAS (2.13 t ha^{-1}). The lower yield was recorded in N, P and S (20-50-40 t ha^{-1}) as basal application (1.64 t ha^{-1}).

The effect of plant growth regulators on growth and productivity of chickpea indicated that, NAA @ 25 ppm at 50% flowering stage 3 times at

5 days interval recorded significantly higher yield. Among the genotypes, NBeG 49 recorded yield (1.72 t ha^{-1}).

Regional Agricultural Research Station, Lam

Studies on the performance of different crop sequences, best pulse crop alternative to bengalgram for *rabi* and find out best crop sequence that is easily adoptable and economically viable in the vertisols of NSP right canal areas indicated that, among the sequence crops, bengalgram recorded higher grain yield of 3.09 t ha^{-1} while both greengram (0.32 t ha^{-1}) and blackgram (0.32 t ha^{-1}) recorded very poor grain yield

Application of recommended dose of fertilizer and foxtail millet crop residue along with 5 t ha^{-1} of FYM recorded highest seed yield (2.44 t ha^{-1}) of bengalgram which is at par with other nutrient combinations except where 50% RDF along with foxtail millet crop residue and bio-fertilizer consortia was applied (1.86 t ha^{-1}).

Crop Protection

Insect Pest Management

Regional Agricultural Research Station, Nandyal

Among Sixteen advanced breeding lines screened for tolerance against pod borer, *Helicoverpa armigera*.The infestation by S. exigua was low in NBeG 810 (12.8%), NBeG 3 (13.8%). Similarly low pod damage of 3.7 percent was recorded in NBeG 857 and NBeG 699 and high yield was recorded in NBeG 699 (2.60 t ha^{-1}).

Incidence of insect pests of chickpea and their natural enemies throughout cropping period sown in three dates of sowing (early, normal and late sowing dates) (results showed that, high pod damage of 28.8 percent was recorded in normal date of sowing i.e. first fortnight of November and low pod damage of 9.66 percent was recorded in late sowing i.e last fortnight of November. Even though there is high pod damage, high yield of 1.60 t ha^{-1} was recorded in normal date of sowing followed by late planting (1.41 t ha^{-1}).

Studies on compatibility of different insecticides with foliar nutrients in chickpea revealed that no phytotoxic symptoms were exhibited when the recommended insecticides *i.e* chlorantrinilliprole 18.5SC and emamectin benzoate combined with foliar nutrients *viz.,* Urea @ 2 %, DAP 2% and KNO_3 @ 2 % and sprayed at pod initian stage against *H. armigera*.

Disease Management

Regional Agricultural Research Station, Nandyal

A total of 223 entries were screened against *Fusarium* wilt in wilt sick plot. Among them 2 entries exhibited immune reaction (0% incidence) and 74 entries recorded resistant reaction (less than 10% incidence) at 30 and 60 DAS.

Among 223 entries screened against dry root rot in dry root rot sick plot, 48 entries recorded resistant reaction (less than 10% incidence) at 60 and 80 DAS

A total of 30 international chickpea wilt and root rot nursery elite lines were screened against *Fusarium* wilt and 12 entries exhibited resistant reaction.

2.5 Cowpea

Crop Improvement

Regional Agricultural Research Station, Tirupati

Among 22 entries tested in AVT and IVT during *kharif* 2018, two entries *viz.,* CP20 (1.43 t ha^{-1}) and CP-17 (1.22 t ha^{-1}) were found significantly superior to check TPTC29 (1.04 t ha^{-1})..

Agricultural Research Station, Anantapuramu

Out of 22 entries along with the check evaluated during *kharif* 2018 the entry CP-11 recorded significantly high seed yield of 0.40 t ha^{-1} followed by CP-5 (0.39 t ha^{-1}) and CP-8 (0.32 t ha^{-1}) compared to the check (0.16 t ha^{-1}).

Agricultural Research Station, Darsi

In Initial Varietal Trial duging *rabi* 2018-19, out of 22 varieties, T14 (1.02 t ha^{-1}) has recorded maximum seed yield compared to T12 (0.36 t ha^{-1})

Crop Production

Regional Agricultural Research Station, Tirupati

The results of the field experiment during *rabi*,2018-19 showed that, among the four varieties of fodder cowpea evaluated under varied phosphorus levels, the entry APFC 10-1 recorded significantly highest green fodder yield of 20.1 t ha^{-1} compared to MFC 08-14 (17.7 t ha^{-1}). Among different P levels, 60 kg recorded higher fodder yield.

Agricultural Research Station, Darsi

Sowing of Cowpea during the 2nd fortnight of September recorded highest grain yield which is at par with October sowings and significantly superior over November sowing. Tirupati-1 recorded significantly highest grain yield compared to local varieties.

2.6 Horsegram

Crop Improvement

Agricultural Research Station, Anantapuramu

During Kharif 2018, 4 varieties from CRIDA were evaluated for seed yield along with local check. The entry ATPHG 11 (0.32 t ha^{-1}) recorded significantly high seed yield followed by CRIDA 1-18 R (0.31 t ha^{-1}) and CRHG-13 (0.30 t ha^{-1}) compared to check CRHG-19 with seed yield of 0.21 t ha^{-1}.

Among eleven entries evaluated for seed yield along with the check in Initial Varietal Trial During *kharif* 2018 the entry ATPHG-11 (0.51 t ha^{-1}) recorded significantly high seed yield followed by HG-20 (0.47 t ha^{-1}) and HG-12 (0.38 t ha^{-1}) compared to check CRHG-19 (0.27 t ha^{-1}.)

Crop Production

Regional Agricultural Research Station, Lam

Under integrated weed management in horsegram, hand weeding @ 20 & 40 DAS recorded the highest grain yield (2.02 t ha^{-1}) and was on par with pendimethalin+ imazethapyr @ 750 + 50 g ha^{-1} as post emergence followed by hand weeding @ 30DAS.

2.7 Rajmash

Regional Agricultural Research Station, Chintapalle

Crop Improvement

A total of seven rajmash varieties were evaluated for their suitability for HAT zone during *rabi,* 2018. The results showed that the variety Amber (0.72 t ha^{-1}) recorded the highest seed yield followed by Utkarsh (0.51 t ha^{-1}) compared to the local variety CTPL red (0.30 t ha^{-1}).

Crop Production

Regional Agricultural Research Station, Chintapalle

Sowing of rajmash during August second fortnight (0.97 t ha^{-1}) performed well followed by September first fortnight (0.89 t ha^{-1}), and lowest yields were recorded during September second fortnight sowing (0.59 t ha^{-1}). Among the varieties Amber (1.13 t ha^{-1}), Utkarsh (0.95 t ha^{-1}) and arun (0.81 t ha^{-1}) performed well when sown during August second fortnight.

Plant Protection

Pest Management

Among the varieties screened for major pests, the varieties Amber, Utkarsh and Uday were found to be tolerant against the sucking pest population (Aphids and Hoppers) with an yield of 0.68, 0.58 and 0.56 t ha^{-1} respectively. The variety Chintapalle Red was found to be more susceptible to sucking pest with an yield of 0.28 t ha^{-1}.

Evaluation of different integrated pest management practices against major pests revealed that seed treatment with imidacloprid @ 4 ml kg^{-1} seed followed by dimethoate @ 2 ml l^{-1} spray at 40 DAS was found with higher yields (0.42 t ha^{-1}) followed by spray with Neem oil @ 5 ml l^{-1} (0.36 t ha^{-1}).

Disease Management

In Among 11 agronomic management practices evaluated against bean yellow mosaic disease , the best boarder / barrier crop for Aphid transmission is Rajmash : Maize (6:2) with an yfield of 0.48 t ha^{-1} followed by Rajmash: Maize (6:1) also recorded lowest disease incidence.

3. Oilseeds

3.1 Groundnut

Crop Improvement

Regional Agricultural Research Station, Tirupati

"Dheeraj" (TCGS 1073), a water-use efficient Spanish bunch culture with high yield potential suitable for cultivation in irrigated situation both in *kharif* and *rabi* seasons has been released by the State Varietal Release Committee. The variety has crop duration of 105-110 days with mean pod yield of 2.37 t ha^{-1} in *kharif* season and 3.44 t ha^{-1} in *rabi* The variety has been notified during the year.

"Nithya Haritha" (TCGS 1157), a short statured spanish bunch culture with high yield potential that matures in 110 days and having fresh seed dormancy, bears higher frequency of three seeded pods was released for Zone IIIB (Maharashtra and Madhya Pradesh). It wss notified by the Central Varietal Release Committee in its 81st meeting.

TCGS 894, short statured short duration (95-100 days) water-use efficient line was identified for Zone III b.

Out of 9 genotypes evaluated against three check varieties in Advanced Varietal Trial (early), one genotype *viz*. TCGS 1707 (2.38 t ha^{-1}) recorded significantly higher pod yield over the best check variety TAG24 (1.87 t ha^{-1}) with 28% higher yield. With respect to kernel yield, it recorded 15% higher yield (1.49 t ha^{-1}) over check genotype TAG 24 (1.30 t ha^{-1}). Highest shelling % was recorded with 69% in TCGS 1711 (69%) along with checks Dharani and TAG 24.

In advanced varietal trial (2nd year), out of 16 genotypes tested against three check varieties, the genotypes TCGS-1888 (pod- 3.10 t ha^{-1} and kernel- 2.04 t ha^{-1}), TCGS-1892 (pod- 2.74 t ha^{-1} and kernel- 1.84 t ha^{-1}), TCGS-1882 (pod- 2.74 t ha^{-1} and kernel- 1.61 t ha^{-1}), TCGS-1894 (pod- 2.66 t ha^{-1} and kernel- 1.76 t ha^{-1}), TCGS-1897 (pod- 2.46 t ha^{-1} and kernel- 1.80 t ha^{-1}), TCGS-1884 (pod- 2.40 t ha^{-1} and kernel- 1.68 t ha^{-1}), TCGS-1886 (pod- 2.35 t $ha^{-1}$and kernel- 1.65 t ha^{-1}), TCGS-1881 (pod- 2.29 t ha^{-1} and kernel- 1.50 t ha^{-1}), TCGS-1895 (pod- 2.08 t ha^{-1} and kernel- 1.27 t ha^{-1}), TCGS-1880 (pod- 2.01 t ha^{-1} and kernel- 1.31 t ha^{-1}), TCGS-1896 (pod- 1.98 t ha^{-1} and kernel- 1.29 t ha^{-1}) and TCGS-1887 (pod- 1.92 t ha^{-1} and kernel- 1.29 t ha^{-1}) gave significantly higher pod and kernel yields over the best check variety Greeshma (pod -1.30 t ha^{-1} and kernel-0' 94 t ha^{-1}). Among the test entries highest shelling out turn was recorded by TCGS-1897(73%).

In advanced varietal trial (1st year-UGC), out of 27 genotypes tested against three check varieties during rabi 2018-19, the genotypes TCGS-2160 (pod- 2.69 t ha^{-1} and kernel- 1.67 t ha^{-1}), TCGS-2198 (pod- 2.54 t ha^{-1} and kernel- 1.60 t ha^{-1}), TCGS2149 (pod- 2.40 t ha^{-1} and kernel- 1.65 t ha^{-1}), TCGS-2197 (pod- 2.26 t ha^{-1} and kernel- 1.38 t ha^{-1}) and TCGS-2.19 (pod- 2.19 t ha^{-1} and kernel- 1.16b t ha^{-1}) gave significantly higher pod yield over the best check variety Narayani (1.57 t ha^{-1}) and higher kernel over Dharani (1.05 t ha^{-1}). The highest shelling out-turn of 74% was registered by TCGS-2204.

In high oleate varietal trial (SB) stage-I, out of 11 genotypes evaluated, three genotypes recorded significantly higher pod yield over the general mean (2.51 t ha^{-1}). Among these, the top performing genotypes were HOVT-I-SB-2018 -11 (3.42 t ha^{-1}), HOVT-I-SB-2018 -8 (3.23 t ha^{-1}) and HOVT-I-SB-2018 -5 (2.90 t ha^{-1}) superior by 137 %, 129 % and 116 % respectively. The same genotypes also recorded higher kernel yield over the general mean of 1.66 t ha^{-1}.

In Advanced varietal trial (SB), out of 5 genotypes evaluated, two genotypes recorded significantly higher pod yield over the general mean (2.56 t ha^{-1}). The top performing genotypes were ASK-2018-9 (3.16 t ha^{-1}) and ASK-2018 -7 (2.91 t ha^{-1}) superior by 124 % and 114 % respectively.

The same genotypes also recorded higher kernel yield over the general mean of 1.66 t ha^{-1}.

In high oleate varietal trial (VB) stage-I, out of 9 genotypes evaluated, three genotypes recorded significantly higher pod yield over the general mean (0.69 t ha^{-1}). Among these, the top performing genotypes were HOVT-I-VB-2018 -8 (1.33 t ha^{-1}), HOVTI-VB-2018 -9 (1.02 t ha^{-1}) and HOVT-I-VB-2018 -3 (0.81 t ha^{-1}) superior by 193 %, 148 % and 118 % respectively. The same genotypes also recorded higher kernel yield over the general mean of 0.47 t ha^{-1}.

In DNA fingerprinting of crop varieties released from ANGRAU Using RAPD and SSR markers, DNA Fingerprinting of pre-release Sugar cane cultures *viz.,* 2007V127 and 2009V127 and three check varieties *viz.,* 87A278, 2003V46 and Co86032 were profiled with 31 RAPD markers. The RAPD markers *viz.,* OPB-05, OPC-09, OPB-10, OPA-08 and OPV-07 displayed distinct allelic differences and clearly distinguished 2007V127 and 2009V127 sugarcane varieties.

DNA fingerprinting of groundnut pre-released cultures *viz.,* TCGS 1157, TCGS 1157, TCGS 1622, TCGS 894, TCGS 1616 and TCGS 1694 with three check varieties Narayani, Greeshma and Tirupati 3 was carried out to facilitate the varietal release with 15 RAPD markers. The RAPD markers *viz.,* OPC10, OPA4, OPC7, OPB6, OPA19 which displayed distinct allelic differences and clearly distinguished the varieties TCGS 1157, TCGS1622, TCGS 894, TCGS 1616 and TCGS1694 and other check varieties.

Agricultural Research Station, Kadiri

In Multilocation varietal trial, out of nineteen entries along with four checks were evaluated during *kharif*, 2018, only one entry YLG -3 (3.15 t ha^{-1}) recorded significantly superior pod yield than check Amaravathi (2.78 t ha^{-1}).

In advanced varietal trial –II, six entries along with four checks was evaluated during *kharif*, 2018. Among them the entries *viz*. K-2317 (3.33 t ha^{-1}) and K-2316 (2.80 t ha^{-1}) recorded significantly superior pod yield than the check K-9 (2.06 t ha^{-1}).

In advanced varietal trial –I (PSND/thrips), among nine entries along with four checks evaluated during *kharif*, 2018, eight entries recorded significantly superior pod yield than highest yielding check K-9 (1.85 t ha^{-1}).

In Advanced varietal trial (Spanish bunch) five entries along with one check were evaluated during *kharif,* 2018. Only one entry *viz.,* ASK 2018-6 (1.47 t ha^{-1}) recorded significantly superior pod yield than the check Kadiri Amravati (1.12 t ha^{-1}).

In Advanced varietal trial (Spanish bunch-Stage-I) during *rab*i, 2017-18 among the entries tested only one entry IVT-I 2017-24 (2.42 t ha^{-1}) recorded significantly superior pod yield than the check Kadiri Harithandhra (1.84 t ha^{-1}).

In Advanced varietal trial (Spanish bunch-Stage-II) during *rabi*, 2017-18. The entries IST-I 2016-11 (1.38 t ha^{-1}) and IST-I 2016-13 (1.13 t ha^{-1}) recorded significantly superior pod yield than the check Kadiri Harithandhra (1.04 t ha^{-1}).

Agricultural Research Station, Anantapuramu

Among various groundnut varieties, higher groundnut pod (0.28 t ha^{-1}) and haulm (1.62 t ha^{-1}) yields and rainwater use efficiency (1.36 kg ha^{-1}-mm) were recorded with K-9 variety. However, this crop was subjected to prolonged dryspells during pegging to pod development stages lead to drastic reduction in yields. All the tested groundnut varieties were realized with negative net returns

During *kharif* 2018, sixteen entries were evaluated for their performance in Multi - Location Trial. Among them the entry MLTG (SB) 18-12 significantly recorded higher dry pod yield (0.16 t ha^{-1}) followed by MLTG (SB) 18-11 (0.15 t ha^{-1}) and MLTG (SB) 18-16 (1.40 t ha^{-1}.) compared to the check K6 (0.054 t ha^{-1}).

Agricultural Research Station, Utukur

Out of 16 entries tested, the entry MLTG 3 (4.87 t ha^{-1}) recorded significantly superior yield followed by MLTG 1 (4.21 t ha^{-1}) and MLTG 8 (3.82 t ha^{-1}).

Agricultural Research Station, Yelamanchili

During *kharif* 2018, out of nineteen ground nut entries tested, the entry MLTG-2 recorded highest significantly high pod yield of 2.47 t ha^{-1} with a shelling % of 69.2 and duration of 109 days followed by MLTG-3 with pod yield of 1.76 t ha^{-1} with shelling % of 64 & 105 days duration.

Agricultural Research Station, Amadalavalasa

A total of 19 entries were evaluated during *kharif,* 2018 in Multilocation Trial. Among them the entry V2 (2.86 t ha^{-1}) recorded high yield followed by V15 (2.56 t ha^{-1}) and V17 (2.19 t ha^{-1}).

Agricultural Research Station, Vizianagaram

Out of 19 entries tested in Multi Location Trial during *kharif* 2018, the entries *viz.,* GN (SB)-15 (1.78 t ha^{-1}), GN (SB)-2 (1.75 t ha^{-1}), GN (SB)-9 (1.68 t ha^{-1}), GN (SB)-6 (1.66 t ha^{-1}) and GN (SB)-7 (1.63 t ha^{-1}) recorded significantly higher grain yield compared to local check K6 (1.15 t ha^{-1}).

Crop Production

Regional Agricultural Research Station, Tirupati

Studies on efficacy of raingun in drought mitigation for rainfed groundnut during *kharif,* 2019 revealed that, with a supplemental irrigation of 20 mm at pegging stage to pod initiation stage, groundnut recorded 2.56 t ha^{-1} of pod yield and 10 mm supplemental irrigation recorded 2.15 t ha^{-1} compared to rainfed (1.64 t ha^{-1}). Supplemental irrigation of 20 mm depth recorded 19% increase in pod yield (2.56 t ha^{-1}) compared to 10 mm depth of irrigation (2.15 t ha^{-1}).

Among the varieties tested for their performance under irrigated conditions during summer/ early *kharif*, the variety Nithyaharitha recorded significantly higher pod yield of 1.89 t ha^{-1} compared to Dharani 1.72 t ha^{-1}. Among different dates of sowing, May 16^{th} sown groundnut recorded significantly highest pod yield (2.31 t ha^{-1}) followed by March 16^{th} sown groundnut (2.26 t ha^{-1}). May 16^{th} sown Nithyaharitha groundnut variety recorded highest pod yield of 2.80 t ha^{-1} compared to Dharani (1.82 t ha^{-1}).

The data for two years (2016-18) on summer groundnut was pooled and analyzed.the results revealed that performance of Nityaharitha (TCGS 1157) is significantly superior [16% increase in pod yield] over Dharani. Among the dates of sowing, significantly higher pod yield of groundnut was recorded with sowing in March followed by April.

The study on Influence of natural farming on soil properties, crop protection and production of quality produce during *kharif* 2018 revealed that ANGRAU ICM recorded the highest groundnut pod equivalent yield of 3.28 t ha^{-1} (groundnut pod yield 1.92 t ha^{-1} + redgram seed yield 1.43 t ha^{-1}) with higher net returns of Rs 88,852 ha^{-1} Sahaja Sendhriya Vyavasaaya Vidhaanam recorded next best groundnut pod equivalent yield of 2.69 t ha^{-1} (groundnut pod yield 1.91 t ha^{-1} + redgram seed yield 0.82 t ha^{-1}) and net income of Rs. 56,714 ha^{-1} While the lowest groundnut pod equivalent yield of 2.24 t ha^{-1} (groundnut pod yield 1.69 t ha^{-1} + redgram seed yield 0.58 t ha^{-1}) and net income of Rs 13,298 ha^{-1} was with Palekar concept.

The results of the study on green and brown manuring for the productivity of groundnut – millet cropping system during *kharif*, 2018 revealed that, brown manure (BM) + EM culture incorporation + STBF recorded highest pod yield (2.67 t ha^{-1}) of groundnut compared to BM + (1 t FYM + *Trichoderma* 5 kg ha^{-1} + PSB 2 kg ha^{-1}) + STBF, FYM 5 t ha^{-1} + STBF and GM + EM culture incorporation + STBF (2.48 kg ha^{-1}) and FYM 5 t ha^{-1}+ STBF (2.47 t ha^{-1}). The highest net returns (Rs. 82811) & B:C ratio (2.22) were obtained with Brown Manure + EM culture incorporation + STBF.

Studies on the efficacy of carrier and liquid based biofertiliser formulations on the performance of groundnut during *kharif*, 2018 revealed that 100 % soil test based fertilizer application resulted in high pod yield (2.96 t ha^{-1}) and net returns (Rs. 99629 ha^{-1}) (B:C ratio 2.48) compared to Liquid Rhizobium + PSB + 50 % STBF + 2.5 t FYM ha^{-1} (Rs. 96962/ha^{-1} and B:C ratio of 2.49).

Agricultural Research Station, Kadiri

Different endophytic bacteria exerted significant influence on pod yield of rainfed groundnut under stress conditions. Significantly higher pod yield was obtained with application of DGREB 2 (1.42 t ha^{-1}) over all the other treatments except DGREB 3 (1.33 t ha^{-1}) which recorded on par yield with that of DGREB 2.

Studies on application of different nutrient levels and bio -formulations in rainfed groundnut indicated that maximum mean pod yield (1.58 t ha^{-1}) was recorded with the application of 100% RDF over different bioformulation followed by 75% RDF and significantly superior over 25% RDF and 50% RDF. Hence, combined application of 100% RDF and Biogrow treated seed recorded significantly higher pod yield but was on par with 75% RDF along with Biogrow treated seed over the different fertilizer levels and Bio formulations. Hence application of 75% RDF along with Biogrow will reduce 25% recommended dose of fertilizer to the Groundnut crop.

Among different treatments, use of hydrogel @ 2.5 kg ha^{-1} + mulching with agro waste / weed biomass (groundnut shells) @ 5 t ha^{-1} + endophytic bacteria (10 g kg^{-1} seed) gave higher pod yield folloed by mulching with agro waste /weed biomass (groundnut shells) @ 5 t ha^{-1} + endophytic bacteria.

Studies on the effect of different nutrient levels and bio formulations during *rabi* 2018 under irrigated groundnut. maximum pod yield (2.25 t ha^{-1}) and kernel yield (1.56 t ha^{-1}) were recorded with the application of 100% followed by 75% RDF over different bio formulations of irrigated groundnut.

Three years pooled data showed that significantly higher pod yield (2.09 t ha^{-1}) and haulm yield (3.57 t ha^{-1}) was recorded with the application of FYM @ 5 t ha^{-1} + 100% P+DGRC2 followed by FYM @ 5 t ha^{-1} + 100% P + DGRC1 and FYM @ 5 t ha^{-1} + 50% P + DGRC. Further it can be concluded that 50% recommended dose of inorganic phosphorous application can be reduced when phosphorous solubilising bacteria DGRC used along with FYM.

An yield increase of 31.2 % was recorded when potassium feldspar (15 t sq m^{-400}) applied as a mulch in rainfed groundnut. All the yield attributes also showed significant increase with the application of potassium feldspar as a mulch along with low weed density compared to control.

The results of pooled data for three years showed that among four varieties sown under different dates of sowing, highest pod yield was recorded with Kadiri-9 variety at 1st fortnight of July sowing which was at par with Harithandra, Kadiri -6 variety (sown during 1st fortnight of July).

Agricultural Research Station, Anantapuramu

The groundnut crop sown in subsoiled fields recorded higher pod yield of 0.24 t ha^{-1} and haulm yield of 1.92 t $ha^{-1}$with 1.11 RWUE compared to the farmers practice(Pod yield 0.14 t ha^{-1} haulm yield 1.56 t ha^{-1}). The Net Returns and BC ratio were higher in improved practice than the farmers' practice.

Foliar spray of Potassium Nitrate @ 0.5% during peg penetration to pod initiation during *kharif* 2018 recorded higher groundnut pod yield of 0.42 t ha^{-1} with BC ratio of 0.77 and 0.39 in treated and control respectively recorded.

Studies on insitu moisture conservation through conservation furrows in groundnut + pigeonpea (8:1) intercropping system indicated that, formation of conservation furrows after every row of groundnut at 30 DAS produced more groundnut pod yield (0.15 t ha^{-1}) and haulm yield (1.24 t ha^{-1}) and significantly superior to formation of conservation furrow after every 4th, 8th and 12th row of groundnut. Higher moisture content was recorded with the formation of conservation furrow in every row.

Long term integrated nutrient management for ground nut over 34 years indicated that integration of both organics (FYM @ 4 t ha^{-1}) and inorganics (half rec. ferti. dose @ 10-20-20 N-P_2O_5-K_2O kg ha^{-1}) recorded 0.97 t ha^{-1} over Rec. Dose @ 20-40-40 N-P_2O_5-K_2O kg ha^{-1} (0.94 t ha^{-1}). However, the control recoded 0.73 t $ha^{-1}$of groundnut pod yield. The treatment with half the recommended dose of fertilizer (10:20:20 kg N, P_2O_5, K_2O) along with FYM @ 4 t ha^{-1} recorded higher Soil Organic carbon stocks (13.42 mg ha^{-1}) at surface soil depth.

Studies on effect of different chemical foliar sprays to cope with dry spells and higher productivity of rainfed groundnut in an alfisols revealed that significant differences were found in groundnut pod yields both in foliar spray of different chemicals during dry spell and also after relieving of stress/dry spell (with favourable soil moisture) during *kharif* 2018. Foliar spray during dry spell with water soluble complex fertilizer (19:19:19) @ 0.5% + recommended dose of micronutrient (Zn SO_4 @ 0.2 %) recorded higher groundnut pod yield (0.19 t ha^{-1}).

Agricultural Research Station, Kadapa

Efficacy of raingun in drought mitigation in rain fed groundnut indicated that only 0.05 t ha^{-1} pod yield was recorded in rain fed plot (A total of 108.4 mm rainfall was received during the crop period). Higher pod yields recoded with 10 mm at 52 DAS (0.13 t ha^{-1}), 10 mm twice at 52 and 63 DAS (0.17 t ha^{-1}), 10 mm at 52,63 and 85 DAS (0.29 t ha^{-1}), with 20 mm at 52 DAS (0.27 t ha^{-1}), 20 mm twice at 52 and 63 DAS (0.31 t ha^{-1}), 20 mm at 52,63 and 85 DAS (0.36 t ha^{-1}) than rainfed plot (0.05 t ha^{-1}).

Crop Protection

Insect Pest Management

Regional Agricultural Research Station, Tirupati

In evaluation of Groundnut Genotypes for their reaction to Insect Pests under normal and late sown conditions, at 30 and 60 days, these entries recorded low incidence of Jassid, the leaves are small and thick green (TCGS 1845). The entries TCGS 1904, 1907, 1908, 1910, 1911 and 1912 recorded high incidence of jassids ranging from 18 to 32%. The leaves are light green in colour.

Among 50 groundnut entries tested against insect pest complex, the entryTCGS 1845 recorded high yield (1.0 kg/row length) and the incidence of jassids and thrips was very low followed by TCGS 1855 (860 g/row length) with moderate incidence of Jassid and thrips damage.

In Integrated Pest Management studies in groundnut during *kharif* 2018, the leaf hoppers damage was high as compared to thrips at 30 and 60 days. Due to prevalence of drought conditions during season the incidence of sucking pest complex was high. There is no much difference in plot yield between organic and inorganic component modules.

Studies on screening of elite groundnut cultures resistant against groundnut bruchid *Caryedon serratus* in groundnut indicated that the entries viz., TCGS 1823, 1908, 1923, 1925, 2134, Greeshma showed low percent weight loss and less number of bruchid adu after 130 days than TCGS 1820, 1826, 1899 and 1909 (more weight loss more number of bruchid adults).

In studies on compatibility of insecticides, fungicides and nutrients, foliar spray with Monocrotophos @ 1.6ml/l + Hexaconazole @ 2 m l^{-1} + 19-19-19 combination was found effective in reducing foliar damage caused by thrips (11.35%) and low incidence of leaf spot score score (2) with high pod yield of 1.12 t ha^{-1} kg/ha compared to untreated control (leaf damage due to thrips was 24.84 % , leaf spot score (6 score) pod yield (0.66 t ha^{-1}).

Management of groundnut root-feeders during *kharif* 2018, seed treatment with imidacloprid 600 FS @ 2 ml/kg of seed before sowing found to be effective with high pod yield of 1.10 t ha^{-1} followed by furrow application of Carbofuran 3 G @ 33 kg/ha before sowing (0.73 t ha^{-1}) compared to untreated control (plant mortality 6.3 % larval count 5.7 Larva/ m2 and pod yield 0.73 t ha^{-1}).

Studies on field evaluation of liquid B.t isolate formulations against *S.litura* in *kharif* groundnut revealed that the performance of liquid formulations of Bt was inferior compared to solid formulations.

Agricultural Research Station, Kadiri

Studies on efficacy of different oils along with chemical check spinosad 45 SC indicated that, spinosad 45 SC @ 0.6 ml/kg^{-1} was the best treatment in achieving significantly high mean mortality of 98.33%. followed by neem oil 10%, (96.66% mortality) and spinosad 45 SC 0.3 ml/kg^{-1} seed (95.00% mortality).

Efficacy of different insecticides indicated that, Cyantraniliprole @ 0.3ml/ l^{-1} was the superior in achieving significantly lowest mean leaf damage of 6.61% by *Spodoptera,* 7.53% by *Helicoverpa* and 4.18% by leaf miner respectively. Cyantraniliprole @ 0.3m l^{-1} and Spinoteram @ % 0.4ml l^{-1} it recorded significantly high dry pod yield (2.06 t ha^{-1} and 2020 kg ha-1) and haulm yield (4547 and 4.40 t ha^{-1}) compared to untreated control dry pod (1.52 t ha^{-1}) and haulm yield (3.26 t ha^{-1}) respectively.

Results of management of white grubs and termites during *kharif,* 2018 showed that soil drenching with chlorpyriphos 20 EC @ 8 ml l^{-10} of water and soil drenching with urea + phorate 10 G @1 kg + 1 kg l^{-10} of water were statistically recorded significant lowest plant damage of 5.03 % and 5.17 % respectively by white grub with highest dry pod (1.40 t ha^{-1} and 1.38 t ha^{-1}) and haulm yields (2.78 t ha^{-1} and 2.71 t ha^{-1}).

A total 20 promising genotypes were screened against thrips, leaf hopper, leaf miner and defoliator's with local checks Kadiri 3 and 6 under field during *kharif,* 2018. The incidence of leafhoppers and leafminers were more compared to other pests in all the genotypes up to the harvest. Out of 20 genotypes, two genotypes K-1706 and K-2064 were resistant to sucking pests and defoliators in which leaf damage was less than 10 per cent, compared to susceptible checks Kadiri 3 and Kadiri 6 which recorded 34 -54 % leaf damage.

Agricultural Research Station, Utukur

Studies on population dynamics of leaf hoppers, thrips and leaf miner in groundnut during *kharif* 2018 revealed that peak foliar damage of leaf hopper (36.16) and thrips (15.47) was observed in 37th std week.

Agricultural Research Station, Darsi

Seasonal incidence of insect pests and their natural enemies during *kharif* 2018 indicated that in the early sown crop, leaf miner larval incidence reached a peak during 38th std week (9.0 larvae/ plant^{-1}). The peak damage due to thrips and jassids was observed during the 31st standard week. Whereas, per cent foliage damage due to *Spodoptera litura* was peek on 40th std week. In the late sown crop the leaf miner incidence was peek during the 37 th std week (6.53 larvae/ plant^{-1}).

The moth trap catches of *S. litura* was maximum during 40th standard week with a mean catch of 5.20 males / trap / week. In the early sown incidence of leaf miner and thrips were positively correlated with maximum temperature. Whereas, in late sown crop incidence of *Spodoptera litura* was positively correlated with morning relative humidity.

Agricultural Research Station, Anantapuramu

Population dynamics of groundnut leaf miner revealed that leaf miner damage was 50.14% during 38th standard week followed by 33.54% in 39th standard week. Rainfall and minimum temperature has positive correlation with leafminer damage. The thrips damage was highest (26.27%) in 40th standard week. Maximum temperature, minimum temperature exerted positive correlation with number of leaf hoppers per top three leaves.

Among the semiochemical blends tested for trapping of *Caryedon serratus* from 2016 to 2018, combination of blends proved effective for trapping of groundnut bruchids. Blend I (47), blend –II (45), blend –III (26.5) trapped in 2016. Blend IV (92) and blend IV a (146) trapped number of bruchids per blend in 2017. Blend I(35), blend II (48), blend III (66), blend IV (74) and blend IV a (88) bruchids per blends tested in 2018.

Disease Management

Agricultural Research Station, Kadiri

Among 60 elite and pre release genotypes of groundnut screened against peanut stem necrosis disease (PSND) significantly less incidence (26.5 %) of PSND was recorded by ICGV 05097, ICGV-02411, K-2195 (DR), ICGV-06149, K-1909 (FDR), K-2311 VG (LLS), ICGV-06139, K-2283 (FDR) and ICGV-06138 against highest incidence of 93.9%.

Among 70 IVT and AVT stage II genotypes screened against major diseases, the genotypes viz., ASK-2017-3; IVK-I-2017-3, 5, 10, 11 and 12; LSVT-I-2017-7 and 9; DTWUE-2017- 9 exhibited resistant reaction against late leaf spot against highest scale of 6.0 on susceptible check Kadiri 6. At harvest, following genotypes recorded below 5.0% incidence of stem rot *viz.,* IVK-I-2017-5; LSVT-I-2017-3, 9 and 11 against maximum incidence of 32.4%. At harvest, among different genotypes, the genotypes *viz.,* ISK-I-2017-30; ASK-2017-1 and IVK-I-2017-3 have recorded below 7.0% incidence.

Studies on control of foliar diseases of groundnut for three years revealed that less intensity of early leaf spot (36.0 % PDI), late leaf spot (24.7% PDI), (rust (21.3% PDI), less intensity of *Alternaria* blight (25.9% PDI), highest pod (1.42 t ha^{-1}) and haulm yield (2.51 t ha^{-1}) with highest ICBR of 12.5 was recorded by treating the seed with Tebuconazole 2 DS @ 1.5 g kg^{-1} seed, followed by foliar spray of Tebuconazole 25.9% EC @ 1ml l^{-1} at 60 and 85 DAS.

Evaluation of different modules against management of diseases and insect pests in groundnut for three years revealed that low incidence stem rot (5.6%) and low intensity early leaf spot (33.7% PDI), rust (19.4 % PDI) and *Alternaria* blight (11.9% PDI), low mean leaf damage of thrips (16.2%) along with higher pod (1.52 t ha^{-1}) and haulm yield (2.64 t ha^{-1}) with highest ICBR of 7.2 were registered by seed treatment with *Trichoderma asperellum* @ 4 g kg^{-1} seed + foliar spray of imidacloprid 17.8 SL @ 0.3ml l^{-1} + foliar spray of Novaluran 10 EC @ 1ml l^{-1} 50-70 DAS + foliar spray of Tebuconazole 25.9 EC @ 1.5 ml l^{-1} at 50-70 DAS).

Studies on management of soil borne diseases indicated that less incidence of dry root rot (4.0%) and stem rot (5.4%) and high pod (1.56 t ha^{-1}) and significantly high haulm yield (2.89 t ha^{-1}) were recorded by deep summer ploughing with mould board.

Regional Agricultural Research Station, Tirupati

Among the entries screened for soil borne diseases under natural incidence, the entries viz., 2179, 2156, 2158, 2165, 2172, 2198, AVT-1901, IET-1789, IET-1862, 1609,1638,1719,1738, 1741, 1746, 1759 recorded zero per cent incidence of stem rot while the entries *viz.,* 2141, 2145, 2152, 2180, 2198, 2206, AVT-1905, 1910, 1916, IET-1789, 1858, 1872, 1602, 1662, 1711, 1731, 1741, 1744, 1755, 1759 recorded zero incidence of dry root rot.

In management of soil borne diseases, deep summer ploughing with MB plough + soil application of *Trichoderma* @ 4 kg ha^{-1} enriched in 250 kg FYM ha^{-1} + seed treatment with Tebuconazole @ 1.5 gkg of seed followed by seed treatment with PGPR @ 625 g/ha of seed + soil application of *Trichoderma* @ 4 t ha^{-1} enriched in 250 kg FYM /ha at 35 and 80 DAS were found effective.

In the management of foliar diseases, spraying with fungicide combination of Tebuconazole 50 % + Trifloxystrobin 25 % WG @ 1.32 g l^{-1} (0.035%) at 40 and 65DAS was found effective in controlling of early leaf spot and rust.

Under screening for viral diseases, among the 119 advanced station entries screened under natural conditions entries 2141, 2145, 2146, 2152, 2154, 2156, 2170, 2176, 2180, 2191, 2207, 1609, 1662, 1716, 1729, 1750, 1756, 1760, AVT-1903, 1911, 1921, 1784, 1862, 1864, 1872 shown tolerance for PBND and IET-1871 for PSND while 2176 shown tolerance to stem rot and 2196, 1631, AVT-1902 and IET-1861 for Dry Root rot. Among the 41 coordinated entries, IVK-2018-05, 08, 09, 17, ISK-I-2018-02, 06, 13, 14, 32 shown resistance for

PBND while IVK-I2018-10 for PSND under natural conditions during *rabi*-2018-19.

3.2 Sunflower

Crop Improvement

Regional Agricultural Research Station, Nandyal

In Initial hybrid trial conducted during *kharif* 2018, the entry SH 2602 (3.34 t ha^{-1}) recorded significantly higher (44.50 %) seed yield than check hybrid, NDSH 1012 (2.38 t ha^{-1}). The oil content was higher in SH 2607 (40.28 %).

In Advanced hybrid trial I conducted during *kharif* 2018, the entries *viz.*, SH 2551 (2.83 t ha^{-1}) and SH 2515 (2.82 t ha^{-1}) recorded significantly higher seed yield and recorded 26.15 % and 25.70 % higher seed yield than NDSH 1012 (2.25 t ha^{-1}) respectively. SH 2515 also recorded higher oil content of 39.88 %.

In Multi location trial during *rabi* 2018, the entries, SH 2335 (2.47 t ha^{-1}) and SH 2199 (2.32 t ha^{-1}), recorded 11.73% and 4.85% higher seed yield than check, NDSH 1012 (2.21 t ha^{-1}) respectively.

Agricultural Research Station, Yelamanchili

In Multi Location Trial during *rabi* 2018, out of ten entries tested, the entry MLT-1 recorded highest seed yield of 0.69 t ha^{-1} with 81 days duration followed by MLT-8 with seed yield of 0.66 t ha^{-1} and 92 days duration.

Crop Production

Regional Agricultural Research Station, Nandyal

Under technology validation programme in sunflower cropping system, Site Specific (soil test based) target yield NPK + S + Zn + 5t FYM ha^{-1} + Crop residue incorporation with *Trichoderma viride* was recorded higher sunflower seed yield of 2.27 t ha^{-1} with net returns of Rs. 46456 /- ha^{-1}.

Studies on response of sunflower to varying planting geometry and fertiliser levels under different land configarations under rainfed conditions indicated that, Broad bed and furrow with paired row planting at 45 cm x 30 cm with 125 % RDF recorded higher sunflower yield of 0.87 t ha^{-1} with net returns of Rs. 15479/- ha^{-1}.

Disease Management

Regional Agricultural Research Station, Nandyal

Studies on r management of leaf curl disease for three years (pooled analysis) indicated that, seed treatment with imidacloprid 600FS @ 5 ml kg^{-1} seed + foliar spray with diafenthiuron 50 WP @ 1.25 gm l^{-1} at 30, 45 and 60 DAS followed by seed treatment with imidacloprid 600FS @ 5ml kg^{-1} seed + foliar spray with Flonicamide 50WG @ 0.25 g l^{-1} at 30, 45 and 60 DAS recorded the significantly less disease incidence of 13.49% and 15.61% and higher yields of 1.65 and 1.63 t ha^{-1} respectively compared to control (29.92% and 1.29 t ha^{-1}).

In management of *Alternaria* blight with new fungicides (combi products), seed treatment with carbendazim 12% + mancozeb 63% wp (SAAF 75 WP) @ 2g kg^{-1} seed followed by two foliar sprays with trifloxystrobin 25% + tebuconazole 50% (Nativo 75WG) @ 0.25g l^{-1} and seed treatment with carbendazim 12% + mancozeb 63% wp (SAAF 75 WP) @ 2g kg^{-1} seed followed by two foliar sprays with difenconazole 25% + propiconazole 25% (TASPA 500EC) @ 0.25% ml l^{-1} recorded less disease severity (PDI) of 24.68% and 28.82% respectively and recorded higher yields of 1.74 t ha^{-1} and 1.68 t ha^{-1} respectively compared to control (35.95% and 1.52 t ha^{-1}).

3.3 Sesamum

Crop Improvement

Agricultural Research Station, Yelamanchili

Multi Location Trial

In Multi Location Trial (Brown seed) during *kharif* 2018, out of seven entries tested against the check YLM-66, the entries YLM-146 (0.76 t ha^{-1}) & YLM-142 (0.72 t ha^{-1}) were found significantly superior in yield to the check YLM-66 (0.51 t ha^{-1}) and less incidence of phyllody and oil percent 50.4 and 50.36 respectively. The entries YLM-142 & YLM-146 recorded 88 days duration.

In Multi Location Trial (Brown seed) during Kharif 2018 at ARS Tirupati during *kharif* 2018, out of seven entries tested against the check YLM-66 (0.34 t ha^{-1}), the entries, YLM-142 (0.78 t ha^{-1}), YLM-1360. (0.63 t ha^{-1}), YLM-147 (0.57 t ha^{-1}), YLM-146 (0.56 t ha^{-1}), YLM-139 (0.50 t ha^{-1}), YLM-141 (0.46 t ha^{-1}) found significantly superior in seed yield.

During *kharif* 2018, in Advanced Varietal Trial (AVT) (white seed), out of nine entries tested against the check TKG-22, the entries YLMW-152 (0.72 t ha^{-1}), YLMW-151 (0.68 t ha^{-1}), YLMW-156 (0.61 t ha^{-1}), YLMW-154 (0.58 t ha^{-1}), YLMW-148 (0.56 t ha^{-1}), YLMW-150 (0.52 t ha^{-1}) and YLMW-153 (0.51 t ha^{-1}) were found significantly superior in seed yield to the check TKG 22 (0.31 t ha^{-1}).

Out of seven entries tested in Multi Location Trial (Brown seed) during *rabi-summer* 2018, the entry YLM-142 recorded significant highest yield of 0.65 t ha^{-1} followed by YLM-146 with 0.67 t ha^{-1} compared to the check YLM-66 (0.51 t ha^{-1}).

In Advanced varietal Trial (white seed) during *rabi-summer* 2018-19, out of nine entries tested against the check TKG-22, the entries YLMW 153 recorded significant highest seed yield of 0.49 t ha^{-1} followed by YLMW-152 (0.37 t ha^{-1}), YLMW-151 (0.32 t ha^{-1}), YLMW-154 (0.25 t ha^{-1}) and YLMW-156 (0.24 t ha^{-1}) compared to the check TKG-22 (0.092 t ha^{-1}).

Agricultural Research Station, Utukur

Out of 4 entries tested in Preliminary yield trial against two checks, the entry UTS 204 (1.33 t ha^{-1}) recorded significantly higher seed yield against the check YLM 66 (1.01 t ha^{-1}). The other check Swetha Til recorded a seed yield of 1.21 t ha^{-1}.

Out of eight entries tested in Multilocation trial, significant differences were found for yield but none of the entries were found to be significantly superior against the check YLM 66 (1.13 t ha^{-1}).

Crop Production

Agricultural Research Station, Yelamanchili

Results on effect of sulphur on seed yield and oil content during *rabi,* 2017-18 showed that, application of sulphur at 45 kg ha^{-1} through gypsum recorded significantly higher seed yield (0.59 t ha^{-1}), higher net returns (Rs. 33,693) and B:C ratio (2.49).

Among the different organic sources tested, application of farm yard manure @ 10 t ha^{-1} recorded significantly higher seed yield (3.56 t ha^{-1}) followed by press mud cake @ 12.5 t ha^{-1}.Among the different nitrogen levels, application of 150% recommended dose of nitrogen (RDN) gave significantly higher seed yield (3.75 t ha^{-1}) than at lower levels. However, it was at par with application of 125% RDN. Among all the organic sources, the highest gross (Rs. 31,690) and net returns (Rs. 11,390) was obtained with application of FYM 10 t ha^{-1} with 150% RDN. However, the highest BCR (2.01) was recorded under application of press mud cake @ 12.5 t ha^{-1} with 125% RDN.

Sequential application of pre and post emergence herbicides for weed management revealed that, two hand weedings at 15 and 30 DAS significantly reduced weed population and weed dry weight at 30 & 50 DAS over rest of the treatments and it was on par with pendimethalin @ 0.5 kg a.i ha^{-1} and quizalofop-ethyl @ 40 g a.i ha^{-1} at 20 DAS.

Under organic farming of sesamum the inorganic plot, recorded more seed yield (0.59 t ha^{-1}) than the organic plot (0.44 t ha^{-1}).

The results of foliar nutrition on growth, yield and quality of rainfed sesame revealed that 100% RDF + Urea @ 2 % foliar spray at flowering and capsule formation resulted in more plant height (100.1 cm), higher number of branches plant^{-1}

(4.97), higher number of capsules plant^{-1} (96.2) and also higher yield (0.59 t ha^{-1}) with higher BC ratio (2.43).

Agricultural Research Station, Reddipalli

Seed yield of sesame was significantly influenced by dates of sowing only. Highest seed yield was recorded (0.40 t ha^{-1}) with October 1st sowing followed by January 1st date of sowing (0.39 t ha^{-1}). Sesame can be taken up from October 1st to January 1st to record higher productivity and returns of sesame.

Crop Protection

Pest Management

Agricultural Research Station, Yelamanchili

Studies on seasonal incidence of insect pests of sesame in relation to biotic and abiotic factors revealed that the sucking pests showed slight to medium positive correlation with temperature and slight to medium positive correlation to relative humidity except for leafhoppers which expressed medium negative correlation. Rainfall showed slight negative correlation with incidence of sucking pests.

Studies on effect of intercropping on incidence of sucking pests of Sesame showed that among the different inter crops, intercropping with greengram and fingermillet reduced the pest incidence significantly in sesame. However intercropping with redgram and groundnut did not show any significant influence on pest incidence and were on par with sole sesame crop.

Efficacy of insecticides for Management of sucking pests in Sesame with insecticides revealed that imidacloprid 70WS (7.5 g kg^{-1} seed) was effective in reducing the sucking pest upto 30 DAS. However, persistent and significant reduction in pest incidence was observed with foliar spray of imidacloprid 17.8 SL (0.25 ml l^{-1}) at 30 and 60 DAS and foliar spray of diafenthiuron 50WP (1.25 g l^{-1}) at 30 and 60 DAS.

Disease Management

Agricultural Research Station, Yelamanchili

In management of sesame Phyllody through vector control in *kharif* 2018-19, the influence on seed yield was higher with the application of insecticides compared with the control. The highest yield was recorded Seed treatment with imidacloprid 600FS @ 5ml kg^{-1} and foliar spray with Acetamiprid @ 0.3 ml l^{-1} at 30 & 45 DAS (0.15 t ha^{-1}) followed by Seed treatment with imidacloprid 600FS @ 5ml kg^{-1} and foliar spray with Thiamethoxam @ 0.3 g l^{-1} at 30 DAS (0.15 t ha^{-1}), and Seed treatment with Imidacloprid 600FS @ 5 ml kg^{-1} and foliar spray with imidacloprid @ 0.3 ml l^{-1} at 30 DAS (0.12 t ha^{-1}).

In rabi/summer-2018-19, the minimum disease incidence (1.3%) and higher seed yield (0.31 t ha^{-1}) was observed in seed treatment with imidacloprid 600FS @ 5 ml kg^{-1} and foliar spray with thiamethoxam @ 0.3 g l^{-1} at 30 DAS followed by Seed treatment with imidacloprid 600 FS @ 5 ml kg^{-1}and foliar spray with Acetamiprid @ 0.3 ml l^{-1} at 30&45 DAS(1.8% and 0.29 t ha^{-1}).

3.4 Castor

Crop Improvement

Agricultural Research Station, Anantapuramu

During *kharif* 2018, a total of 500 germplasm entries collected were multiplied and are maintained for utilization in future breeding programme.

Out of 17 hybrids evaluated during *kharif* 2018, 6 hybrids viz., GCH-818 (374 kg/ha), GCH-1715 (349 kg/ha), ICH-861 (342 kg/ha), GCH 8 (328 kg/ha) have recorded significantly superior yield compared to the local check GCH-4 (274 kg/ha).

In Initial Varietal/Hybrid Trial Set-I (IVHT Set-I) 16 castor entries (IVHT Set-I) were evaluated for seed yield during *kharif* 2018. Among them 7 hybrids *viz.,* IVHT-25 (0.81 t ha^{-1}) followed by IVHT-18 (0.63 t ha^{-1}), IVHT-19 (0.62 t ha^{-1}), IVHT-27 (0.58 t ha^{-1}), IVHT-23 (0.57 t ha^{-1}) and IVHT-30 (0.57 t ha^{-1}) have recorded significantly superior seed yield compared to the check (GCH-4).

Among 16 entries evaluated in Castor Initial Varietal/ Hybrid Trial Set-II, 6 hybrids have recorded significantly superior yield compared to the local check GCH-4. The entry IVHT-34 recorded highest seed yield (0.46 t ha^{-1}) followed by IVHT-40 (0.43 t ha^{-1}), IVHT-43 (0.41 t ha^{-1}), IVHT-35 (0.37 t ha^{-1}) and IVHT-36 (0.37 t ha^{-1}) have recorded more than 20 % yield increase over check (GCH-4).

In evaluation of hybrids and varieties, the results revealed that the entries DCH-519 (0.51 t ha^{-1}), DCH-177(0.50 t ha^{-1}), GCH-4 (0.46 t ha^{-1}) and PCH-111 (0.44 t ha^{-1}) recorded significantly higher seed yield when compared with other entries. Among the entries DCH-519 recorded the highest gross returns, net returns and B : C ratio compared to Haritha.

Crop Production

Agricultural Research Station, Anantapuramu

Among the different cropping systems evaluated, castor sole crop recorded higher growth and yield attributes which resulted in highest Gross returns, net returns, B:C ratio, Castor equivalent yield. The lowest Gross returns, net returns, B:C ratio, Castor equivalent yield was registered by finger millet sole crop. However, LER was highest in Castor + foxtail millet among all treatments.

Genotype PTB-1 produced significantly higher yield (0.39 t ha^{-1}) followed by KBC-7 (0.33 t ha^{-1}) compared to other three genotypes (KBC-9 (0.28 t ha^{-1}), TPTC-29 (0.27 t ha^{-1}) and KBC-8 (0.27 t ha^{-1})) which recorded on par yields with each other. A spacing of 45 cm x 10 cm recorded significantly higher yield compared to 30 cm x 10 cm spacing. Seed yield of all genotypes did not differ significantly with 100% RDF or 125% RDF application.

Application of 20 mm life saving irrigation at primary spike development resulted in highest seed yield (0.33 t ha^{-1}) followed by 10 mm life saving irrigation at primary spike development (0.32 t ha^{-1}).

Mustard

Agricultural Research Station, Reddipalli

Studies on identification of suitable sowing date indicated that higher seed yield (1.19 t ha^{-1}) was recorded with November 16th date of sowing while January 1st sowing recorded lower seed yield (0.52 t ha^{-1}). The mustard seed yield was similar with dates of sowing from October 1st to November 16th. Gross returns and net returns were higher with November 16th date of sowing of mustard.

Water use efficiency was high with November 1st to November 16th (3.7 kg ha^{-1}-mm) date of sowing than January 1st sowing (2.1 kg ha^{-1} -mm).

4. Commercial Crops

4.1 Cotton

Crop Improvement

Regional Agricultural Research Station, Lam

Out of 37 *G. hirsutum* entries tested in in Initial Evaluation Trail, the genotypes L1384 (2.73 t ha^{-1}) and GISV322 (2.68 t ha^{-1}) recorded significantly superior seed cotton against the local check NDLH-1938(2.19 t ha^{-1}). The entries, GISV322 (5.2 g/tex, 27.0 mm), L1384 (4.7 g/tex, 29.4mm) showed superior fibre strength and 2.5% span length.

In Preliminary Varietal Trial of *G. hirsutum* varieties, the test entry THS325 was found to be promising with highest seed cotton yield of 2.41 t ha^{-1} and 2.5% span length (30 mm) compared to the local check NDLH-1938 (2.39 t ha^{-1}).

In CVT of *G. hirsutum* varieties, out of five entries tested, HS298 (2.57 t ha^{-1}), RHC1217 (2.40 t ha^{-1}) was found to be on par with the local check NDLH-1938 (2.35 t ha^{-1}). Similarly, the entries HS 298 and RHC 1217 recorded the highest boll number (53 Nos) per plant and ginning out turn of 33.7 and 33.9 per cent, respectively.

In Preliminary Evaluation Trail of Compact Genotypes, out of 10 entries tested, the genotypes LHDP2 (2.64 t ha^{-1}) followed by RHCHD 1433 (2.39 t ha^{-1}) and GISV 298 (2.26 t ha^{-1}) recorded significantly superior yield ha^{-1}, compared to the check NDLH1938 (1.86 t ha^{-1}). The entries LHDP2 (27.4 mm) and RHCHD 1433 (28.1mm) also recorded highest 2.5% span length.

In Initial Evaluation Trial of Colour Cotton, the entry LHCC2 (2.45 t ha^{-1}) followed by LHCC1 (2.32 t ha^{-1}) showed significantly superior performance against the check NDLH1938 (1.73 t ha^{-1}).

In CHT *G. hirsutum* intra specific hybrids, the hybrids, LAHH34 (3.01 t ha^{-1}) followed by LAHH33 (2.81 t ha^{-1}) and DHH 1802 (2.78 t ha^{-1}) recorded the superior seed cotton yield and found to be on par with the Zonal check Bunny (2.51 t ha^{-1}). The hybrid LAHH 34 also recorded highest lint yield of 1.05 t ha^{-1} and boll number of 64 per plant with the superior mean boll weight of 5.02 g.

In Preliminary Evaluation Trail of *G.barbadense*, out of seven varieties tested, the genotypes CCB 129 (2.32 t ha^{-1}) followed by SBSG1-5 (2.05 t ha^{-1}) and CCB 51(1.93 t ha^{-1}) were found to be significantly superior to Zonal check Suvin(1.39 t ha^{-1}).

In CVT of G.barbadense, out of four varieties tested, the genotypes RHCB 1014 (2.20 t ha^{-1}) and DB 1601 (1.97 t ha^{-1}) were found to be significantly superior to Zonal check Suvin (1.53 t ha^{-1}).

In Preliminary Hybrid Trial of Inter-specific cotton hybrids, hybrids RHB1624 (2.61 t ha^{-1}) and DHB1801 (2.16 t ha^{-1}) were found to be significantly superior to check hybrid Phule Dhara (1.59 t ha^{-1}). The hybrids RHB1624 (40.3 mm) recorded highest 2.5% span length.

In Co-ordinated Hybrid Trial of Inter-specific cotton hybrids, out of five hybrids tested, significantly superior yield was recored in ARBHB 1601 (2.06 t ha^{-1}) followed by LAHB1(2.04 t ha^{-1}) compared to the check (1.36 t ha^{-1}).

Out of 19 entries tested in Preliminary Yield Trial, the entries *viz.,* L 1609 (2.58 t ha^{-1}), L 1581 (2.42 t ha^{-1}), L 1675 (2.37 t ha^{-1}) followed by L 1586 (2.32 t ha^{-1}) recorded significant yield over the checks NDLH 1938 (1.73 t ha^{-1}) and L 604 (1.56 t ha^{-1}).

In Advanced Yield Trial during 2018-19, twelve entries were tested along with checks L 604 & NDLH 1938. Out of 12 entries, eight entries viz., L 1564 (2.34 t ha^{-1}), L 1526 (2.25 t ha^{-1}), L 1536 (2.23 t ha^{-1}) followed by L 1565 (2.19 t ha^{-1}) recorded significant yield over the checks NDLH 1938 (1.67 t ha^{-1}) and L 604 (1.53 t ha^{-1}).

In Multi location Varietal Trial during 2018-19 out of 11 entries tested, four entries *viz.,* L 1384 (2.13 t ha^{-1}), L 1539 (1.99 t ha^{-1}), L 1534 (1.97 t ha^{-1}) and L 1527 (1.96 t ha^{-1}) recorded significant yield over the checks NDLH 1938 (1.57 t ha^{-1}) and L 604 (1.47 t ha^{-1}). The arboretum entry NDLA 2985 (1.57 t ha^{-1}) recorded numerically higher yield over check Yaganti (1.39 t ha^{-1}).

In Multi location Varietal Trial (HDP) during 2018-19, five entries were tested along with checks L 1060, L 604 and NDLH 1938. The five entries viz., LHDP 1 (3.36 t ha^{-1}), LHDP 3 (3.23 t ha^{-1}), LHDP 2 (3.13 t ha^{-1}), LHDP 4 (2.84 t ha^{-1}) and LHDP 5 (2.80 t ha^{-1}) recorded significantly superior yield over the checks NDLH 1938 (2.04 t ha^{-1}), L 1060 (1.97 t ha^{-1}) and L 604 (1.85 t ha^{-1}).

Regional Agricultural Research Station, Nandyal

In Multi-location Varietal trial of *G. hirsutum* cotton, among the 15 entries tested, two varieties were found significant *i.e.* NDLA - 2985(1.71 t ha^{-1}) compared to the check Yaganti (1.28 t ha^{-1}) and in *G.arboreum*.NDLH -2005-4 (0.86 t ha^{-1}) recorded significantly superior than check Srirama (0.51 t ha^{-1}).

Among the eight entries tested in Multi-location trial (HDPS) of *G. hirsutum* cotton, two varieties were found significant i.e. LHDP 1 (0.96 t ha^{-1}) followed by LHDP 4 (745 kg/ha) compared to local check Srirama (0.48 t ha^{-1}).

A total of 426 germplasm lines of *G.hirsutum* cotton were maintained and some of them were utilized in hybridization.

In Advance Hybrid Trial, among the 22 entries (21+1) tested, 10 entries were significantly superior over check NDLHH -240. The highest kapas yield was recorded by NDLHH – 481 (2.31t ha^{-1}) followed by NDLHH – 462 (1.69 t ha^{-1}) and NDLHH – 442 (1.69 t ha^{-1}).

Among 27 entries tested in Initial Evaluation Trial of *G.hirsutum* cottons (RF); six entries were found significant i.e. Sivanandi (LC) (2.65 t ha^{-1}) followed by RAH 1075 (2.26 t ha^{-1}), NDLH – 2035-5 (2.00 t ha^{-1}) than zonal check Sri rama (1.30 t ha^{-1}).

In PVT of *G.hirsutum* Cotton trial (SZ), among 10 entries tested seven entries were found significant i.e. NDLH - 2051- 1 (2.17 t ha^{-1}) followed by GSHV-191 (1.88 t ha^{-1}) RAH – 1071 (1.86 t ha^{-1}) than zonal check sahana (1.01 t ha^{-1}).

Among 6 entries tested in PVT of *G.hirsutum* Cotton trial (RF), all the entries were found significant i.e. Sivanandi (LC) (2.00 t ha^{-1}) followed by BGDS – 1072 (1.73 t ha^{-1}) than zonal check Sahana (0.80 t ha^{-1}).

Among 8 entries tested in Coordinated Hybrid Cotton trial (RF), only one entry Srirama (1.73 t ha^{-1}) was found significantly than local check LAHH – 5 (0.93 t ha^{-1}).

In Compact genotype trial – I (RF), out of 20 entries tested, 10 entries were found significant *i.e.,* AKH – 1302 (2.05 t ha^{-1}) followed by DSC 1851(1.95 t ha^{-1}), AKH -1301(1.80 t ha^{-1}) than the check Suraj (0.89 t ha^{-1}).

Among the 9 entries tested in Compact genotype trial-II (RF) one entry *i.e.,* RHC HD 1420 (1.97 t ha^{-1}) was found significant than zonal check suraj (1.45 t ha^{-1}).

Among the seven coloured cotton entries tested, one entry *i.e..* Sivanandi LC (2.28 t ha^{-1}) was found significant than zonal check Suraj (1.19 t ha^{-1}).

Out of 15 long linted *G. arboreum* entries tested, one entry i.e. AKA – 2010 -10 (1.84 t ha^{-1}) was significant than quality check DSLA – 17 (1.47 t ha^{-1}) for kapas yield.

In Coloured cotton trial (G.a) (RF), among the 8 entries tested, the local check Yaganti (2.52 t ha^{-1}) was found significant than zonal check DLSa – 17 (1.72 t ha^{-1}).

Crop Production

Regional Agricultural Research Station, Lam

In agronomic evaluation pre released cultures the variety PA 812 recorded maximum seed cotton yield in 60 cm X 15 cm (4.92 t ha^{-1}) spacing and was on a par with 75 cm x 15 cm (4.74 t ha^{-1}) spacing compared to 75 cm X 30 cm (4.08 t ha^{-1}) spacing. Application of different levels of nutrients did not influence the seed cotton yield.

In studies on technology for organic cotton production results revealed that highest seed cotton yield was recorded in application of RDN through inorganic sources (1.54 t ha^{-1}) followed by (RD of Nutrient through organic based on P equivalent basis (1.08), application of Neem cake 250 kg ha^{-1} (1.00 t ha^{-1}), raising of sunhemp between rows and incorporated before flowering (1.09 t ha^{-1}),

seed treatment and soil application of rec. bio fertilisers and foliar application of PPFM and Neem cake 250 kg ha^{-1} (1.07) compared to control (0.89 t ha^{-1}).

Studies on enhancing the nitrogen use efficiency indicated that maximum seed cotton yield (3.51 t ha^{-1}) was recorded in application of 75% of RDN as placement (Spot application in 4 Split: Basal, Squaring, Flowering, Boll development) along with foliar application of 1% urea (3 times at Squaring, Flowering, Boll development and raising of sunhemp between rows and incorporated before flowering (3.49 t ha^{-1}), Band application of 100 % RDN in 2 splits at Basal & Flowering (3.51 t ha^{-1}) compared to control (No nitrogen; yield : 2.69 t ha^{-1}).However, the benefit cost ratio was similar among the treatments.

In the natural farming studies on cotton (NDLH 1938), results indicated that, ICM package (2.05 t ha^{-1}) resulted in an increase of 149% kapas yield over Palekar package (0.95 t ha^{-1}) and 124% over Department of Agriculture practice (0.91 t ha^{-1}). Similarly redgram LRG 187 grown as intercrop in the cotton (1:7) recorded 0.26 t ha^{-1} in

ICM package 0.29 t ha^{-1} in DOA practice and 0.31 t ha^{-1} in Palekar package. The Cotton equivalent yield recorded was 2.31 t ha^{-1}, 1.81 t ha^{-1} in DOA practice and 1.13 t ha^{-1} in Palekar package.

Regional Agricultural Research Station, Nandyal

Among the 21 entries (17+4) tested with srirama as check under HDPS, highest kapas yield (1.77 t ha^{-1}) was recorded by Srirama under normal spacing (60 x 30 cm) followed by Narasimha (HD) (1.66 t ha^{-1}) and normal spacing (60 x 30 cm) (1.70 t ha^{-1}).

In an experiment on evaluation of compact cultures under HDPS with different nutrient levels, higher seed cotton yield (1.76 t ha^{-1}) was recorded with spacing of 60 cm x 15 cm followed by 60 cm x10 cm (1.69 t ha^{-1}) than 75 cm x 10 cm (1.47 t ha^{-1}). Among different fertilizer levels higher seed cotton yield (1.70 t ha^{-1}) was recorded with 150% RDF followed by 125% RDF (1.60 t ha^{-1}) than 100% RDF (40-20-20 NPK kg ha^{-1}; yield : 1.54 t ha^{-1}).

Studies on enhancing nitrogen use efficiency in Bt cotton revealed that among the treatments significantly higher seed cotton yield (1.83 t ha^{-1}) was recorded with 75% of RDN + spot application in 4 splits + foliar application of 1% urea followed by 75% of RDN + spot application in 4 splits + foliar application of 1% urea + raising of fodder cowpea between rows incorporated before flowering (1.81 t ha^{-1}), 75% of RDN + spot application in 4 splits at basal, squaring, flowering, boll development (1.71 t ha^{-1}), 75% of RDN +spot application in 2 splits at basal & flowering (1.62 t ha^{-1}) compared to control (no nitrogen; yield: 1.30 t ha^{-1}).

Evaluation of organic cotton production technologyshowed that, among different methods , higher seed cotton yield (0.97 t ha^{-1}) was recorded with RDN through inorganic and was on par with all other treatments and superior to no organics and in organics (0.63 t ha^{-1}).

In an experiment on packages of labour saving practices in cotton, significantly higher seed cotton yield (1.70 t ha^{-1}) was recorded with land preparation and shaping by machine + poly mulch than land preparation by machine (1.17 t ha^{-1}).

Among agronomic requirements of promising pre release *G. hirsutum* genotypes of cotton revealed that higher seed cotton yield (1.53 t ha^{-1}) was recorded with 60 cm x 30 cm spacing than 90 cm x 45 cm spacing (1.25 t ha^{-1}). Higher seed cotton yield (1.39 t ha^{-1}) was recorded with 150% RDF and was on par with 125 % RDF (1.36 t ha^{-1}) and lower seed cotton yield (1.08 t ha^{-1}) was recorded with 100% RDF(40-20-20 NPK kg ha^{-1}).

In the studies on long-term fertilization on the productivity of rainfed cotton and soil quality in vertisols, highest seed cotton yield of 3.34 t ha^{-1} was recorded with 150% RDF + FYM @ 5 t ha^{-1} + Gypsum @ 0.50 t ha^{-1} + Zn SO_4 @ 50 kg ha^{-1}) and 2.95 t ha^{-1} in 150 % RDF + Gypsum @ 0.50 t ha^{-1} which was on par with all treatment except Control and FYM @ 0.50 t ha^{-1} (1.26 and 1.98 t ha^{-1} respectively).

Crop Protection

Insect Pest Management

Regional Agricultural Research Station, Lam

Population dynamics studies, among the various insect pests recorded on cotton, leafhopper was the major pest and above ETL during the major part of the crop growth period. Incidence of Pink bollworm was observed and no. of larvae per 20 green bolls ranged from 2 to 30. Peak incidence was observed during 3rd standard week (3rd week of January).

Estimation of yield loss due to pink bollworm indicated that, lowest yield loss was observed in application of thiodicarb at 60 DAS, chlorpyriphos at 90 DAS and lamda-cyhalothrin at 120 DAS. This was closely followed by Achook at 45 DAS, thiodicarb at 60 DAS, chlorpyriphos at 90 DAS and lamda- cyhalothrin at 120 DAS. Highest yield loss was observed in where there is no spray at 60, 90 and 120 DAS which ranged from 17.77 to 18.59.

Mass trapping of pink bollworm in farmer’s field showed that mean moth catch of Pink bollworm per week per trap was highest in phero sensor sleeve trap than delta trap. Larval incidence of pink bollworm was lowest in phero sensor sleeve trap but on par with delta trap at 135 and 150 DAS. Mass trapping of pink bollworm adult moths with pheromone traps has no yield advantage as all treatments were at par with each other.

Evaluation of insecticides against pink bollworm showed that Green boll locule damage (%) was lowest in cypermethrin 25 EC, bifenthrin 10% EC and profenophos 40 EC and superior to rest of the treatments. Highest yields were obtained in cypermethrin 25 EC, profenophos 40 EC and bifenthrin 10% EC.

In natural farming trial among all the sucking pests, incidence of leafhoppers was above ETL continuously from 45 DAS to 152 DAS in ZBNF package, where as it was below ETL in ANGRAU package throughout the season. The larval incidence, boll and locule damage in green bolls due to pink bollworm was high in ZBNF package.

Evaluation of botanicals against pink bollworm revealed that insecticide treated plots showed maximum per cent reduction of pink bollworm larval incidence (56.00 to 62.26), green boll damage (60.85 to 62.96) over control and higher yield (1.54 to 2.13 t ha^{-1}) than botanical pesticide treated plots (5.64 to 10.02; 12.60 to 16.13; 1.53 to 2.05 t ha^{-1}).

Eleven *hirsutum* varieties out of 123 entries tested under different national trials for resistance to insect pests under unprotected conditions were found resistant to jassids along with higher yield.

Under advanced screening, the entries *viz*., NDLH 2010, RAH 1070 and TSH 0499 were found tolerant to jassids with grade I and II.

Among the various insect pests recorded on cotton, leafhopper was the major pest and above ETL during the major part of the crop growth period. Severe incidence of pink bollworm was observed (4 to 75.2 larvae per 20 green bolls). Peak incidence was observed during 51st standard week (3rd week of December).

Bioefficacy of insecticides against cotton pest complex revealed that spinetoram 10% + sulfoxaflor 30% WG @ 120 g ai ha^{-1}recorded significantly lowest jassid population per three leaves (3.80) over control (10.13) and other treatments except spinetoram 10% + sulfoxaflor 30% WG @ 140 g a.i $ha^{-1}$and sulfoxaflor 24% SC @ 105 g a.i ha^{-1}.

Evaluation of pheromone traps for monitoring purpose of pink bollworm, clearly indicated that the sleeve traps are performing better than delta traps and funnel trap for trapping the adult moths. Among the two trap densities, the trap density of 8 traps/ acre is most effective for monitoring of pink bollworm.

Application of cypermethrin 25 EC, bifenthrin 10 EC, profenophos 50 EC, thiodicarb 75 WP and quinolphos 25 EC recorded lowest open locule damage by pink bollworm and superior to rest of the treatmentsand also recorded highest yield in cypermethrin 25 EC bifenthrin 10 EC, profenophos 40 EC and thiodicarb 75 WP.

Maximum per cent reduction of 35% over control was recorded in acephate 75% SP @ 1.5 g l^{-1} treated plot for jassids. Lowest incidence of whitefly was recorded in the water spray treated plot and it is on par with *neemastra* 20 ml l^{-1}, NSKE 5% and *agniastra* 20 ml l^{-1} in cow based organics evaluation against pest complex of cotton.

Regional Agricultural Research Station, Nandyal

In Population dynamics studies, Jassids crossed ETL during 41st std week (6.80 $leaves^{-3}$), thrips had crossed ETL during 40th std week (30.7/ $leaves^{-3}$), white flies attained ETL during 40th and 43rd std weeks in RCH-II BG-2 , where as in DCH-2 hybrid, peak population of jassids were noticed during 40th std week, jassids crossed ETL during 39th, 40th, 42nd, 43rd, 44th, 45th std weeks.

Determination of ETLs and estimation of yield losses for cotton pink bollworm revealed that application of Achook 5 ml l^{-1} at 45 DAS, Thiodicarb 1.5 g l^{-1} at 60 DAS, Chloropyriphos 2 ml l^{-1} at 90

DAS and Lamda Cyhalothrin 1 ml l^{-1} at 120 DAS has registred and lowest green boll (25.2%), open boll damage (31%) and high yield (1.88 t ha^{-1}).

In IPM module validation studies for cotton pink bollworm, IPM plot had recorded less green boll damage (3.3%), open boll damage (5.0%), locule damage (7.0%), pheromone trap catches (21 $week^{-1}$) and more yield (1.25 t ha^{-1}) than farmers practice (10.0%, 10.0%, 8.6%, 46 $week^{-1}$ and yield 1.13 t ha^{-1} respectively).

Management of sucking pests and Pink bollworm in cotton through botanicals indicated that, chemical insecticides such as profenophos @ 2 ml l^{-1} and Acephate @ 2 g l^{-1} effectively reduced jassid population. Application of Thiodicarb @ 1.5 g l^{-1} was proved to be effective against green boll damage at 90 and 120 DAS and open boll damage.However it was at par with botanical pesticide Aavya @ 4 ml l^{-1}.

In Evaluation of new chemicals/ scheduled sprays against pink bollworm, lowest green boll damage (33.56%), open boll damage (10.66%) and highest yield was recorded in treatment pheromone traps along with sprays of chlorantraniliprole @ 0.3 ml l^{-1} (2.61) followed by bifenthrin @ 1 ml l^{-1}.

Disease Management

Regional Agricultural Research Station, Lam

Alternaria leaf spot and rust were major diseases during *kharif*, 2018.

RH I, RH II and rainfall significantly influenced the progress and intensity of *Alternaria* leaf spot during kharif, 2018.

Minimum temperature and evaporation significantly influenced the progress of grey mildew while maximum temperature and wind speed showed partial influence on the development of grey mildew.

Minimum temperature and RH I significantly havev influenced rust intensity while evaporation expressed partial influence on the progress of rust during *kharif*, 2018.

Entry, CCB 26 was free from grey mildew; entries *viz.,* H 1523 and Suvin expressed resistant reaction to both grey mildew and rust and moderately resistant reaction to *Alternaria* leaf spot.

Selected entries, RAH 0603, LHDP 1, GISV 312 and SHC-32 were resistant to grey mildew; GISV 312 and Suvin (CC) were resistant to rust during 2nd year of testing.

Intensity of *Alternaria* leaf spot, grey mildew and rust intensity was relatively more in ZBNF than that in ANGRAU package.

4.2 Mesta

Crop Improvement

Agricultural Research Station, Amadalavalasa

A total of eight roselle entries were evaluated during *kharif* 2018 in Initial Evaluation Trial. Among them the entry JRHS 12 recorded significantly highest fibre yield of 6.49 t ha^{-1} followed by JRR 2017-1 (5.27 t ha^{-1}) compared to best check HS 4288 (4.79 t ha^{-1}).

Among the six roselle entries evaluated in Advanced Varietal Trial -I, the entry JRR 16 recorded significantly higher fibre yield of 3.25 t ha^{-1} followed by AHS 309 (2.82 t ha^{-1}) and AHS 310 (2.75 t ha^{-1}) compared to best check HS 4288 (2.70 t ha^{-1}).

In Advanced Varietal Trial –II, among the six roselle entries evaluated, the entry AHS 286 recorded significantly highest fibre yield of 3.06 t ha^{-1} followed by AHS 298 (2.20 t ha^{-1}) and JRHS 5 (2.18 t ha^{-1}) compared to the best check HS 4288 (2.09 t ha^{-1}).

Out of six kenaf entries studied in Advanced Varietal Trial –I, the entry JRK 2016-2 recorded highest fibre yield of 2.97 t ha^{-1} compared to best check AMC 108 (2,79 t ha^{-1}). The entry JRK 2016-5 was found to be highly susceptible to foot and stem rot at the station.

Among the seven entries evaluated Initial Evaluation Trial for Calyx, the entries HSLC1 recorded higher fresh calyx yield of 4.78 t ha^{-1} followed by AHC 1 (4.36 t ha^{-1}) than the best check AMV 5 (4.20 t ha^{-1}).

A total of 17 roselle entries were evaluated including two checks in Initial Yield Trial during *kharif* 2018. Among seventeen entries, the entry AHS 342 recorded significantly higher fibre yield of 1.81 t ha^{-1} followed by AHS 340 (1.79 t ha^{-1}) compared best national check AMV 5 (1.48 t ha^{-1}).

In Preliminary Yield Trial, eleven roselle genotypes were along with two checks were evaluated during *kharif* 2018. The entry AHS 328 recorded significantly superior fibre yield of 1.17 t ha^{-1}followed by AHS 329 (1.14 t ha^{-1}) compared to best national check (0.93 t ha^{-1}).

Crop Production

Agricultural Research Station, Amadalavalasa

Integrated weed management studies in Mesta indicated that application of pretilachlore 50 EC @ 900 ml ha^{-1} with one hand weeding recorded the highest fibre yield along with maximum weed control and it was on par with two hand weedings and significantly superior over all other practices.

Performance of new roselle genotypes under different fertilizer management schedules revealed that the test roselle entry AHS 255 recorded significantly higher fibre yield (1.54 t ha^{-1}) over other genotypes and check varieties. The data on fertilizer application revealed that maximum plant height and basal diameter of roselle were recorded with highest fertilizer dose (80:40:40 kg NPK/ha^{-1}). The interaction of variety and fertilizer on fibre yield of roselle was found non- significant.

Studies on the effect of sowing time and spacing of kenaf on seed yield as influenced by topping management practices revealed that sowing kenaf on 1st july recorded significantly more seed yield (0.72 t ha^{-1}) over other dates of sowing and a decline trend was observed with further delay in sowing of the crop. Higher yield attributing characters and seed yield (0.82 t ha^{-1}) were recorded with 45x10 cm spacing and topping at 45 DAS recorded high seed yield (0.57 t ha^{-1}).

A) SOIL SCIENCE

Studies on the effect of soil amelioration and integrated nutrient management on yield of Kenaf (*Hibiscus cannabinus* L.) under acidic soil condition' indicated that, all the treatments significantly influence the Plant height, Basal diameter, Green biomass and fibre yield. Application of 150 % NPK on STT-Y along with 25% lime application and FYM @ 5 t ha^{-1} recorded highest fibre yield (3.41t ha^{-1}) which is on par with application of 100% NPK on STT- Y+ 25% lime application + FYM @ 5 t ha^{-1} (3.32 t ha^{-1}) . Whereas recommended dose of fertilizer (40:20:20 NPK Kg ha^{-1}) application recorded fibre yield of 1.52 t ha^{-1}, lowest fibre yield of 0.65 t ha^{-1} was recorded in control.

Among the inter cropping systems, Mesta + Maize inter cropping (2:1) recorded highest mesta equivalent fibre yield of 9.68 t ha^{-1} with B:C ratio 4.73 followed by Mesta + Sunhemp intercrop (3:4) (3.10 t ha^{-1}) with B:C ratio 3.69 compared to Mesta sole crop (2.24 t ha^{-1}) with B:C ratio 2.64.

In acidic soils, conjoint use of soil ameliorates, fertilizers and organic manure significantly produced highest yield of Mesta. Application of NPK fertilizers @ 80: 60:60 kg ha^{-1} along with 25% lime application and FYM @ 5 t ha^{-1} recorded highest seed and fibre yield of 1.05 t ha^{-1} and 2.04 t ha^{-1} respectively. In acid soils application of NPK @ 80: 40:40 kg ha^{-1} along with 25% lime along and FYM @ 5 t ha^{-1} significantly improve the Mesta yields, besides fertilizer application.

Crop Protection

Insect Pest Management

Agricultural Research Station, Amadalavalasa

Among the six entries tested in AVT-I, AMV-5 recorded lowest incidence of aphids (0.69 No. plant^{-1}) and leaf damage by semilooper (7.92%). However, highest fibre yield of 2.93 t ha^{-1} was observed in JRR-16 variety.

Among the six entries tested in AVT-II, the entry AHS-286 recorded low incidence of aphids (0.70 No plant^{-1}) and mealybug (2.50%) with highest fibre yield of 2.76 t ha^{-1} .

Management of mesta sucking pests through eco-friendly insecticides revealed that, seed treatment with imidacloprid 600 FS (2 ml + 4 ml water) @ 5 ml kg^{-1} seed gave protection upto 50 DAS against sucking pests. Botanicals *viz.,* NSKE 5% and Azadirachtin (1500 ppm) @ 5 ml l^{-1} and bio-agent, *Lecanicillium lecani* @ 6 g l^{-1} significantly superior over control by recording lowest population of sucking pests and were on par with each other.

Influence of weather parameters on major pests in mesta revealed peak incidence of aphids and semiloopers was observed at 31st and 32nd standard weeks, respectively. Incidence of both whiteflies and mealybug was more observed at 34th standard. Evening relative humidity exerted significant negative influence on aphids. Mininmum temperature exerted significant positive influence on semilooper.

Influence of organic manures on incidence of insect pests revealed that incidence of semilooper (1.33% leaf damage) and mealybug (5.18% infestation) was low with Bio-char application @ 5 t ha^{-1} treatment. Recommended dose of fertilizers (60N:30P:30K) recorded highest fibre yield of 2.09 t ha^{-1} followed by poultry manure @ 3 t ha^{-1} (1.86 t ha^{-1}) and Bio-char @ 5 t ha^{-1} (1.80 t ha^{-1}).

Disease Management

Agricultural Research Station, Amadalavalasa

Six advanced varieties in AVT-I were tested for foot and stem rot disease incidence. Of all the tested varieties, AHS-309 was found moderately resistant (4.0%) with a fibre yield of 2.82 t ha^{-1} compared to check variety, AMV-5 (34.6%; 2.19 t ha^{-1}).

Among six advanced varieties in AVT-II tested for foot and stem rot disease incidence, the entry AHS-286 recorded less disease incidence of 7.1% (moderately susceptible) and high fibre yield (3.06 t ha^{-1}) compared to Check variety AMV-5 (67.2%; 0.94 t ha^{-1}).

Seasonal incidence of Mesta revealed that, foot and stem rot disease was observed from 35th standard week of August month with 12.2% incidence. However, peak incidence of disease was noticed during 47th standard week of November at 110 DAS (73.0%). During September month, gradual increase of disease was observed due to high rainfall and low minimum temperature. Correlation studies indicated that minimum temperature is negatively correlated (-0.209) and morning relative humidity is positively correlated (0.708) with foot and stem rot disease incidence.

4.3 Sugarcane

Crop Improvement

Regional Agricultural Research Station, Anakapalle

During 2018-19 a total quantity of 740.50 g of fluff was received from Sugarcane Breeding Institute, Coimbatore. A total number of 4533 seedlings were transplanted from 29 station crosses, 3PCS and 21 GCS. Out of 4533 seedlings obtained 3811 seedlings survived in the main field with an average survival percentage of 84.07.A total of 302 selections were made based on desirable morphological characters, HRbrix percent, cane length ,cane diameter and single cane weight.

Among six entries evaluated in Main Yield Trial (Early)-I Plant crop three standards *i.e.,* 87A298, 2003 A 255 and CoC 01061 during 2018-19, the clone 2014 A 210 recorded significantly higher cane yield (135.63 t ha^{-1}), CCS yield (18.00 t ha^{-1}) and jaggery yield (15.56 t ha^{-1}) followed by 2014 A 122 (130.98 t ha^{-1}, 17.76 t ha^{-1}, and 15.50 t ha^{-1}) respectively compared to best standard 2003 A 255 (124.46 t ha^{-1}, 17.42 t ha^{-1} and 14.92 t ha^{-1}) respectively.

A total of six entries were tested against two standards, 87A298 and CoC01061 Main Yield Trial (Early)-II Plant crop during 2018-19. Among them the clone 2013A102 recorded significantly highest NMC (148.33 thousands ha^{-1}), cane yield (135.63 t ha^{-1}) CCS yield (18.98 t ha^{-1}) and jaggery yield (15.44 t ha^{-1}) followed by the clone 2013A177 (139.33thousands ha^{-1}, 130.98 t ha^{-1}, 18.34 t ha^{-1} and 15.42 t ha^{-1}) respectively.

Out of six clones studied against two standards in Main Yield Trial (Early) Ratoon Crop, the clone 2013 A 188 recorded maximum cane yield (97.66 t ha^{-1}) and CCS yield (13.54 t ha^{-1}) and found to be superior over the best standard 87 A 298 (96.58 t ha^{-1} and 13.37 t ha^{-1}). The fibre estimates revealed that the clone 2013 A 102 (16.38) recorded highest fibre value, while the standard 87 A 298 (13.32) recorded lower fibre percent.

In Main Yield Trial (Mid-late)- I Plant Crop, a total of six entries tested against three standards for their performance during 2018-19. Among them the genotype 2014 A 224 recorded significantly higher NMC, cane yield, CCS yield and jaggery yield (138.33 thousands ha^{-1}, 132.67 t ha^{-1}, 18.01 t ha^{-1} and 15.88 t ha^{-1}) followed by 2014 A 68 (133.67thousands ha^{-1},128.33 t ha^{-1}, 17.78 t ha^{-1} and 15.45 t ha^{-1}) respectively when compared to the standard 83 V 15 (125.67 thousands ha^{-1}, 118.33 t ha^{-1},16.73 t ha^{-1} and 12.67 t ha^{-1}) respectively.

Among six entries tested against three standards i.e., 83 V 15, Co 86249 and 2000 A 225 in Main Yield Trial (Mid-late)-II Plant Crop during 2018-19, the genotype 2013 A 216 recorded maximum Number of Millable Canes (125.00 thousands ha^{-1}), cane yield (132.73 t ha^{-1}) and CCS Yield (18.62 t ha^{-1}) and Jaggery yield (15.33 t ha^{-1}) followed by the genotype 2013 A 217 (121.05 thousands ha^{-1},131.48 t ha^{-1}, 18.51 t ha^{-1} and 15.00 t ha^{-1}) respectively and found to be significantly superior over the best standard 83 V 15 (100.60 thousands ha^{-1}, 110.59 t ha^{-1}, 15.27 t ha^{-1} and 13.45 t ha^{-1}) respectively.

In the Main Yield Trial (Midlate) Ratoon Crop the clone 2013A 216 was found to be significantly superior for cane yield (97.27 t ha^{-1}), CCS Yield (12.30 t ha^{-1}) over the best standard Co86249 (77.08 t ha^{-1} and 9.50 t ha^{-1}). The Standard 83V15 recorded higher (18.73 %) percent juice sucrose when compared to test clones and other standard Co 86249 (17.75%).

A total of 195 clones comprising of Anakapalle, Coimbatore, Vuyyur, Rudrur, Perumallapalle, Cuddalore and Maharastra were grown and maintained under field conditions during 2018-19 season.

Six clones along with two standards were studied for tolerance/resistance to YLD under natural disease conditions and for yield during 2018-19. The clones 2015A311 (130.33 t ha^{-1} & 18.00 t ha^{-1}) and 2015A 308 (130.00 t ha^{-1} & 18.00 t ha^{-1}) have recorded higher cane yield and CCS yields when compared to best standard, 87A298 (128.00 t ha^{-1} & 18.00 t ha^{-1}). YLD incidence was not observed in the clone, 2015A 311 under natural disease pressure and ScYLV was not detected upon serological and molecular diagnosis.

Out of three clones tested against three standards under Advanced Varietal Trial (Early) I Plant Crop during 2018-19, the clone CoV 15356 recorded higher cane yield (86.89 t ha^{-1}), per cent juice sucrose (20.74%) and CCS yield (12.81 t ha^{-1}) over other entries and on par with the standards. The standard CoC 01061 recorded high cane yield and CCS yield (96.40 t ha^{-1} and 13.71 t ha^{-1}) at harvest.

Among the three clones tested against three standards under Advanced Varietal Trial second Plant Crop during 2018-19, the clone CoA 14321 recorded higher cane yield (83.01 t ha^{-1}) over other entries and was on par with standards CoOr 03151 and CoC 01061. The entry CoC 14336 recorded high per cent juice sucrose (20.95 %) while CoA 14321 recorded higher CCS yield (11.45 t ha^{-1}) at the time of harvest.

In Advanced Varietal Trial (Early) – Ratoon crop, three clones were tested against two standards during 2018-19. Among them the clone CoA 14321 recorded higher cane yield (108.13 t ha^{-1}), CCS yield (14.04 t ha^{-1}) and found to be superior over the best standard CoC 01061. The clone CoC 14336 (18.62) recorded higher per cent juice sucrose at harvest.

A total of six clones were tested against three standards under Advanced Varietal Trial (Midlate) second plant crop during 2018-19. Out of them the clone PI 14377 recorded significantly higher cane yield (119.88 t ha^{-1}) and CCS yield (15.48 t ha^{-1})

over other entries and on par with best standard CoV 92102 (114.81 t ha^{-1}, 15.44 t ha^{-1}).

Among the six clones tested against two standards under Advanced Varietal Trial (Midlate) ratoon crop during 2018-19, the clone PI 14377 recorded significantly higher cane yield and CCS yield (108.95 t ha^{-1} and 13.55 t ha^{-1}) followed by CoA 14323 (98.61 t ha^{-1} and 12.69 t ha^{-1}) over other entries and best standard Co 86249 for cane yield and CCS yield (90.43 t ha^{-1} and 10.76 t ha^{-1}).

Agricultural Research Station, Perumallapalle

An early sugarcane variety 2005 T 16 was released for general cultivation under the name Swarnamukhi in 2018. It matures in 10 months with cane yield of 110 t ha^{-1}, 18.83 % of sucrose, 10.7 t ha^{-1} of CCS yield and 10.1 t ha^{-1} jaggery yield.

Four entries *viz.,* 2013 T 106 (Co T 18366), 2013 T 39 (Co T 18367), 2013 T 124 (Co T 18368) and 2013 T 16 (CoT 18369) were accepted for evaluation in coordinated trials under AICRP (Sugarcane).

A total of 167 clones were maintained (50 clones were from Perumallapalle, 30 from Anakapalle, 32 from Vuyyuru, 26 from Rudrur and 29 from All India Coordinated trials). DUS description of fourteen new accessions were recorded.

Among 20 clones tested against 4 checks in Preliminary Yield Trial, the entries *viz.,* 2015 T 235(cane yield of 143.84 t ha^{-1}, CCS yield of 19.53 t ha^{-1}, sucrose of 19.3%) and 2015 T 19 (cane yield of 145.13 t ha^{-1}, CCS yield of 18.89 t ha^{-1}, sucrose of 18.7%) were significantly superior in cane yield and CCS yields against the check 2003 V 46 (cane yield of 110.54 t ha^{-1}, CCS yield of 15.35 t ha^{-1}, sucrose of 19.2%).

In Main Yield Trial (Early) – I Plant Crop, out of 5 Clones tested against 3 checks, the clone 2014 T 85 (cane yield of 139.05 t ha^{-1}, CCS yield of 15.8 t ha^{-1}, sucrose of 16.2%) and 2014 T 71 (cane yield of 134.89 t ha^{-1}, CCS yield of 16.78 t ha^{-1}, sucrose of 17.8%) recorded significant cane yield against the check 2003 V 46 (127.94 t ha^{-1}, CCS yield of 15.34 t ha^{-1}, sucrose of 17.2%).

Out of seven clones tested against 3 checks in Main yield trial (Early) – II Plant Crop, the clone 2013 T 8 has recorded highest significant cane yield (163.45 t/ha) and CCS yield (20.38 t ha^{-1}) with 17.8% sucrose against the check 2003 V 46 (cane yield of 109.76 t ha^{-1}, CCS yield of 14.33 t ha^{-1}, sucrose of 17.8%).

Five clones were tested against 3 checks in Main yield trial (Mid late) - I Plant Crop. The clones 2014 T 25 (cane yield of 87.95 t ha^{-1}, sucrose of 17.25 %) and 2014 T 30 (cane yield of 89.37 t ha^{-1}, sucrose of 16.3%) recorded significant cane yields against the check Co 86032 (cane yield of75.48 t ha^{-1}, CCS yield of 9.81 t ha^{-1}, sucrose of 18.5%). 2014 T 39 has recorded cane yield of 83.2 t ha^{-1} and significant CCS yield of 11.35 t ha^{-1} with 19.5% sucrose.

Out of 7 clones tested against 2 checks in Main Yield Trial (Mid late) – II Plant Crop, the clones 2013 T 59 (cane yield of 130.14 t ha^{-1}, CCS yield of 16.90 t ha^{-1}, sucrose of 18.5%), 2013 T 106 (cane yield of 130.81 t ha^{-1}, CCS yield of 16.77 t ha^{-1}, sucrose of 18.2%) and 2013 T 82 (cane yield of 119.07 t ha^{-1}, CCS yield of 15.65 t ha^{-1}, sucrose of 18.8%) have recorded significant cane and CCS yields over the check Co 86032 (cane yield of 100.75 t ha^{-1}, CCS yield of 13.02 t ha^{-1}, sucrose of 18.4%).

In Main Yield Trial (Mid late) – Ratoon Crop, out of 7 clones tested against two checks, the clones 2013 T 39 (cane yield of 121.47 t ha^{-1}, CCS yield of 16.37 t ha^{-1}, sucrose of 19.2%) 2013 T 59 (cane yield of 121.78 t ha^{-1}, CCS yield of 16.37 t ha^{-1}, sucrose of 19.2%), 2013 T 82 (cane yield of 129.58 t ha^{-1},CCS yield of 16.02 t ha^{-1}, sucrose of 17.6%) and 2013 T 106 (cane yield of 127.04 t ha^{-1}, CCS yield of 15.75 t ha^{-1}, sucrose of 17.8%) have recorded significant cane and CCS yields against the check Co 86032 (cane yield of 97.11 t ha^{-1}, CCS yield of 12.71 t ha^{-1}, sucrose of 18.7%).

Seventeen clones were tested for their performance against three standards *viz*. Co 86032, CoSnk 05103 and CoC 671 in Advanced Varietal

Trial – I Plant Crop. Of the twenty test clones, three clones *viz* PI 13132 (134.4 t ha^{-1}cane yield and 16.8 t ha^{-1} CCS yield), Co 13013 (124.7 t ha^{-1} cane yield and 15.9 t ha^{-1} CCS yield) and CoN 13072 (122.3 t ha^{-1}cane yield and 15.5 t ha^{-1} CCS yield) out yielded the best check, Co 86032 (95.2 t ha^{-1} cane yield and 12.4 t ha^{-1} CCS yield) by more than 24% improvement in CCS yield.

A total of eight clones were tested against three standards under Advanced Varietal Trial -II plant crop during 2018-19. Among the test clones, the clone Co 12009 recorded significantly superior cane yield (132.6 t ha^{-1}) and CCS yield (18.2 t ha^{-1}) compared to the best check, Co 86032 (98.1 t ha^{-1}cane yield and CCS yield (12.9 t ha^{-1}).

A set of eight clones were tested against three standards under Advanced Varietal Trial - II plant crop. Among them only one clone, Co 12009 exhibited superior performance with respect to cane yield (114 t ha^{-1}) and CCS yield (15.3 t ha^{-1}) over the best check, Co C 671 (80.9 t ha^{-1} cane yield and 11.6 t ha^{-1} CCS yield).

Agricultural Research Station, Vuyyuru

In seedling nursery (2018-19), 2204 seedlings were obtained from 290.5 grams of fluff of which 1022 seedlings survived with 46.37 per cent survival.

Out of 22 clones studied along with two standards Co 6907 and Co 7219 in Preliminary Yield Trial – Plant crop (2018-19), the clone 2016 V 205 recorded significantly higher cane yield of 118.44 t ha^{-1} followed by 2016 V 131 (113.20 t ha^{-1}) compared to the standard Co 6907 (97.19 t ha^{-1} cane yield) in early group. The clone 2016 V 187 recorded significantly higher cane yield of 117.42 t ha^{-1} followed by 2016 V 130 (105.16 t ha^{-1}) and 2016 V 136 (100.78 t ha^{-1}) whereas the standard Co 7219 recorded 76.25 t ha^{-1} cane yield in mid-late group. The clone 2016 V 144 recorded significantly higher per cent juice sucrose of 22.28 at 10th month and 21.81 at 12th month.

In PYT-Ratoon (2018-19), out of twenty four clones studied against two standards, the clones 2015 V 105 (20.63), V 112 (20.53) and V148 (20.25) recorded significantly higher per cent juice sucrose.

In Main Yield Trial (Early) – First Plant Crop (2018-19), the clone 2014 V 2 recorded higher cane yield of 97.57 t ha^{-1}and CCS yield of 13.45 t ha^{-1} and significantly higher per cent juice sucrose of 19.10 than the standard 2003 V 46 (95.31 t ha^{-1} cane yield, 12.01 t ha^{-1} CCS yield and 17.44 per cent juice sucrose).

In Main Yield Trial (Early) – Second Plant Crop (2018-19), the clone 2013 V 122 recorded higher cane yield of 115.63 t ha^{-1}and significantly higher CCS yield of 16.57 t ha^{-1} than the standard Co C 01-061 (104.17 t ha^{-1} cane yield, 13.27 t ha^{-1} CCS yield and 17.67 per cent juice sucrose). The clones 2013 V 131 (19.91), 2013 V 122 (19.68) and 2013 V 126 (18.76) recorded significantly higher per cent juice sucrose.

In Main Yield Trial (Early) – Ratoon Crop (2018-19), the clone 2013 V 70 recorded significantly higher cane yield of 120.38 t ha^{-1} and CCS yield (16.13 t ha^{-1}) than the standard 2003 V 46 (92.71 t ha^{-1} cane yield, 12.49 t ha^{-1} CCS yield and 18.53 per cent juice sucrose). The clones 2013 V 102 (20.26) and 2013 V 126 (20.07) recorded significantly higher per cent juice sucrose.

In Main Yield Trial (Mid-late) - First Plant Crop (2018-19), the clone 2014 V 97 recorded significantly higher cane yield of 101.04 t ha^{-1} and the clone 2014 V 9 recorded higher CCS yield of 14.47 t ha^{-1}and significantly higher per cent juice sucrose of 20.24. The standard 83 V 15 recorded 87.50 t ha^{-1} cane yield, 12.64 t ha^{-1} CCS yield and 19.52 per cent juice sucrose.

In Main Yield Trial (Mid-late) - Second Plant Crop (2018-19), the clone 2013 V 46 recorded higher cane yield of 116.93 t ha^{-1} and CCS yield of 16.93 t ha^{-1} and significantly higher per cent juice sucrose of 19.87 than the standard 83 V 15 (106.25 t ha^{-1} cane yield, 14.89 t ha^{-1} CCS yield and 19.06 per cent juice sucrose).

In Main Yield Trial (Mid-late) - Ratoon (2018-19), the clone 2013 V 46 recorded significantly higher cane yield (94.79 t ha^{-1}) and CCS yield (13.31 t ha^{-1}) followed by 2013 V 53 (93.40 t ha^{-1} cane yield and 13.93 t ha^{-1} CCS yield). Compared to the standard 83 V 15 (72.22 t ha^{-1} cane yield and 10.58 t ha^{-1} CCS yield).

In Advanced Varietal Trial (Early) - II plant (2018-19), the clone Co A 14-321 recorded high cane yield of 98.23 t/ha while the clone Co C 14-336 recorded significantly higher per cent juice sucrose of 18.63 and per cent CCS of 13.61 compared to the standard Co C 01-061 (16.74 percent juice sucrose and 11.96 per cent CCS).

In Advanced Varietal Trial (Early) - Ratoon (2018-19), the standard Co C 01-061 recorded higher cane yield of 97.15 t ha^{-1} and CCS yield of 13.50 t ha^{-1} . The clones Co C 14-336 (20.15%) and Co A 14-321 (19.93%) recorded significantly higher per cent juice sucrose values while the standard Co C 01-061 recorded percent juice sucrose of 19.16 at 270 days after ratooning.

In Advanced Varietal Trial (Mid-late) - II Plant (2018-19), the clone Co 13029 recorded significantly higher cane yield of 131.94 t ha^{-1} and the clone PI 14-377 recorded significantly higher CCS yield of 16.09 t ha^{-1}. The clone Co A 14-323 recorded significantly higher per cent juice sucrose of 20.23.

In AVT (Mid-late) - Ratoon (2018-19), the clone Co A 14-323 recorded significantly higher cane yield of 81.07 t ha^{-1}, CCS yield of 13.32 t ha^{-1}, diameter (2.85 cm) and single cane weight (1.41 kg). The clones Co A 14-323 (22.16) and PI 14-377 (20.37) recorded significantly higher per cent juice sucrose.

Studies on performance of clones under waterlogged conditions (2018-19) in different maturity groups revealed that, the clone 2012 V 28 recorded significantly higher cane yield of 117.53 t ha^{-1} followed by 2012 V 131 (114.50 t ha^{-1}) and 2012 V 123 (106.25 t ha^{-1}) compared to the standard 2003 V 46 (89.76 t ha^{-1} cane yield) in early group. The clone 2013 V 30 recorded significantly higher cane yield of 106.60 t ha^{-1} whereas the standard 83 V 15 recorded 77.52 t ha^{-1} cane yield in mid-late group.

Crop Production

Regional Agricultural Research Station, Anakapalle

Studies on suitability of different agronomic management practices for late planted (May) sugarcane with seedling under irrigated conditions revealed that, population density of 27,700 seedlings ha^{-1} i.e. 60 x 60 cm (70.2 t ha^{-1}) or 37,000 seedlings ha^{-1} i.e. 90 x 30cm (67.5 t ha^{-1}) recorded significantly higher cane yield when compared to lower population density of 18,500 seedlings ha^{-1} i.e. 90 X 60 cm (59.4 t ha^{-1}) or 24,700 seedlings ha^{-1} (63.2 t ha^{-1}). Under late planted conditions, seedlings responded to 100% recommended level of nitrogen + Bio fertilizers (*Azospirillum* + PSB) + trash mulching @ 3.0 t ha^{-1} and recorded higher cane yield of 67.9 t ha^{-1} than 100% recommended dose of nitrogen alone (60.1 t ha^{-1}).

The studies for three years (2016-17 to 2018-19) on performance of sugarcane seedlings under late planted conditions recorded that higher cane yields at population density of 27,700 seedlings ha^{-1} i.e. 60 x 60 cm (65.5 t ha^{-1}) or 37,000 seedlings ha^{-1} i.e. 90 x 30 cm (63.2 t ha^{-1}) when compared to lower population density of 18,500 seedlings ha^{-1} i.e. 90 X 60 cm (57.9 t ha^{-1}) or 24,700 seedlings ha^{-1} (60.5 t ha^{-1}). Under late planted conditions, seedlings responded to 100% recommended level of nitrogen + Bio fertilizers (*Azospirillum* + PSB) + trash mulching @ 3.0 t ha^{-1} and recorded higher cane yield of 64.7 t ha^{-1} than 100% recommended dose of nitrogen alone (57.1 t ha^{-1}) but on par with 100% RDN + Pressmud @ 12 t ha^{-1} (62.5 t ha^{-1}) or 150% recommended dose of nitrogen (62.0 t ha^{-1}).

Performance of early maturing sugarcane genotypes at different ages of harvest was studied during 2018-19 at RARS, Anakapalle. The results of the study indicated that, varieties 2003 A 255 (78.5 t ha^{-1}) and 2009 A 107 (77.2 t ha^{-1}) registered higher cane yield when compared to 2006 A 102 (75.0 t ha^{-1}). All the early maturing sugarcane genotypes registered higher cane yield when harvested at10 months (80.8 t ha^{-1}) or 11 months age (81.5 t ha^{-1}) when compared to delayed harvesting at 12 months age (77.1 t ha^{-1}) or 13 months age (70.9 t ha^{-1}). Significantly higher juice sucrose values were registered when at 11 months (19.9 %) or 12 months harvest (19.56%) compared to 10 months (18.9%) or 13 months age (18.55%).

Among different tillage systems evaluated, sugarcane planted in conventional tillage system registered higher cane yield of 76.2 t ha^{-1}compared to zero tillage (71.2 t ha^{-1}) or minimum tillage (67.1 t ha^{-1}). Among different types of seed material, three bud setts registered significantly higher cane yield of 74.0 t ha^{-1} when compared to single node seedlings (69.0 t ha^{-1}).

The results of management of late ratoons in sugarcane indicated that, working with trash shredder + spraying of Gibberellic acid @ 100 ppm at one week after rationing registered significantly higher ratoon cane yield (74.7 t ha^{-1}) closely followed by working with trash shredder (71.4 t ha^{-1}) and stubble shaving + spraying Gibberellic acid @ 100 ppm at one week after rationing (69.0 t ha^{-1}) when compared to other practices and Control (58.2 t ha^{-1}).

The results of different alternate cropping systems to rainfed sugarcane indicated that, among the crops grown as first crop in the sequence under complete rainfed conditions, ragi registered higher grain yield of 2.28 t ha^{-1} followed by maize (1.51 t ha^{-1}) and Groundnut (1.39 t ha^{-1}). Sequence crop of horsegram grown after groundnut registered higher yield of (0.63 t ha^{-1}). Sugarcane registered 48.9 t ha^{-1}of cane yield whereas redgram gave 1.24 t ha^{-1}of grain yield. Ragi – Horsegram registered highest B:C ratio of 2.32. which was closely followed by redgram (2.27).

Spilt application of recommended nitrogen and potassium for ratoon crop of sugarcane under seedling transplantation, pocketing of N&K fertilizers in 4 splits at ratooning, 30, 60 and 90 DAR (85.1 t ha^{-1}) or 5 splits at ratooning, 30, 60, 90 and 120 DAR (87.7 t ha^{-1}) was proved advantageous with additional cane yield of 6.04 t ha^{-1} over recommended practice of N&K in two splits at ratooning and 45 DAR (81.5 t ha^{-1}).

ICM recorded maximum cane yield of 70.33 t ha^{-1} and organic farming and natural farming recorded a cane yield of 63.9 t ha^{-1} while Palekar's ZBNF recorded the lowest cane yield of 26.4 t ha^{-1}. Jaggery recovery was relatively higher with organic farming and natural farming (5.89 %) compared to ICM (5.61%). While jaggery yield was relatively higher with ICM (3.94 t ha^{-1}) compared to organic farming and natural farming (3.76 t ha^{-1}).

Among the elite early sugarcane genotypes viz., Co Or 03151, Co13023, CoA 14321, Co C 14336 with two checks *viz.,* COA 92081 and COC 01061 evaluated, the entry Co13023 recorded significantly higher cane yield of 87.4 t ha^{-1} as compared to the other genotype and found on par with the check variety COC 01061 (88.9 t ha^{-1}).

During 2018-19, the results indicated that scheduling irrigation at 1.0 IW/CPE gave higher cane yield of 82.8 t ha^{-1} when compared to IW/CPE of 0.6 and 0.8 (75.0 t ha^{-1} and 79.9 t ha^{-1} respectively). Among different mulching treatments, furrow irrigation with sunhemp mulch recorded higher cane yield of 84.0 t ha^{-1}

Studies on evaluation of varieties for drought tolerance revealed that IW/CPE ratio of 1.0 gave significantly higher cane yield of 87,6 t ha^{-1} and among the varieties tested 87A298 (88.2 t ha^{-1}) and 2000A225 (90.1 t ha^{-1}) performed well but on par with the remaining varieties except 2003A255 (77.1 t ha^{-1}).

Agricultural Research Station, Perumallapalle

Four prerelease early varieties in sugarcane were tested for nitrogen with three planting methods. Among these early varieties 2012 T 81 recorded higher cane yield when planted in normal row method of planting with 150% (113.9 t ha^{-1}) RDN followed by 2012 T 180 recorded higher cane yield (105 t ha^{-1}) when planted in normal row method of planting with 125% RDN.

Among the four midlate varieties tested, the variety 2012 T 58 (117.3 t ha^{-1}) recorded higher cane yields at 150% RDN where as 2012 T 72 recorded higher cane yield at 175% RDN (105. 5 t ha^{-1}).

Application of sugarcane trash by trash shedder and trash mulching increased cane yield by 7.32% and 3.25% respectively than without trash application.

Under influence of organic farming in sugarcane (crop rotation with paddy), application of 100% RDF recorded higher grain yield (6.67 t ha^{-1}) than organic manure application (5.36 t ha^{-1}). Available N and P_2O_5 showed 7.8% and 52.6% buildup with 100% RDF and 1.3% and 36.4% build up with organic manures, respectively. Soil organic carbon increased from 0.34% to 0.49% with the use of organic manures and from 0.34% to 0.47% with the use of 100% RDF.

Among ten entries studied for delayed and post harvest deterioration, the entries 2012 T 81, 2012 T 180. 2012 T 72 and 2012 T 78 were found to be suitable for delayed harvesting. The entries 2012 T 81 and 2012 T 182 showed tolerance to post harvest deterioration.

Agricultural Research Station, Vuyyuru

Among the four clones *i.e.,* 2003 V 46 (check), 2010 V 32, 2010 V 57 and 2010 V 58 tested in ratoon trial, the check 2003 V 46 recorded significantly higher cane yield (93.48 t ha^{-1}) compared to the other genotypes. Among the new clones 2010V 57 recorded higher cane yield (83.57 t ha^{-1}) compared to other new clones 2010 V 32 and 2010 V 58. These two clone were poor ratooners and severely affected by wilt and whitefly.

In ratoon crop, four clones 2003 V 46 (Check) 2009 V 127, 2008 V 337 and 2008 V 347 were harvested at 9th, 10th and 11th month. Among the four clones, 2003 V 46 (c) recorded significantly higher yield (91.48 t ha^{-1}) as compared to other new clones. Among the new clones, 2009V 127 recorded higher cane yield (88.06 t ha^{-1}) as compared to the other clones.

Among the four clones *viz.,* 2003 V 46 (Check), 2010 V 32, 2010 V 57, 2010 V 58 tested in Plant Crop, the clone 2003 V 46 (Check) recorded significantly higher cane yield (119.3 t ha^{-1}) as compared to other three new clones. Among the new clones 2010 V 32 (114.7 t ha^{-1}) and 2010 V 57 (113.0 t ha^{-1}) were at par and recorded significantly higher cane yield over 2010 V 58 (102.4 t ha^{-1}).

Among different split applications of nitrogen i.e., at planting at 15, 30,45,60,90 and at 150 days after planting to the plant crop raised from single node seedlings, nitrogen application at planting recorded significantly higher cane yield as compared to two splits at 45 & 90 days and three splits at 30 ,60 & 90 days where as all other treatments which received nitrogen at planting were at par.

Crop Protection

Insect Pest Management

Regional Agricultural Research Station, Tirupati

Integrated management of shoot borers in sugarcane with special reference to internode borer, the damage of internode borer and top shoot borer was considerably low in acephate @ 1.5 g l^{-1}, chlorantraniliprole @ 0.3 ml l^{-1} i at 150 DAS after planting. In mass trapping by pheromone traps, the incidence of borers was comparatively high.

The moth catches of sugarcane borer pests in pheromone traps during 2018-19, indicated that, early shoot borer catches were high during April to August. In case of internode borer, the catches were obtained throughout the crop and declined from October onwards. The moth catches of top borer was high during May to August. Highest number of catches of ESB, INB and TSB obtained $week^{-1}$ are 12, 8 and 11 in May, June and August months respectively.

Regional Agricultural Research Station, Anakapalle

Large scale demonstration using temperature tolerant strain *T. chilonis* was conducted in 30 acre area of 9 locations in 9 villages of Navbharath ventures (Sugar division) operational area, Samalkota, East godavari dist., Andhra Pradesh and 1 acre in RARS, Anakapalle and carried eight (5 releases in may and 3 releases in june) field releases of temperature tolerant strain of *T.*

chilonis @ 50,000 ha^{-1} at weekly interval from 30 days after planting against early shoot borer and 4 releases from node formation during July, August against internode borer. Average incidence of early shoot borer (4.68 % DH) and internode borer (22.85%) was low in temperature tolerant strain *T. chilonis* released for 8 + 4 times compared to farmer's practice (Chlorpyriphos sprays two times (15.45% DH and 31.82 %). Yield and incremental benefit cost ratio were also high in temperature tolerant strain of *T. chilonis* released plot (63.6 t ha^{-1} and IBCR : 49.93) compared to farmers practice (58.03 t ha^{-1} and IBCR : 7.31).

Demonstrations on efficacy of entomopathogenic nematodes and entomofungus for the management of white grub in sugarcane ecosystem in Navabharath ventures (Sugar division) operational area, Samarlkota inferred that *H. indica* was found significantly effective in reducing white grub damage compared to *M. anisopliae.* Percent reduction in plant damage due to white grub recorded high in *H. indica* (81.17%), *M. anisopliae* (78.83%) and chlorantraniliprole 18.5SC (54.17%) over untreated control.

Monitoring insect pests of sugarcane using light traps revealed high moth catch was observed during 1st std. week (22 moths $trap^{-1}$) coincides with maximum temperature of 30.3^{0}C, minimum temperature of 16.0^{0}C, relative humidity as 85% & 37% (max & min) followed by 17th std. week (17.0 moths $trap^{-1}$) coincides with maximum temperature 37.3^{0}C, minimum temperature 26.0^{0}C, relative humidity as 84% & 60% (max & min).Maximum temperature (r = 0.171), minimum temparature (r=0.123), rainfall (r=0.159) and number of rainy days (r=0.047) showed significant positive correlation and morning relative humidity (r=0.236), evening relative humidity (r=0.181) showed significant negative correlation with early shoot borer moth catches in light trap. Regression values indicated low R^2 (0.321) in predicting early shoot borer moth catch.

In Advanced Varietal Trials, six entries, Co C 15 336 (9.44%DH), Co C 15338 (11.90% DH), Co C 14 336 (9.44% DH), Co A 14321 (9.74% DH), Co C 14337 (7.55% DH) and PI 14377 (9.37% DH) recorded less incidence of dead hearts and found promising against early shoot borer compared to susceptible check, 93 A 145 (25.33% DH).

In IPM module less incidence of early shoot borer, internode borer and more shoot population at 120 DAP (4.62% DH; 48.43% & 5.71%; 69,330 ha^{-1}) were recorded compared to zonal recommendation (15.48% DH; 64.98% & 8.71; 64,875 ha^{-1}) and to untreated control (31.81% DH, 80%, 12% and 52,515/ha). Superior cane yield was recorded in IPM module (70.20 t ha^{-1}) compared to zonal recommendation (68.80 t ha^{-1}) and untreated control (57.80 t ha^{-1}).

Soil application of chlorantraniliprole 0.4G @ 22.5 kg ha^{-1} (6.0% DH; 20.67%; 71.28 ha^{-1}) at basal and 60 days after planting or chlorantraniliprole 18.5 SC @ 375 ml ha^{-1} (14% DH; 26%, 69.50 t ha^{-1}) at 30 days after planting and 60 days after planting found effective against early shoot borer and internode borer and recorded superior cane yields with a benefit cost ratio of 1.67 & 1.68 respectively, over check insecticide, chlorpyriphos @ 2.5ml l^{-1} (33% DH, 58.67%; 66.0 t ha^{-1}; 1.60).

Agricultural Research Station, Vuyyuru

Among various granular insecticides evaluated for efficacy, ferterra 0.4G @ 20 kg ha^{-1} as basal, 120 DAP and 180 DAP has recorded less incidence of shoot borer and scale insect and found significantly superior over other treatments in suppressing early shoot borer, internode borer and scale incidence in sugarcane with 83.87, 58.59 and 78.38 per cent reduction over control respectively.

Sett treatment with imidacloprid 600FS @ 1 ml l^{-1} + soil application of chlorantraniliprole 0.4 G @ 20 kg ha^{-1} at 60 DAP and sett treatment with imidacloprid 600FS@ 1 ml l^{-1} + soil application of fipronil 0.3 G @ 25 kg ha^{-1} at 60 DAP was found effective against early shoot borer in sugarcane raised with single node seedlings with 83.03 and 73.15 per cent reduction over control respectively

Disease Management

Regional Agricultural Research Station, Anakapalle

Among 59 entries including check evaluated against smut under artificially inoculated conditions during 2018-19, eleven entries *viz.,* Co 13023, Co 01061, Co 06030, Co 86249, 2014A 122, 2014A 142, 2014A 164, 2014A 210, 2014A 224, 2014A 251 and 2014A 322 exhibited resistant reaction, while thirteen entries showed moderately resistant reaction (CoC 16337, CoV 16356, CoC 16339, CoA 14321, Co 13029, Co 13031, CoC 14337, CoV 92102, Co 7219, 2014A 23, 2014A 54, 2014A 68 and 2015A 222) and the remaining entries are either moderately susceptible or susceptible or highly susceptible.

Out of 59 entries screened for red rot resistance in plug method of inoculation, the entries *viz.,* CoA 16321, CoV 16357, CoC 15336, CoA 14321, Co 13028, CoA 92081, Co 86249, 2015A 51, 2015A 59, 2015A 228, 2015A 230 and 2015A 233 exhibited resistant reaction to the established pathotypes (Cf 419, Cf 671 and Cf 997) of red rot fungus.

Among 59 zonal entries evaluated against *Fusarium sacchari* under artificially inoculated conditions, seventeen entries (CoV 15356, Co 13031, CoOr 3151, Co 01061, Co 06030, Co 86249, 2014A 68, 2014A 122, 2014A 154, 2004A 164, 2015A 51, 2015A 93, 2015A 137, 2015A 152, 2015A 228, 2015A 230 and 2015A 223) exhibited resistant reaction.

Out of fifty nine zonal varieties including check screened against YLD under natural conditions, YLD incidence was less (Mean YLD severity Index of 0.0 - 1.0) in the varieties, *viz.,* CoA 16321, CoC 16338, Co 13028, Co 13029, Co 13031 CoV 92102, Co 419, CoC 671, CoA 89085, Co 6907, Co 7219, Co 7706, 2014A 23, 2014A 54, 2014 68, 2014A 95, 2014A 251, 2014A 322, 2015A 37, 2015A 51, 2015A 59, 2015A 67, 2015A 85, 2015A 93, 2015A 137, 2015A 152, 2015A 183, 2015A 199, 2015A 222, 2015A 230 and 2015A 233.

In studies on epidemiology and management of top rot in sugarcane revealed that, sett treatment followed by foliar spray with carbendazim @ 0.05% was found effective for the management of top rot disease of sugarcane. The disease was initiated during second fortnight of May and prevailed upto last week of September. The disease incidence was found to be highly influenced by number of rainy days and minimum temperature.

Sett treatment with Azoxystrobin + Tebuconazole was found effective for the management of whip smut of sugarcane in plant crop. In ratoon crop, spraying of tebuconazole (0.1%) immediately after ratooning followed by another spray at 30 days after ratooning was found highly effective.

Agricultural Research Station, Perumallapalle

The efficacy of potential biocontrol agents were tested in field under microplots. Red rot susceptible variety Co-671 was used for the study. Among 10 potential biocontrol agents tested for their efficacy, sett treatment with carbendazim @ 1 g l^{-1} + sett treatment with bioagents and soil application of the bioagents at 30days interval recorded lowest disease of 44.34% compared to 86.66 % incidence in treated control.

Among the 52 sugarcane entries tested for red rot reaction against four pathotypes (Cf 261, Cf 419, Cf 671 and Cf 997) 2015T 194 and 2015 T 235, showed resistant reaction to four pathotypes in plug method and in cotton swab method.

Among the 52 sugarcane entries tested for smut resistance, 39 entries showed resistant reaction and 9 entries showed moderately resistant reaction while 4 entries showed moderately susceptible reaction.

Agricultural Research Station, Vuyyuru

The varieties 2012 V 25, 2012 V 67, 2012 V 28, 2012 V 123, 2013 V 126, 2013 V 131, 2013 V 46, 2013 V 81, 2014 V 92, 2014 V 45, 2014 V 91 were found to have horizontal resistance to all the pathotypes of red rot pathogen in addition to good quality and yield.

The varieties 2014 V 45, 2014 V 92, 2014 V 91, 2013 V 126, 2013 V 92, 2012 V 28, 2012 V 31 were resistant to smut disease in addition to agronimically promising in yield and quality.

Among seven strains of *Trichoderma* isolated from rhizosphere and internal stalk tissues of sugarcane. The strain Tricho- 2 and one bacterial strain EPB-5 among endophytic bacteria showed very good antagonism and inhibited the mycelia growth *of C. falcatum* upto 84.43% and 87.15% respectively.

4.4 Tobacco

Crop Improvement

Regional Agricultural Research Station, Nandyal

In initial varietal trial of bidi tobacco, the entries NBD316 (1808 kg/ha), ABD189 (1.80 t ha^{-1}) & NyBD61 (1.79 t ha^{-1}) recorded significantly higher cured leaf yield as compared to the checks Nandyal Pogaku 1(1.50 t ha^{-1}) & A 119 (1.34 t ha^{-1}).

In Advanced Hybrid Trial of bidi tobacco, the entries BTH 315 (1.71 t ha^{-1}), NyBTH 124 (1.65 t ha^{-1}) & BTH 336 (1.65 t ha^{-1}) recorded significantly higher cured leaf yield as compared to the checks MRGTH1 (1.39 t ha^{-1}), A 119 (1.42 t ha^{-1}) & Nandyal Pogaku 1 (1.42 t ha^{-1}).

In Advanced Varietal Trial I of bidi tobacco, the entries ABD174 (1.89 t ha^{-1}) and NyBD60 (1.89 t ha^{-1}) have recorded significantly higher cured leaf yield as compared to the checks Nandyal Pogaku 1 (1.66 t ha^{-1}) & A 119 (1.58 t ha^{-1}).

In advanced varietal trial II (2018-19) of bidi tobacco, the entry ABD163 (1.74 t ha^{-1}) has recorded significantly higher cured leaf yield as compared to the checks Nandyal Pogaku 1 (1.54 t ha^{-1}) & A 119 (1.38 t ha^{-1}) respectively.

In an on-farm trial of bidi tobacco, the entries ABD132 (2.17 t ha^{-1}) and NyBD 56 (2.06 t ha^{-1}) recorded higher cured leaf yield when compared to the checks Nandyal Pogaku 1 (1.79 t ha^{-1}) & A119 (1.58 t ha^{-1}). Chemical and smoke quality parameters are within the permissible limits.

In station hybrid trial- I of bidi tobacco, the entries NyBTH-171 (1.74 t ha^{-1}), NyBTH-170 (1.71 t ha^{-1}) and NyBTH-173 (1.70 t ha^{-1}) recorded significantly higher cured leaf yield as compared to the checks MRGTH-1(1.46 t ha^{-1}), Nandyal Pogaku 1 (0.53 t ha^{-1}) and A 119 (1.46 t ha^{-1}).

In Station hybrid trial-II of bidi tobacco, the entries NyBTH-163 (1.73 t ha^{-1}), NyBTH-168 (1.69 t ha^{-1}) & NyBTH-166 (1.61 t ha^{-1}) recorded significantly higher cured leaf yield as compared to the checks MRGTH-1(1.43 t ha^{-1}), Nandyal Pogaku1 (1.42 t ha^{-1}) & A 119 (1.38 t ha^{-1})

Crop Production

Regional Agricultural Research Station, Nandyal

Among different fertilizer doses tested under economization and management of P & K fertilizers for bidi tobacco, significantly higher cured leaf yield (1.92 t ha^{-1}) was recorded with 100% RDF (110 kg N; 70 kg P_2O_5; 50 kg K_2O) which was on par with other doses except 100% RDN (1.31 t ha^{-1}) and control (0.99 t ha^{-1}). Higher net returns (Rs. 87,125 ha^{-1}) were recorded with application of 100% RDF.

Studies on effect of topping, crop period and number of leaves on growth, yield and quality of bidi tobacco revealed that topping at 15 leaf early flowering stage recoded 1.94 t ha^{-1} cured leaf yield with a net returns of Rs. 88,850 ha^{-1} and BCR of 2.57. Significantly lower cured leaf yield was recorded with topping at 8 leaf button stage (1.15 t ha^{-1}).

Higher seed yield (0.39 t ha^{-1}) and cured leaf yield (1.76 t ha^{-1}) was realized with 60 x 60 cm spacing and higher seed yield (0.39 t ha^{-1}) and cured leaf yield (1.81 t ha^{-1}) was obtained with application of 150% RDF (165 N + 105 P_20_5 + 75 K_2O). Higher seed yield (0.40 t ha^{-1}) was recorded with A119 and cured leaf yield (1.84 t ha^{-1}) in ABD 132.

Studies on chemical sucker control in 'natu tobacco' revealed that significantly higher cured leaf yield (2.00 t ha^{-1}) was recorded with application of fatty alcohol @ 5% with lower ground suckers (1.8 plant^{-1}) and auxillary suckers (2.3 plant^{-1}). There was no significant effect of topping stage on cured leaf yield and ground and auxillary suckers.

B. DISCIPLINE ORIENTED RESEARCH

1. Agronomic Research

Cropping Systems and Farming Systems

Agricultural Research Station, Ananthapuramu

Studies on performance of contingent crops under delayed onset of monsoon indicated that green gram has recorded seed yield of 0.23 t ha^{-1} and net returns of Rs. 6195 ha^{-1}.

Demonstration on strengthening traditional IFS for marginal, small and medium farm holdings under crop + small ruminants based farming system in rainfed situation, improved practice (Horsegram + rearing of 2 ramlambs with grazing + concentrate feeding @ 125 g day^{-1} for 4 months) has recorded higher net returns of Rs. 6,248 ha^{-1} compared to farmers practice (Rs. 5,725 ha^{-1}).

On-farm demonstration of improved varieties of groundnut during *rabi* season revealed that Kadiri Harithandhra has recorded higher pod yield of 2.91 t ha^{-1} compared to Dharani (2.60 t ha^{-1}) and K-6 (2.65 t ha^{-1}).

On-farm demonstrations of spraying of KNO_3 @ 5 g l^{-1} at peg penetration and pod development stage of groundnut during *rabi* season has recorded higher pod yield of 2.87 t ha^{-1} compared to farmers practice (No spraying KNO_3) (2.534 t ha^{-1}).

Crop + large ruminants based farming system revealed that, improved practice (groundnut + fodder maize + feeding of buffaloe with groundnut haulm @5 kg day^{-1} + fodder maize 10 kg + UMMB 1 kg block days^{-10}) has recorded higher net returns of Rs. 96,667 ha^{-1} with respect to marginal farmers, improved practice (groundnut + fodder maize + feeding of desi cow with groundnut haulm @ 5kg/day^{-1} + fodder maize 10 kg + UMMB 1 kg block days^{-10}) has recorded higher net returns (Rs. 89,767 ha^{-1}) for small farmers compared to farmers practice. In case of medium farmers improved practice (groundnut + fodder maize + feeding of crossbred cow/with groundnut haulm @ 5kg day^{-1} + super napier 30 kg + rice bran 1 kg + RSMM 80 g) has recorded higher net returns of Rs.1,14,564 ha^{-1}.

The results on-farm demonstration on strengthening traditional IFS for marginal, small and medium farm holdings under crop + small ruminants based farming system in partially irrigated situation revealed that the practice of (groundnut var. Kadiri Harithandhra + rearing of 2 ram lambs with grazing + groundnut haulm 300 g + grain feeding 100 g day^{-1} + mineral block 1 kg) has recorded higher net returns of Rs. 1,05,202 and 1,21,103 ha^{-1} with respect to marginal and small farmers improved respectively. In case of medium farmers, improved practice (groundnut with KNO_3 spray + rearing of 5 ram lambs with grazing + groundnut haulm 300 g + grain feeding 100 g day^{-1} + mineral block 1 kg) resulted higher net returns of Rs.1,42,155 ha^{-1} compared to farmers practice.

Agricultural Research Station, Utukur

Among the treatments tested in rice, farmers practice i.e application of 150-60-40 kg NPK ha^{-1} recorded significantly higher grain yield (4.95 t ha^{-1}) and straw yield (7.60 t ha^{-1}) compared to application of 100 % RDF (80-60-40 kg NPK ha^{-1}) (4.25 t ha^{-1}) or RDF along with 25 (4.25 t ha^{-1}) or 50 % N addition through vermicompost (4.31 t ha^{-1}). Application of 50% N through vermicompost has residual effect on improving the yield of succeeding groundnut.

Integrated Farming Systems, Vizianagram

Studies on crop response to plant nutrients in rice-maize cropping system indicated that, there was a significant response to applied recommended dose of NPK and NPK + Zn in base crop rice as well as maize crop. Application of NPK + Zn recorded significantly higher grain yield (5.80 t ha^{-1} & 7.37 t ha^{-1}) over other levels and on par with recommended dose of NPK application (5.52

t ha^{-1} & 6.76 t ha^{-1}) respectively. Application of NPK + Zn recorded higher system net returns (Rs 104640 ha^{-1}) followed by recommended dose of NPK application and farmer practice. Benefit Cost Ratio were higher in case of NPK+ Zn (1.37) followed by NPK (1.31) and farmer practice (1.20).

The result of the experiments conducted at 24 locations during 2018-2019 revealed that net benefit due to cropping system diversification, livestock diversification and product diversification were Rs.31875, Rs.13388 and Rs. 3460 with diversification cost of Rs. 3770, Rs. 2300 and Rs. 500 respectively. The total system gross income increased due to different diversification from Rs.157398 to Rs. 206081 with total intervention cost of Rs. 6570. The total farming system gross income increased due to different diversifications in cropping system, livestock, nutritional kitchen garden from Rs. 1,57,398 to Rs. 2,06,081 with total intervention cost of Rs. 6,570.

The result of the experiments conducted at 12 locations with three farming systems during 2018-2019 revealed that, the gross income increased in crop – poultry farming system due to different modules from Rs. 67856/house hold to Rs. 85387/house hold with B: C ratio 2.06, gross income increased in crop – dairy farming system due to different modules from Rs. 78240 $house^{-1}$ hold to Rs. 105235 $house^{-1}$ hold with B: C ratio 2.18 and gross income increased in crop – dairy - poultry farming system due to different modules from Rs. 82376/house hold to Rs. 108967 /house hold with B: C ratio 2.19.

Integrated Farming Systems, Maruteru

Studies on evaluation of weed management practices under organic production system during *kharif*, 2018 season revealed that, mulching with locally available weed mulch (*Eichhornia*) + one hand weeding recorded significantly higher yield of 5.22 t ha^{-1} which is on par with hand weeding twice (5.08 t ha^{-1}) and location specific green leaf manure incorporation (5.03 t ha^{-1}). In *rabi*, 2018-19 the results indicated that highest number of green cobs of 88333 were realized with locally available weed mulch (*Eichhornia*) + one hand weeding.

Studies on identification of cropping systems module for different farming systems revealed that, highest grain yield of 7.43 t ha^{-1} was recorded with cropping system involving green fodder to meet livestock nutrition followed by 7.00 t ha^{-1} was recorded with cropping system involving pulses/ oilseeds to meet household nutrition compared to predominant cropping system (5.47 t ha^{-1}) during *kharif,* 2018 season. During *rabi,* 2018-19 high value crops like sweet corn and marigold performed better compared to other ID crops. Highest rice equivalent yield of 14.07 t $ha^{-1}$was realized with sweet corn which is on par with marigold (12.80 t ha^{-1} REY). Among different cropping system modules Rice-Sweetcorn or Rice-Marigold performed well followed by Rice-Blackgram cropping system.

Studies on development of region specific IFS model during the year 2018-19, BPT 5204 in *kharif* recorded 4.16 t ha^{-1} under organic production system. Under fish component, 3 species of fingerlings viz., Rohu, Indian Carp and Grass Carp were grown. Poultry birds *viz.*., Kadaknath and Aseel birds were reared in cages. In Horticulture component, high value timber (Red sandal wood) and apple ber were planted. Other fruit crop like Banana (3 varieties), guava, papaya, pomegranate, pomelo citrus, litchi and karonda were planted. Flower crops were cultivated throughout the year.

1.2. Agro-Forestry

Agricultural Research Station, Kavali

The variety Balaji recorded higher plant height of 77.8 cm among all the tested acid lime varieties suitable for lateritic soils of Andhra Pradesh. ™

Studies on response of Casuarina to phosphorus and spacing indicated that, adopting a spacing of 2 m X 2 m recorded high plant height, with the application of 75 kg P_2O_5 ha^{-1}.

1.3. Saline Water Management, Bapatla

Soil Science

Effect of sea water intrusion on ground water quality in coastal belt of Krishna Zone. A P

Studies on the effect of sea water intrusion in coastal belt of Krishna zone revealed that ground water was neutral to slightly alkaline and saline in all the points. Among the cations sodium was dominant whereas among the anions chlorides were dominant.

Survey and characterization of ground water of Nellore district

Revisiting of sites in Nellore district for quality of irrigation water indicated that, quality of irrigation water was found to be deteriorated as compared to earlier studies. Per cent good quality water came down to 38% as compared to 39% as per earlier studies. Similarly, marginally saline water increased to 22.4% as compared to 6.2%, Saline water exhibited an increase to 6.9% as compared to 0.4% and High SAR saline water enhanced to 4.9% as compared to 2.6% of earlier studies.

Seaweed cultivation for economic rehabilitation of coastal farmers in Andhra Pradesh sea coast

At present sea weeds are used in agriculture, pharmaceuticals and even to reduce pollution. Especially in agriculture the sea weed material supply hormones to plants and also used as bio-fertilizers. They are also used in the manufacture medicines. They also fix carbon dioxide from the atmosphere and reduce global warming and the pollution. Besides, they provide alternate source of income to the fishermen during fishing holidays

Agronomy

Evaluation of Silvi-horticultural crops in saline/ Alkali soils under rainfed conditions

The plants of Casuarina, neem, sapota, guava and pomegranate attained the plant height of 565, 480, 225, 420 and 370 cm respectively with plant girth of 25, 32, 21 and 28 cm. The mean no. of fruits recorded in sapota, guava and pomegranate were 25, 42 and 21 respectively.

Performance of medicinal plants with saline irrigation water through drip system.

Chrysanthemum, marigold and tulasi were tested under drip irrigation system with different salinity water levels of 0.6, 2.0, 4.0, 6.0 and 8.0 ECiw for salinity tolerance. The results indicated that Chrysanthemum recorded 96.8 flowers plant^{-1} at 0.6 ECiw and reduced to 68.1% at 8.0 ECiw by recording 30.9 flowers plant^{-1}. Marigold registered 158.6 flowers/plant at ECiw of 0.6 and reduced to 71.8% at ECiw of 8.0 with 44.7 flowers plant^{-1}. For both, Chrysanthemum and marigold 50% yields were obtained at water salinity level of 5.8 and 5.5 ECiw respectively. However, 'tulasi' recorded 8.6 t ha^{-1} of biomass at 0.6 ECiw and reduced to 5.6 t ha^{-1} at ECiw of 8.0 and there was a reduction of 35.2%. It clearly showed that 'tulasi' was more tolerant to salinity as compared to Chrysanthemum and marigold.

Studies on performance of fodder crops in salt affected soils.

Six fodder crops were tested on large plots in farmers fields at Nidubrolu, Guntur district. Out of six crops tested, sweet sudan grass recorded the maximum biomass yield of 42.8 t ha^{-1} followed by CoFS-29 (39.7 t ha^{-1}) and Panthchari-6 (36.5 t ha^{-1}). Hedge lucerne yielded the biomass of 31.4 t ha^{-1}. Stylo and Lucerne recorded the biomass yield of 7.2 and 8.7 t ha^{-1} respectively.

Effect of exogenous application of organics for alleviating salt stress in sorghum crop

A study on effect of exogenous application of organics for alleviating salt stress in sorghum crop indicated that farmers' practice of using brackish water having water salinity of 19.0 (dS m-1) for life saving recorded the grain yield of 5.78 t ha^{-1} and it was increased to 6.25 t ha^{-1} by foliar spray with proline (0.6 g l^{-1}).

Performance of different crops to reclaimed sodic water through gypsum tank

Performance of different crops to reclaimed sodic water through gypsum tank indicated that the grain yield of paddy increased by 8.4% when irrigation water passing through gypsum . Similarly, the biomass of fodder jowar, pillipesara and para grass was increased to 5.7, 7.8 and 3.8 percent, respectively.

2. Agricultural Engineering

Agricultural Research Station, Anantapuramu

A total run off of 48.41 lakh litres were collected in the month of September with the available 12 number farm ponds in the station. The pod and haulm yield in farmer's practice (No supplemental irrigation), with 10 mm supplemental irrigation and 20 mm supplemental irrigation treatments was recorded as 0.18, 0.23, 0.26 t ha^{-1} and 1.48, 2.07 and 2.30 t ha^{-1}, respectively the increase in pod yield was 20.35% and 30.77% with 10 mm and 20 mm supplemental irrigation levels over farmers' practice.

The groundnut + pigeonpea (8:1) intercropping planter was modified and was tested in the field conditions to evaluate the performance parameters *viz*.., width of operation (310 cm), depth of operation (6 cm), theoretical field capacity (1.16 ha h^{-1}), actual field capacity (0.8 ha h^{-1}), field efficiency (68.7%), seed rate (groundnut - 100 kg ha^{-1} and pigeonpea -5 kg ha^{-1}), fuel consumption (3 l h^{-1}) and energy requirement (453.82 MJ ha^{-1}). The results shown that pod and haulm yield of groundnut was 1.82 and 1.86 t ha^{-1} and pigeonpea crop failed due to severe drought situation.

The control track system planter was designed and developed to form conservation furrows along with the sowing operation. The tines of the Ananta planter were adjusted to form a track for every four rows with spacing of 45 cm to make the inter cultivation easier with tractor drawn implements. Among the treatments conducted, control track mechanism with conservation furrow recorded higher pod yield of 0.29 t ha^{-1} than the other treatments.

The mini tractor drawn implements of Ananta planter, Kissan planter and inter cultivation equipment for groundnut, pigeonpea, castor and horsegram crops were developed and tested their performance in the laboratory and field conditions. Precision in spacing, missing index and multiple indexes recorded as 82%, 18.9% and 6.2%, respectively. The weeding efficiency and plant damage efficiency of the intercultivator were observed as 90% and 4%, respectively.

AICRP on Farm Implements and Machinery, College of Agricultural Engineering

Feasibility testing of Mulcher + Rotary plough/rotopuddler for incorporation of green manuring crop

Feasibility testing of mulcher + rotary plough/ rotopuddler was conducted in 2.8ha of farmers field for incorporation of green manuring crop in to the field. It was found that mulcher + rotary plough are suitable for incorporation of green manuring crop in to the soil and preparation of seedbed in dryland and passes of rotopuddler in wetland.

Fig: Working of Mulcher + rotary plough for incorporation of biomass

Fig: Rotopuddler for incorporation of green manuring crop

Feasibility testing of Drone sprayer for spraying pesticide and application of bio fertilisers

Observed from spray efficacy tests that drone spraying is as effective as knapsac spraying for different systemic chemicals *viz.,* Dinoteferon against BPH in paddy, thiodicarb against fall armyworm in maize, Tebuconazole+ Trifloxystrobin (Nativo) against Alternaria, anthracnose and cercospora in chillies and imidachloprid against leaf hopper in cotton with spray efficacy of 90, 75, 86 and 95%, respectively.

Fig: Drone sprayer after fitted with electrostatic sprayer and autonomous controller

Feasibility testing of Paddy straw chopper

Feasibility testing of paddy straw chopper conducted in 1.2 ha of farmers' field revealed that the straw cutting efficiency was 85% with a field capacity of 0.22 t ha^{-1} (32.2% field efficiency). The cost of operation worked out to be Rs.3182 ha^{-1}.

Fig: Paddy straw repear in operation

Regional Agricultural Research Station, Tirupati

In evaluation of poly-house solar dryer for groundnut, solar tunnel dryer took 5, 13, 24, 25 and 30 h to reduce moisture content of groundnut pods (Dharani Variety of *kharif*, 2018 season) from 40%(wb) to 30, 20, 10, 9 and 8% (wb) where as Sun drying took 7, 15, 31, 32, 34 h respectively. Shade drying took 17, 30, 100 h to reduce the moisture content to 30, 20 and 11.3% (wb). It clearly shows that solar tunnel dryer took 6-7 hours less time to reduce the moisture content to 9-10% (wb). The shade drying could able to dry only upto 11.3% (wb) and it took nearly 77 h more time than solar tunnel drying and 70 h more than sun drying method.

Studies on evaluation of performance of multi crop thresher, the machine is found to be suitable for threshing of groundnut as well as red gram crops. For groundnut the threshing efficiency was found to be 94%, losses during threshing was recorded as 4% and losses due to splitting of Kernals was 3%.

In micro irrigation and fertigation studies using bud chip planter in sugarcane planting for complete mechanization, results revealed that higher cane yield was recorded with sugarcane seedlings transplanted in a row spacing of 150 cm (80.1 t ha^{-1}) with intra row spacing of 30 cm (between seedling to seedling) 77.2 t ha^{-1}and 100% of fertilizers applied through fertigation (80.6 t ha^{-1}).

Studies on effect of leaf shredding and incorporation using machines in sugarcane cultivation as soil health improvement programme revealed that trash shredding by trash shredder recorded significantly highest cane yield (124 t ha^{-1}) followed by trash (119 t ha^{-1}) and showed 8.77% increase in cane yield and high benefit cost ratio (1.17) over control. Significantly higher organic carbon, available P_2O_5 and K_2O was recorded with trash spreading by trash shedder (0.53%, 0.59 and 258 kg ha^{-1}, respectively).

Regional Agricultural Research Station, Anakapalli

Standardized the process technology for the preparation of various value added products *viz.* Jaggery based maize cookies, foxtail millet cookies, ragi cookies, jaggery-ragi chocolates, Gurpapadi, a nutrient rich jaggery based infant food and jaggery based extruder products.

Standardized the process for preparation of food packaging material with sugarcane bagasse (6%) slurry treated with polyvinyl alcohol (2%), starch (3%) and bamboo powder (3%). Designed and fabricated hot compression moulding machine.

Studies on effect of edible coatings on shelf-life of jiggery indicated that the highest value of water activity i.e. 0.421 was found in the solid jaggery sample without edible coating (control) and the lowest value of water activity i.e. 0.387 was found in the solid jaggery sample coated with 0.5% concentration WPC packed in PP pouch with vacuum condition. Jaggery cubes coated with 0.5% WPC packed in HDPE pouches with vacuum condition shows less change in the color followed by 0.5% WPC coated jaggery cubes packed in LDPE pouches with MAP packing and 0.5% gum arabic coated jaggery cubes packed in HDPE pouches with MAP packing throughout the storage period. WPC coated and packed in PP pouch with vacuum package showed less decrease in the hardness as compared to the other samples.

Techno-economic analysis revealed that, the use of cutter planter and budchip planter reduces drudgery, saving of 52-56%;labour cost, 58% time and 68-75% seed cost over conventional planting. The population count was found to be very low in sugarcane crop planted with easy planter due to shallow depth of planting.

Regional Agricultural Research Station, Chinthapalli

Under studies on modification and evaluation of mini paddy harvester, brush cutter was modified in to mini paddy harvester by changing cutting blades and a frame was fabricated with wheel support to reduce load on operator. Field capacity of modified reaper was observed to be 0.03 ha h^{-1} and fuel consumption was 0.25 l h^{-1}. Shattering losses was observed to be more in manual harvesting when compared with modified reaper.

Fig. mini paddy harvester by changing cutting blades and a frame was fabricated with wheel support to reduce load on operator.

4. Agrometeorology

Regional Agricultural Research Station, Tirupati

During *kharif* and *rabi* 2018-19, a total of 95 agro-advisory weather bulletins were issued to the farmers through press, All India Radio, DAATTC, KVKS, service providers of IMD like IFFCO, Nokia, Reliance and through e-mails on every Tuesdays and Friday. These bulletins were uploaded in IMD National website, Kisan portal, Farmers portal and important information pertaining to that week was sent to nearly 10,00,000 farmers of southern zone through mobile SMSs. Block level weather based Agro advisories were also being prepared and dessiminated to four blocks of Chittoor district.

In crop weather relationship of groundnut, among 7 groundnut varieties (Narayani, Dharani, K-6, K-9, TCGS-1073, TCGS-1157 and TCGS-1416) were sown from second fortnight of June to second fortnight of July at fortnightly interval, the July first fortnight sown crop performed better (1.89 t ha^{-1}) compared to the crop sown during second fortnight of June (1.63 t ha^{-1}) and second fortnight of July (1.54 t ha^{-1}). Among the varieties TCGS-1157 (2.16 t ha^{-1}) recorded highest yield followed by k-9 (1.98 t ha^{-1}) and Dharani (1.79 t ha^{-1}) compared to Narayani (1.21 t ha^{-1}).

Studies to identify the suitable heat tolerant and water use efficient groundnut varieties under different irrigation regimes indicated that, the performance of K-9 was significantly superior with highest yield (1.95 t ha^{-1}) compared to all other varieties. Among different irrigation regimes studied, IW/CPE ratio of 1 has given highest yield of 1.701 t ha^{-1} followed by IW/CPE ratio of 0.8 (1.49 t ha^{-1}).With decrease of IW/CPE ratio from 1 to 0.4, there is gradual decrease in the yield in all the varieties. Among different irrigation regimes and varieties, K-9 performance is better at all the irrigation regimes followed by Dharani.

Uunder verification of Legume Crop Sequence, different legume crops (pilli pesera, rice bean, sunhemp, greengram, horsegram and cowpea) as base crops raised with summer showers groundnut has given highest yield of 1.58 t ha^{-1} when greengram crop was taken as base legume crop before groundnut followed by cowpea crop raised during summer before sowing of groundnut (1.19 t ha^{-1}). and Sunhemp (1.14 t ha^{-1}). The least yields were recorded where pillipesara, ricebean and fallows.

Microbial population in different green manure crops sown before groundnut crop revealed highest fungal population (28.3 x 104 cfu g^{-1} of soil) and actinomycetes population (24 x 104 cfu g^{-1} of soil) in sunhemp followed by cowpea sown plots (27 x 104 cfu g^{-1} of soil) & (19.7 x 104 cfu g^{-1} of soil). The highest bacterial population (33.3 x 106 cfu g^{-1} of soil) was observed with greengram followed by horsegram (26.7 x 106 cfu g^{-1} of soil) and cowpea (26.3 x 106 cfu g^{-1} of soil). Highest organic carbon percent (0.5%) was observed with sunhemp followed by horsegram & cowpea (0.49%) compared to fallow (0.45%).

Long term experiment on weed shift with different tillage practices and weed controlpractices during *kharif,* significantly highest pod yield (1.14 t ha^{-1}) of groundnut was recorded with vertical tillage treatment applied with farmyard manure. Among different weed control treatments pre-emergence application of pendimethalin followed by post emergence application of Imazithapyr gave highest yield of 1.41 t ha^{-1} followed by hand weeding (1.10 t ha^{-1}).

Regional Agricultural Research Station, Anakapalle

During 2018, a total of 104 weather based agro – Advisory bulletins were prepared district wise and communicated to farmers of Visakhapatnam, Viziangaram and Srikakulam and also communicated to the JDAs, Programme Coordinators of KVKs and Coordinators of DAATTC of respective districts for further dissemination to the farmers and local Newspapers *viz.,* Eenadu, Sakshi, Vartha, Andhra Bhoomi and Praja Shakti and AIR. Weather forecast was disseminated through mkisan portal also and uploaded the advisory bulletins in IMD website. The rainfall prediction for the period from January, 2018 to December, 2018 was correct to the tune of 31.4 % while the prediction was correct to the tune of 46.0 % during South West monsoon period. Special advisory bulletins were issued during the cyclones *viz.,* Titli in October, 2018 and Pethai in December, 2018.

Intercropping of six crops *viz.,* maize, bhendi, ragi, korra, greengram and groundnut with redgram in strips recorded gross returns of Rs. 121796/- whereas sole redgram registered gross returns of Rs. 61517/- Highest gross returns were recorded with Bhendi-horsegram sequence Rs. 159560/-.

Highest grain yield was noticed with first date (30-06-2018) of sowing (4.73 t ha^{-1}) which was significantly superior over all other dates of sowing. Significant increase in grain yield was noticed upto 120 kg N ha^{-1} (4.08 t ha^{-1}) further nitrogen increase did not increase the grain yield significantly.

Agricultural Research Station, Anantapuramu

The total of 97 weather based agro-advisory bulletins were issued to the farmers of scarce rainfall zone during June 2018 to April 2019. The bulletins were disseminated to various stakeholders through mass media (Newspaper and Radio), ATP channel, Project Director, ATMA, Dept. of Agriculture, District Collector, NGOs and extension agencies. About 97 experimental block level agromet advisory bulletins were issued to Ananthapuramu, Dharmavaram, Gooty and Tadipatri blocks during June 2018 to April 2019.

A total 772 SMS agromet advisories were communicated through m-KISAN portal of Govt. of India to 8.18 lakh the farmers of scarce rainfall zone and so far 3.16 crores of farmers received SMS sent by AMFU, Ananthapuramu. Sending agromet advisories through voice message to the farmers in collaboration with Reliance Foundation.These agromet advisory bulletins for Ananthapuramu and Kurnool districts were uploaded in the website www.imdagrimet.gov,in on every Tuesday and Friday.

In Crop-Weather relationship studies the yield of groundnut crop was significantly influenced by rainfed (0.23 t ha^{-1}) and protective irrigation (0,80 t ha^{-1}). There is no significant difference among different sowing environments. Crop sown during 1st FN of July, 2nd FN of July and 1st FN of August recorded pod yield of 0.54 t ha^{-1}, 0.53 t ha^{-1} and 0.46 t ha^{-1}, respectively. All the four varieties recorded on par yields and there is no significant interaction among sowing environment and varieties; sowing environment and varieties under rainfed and protective irrigation condition.

Estimation of actual evapotranspiration and crop coefficients for groundnut indicated that Crop sown during 1st FN of July produced significantly higher pod yield (1.70 t ha^{-1}) than the crop sown during 1st FN of August (1.52 t ha^{-1}). But 1st and 2nd FN of July sown crop gave on par pod yield. The crop irrigated at 0.8 IW/CPE ratio recorded significantly higher pod yield (1.70 t ha^{-1}) than 0.6 (1.54 t ha^{-1}) and 1.0 (1.59 t ha^{-1}) IW/CPE ratio. The interaction among sowing environment and IW/CPE ratio is also significant.

Crop-Weather relationship in redgram indicated that crop sown during 2nd FN of June (30.6.18) has recorded significantly higher grain yield (0.21 t ha^{-1}), which was however on par with 1st FN of July (15.07.18) sown crop (0.17 t ha^{-1}) and significantly lower yield was recorded in the crop sown during 2nd FN of July (29.07.18) sown crop (0.17 t ha^{-1}) and 1st FN of August (11.8.18). (0.15 t ha^{-1}).

5. Post-Harvest Technology

Post-Harvest Technology Centre, Bapatla

Design and fabrication of 2.5 ton capacity Microprocessor Controlled On-Farm Dryeration Bin for paddy has been completed. Freshly harvested high moisture paddy grains were dried in the bin from initial moisture content of 21.2% (wet basis) to final moisture content of 10.4% (wet basis) with a drying time of 20 h. The cost of drying inclusive of storage has been worked out to be Rs.

2.69 kg^{-1} of wet paddy. Cost economics of paddy from harvesting to storage in conventional method (Purulu), rural godown and dryeration bin has been worked out to be Rs. 4.18, 4.59, 3.79 per kg wet paddy.

Development of double chamber centrifugal de-huller for millets has been completed. Capacity of de-huller is 70-85 kg^{-1}. De-hulling efficiency obtained single and double pass for raw millets is 81.47 ±2.54% and 94.60 ±1.05 % respectively and for hydrothermal treated millets 96.35±1.45% and 96.75 ±1.15%. Head rice recovery, broken and husk were obtained 69.65%, 2.06% and 28.29% respectively.

Filtration of Jeevamrutham was done with self cleaning filtration system with permeate flux at discharge section of 6 L/m2-s. The pH and EC of permeate were found to be 5.0 and 3.65 dS m^{-1} respectively. Spraying trials were conducted with filtered Jeevamrutham using knapsack sprayer on paddy crop and observed no sediments in the nozzle while the spraying operation was hassle free.

Based on the differences in the contents of secondary metabolites *viz,* total phenols, tannins, flavonoids and ortho di-hydric phenols and anti oxidative activity, the organic samples of paddy, maize, rajmah and little millet samples obtained from the research stations of the University could be differentiated from the non- organic samples.

Among 43 rice varieties with different coloured grains (including varieties having white, brown, red and black coloured milled grains) studied for different biochemical parameters, red and black rice genotypes were found to have more proteins, phenolic and flavonoid contents resulting in high antioxidant activity compared to light brown kernel genotypes.

Preference of stored grain insect pests; red flour beetle, *Tribolium castaneum* lesser grain borer, *Rhizopertha dominica* and Angoumois grain moth, *Sitotroga cerealella* to stored millets and their population buildup indicated that bajra was the most preferred grain by all these insects where as finger millet and little millet were not preferred probably due to their physico-chemical factors.

Among the indigenous methods tested against pulse bruchid in blackgram, there was no bruchid population buildup in camphor, cow dung ash and buffalo dung ash treatments even after six months of storage while there was an emergence of 3897 bruchid insects from the untreated grains inflicting 67 per cent damage.

Essential oils of Clove, Acorus, Eucalyptus, Orange, Cedar wood, and Neem at 1 ml each were impregnated on a wooden cube of 1 inch and placed over the grain surface of greengram and a total of 20 insects were released.There was no population buildup in the Clove, Acorus, Eucalyptus and Orange oil treatments even after 120 days, while a mean number of 2060 adults were emerged from the untreated greengram.

6. Seed Production

A quantity of 11,600.64 quintals of breeder seed was produced during 2018-19. Among the various crops, large quantity of groundnut breeder seed 6964 quintals was produced covering the major varieties viz., K6, Dharani and K9 during 2018-19. A sizeable quantity of breeder seed (3442 q) of rice particularly in six varieties of viz., BPT 5204, MTU 1001, MTU 1010, MTU 7029, NLR 34449 and NDLR 7 was also produced during 2018-19. In addition, 7739.62 quintals of foundation seed was produced in different crops during the year 2018-19.

7. Agricultural Statistics

Regional Agricultural Research Station, Tirupati

"Advancement of Optimization Techniques in Agricultural Experiments, A Central Composite Design" was tried on the experimental data which was concluded based on FRBD in which two continuous factors are planned. The efficacy of the RSD in exploring the effects of various squared factors along with the main and interaction effects was observed.

Yield Gap Analysis conducted for major crops (Groundnut and Green gram) in Southern zone of Andhra Pradesh revealed significant factors for yield gaps at three levels (breeders, extension centres (KVK/DAATTC) and farmer's fields).

8. Agricultural Biotechnology

Regional Agricultural Research Station, Tirupati

In DNA fingerprinting of crop varieties released from ANGRAU using RAPD and SSR markers, DNA fingerprinting of pre-released sugarcane cultures *viz.,* 2007 V 127 and 2009 V 127 and three check varieties *viz.*, 87 A 278, 2003V46 and Co 86032 were profiled with 31 RAPD markers. The RAPD markers viz., OPB-05, OPC-09, OPB-10, OPA-08 and OPV-07 displayed distinct allelic differences and clearly distinguished 2007 V 127 and 2009 V 127 sugarcane varieties.

DNA fingerprinting of groundnut pre-released cultures viz., TCGS 1157, TCGS 1157, TCGS 1622, TCGS 894, TCGS 1616 and TCGS 1694 with three check varieties Narayani, Greeshma and Tirupati 3 was carried out to facilitate the varietal release with 15 RAPD markers. The RAPD markers *viz.,* OPC10, OPA4, OPC7, OPB6, OPA19 which displayed distinct allelic differences and clearly distinguished the varieties TCGS 1157, TCGS1622, TCGS 894, TCGS 1616 and TCGS1694 and other check varieties.

DNA fingerprinting of blackgram prerelease culture GBG1 and four check varieties *viz.,* LBG 752, LBG 623, IPU2-43, and PU 31 was carried out with both SSR and RAPD markers. The SSR markers resulted in monomorphic banding pattern and fingerprint profiles were developed RAPD markers OPS 7, OPF 16, OPC 9, OPF 9, OPN 10 and OPN 8 which distinguished the varieties under testing.

DNA fingerprinting of fingermillet varieties PPR1012 and four check varieties *viz.,* Vakula, GPU67, Godavari and Saptagiri was carried out with RAPD markers. Based on OPR4, OPC20, OPC9, OPF9, OPN4 markers, the variety PPR1012 and four check varieties *viz.,* Vakula, GPU67, Godavari and Saptagiri displayed distinct allelic differences.

Development of gene based markers for MAS of drought tolerance in groundnut, cDNA-RAPD profiles were developed with 35 RAPD markers in three regimes of moisture stress *i.e.,* 60, 70 and 80 DAS. Altogether, 35 RAPD primers produced 714 reproducible and scorable Transcript Derived Fragments (TDFs). Maximum number of TDFs (78) was amplified by OPA2 and least number of TDFs (10) was identified with OPD16. A total of 347 TDFs were found to be up-regulated and 347 TDFs were found to be down regulated out of which 72 in 10 Days while 173 in 20 Days and 102 in 30 days stressed plants

In identification of effective *Bt* strains for biopesticide formulations based on cry gene composition and efficacy against *Spodoptera litura*, the crystal proteins were induced in Bt strains by culturing them in T3 media and all the stains have different crystal characteristics. Different types of crystal shapes were observed such as spherical, cubical, bipyramidal, irregular pointed and irregular shaped. More than one type of crystal proteins were also found in some isolates.

In silico characterization and comparative analysis of SSR markers in groundnut (*Arachis hypogaea L.*), the whole genome sequence of the cultivated groundnut was retrieved and analyzed for resistance gene analogues. A total 1434 RGAs with different functional motifs were identified and 1429 were localized on 20 groundnut chromosomes except for 5 RGAs which confined to scaffold region and yet to be assigned to the chromosomes. Out of the 1434 RGAs identified in tetraploid groundnut, 752 were present in B sub-genome (donar: A. ipaensis) where as 677 were present in A sub-genome (donar: A. duranensis).

9. NANO TECHNOLOGY

Different nanoscale materials including nanoscale ZnO, nanoscale CaO, nanoscale MgO, nanoscale iron oxide, nanoscale silicon dioxide were prepared using sol-gel method. The average size range of the prepared nanoparticles was found to be 25-50 nm.

Significantly (9%) higher grain yield (1.07 t ha^{-1}) has been recorded with the application of RDF along with foliar spray (at 25 & 40 DAS) of nanoscale zinc oxide @ 2 g l^{-10} compared to the application of RDF along with the foliar application of zinc sulphate @ 2 g l^{-1} (twice) in *rabi* season (0.97 t ha^{-1}). Further, higher grain zinc content (33.2 ppm) also been recorded with the application of nanoscale zinc oxide @ 2 g l^{-10}.

Significantly higher grain yield (1.50 t ha^{-1}) was recorded in application of RDF along with the foliar application of nanoscale zinc oxide @ 2 g l^{-15} at 25 & 40 DAS compared to control (1.15 t ha^{-1}).

Significantly higher pod yield (2.12 t ha^{-1}) was recorded in groundnut with the application of nanoscale zinc oxide @ 2 g l^{-15} compared to zinc sulphate application @ 2 g l^{-1} (1.73 t ha^{-1}) under rainfed conditions. At high altitude zone with the application of nanoscale zinc oxide significantly higher yield was recorded (1.08 t ha^{-1}) compared to zinc sulphate application @ 2 g l^{-1} (0.89 t ha^{-1}).

Higher pod yield (2.13 t ha^{-1}) was recorded with the application of nanoscale calcium oxide @ 200 ppm along with RDF compared to soil application of Gypsum @ 500 kg ha^{-1} (1.50 t ha^{-1}). Phloem transport of calcium at nanoscale has been proved at field conditions.

10. APICULTURE

Agricultural Research Station, Vijayarai

Under rtificial domiciliation of Non-Apis pollinators studies, a total of 2100 *Saccharum sp.* sticks were kept in pollinators domiciliation pandal out of which 29 (1.38%) were found domiciled by different pollinators.

Under management of predatory wasps in *Apis mellifera* and *Apis cerana* apiaries, in apiaries around Vijayarai, slight incidence of wasps were recorded (3-4 wasps/Bee hive). They have kept unfed sugar syrup feeder outside the hive, to which attracted wasps were killed by using sticks. In weak colonies wasps were found directly entering into hive and are taking away the brood.

Severe incidence of predatory birds (*Merops orientalis*) was recorded in *Apismellifera* apiaries, due to which draustic reduction in bee strength was observed for 3 weeks. Firing crackers, throwing stones with catapult, beating drums and producing acoustic sounds, tying of reflective ribbons were adopted for scaing these birds. During fourth week of January, 2019 kites, swifts and hawk birds flying and chasing of these predatory birds has been observed and it was found that the predatory birds screamed and left the apiary when ever these birds found flying in the sky. These birds (Kites, hawles and swifts) were encouraged near the apiaries by keeping chicken waste.

During the survey and surveillance for honey bee diseases and enemies in Andhra Pradesh, recorded the incidence of Greater wax moth (10-15%), Ectoparasitic mite, Tropilaelaps clareae (5-7%), Varroa mite (2-3%), European foul brood disease (10-15%), Green Bee eater bird, Merops orientalis & black drongo, Dicrures sp (Severe incidence was observed up to first week of February, 2019).

11. Agro-Economic Research

Regional Agricultural Research Station, Anakapalle

Costs of cultivation (per hectare) for important crops in North Coastal Zone were worked out such as sugarcane (irrigated plant crop - Rs. 2,62,025, rain-fed plant crop - Rs.1,81,885), sugarcane ratoon crop (irrigated -Rs.1,91,647, rainfed - Rs. 1,37,878) rice (transplanted Rs.1,46, 260; direct sown Rs.1,10,070; Drum Seeder sowing Rs.1,11,292; SRI method Rs.1,49,530), maize (Rs. 88,017) ragi (Rs.73,817), blackgram (Rs. 14,562), greengram (Rs.14,045), redgram (Rs.31.535), groundnut (Rs. 74,937), sesamum (Rs. 22,00) and mesta (Rs. 68,217).

To forecast the month wise prices for the period April'2019 to March'2020, monthly prices (per quintal) of jaggery in Anakapalle market for the period 1990-91 to 2018-19 were analysed. The average price for 2019-20 is going to be Rs. 2,996 against the average price of 2904 for the year 2018-19. The ranges of forecast prices (per quintal) from April'2019 to March'2020 arrived through Best Fit method are as Rs. 2,845 to 3,305, Rs. 2,816 to 3,181, Rs. 2,836 to 3,252, Rs. 2,822 to 3,194, Rs. 2,832 to 3,178, Rs. 2,825 to 3,221, Rs. 2,830 to 3,213, Rs. 2,687 to 3,097, Rs. 2,829 to 3,109, Rs. 2,827 to 3,122, Rs. 2,779 to 3,135 and Rs. 2,828 to 3,147 respectively.

Regional Agricultural Research Station, Lam

The return on rupee of investment of paddy-paddy, rice-blackgram, rice-greengram, rice-maize, rice-jowar were 0.07,-0.05,0.06 and 0.08. The cost of production (Rs/q) were 1841.28/-, 1902.37/-, 1925.19/-, Rs.1641.52/- and Rs.1789.18/- respectively.

During 2018-19, in cotton, sugarcane, bengalgram, redgram, turmeric and tobacco the farmers realized -0.06,0.01,-0.38 ,-0.48,0.10 and -0.36 as return on rupee of investment respectively.

The per quintal cost of production of cotton, sugarcane, bengalgram, redgram, turmeric and tobacco was Rs.5195.42/-,2813.85/- Rs.6326.88/- Rs.9272/-, Rs.5279 and Rs.18980/- respectively.

In chillies lower Seasonal index of prices was observed during January-May months due to more arrivals. The seasonal index of paddy prices was high during May to October months.

The average total family expenditure per household was Rs.77,470/- which includes all the items pertaining to necessaries, comports and luxuries.

On an average 48.47 per cent of total expenditure was spent on food, 10.66 per cent on clothing & foot wear, 12.09 per cent on education, 6.87 per cent on family and social functions, 5.48 and 5.13 per cent on comforts and luxuries and health respectively

The net income/ha of operational farm holding was negative for pure tenants *i.e.* Rs. -10478/- from agricultural operations and Rs.16450/- for owner cum tenant farmers.

12. AINP on Biofertilizers, Amaravathi

Studies on influence of liquid inoculants on the crop growth of pigeon pea revealed that the nodulation and nodule dry weight was more in plots inoculated with liquid inoculants compared to powder inoculants and uninoculated control. The maximum yield was recorded in the plots inoculated with liquid biofertilizers compared to powder biofertilizers and uninoculated control.

Among different crops *viz,* ragi, maize, sorgum, foxtail and their combination tested for suitable host to multiply AM Fungi, maize was found superior in enhancing per cent root colonization and AM chlamadospore production compared to ragi, sorgum, and foxtail millet. Influence of different sugars *viz,* maltose, glucose, sucrose and trehalose on AM spore germination and its growth was revealed that, glucose and fructose are having more effective inducing spore germination than maltose and trehalose.

Results of rapid decomposition of agricultural wastes through biological means and their impact on agricultural crops indicated that nodulation by Rhizobium, the population of Rhizobium, PSB and KRB increased significantly with the increased dose of compost. Further, the plant growth and yield were also enhanced due to the increased activity of the inoculated organisms. Microbial population in rhizosphere soil at time of flowering was more in treatments inoculated with biofertilizers along with double the dose of compost.

Application of potassium releasing bacteria enhanced the growth and yield of sorghum over the treatment only 100% RDF. The highest yield was recorded with 75% RDK + 100 NP with the application of KRB.Plant height, stem girth was more in the treatment with 75% RDK+100% NP with KRB application whereas shoot biomass and grain yield (2053) were highest in the treatment with application of KRB + 100% NPK and least in 100% RDF alone.

During 2018-19, produced different biofertilizer of both powder and liquid formulation for different crops as shown in the table.

The quality of these biofertilizers was analysed and found satisfactory.

In Multilocation Yield Trial (Desi), among 7 entries tested, none of the entries recorded superior seed yield/ha over the checks JG-11 (2.54 t ha^{-1}) and NBeG-49 (2.43 t ha^{-1}).

In Multilocation Yield Trial (Kabuli), 9 entries were tested along with checks. The entries *viz.,* NBeG-833 (2.07 t ha^{-1}), NBeG-810 (2.01 t ha^{-1}) and NBeG-829 (1.90 t ha^{-1}) recorded numerically superior seed yield ha^{-1} over the checks Vihar (1.82 t ha^{-1}), MNK-1 (1.68 t ha^{-1}) and NBeG-119 (1.61 t ha^{-1}).

Studies on effect of bio-inoculants on growth and yield of chickpea, revealed that highest grain yield (1.62 t ha^{-1}) was obtained with 100% RDF which was on par with all the treatments except VAM application (1.13 t ha^{-1}) and control (0.93 t ha^{-1}). The results indicated that bio consortium is effective in realizing the economic yield by reducing the recommended fertilizer dose by 50%. Highest nodular count was recorded in 50% RDF along with bio consortium and VAM was applied.

In mungbean, highest grain yield was realized with 100% RDF (0.90 t ha^{-1}), which is on par with 50% RDF + Microbial consortium (15 kg ha^{-1}) + VAM (12.5 kg ha^{-1}) (0.87 t ha^{-1}) and 50% RDF + Microbial consortium (15 kg/ha) (0.82 t ha^{-1}) and all other treatments are on par with each other and the lowest grain yield was recorded in control (0.61 t ha^{-1}).With regard to nodule count highest nodules were recorded in bioconsortium and VAM was applied along with 50% RDF.

13. Agricultural Extension

Regional Agricultural Research Station, Tirupati

The training need assessment of extension functionaries working in Southern Zone revealed that among the agricultural knowledge training needs, disease diagnosis and management, pest identification and control, disaster management, farm machinery, integrated farming system, weed management, post harvest management, eco-friendly agriculture were the most needed training areas. Among the training needs on extension areas include ICTs in extension, IOT, Robotics and big data, training organising and evaluation, technical documentation and reporting, multimedia in extension, modern agricultural information sources, agricultural growth indicators and smart agriculture are the most needed training areas along with other areas.

In the case study conducted on the groundnut cultivation in coastal sandy soils of SPSR Nellore district recorded the seed to seed cultivation practices peculiarly being followed by the farmers. Among the major practices followed are two seasons cultivation during June- October and December -March, TAG-24 variety, 240-320 kg of pods per acre as seed rate, complete seed drill sowing, heavy application of fertilizers and complete sprinkler irrigation.

Major constraints identified are lack of combined harvester and threshers, labour shortage during peak season, no storage facility for selling for seed purpose and during drought year water shortage is more leading to reduced area of cultivation.

Regional Agricultural Research Station, Lam

Studies on perception and adoption of soil health cards (SHCs) by the farmers in Guntur district indicated that the constraints faced by the farmers in adoption of SHC recommendations were lack of awareness about soil sampling (43.68%) followed by difficulty in understanding and follow the recommended doses (42.53%), realizing lower yields (40.23%) when fertilizers applied as per soil health cards recommendation, delay in issuing soil health cards (36.78%), farmers felt that fertilizer dose was not sufficient if applied as per SHC result (36.78%), non-availability of gypsum in nearby shops (32.18%) and lack of guidance (27.59%).

On the basis of the results, the constraints faced by the MPEOs concluded that lack of need based trainings (62.1%), lack of knowledge (48.28%) of e-crop booking and non-cooperation of farmers and VRO must be with us (44.83%), lack of guidance (41.38%),lack of speaking skills and time management (27.59%).

Regional Agricultural Research Station, Anakapalle

The Lakkavaram (V) was adopted in the year 2016-17 and technological interventions are being made since then, keeping in view of data base of the village.

In on farm trail on the impact of revised fertilization in rice (var. RGL 2537), the results revealed that revised fertilizer application based on soil test based results increased the yield (2.5 t ha^{-1}) over the farmers practice (2.3 t ha^{-1}). Revised fertilizer dose had incurred an additional expenditure of Rs.2000/- $acre^{-1}$. The net returns are found to be higher (Rs. 3,400/- $acre^{-1}$) with B:C ratio of 1.9 in experimental plot when compared to that of control plot (B:C ratio 1.8).

Studies on information sources dissemination and utilization patterns of farmers of N.C. Zone indicated that the perception of farmers about the access of information sources, T.V stood first with 100% extent of access followed by traditional media i.e friends and neighbours (83.3%) and news paper (74.1%) .While the effectiveness of information, newspaper ranked as first. The overall awareness, access and utilization of traditional sources of information were found to be highest.

Studies on adoption of RARS technologies on sugarcane productivity was indicated that majority of farmers (58.7%) adopted the improved production technologies of sugarcane developed by RARS, Anakapalle followed by medium (37.5%) and low (3.75%). Majority had awareness about 'Single Node' technology (65.0%) followed by use of tricho cards for control of borers (50%) and new varieties of sugarcane (50%). While coming to adoption, majority had adopted the technologies like single node seedlings (50%) and *Tricho* cards (50%). It is recommended from the study that extensive extension activities need to be implemented to help the farmers to adopt the new technologies and also to promote sustained progress from awareness stage to adoption stage

Mobile App on sugarcane cultivation aspects was developed and kept in Google Play store for the purpose of farmers and Agricultural Department.

V. EXTENSION

Agricultural Extension is one of the major mandates of ANGRAU in disseminating proven technologies to farmers from research laboratories of Agricultural Colleges, Agricultural Research Stations and on farm research in the farmers' fields. Disseminating of day to day plant production and plant protection management practices is being carried out in ANGRAU. The Extension wing also takes the responsibility of educating rural people in agriculture and allied sectors through various outreach methods including frontline demonstrations, on-farm trials and of farming variety of extension services. Besides, Extension department also assists the Development Departments of State and Central Governments. Given below is the organogram different functionaries under Extension wing of ANGRAU with their job chart devotailed with each other (Fig XX).

I. EXTENSION SERVICES

The extension services of our University are being operated through a) Krishi Vigyan Kendras (KVKs); b) District Agricultural Advisory and Transfer of Technology Centres (DAATTCs); c) Extension Units in RARS; d) Agricultural Information & Communication Centre (AI&CC); e) Electronic Wing; and f) Farmers' Call Centre. The following are the details.

a) KRISHI VIGYAN KENDRAS (KVKs)

Altogether, there are 13 KVKs under ANGRAU that are functioning with an overall goal of educating farmers, farm-women and rural youth by imparting them with life making gulp in Agriculture short and long term training programmes. Since, Govt. of India is keen on achieving the target of doubling of farm income by 2022 to mark the celebrations of 75 years of Independence; ANGRAU in this direction is playing epi centric role of ensuring livelihood security in rural areas through Vocational Training in agriculture and allied sectors. The KVKs are being assigned with the task of "Technology-Assessment and Refinement" under real-time farm situations. Application of ICT technologies by KVKs has been able to provide tangible and substantial benefits in providing timely information on weather, markets and offering solutions on day to day problems faced by farmers.

b) DISTRICT AGRICULTURAL ADVISORY AND TRANSFER OF TECHNOLOGY CENTRES (DAATTCs)

A total of thirteen (13) DAATTC while functioning, one in each of the 13 district headquarters in. These DAATTCs now were shifted from Agricultural Market Committees to ARSs or KVK premises *w.e.f.* 09/11/2017 for their effective functioning and Transfer of Technology (TOT) activities, better utilization of manpower and nevertheless to say for achieving synergy between KVK & DAATTC in discharging their duties.

c) FARMERS CALL CENTRE

The Farmers Call Centre (FCC) was initially established in Andhra Pradesh by ANGRAU during 2003 through the integration of "Information and Communication Technology" (ICT) and "Agricultural Technology" (AT). The main objective of FCC is to disseminate agricultural information in all aspects in agriculture, horticulture and allied sectors. The Centre works with a toll-free number 1800-425-0430 at Lam, Guntur and is accessible to the farmers for two way communication. The farmers' queries as well as solutions offered bythe Scientists are also being published regularly in "Vyavasayam", "Padipantalu" and other monthly magazines. With this FCC facility at Lam, Guntur, farmers throughout AP have free access to obtain suggestionsfrom Scientists on all aspects of agriculture and allied sectors.

During 2018-'19, 3681 calls were received from all over AP and all these queries were answered and suitable solutions were offered by the scientists.

d) Agricultural Information & Communication Centre (AI&CC):

The AI&CC under the control of Director of Extension looks after the processing works of latest agricultural information that is available at university and will transfer this technologies/ information through various means such as publications and media combinations.

e) Electronic Wing:

After bifurcation of the University, the Electronic wing started its functioning from 2016 to promote e-extension and support TV channels and develop DVDs on various crops and technologies.

The Electronic Wing was previously functioning under Director of Extension, whereas FCC under the control of Director of Research previously. However, w.e.f. 29-12-2017, both these units are brought together and merged with AI&CC for effective transfer of technology through print and electronic media.

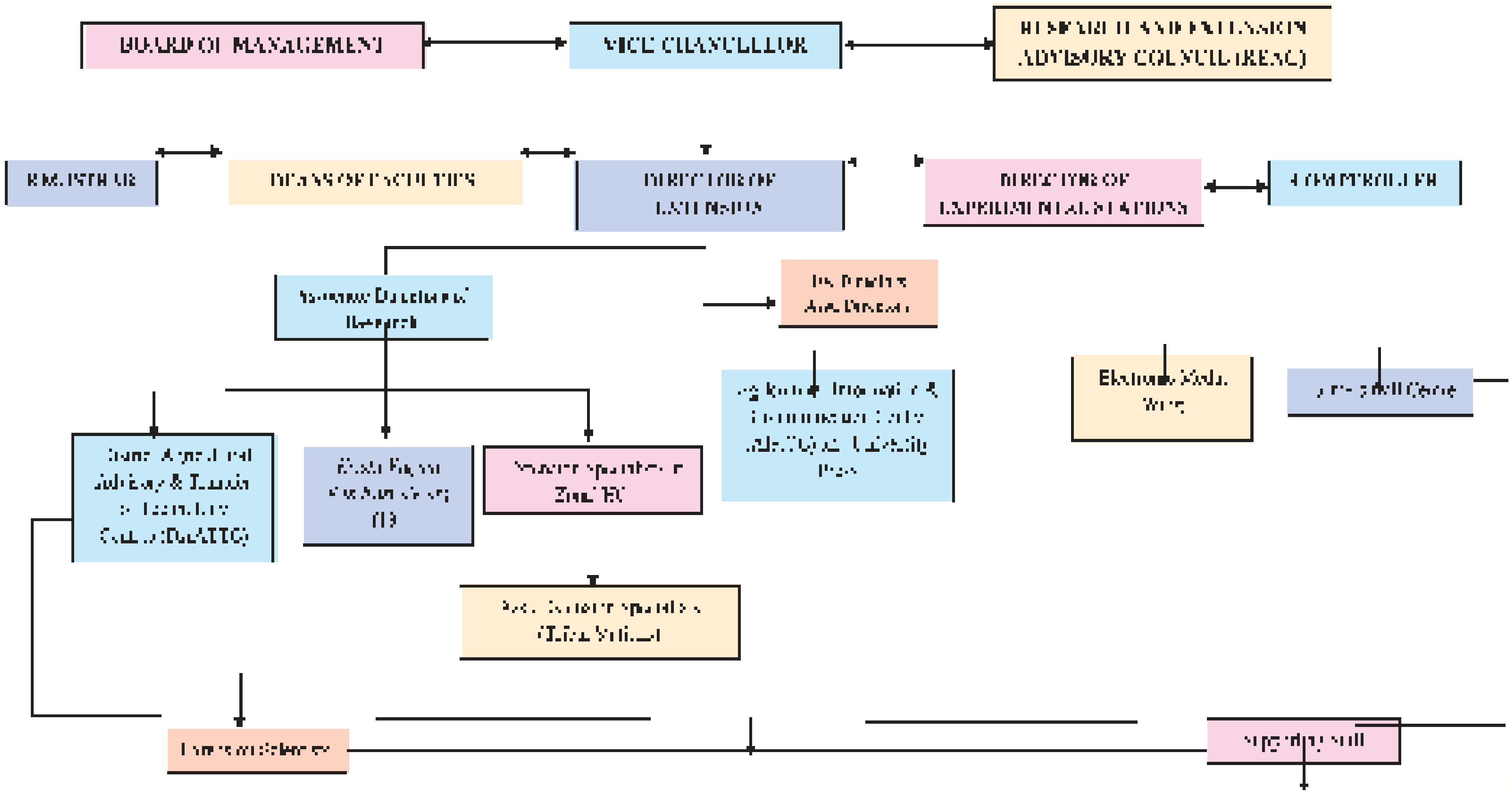


Fig 8. Organogram of Extension in the University.

II. EXTENSION ACTIVITIES

The significant highlights of the extension activities carried out during 2018-'19 are presented below.

1. TECHNOLOGY ASSESSMENT AND REFINEMENT (TAR)

Assessment/evaluation of proven technologies evolved at research stations under farmers' field conditions is a crucial step in delivering successful technologies to farmers. Since, not all the proven technologies at research stations evolved by scientific personnel work successfully under farmers' field situations.It is imperative that the proven technologies need to evaluated at real-time situations before advocating them as blanket recommendations. In this direction, "On-Experimental Station / research-adaptive research-extension" is a continuous process that helps to generate practicable,successful and sustainable technologies to farmers. Besides, technological developments, refinement of already proven technologies that are being adapted at farmers level is another important area where a proven technology will be refined suiting to local needs or based on the situation in demand for the up surging problems. In fact, these aspects like "technology development" and "technology refinement" is a continuous process that helps to generate profitable technologies to yeoman community. Both these two are crucial steps between research and extension for developing location specific sustainable and profitable technologies. Major reasons for yield gaps of proven technologies at research stations and farm fields are erroneously attributed to poor and inadequate extension efforts. However, the ground realty is that the proven technologies at experimental fields at Research Stations could not fare well under farmers' field conditions. That is the reason why, the need and role of "Technology Assessment and Refinement" assumes significance. Both the DAATTCs and KVKs have enhanced extension reach through TAR.

Minikits:

During the year 2018-'19, minikit trials were conducted in Andhra Pradesh by District Agricultural Advisory & Transfer of Technology Centres, Krishi Vignan Kendras and Extension Personnel of the University. During the year 2018-19, the District Agricultural Advisory and Transfer of Technology Centres (13 nos.) and Krishi Vigyan Kendras (5 nos.) together have tested 42 minikit cultures of 10 crops at 1113 locations during Kharif 2018-19 (719 nos.) and Rabi 2018-19 (394 nos.) covering all the districts of the state..

On-Farm Trials (OFTs):

A proven technology in research laboratory is in experimental fields of research stationneed to be tested at farmers' fields and its efficacy needs on-farm evaluation prior to advocating them as recommendations to farming community. In fact, this step is a pre-requisite to evolve a sustainable, economically viable and technically feasible technology to gainwidely acceptance. In this context, On Farm Trials (OFTs) across the state assumes significance. During 2018-19, 309 technologies were assessed by KVKs and DAATT Centres and Extension Specialists of RARSs, covering field crops, horticultural crops, animal husbandry/fisheries and home science. Thefeedback obtained on the performance of these technologies was ready for further action.

Front Line Demonstrations (FLDS):

Our University is actively carrying out Front Line Demonstrations (FLDs) both during Kharif & Rabi seasons every year with goals of a) demonstrating improved technologies at farmers' fields, popularize them for effective management of resources, and to build synergy among all stakeholders like farmers, researchers, planners and agro-industries etc. Both KVKs and DAATTCs have been entrusted with this job majorly. The Extension Specialists in RARS also have the responsibility of conducting FLDs in RARS jurisdiction. With FLDs, a direct interface between researchers and farmers is feasible because scientists are directly involved in planning, execution and monitoring of demonstrations for the technologies framed at their end and to obtain scientific feedback. Along with FLDs, training programmes and field days are being organized to enable rapid dissemination of improved technologies. During the year 2018-'19, a total of 190 FLDs were organized by KVKs in 631.4 ha (1754 farmers) and 47 FLDs by DAATTCs and ESs in 94.85 ha (277 farmers) covering cereals, millets, pulses, oilseeds, commercial crops, fodder crops, vegetables, fruits, flowers, spices, plantation crops, medicinal plants, farm machinery, animal husbandry, aquaculture and home science.

2. DIAGNOSTIC FIELD VISITS

Diagnostic field visits are being conducted every year and in every season by KVKs, DAATTCs, ARS Scientists along with Officers of Department of Agriculture to diagnose the field problems in a particular season and to advocate farmers in person on the plant protection practice. During 2018-2019, a total of 1945 diagnostic surveys were undertaken in different districts of the state. Out of 1945, 597 surveys were undertaken by the DAATTC scientists and ESs alone and 700 by KVKs alone while 648 surveys were conducted jointly by the DAATTC, KVK, ARS Scientists and Officers of DoA. The following are the major biotic and abiotic stresses identified on different crops throughout and timely and relevantAndhra Pradeshprotection advices have been advocated.

Crop	Biotic/Abiotic Constraints Identified
Rice	Stem borer, Gall midge, Leaf folder, sheath blight, Zn deficiency, blast, false smut, leaf mite, potash deficiency, leaf blast, neck blast, panicle mite, sulphide injury, stem borer, salinity problem, bacterial leaf streak (BLS), early panicle emergence, iron deficiency, cut worm, weed problems,White backed plant hopper (WBPH), Kresek phase of Bacterial leaf (BLB), sheath rot, Green leaf stopper (GLH), Brown Plant Hopper(BPH), impact of using over aged seedlings, low plant density,
Maize	Fall Army Worm, spiraling Whitefly, Stem Borer, Banded leaf and sheath blight and bacterial wilt, moisture stress, potash deficiency, cob borer, pink borer, pink borer, aphids, late reproductive blights, Turcicum leaf blight, Zn deficiency, Nitrogen deficiency, phosphorus deficiency, *Spodoptera* andrust.
Jowar	Moisture stress, shootfly, stem borer, aphids and fall armyworm, leaf miner, *Spodoptera*, nematodes, dry root rot and stem rot
Cowpea	Aphids,
Blackgram	Yellow Mosaic Virus (YMV), cuscuta, thrips, white fly, powdery mildew, leaf crinkle, flea beetles, powdery mildew, salt injury, *Spodoptera*, *Maruca* pod borer, *Corynespora* leaf spot, PBND, aphids, rust, *Cuscuta*, stem cankerLeaf curl, aphids, iron deficiency and root rot
Greengram	Thrips, white fly, YMV, leaf curl, powdery mildew, *Maruca* pod borer, aphids, leaf spot,
Redgram	Maruca pod borer, pod fly, wilt, mite, sterility mosaic, *Helicoverpa*, leaf webber, ash weevil, terminal moisture stress, Jewel beetle grub, spotted pod borer,

Crop	Biotic/Abiotic Constraints Identified
Bengalgram	Beet army worm [*Spodoptera exigua (Hubuer)*],dry root rot, wilt, moisture stress, *Helicoverpa armigera*
Cotton	Pink Bollworm, magnesium deficiency, thrips, plant hoppers, white fly, mealy bug, leaf spots, para wilt, wilt, pink boll worm, Fusarium wilt, moisture stress, *Alternaria* leaf spot, grey mold, aphids, jassids, flower drying and boll drop, desiccation, boll rot, root rot, stem weevil,
Groundnut	*Helicoverpa*, leaf miner, *Spodoptera*, early leaf spot, PSND, collar rot, iron deficiency, late leaf spot, moisture stress, sucking pests (jassids, thrips, aphids), stem rot, PBND, weeds and iron deficiency, thrips, mites, leaf webber, root grub, leaf miner, root rot, nutrient deficiencies, wild boars, nematodes, dry root rot,
Sesame	Powdery mildew, phyllody, sucking pests and leaf eating caterpillar
Sunflower	Necrosis, *Helicoverpa armigera*, moisture stress and leaf eating caterpillar
Niger	Cuscuta,
Oilpalm	Boron deficiency, Mg deficiency, Bag worm and fruit rot
Ragi	Blast, stem borer andchaffy grains
Sugarcane	Stem borers , iron deficiency, whip smut, early shoot borer, mealy bug, scale insects, Yellow Leaf Disease, mosaic, grass shoot, whitefly, redmite, yellow mite, smut, red rot, ring spot, mealy bug, termites, internode borer, rust, white grub, top rot, weed menace, weed menace, top shoot borer andred mite
Bhendi	YVMV, Fruit borers and sucking pests
Chillies	Gemini virus, thrips, white fly, mites, pod borers and powdery mildew, *Cercospora* leaf spots, stem &fruit rot, upward and downward curling, midge, fruit borers, *Spodoptera*, die back, *Choanephora* blight, blossom midge, viral diseases, leaf curl, damping off, mites, flower midge and micronutrient deficiencies
Tomato	Fruit borers, *Alternaria* leaf spot, leaf miner (*Tuta absoluta*), wilt, calcium deficiency, powdery mildew, bud necrosis, red spider mite, bacterial streak, early blight, late blight and Septoria leaf spot,
Brinjal	Shoot & Fruit borer, Phyllody, mites, wilt, flower drop, little leaf,
Papaya	Viral complex, Ring spot virus and Leaf curl disease, Alternaria leaf spot, stem rot, flower drop,
Onion	Thrips, root grubs and purple blotch
Cluster bean/Field bean	Flowering problem,
Turmeric	Iron deficiency, leaf blotch, *Rhizome rot, Rhizome fly* and leaf spots
Cauliflower/Cabbage	Butterfly andDiamond back moth

Crop	Biotic/Abiotic Constraints Identified
Coccinia	Powdery mildew
Watermelon	Low fruit set
Betelvine	Root rot
Cashew	Tea mosquito bug and stem and root borer
Mango	Leaf hoppers, anthracnose, powdery mildew, irregular flowering, Thrips (*Mangu*), fruit borer, leaf galls, potassium deficiency, fruit fly, shoot and petiole borer, bark borer, gummosis, micro nutrient deficiencies, fruit rot, leaf webber, sooty mold, zinc deficiencies, dry root rot, rejuvenation of neglected gardens, irregular bearing and flower and fruit drop
Citrus	Root rot, mite, micronutrients deficiencies, citrus canker and dry root rot
Sapota	Leaf webber and mealy bug
Mesta	Mealy bugs and stem rot
Coconut	*Eryiophyid* mite, *Ganoderma* basal stem rot black headed caterpillar, boron deficiency, potash deficiency, *Rugose* whitefly and red palm weevil, red palm weevil, *Rhinoceros* beetle, stem bleeding,
Banana	*Sigatoka* leaf spot, bunchy top virus, bract mosaic disease, nematodes, *Spodoptera*, rhizome rot, thrips and micronutrient deficiency
Cucumber/Cucurbits	Cucumber mosaic virus disease, fruit fly andnematodes,
Ginger	Leaf spot
Guava	Root wilt , nematodes, mealy bug and leaf drying from tips
Musk melon	Fruit cracks, downy mildew, damping off and leaf curl
Apple/ber	
Acid Lime/Sweet Orange	Micro nutrient deficiencies, citrus canker, gummosis, dry root rot, wilt, mites, leaf miner, mealy bugs, scales, thrips, mangu, aphids, black fly, white scales and blossom end rot
Pomegranate	Bacterial blight, anthracnose, thrips and leaf spots
Eucalyptus	Leaf galls
Water melon	Viral diseases
Pumpkin	Fruit rot
Super Napier	Fall army worm and weeds
Drumstick	Wilt
Tamarind	Bagworm
Curry leaf	Leaf eating caterpillar
Chrysanthemum	Browning of petals

Crop	Biotic/Abiotic Constraints Identified
Marigold	Thrips and leaf curl
Jasmine	Mite, die-back, red mite, flower midge and Flower bud borer
Fisheries (Aquaculture)	*Haemorrhagic septicemia* Pangasius, bacterial gill disease in Argulosis Dactylogyrosis - Gill fluke, Pangasius and Rupchand, Myxobolus infection in Catla and Rohu, depletion of oxygen, ammonia toxicity, indiscriminate use of pesticides and medicines- antibiotics; white gut syndrome, white spot viral disease,EMS or RMS, black gill disease, dissolved oxygen depletion, ammonia and nitrite toxicity High plankton bloom and low dissolved oxygen levels, macro vegetation, low plankton color and density, high pH, low pH, stunted growth, red disease and Argulus Body cramp & white muscle, white spot, loose shell, white gut, white muscle disease, running mortality syndrome, EHP disease,
Veterinary	
Buffalo	FMD, Pneumonia, Metritis,
Sheep and Goat	Foot rot, PPR,
Home Science	Drudgery of farm women in agricultural operations iron deficiency, anemia among women in farm families; lack of income generating avenues among women and rural youth, low intake of vegetables and leafy vegetables and Malnutrition among preschool children.

3.CAPACITY BUILDING PROGRAMMES

Various capacity building programmes viz., trainings, skill teachings, vocational trainings, group discussion, fields days and RythuSadassus were organized to build the capacity of clientele groups covering crop production and protection technologies of field and horticulture crops, home science and fisheries by DAATTCs, ESs and KVKs during 2018-19. About 261 capacity building programmes to extension personnel, 929programmes to farmers and farm women, 136 programmes to NGOs and input agencies,111 programmes to rural youth, 526method demonstrations, 44vocational training programmes, 103rythusadassus, 577 group discussions and 141 field days were organized for the benefit of the farmers etc.

3.1 Extension Personnel

The DAATTCs and KVKs conducted 261 training programmes and trained altogether 8498 Extension Personnel. The training programmes included Integrated Pest Management(IPM), Integrated Nutrition Management (INM) and Integrated Water Management (IWM) in maize, groundnut, pulses and oilseeds; soil test based fertilizer application; soil health and fertility; water use management and weed management in different crops; alternate Integrated Dry (ID) crops to rice etc.,

3.2 Farmers

A total of 929training programmes were conducted, covering 31817 farmers and farm women by the DAATTCs and the KVKs. These programmes have focused on latest production technologies in crops such as rice, maize, sunflower, pulses, groundnut, fiber crops and vegetables. They also included aspects like soil test based fertilizer application, climate resilience agriculture, value addition to millets, use of biofertilizers, vermin-compost, sheep and goat rearing, integrated farming system, farm mechanization, formation and management of Self Help Groups (SHGs), farmers' organizations, preparation of low cost nutritious diet, preparation of value added multi grain products, weaning foods for infants and amylase rich food preparations etc.

3.3 NGOs

A total of 136 training programmes were conducted benefitting 4169 personnel of NGOs, banks and input dealers. The training programmes covered particularly aspects like soil testing, based fertilizer application, plant protection measures in vegetables, critical interventions in production technologies and cost reduction technologies in agriculture, horticulture and animal husbandry, vermin compost, bee keeping, soil health management, seed village programme, integrated storage pest management and long term-storage of cereals.

3.4 Skill Teachings

A total of 42 skill teachings were imparted by KVKs and DAATTCs to 514 farmers and rural youth. The training programmes imparted skills on preparation of value added millet products, micro &macro finance, poultry rearing, IPM practices for pink bollworm in cotton, pest and disease management in rice, management practices for fall army worm in maize,establishment of pheromone traps, identification of fall armyworm, sticky traps usage in Sugarcane, direct sowing with Ferti cum Seed Drill, seed treatment in rice, direct sowing with Drum seeder, stem application in cotton, direct sowing with drum seeder, Installation of tricho card in sugarcane for management ESB, diagnosis and management of major pests and diseases in different crops and mushroom cultivation etc.,

3.5 Vocational Trainings

With a motive to encourage self-employment, the KVKs have been entrusted with the job of imparting vocational trainings to farmers. The DAATTCs have been imparting these kinds of trainings to final year undergraduate students during their RAWEP. During 2018-'19, altogether, the extension wing of ANGRAU have imparted 44vocational trainings. The KVKs have organized 44 to 1685 trainees/beneficiaries that included men and women farmers, rural youth and other stakeholders). The broad areasthat were covered include 1) millet based products and value addition; 2) nutri-gardens & backyard poultry; 3) value addition in fruits & vegetables; 4) mushroom cultivation; 5) production and management of nurseries of horticultural crops & vegetables; 6) vegetable production in shade net; 7) IPM in rice &vegetables; 8) vermi-composting; 9) management practices in rabi crops; 10) farm mechanization and technology; 11) quality seed production; 12) captive nursery rearing of fish seed as income generation activity; 13) friends of coconut tree (FOCT); 14) bee keeping & maintenance; 15) training, pruning and grafting techniques in cashew; 16) personality development, communication skills and entrepreneur skills to students; 17) preparation of botanical pesticides and usage in different crops; 18) jute bag making; and 19) tie and dye of fabrics etc.

3.6Group Discussions

A total of 577 group discussions were organized by the DAATTCs and KVKs for 10,028 farmers during 2018-19. The topicsincluded like culture of improved fish varieties in fresh water fish tanks, problems in Shrimp culture, zero tillage maize, pre-*kharif* action plan, systems of rice cultivation, reciculatory aquaculture, nutrient and weed management practices in rice, mushroom cultivation, liquid biofertilisers, importance of nutritional garden, remedial Measures for cyclone affected crop, fertilizer application in coconut, importance of pheromone traps in vegetable crops, weed management in pulses, importance of terrace garden, staking in tomato, drip irrigation in banana, awareness on income generation activities, awareness on drudgery reduction tools, anaemic problems in pregnant women and adolescent girls, IPM in vegetable crops, Paddy production technologies, entrepreneurship development, viral disease management in cucurbits, plant propagation techniques of horticultural crops, interpretation soil health cards, pests and diseases control measures in citrus,marigold cultivation, tuberose production technology,waste decomposer preparation and uses, safe storage of pulses for seed purpose, fall army worm management in Maize, Cashew pest management, YMV management in summer pulsesetc.

3.7 Field Days

A total of 141 field days were conducted by DAATTCs and KVKs and benefited 4761 farmers. These included field days on performance of MTU-1156 paddy variety, cluster frontline demonstrations of bengalgram and seed hub, MSRI in rice, rhizome rot management in turmeric, drum seeder technology in rice, TCGS 1694 performance, performance of NLR 3354, NLR 3186, NLR 3354 minikit of Paddy, K 1735 minikit of groundnut, greengram GGG-oneminikit, soil test based fertiliser application in paddy rice fallow jowar, weed management in bengalgram, double cropping system, rice minikit MTU 1217, MTU 1210,tomato,liquid bio fertilizer in rice, introduction of marigold as an alternative crop to tomato in late *kharif* etc.

4. Kisan Melas

A total of 17 Kisan Melas were organized during the year 2018-'19. At research stations, Kisan Melas were organized at RARS, Lam (22/01/2019 & 15.03.2019); RARS, Nandyal (12& 13/12/2018); RARS, Anakapalle (28/11/2018 & 15/02/2019); RARS, Chintapalle (07/02/2019); RARS, Maruteru (26/03/2019); ARS, Kadiri (20/11/2018); ARS, Nellore (27/02/2019); ARS, Peddapuram (28/02/2019); ARS, Vizianagaram (30/01/2019); Agricultural College, Naira (30/03/2019); KVK, Reddipalli (24/02/2019); KVK, Amadalavalasa (23/02/2019); KVK, Lam (25/10/2018); and KVK, Banavasi (12/12/2018). For the Kisan Mela organized by RARS, Lam at Swarna Bharat Trust, Athkur, on March 15, 2019, Shri M. Venkaiah Naidu, Hon'ble Vice President was the Chief Guest. The Farm Mechanization Kisan Mela organized on February 15, 2019 at RARS, Anakapalle by PHET, Anakapalle and PHET, Bapata on agricultural technology and is a "Technology & Machinery Demonstration cum Kisan Mela". With Kisan Melas, awareness is being created to educate farmers on latest farm technologies and developments. Farmers and other stakeholders have an opportunity to witness latest technologies, live demonstrations, informative agricultural exhibitions, interaction with the scientists, input agencies. Exhibitions, Rythu-sadassus, and field visits were part of these Kisan Melas.

Hon'ble Vice-President, Shri. M. Venkaiah Naidu addressing the farmers on the eve of Kisan Mela at Swarna Bharath Trust, Atkur, Krishna District (ARS, Ghantasala)

Hon'ble Vice - Chancellor, Dr V. Damodara Naidu, ANGRAU addressing farmers at Kisan Mela of ARS, Vizianagaram and book release in Kisan Mela of RARS, Nandyal

5. DISTANCE EDUCATION

Open and Distance Learning Centre (ODLC):

The KVKs have been involved in conducting contact classes for the certificate courses offered through Open and Distance Learning Centre (ODLC), which was established in the University. During 2018-19,two batches of organic farming (433 candidates) and one batch for terrace gardening (135 candidates) were completed. Three contact classes for each batch at monthly interval were conducted at the KVKs. Subsequently, the certificate courses on mushroom cultivation and bee keeping were also started.

Certificate Course on Organic Farming organized at KVKs

AI&CC Programmes

ANGRAU is one of the few Agricultural Universities in the country to start distance education through a private TV channel, ETV under "Annadata-Velugubata" programme from 2nd October, 1998 twice a week, Tuesday and Friday. To facilitate these efforts, initially 'Electronic Media Wing' was established during 2001 to promote e-extension, however after bifurcation of the University, it was made functional once again from July, 2016.

6. PHONE IN LIVE PROGRAMMES:

I) TV programmes: The Phone in Live Programmes were telecasted in popular TV channels like Pasidipantalu (Doordarshan), Annapurna (TV5), ETV-Annadata, JaiKisan, DD-Saptagiri, 24X7-TV, CVR News, etc. during 2018-'19. All the topics pertaining to crops cultivated in AP were covered by the Extension Scientists from all the agro-climatic zones. The Electronic Wing identified the topics and the resource persons for 36 programmes telecasted on Doordarshan phone-in-live programme during the year, 2018-19.

II) All India Radio (AIR): A total of 137programmes were broadcasted in AIR by the Scientists covering all the important aspects of agriculture and allied activities during 2018-'19.

III.Vyavasaya Patasala in All India Radio (AIR) Using the services of ANGRAU Scientists, the "Vyavasaya Patasala" program is being broadcasted in All India Radio (AIR) on every Monday. During 2018-'19, a total of 61 programs were broadcasted.

IV. Vyavasaya Suchanalu in Telugu Dailies In order to have wider dissemination of the technologies generated by the University, ANGRAU is regularly contributing technical content for Vyavasaya Suchanalu weekly for publication in telugu daily newspapers in 13 districts of Andhra Pradesh since 2014. These weekly advisories get published in Sakshi (Padi Panta column) on every Monday, Prajasakthi (Agri Plus column) on every Friday, Andhra Jyothi and Andhra Prabha newspapers. Besides newspapers dailies, the weekly advisories are provided to the farmers through Kalgudi and Reliance Foundation Information Services as well.

V.Electronic Wing Blogspot (www.angrauew.blogspot.in)

In order to provide the agricultural information with customized, visual, multi-perspective and multi-level active service, digital agricultural information resources sharing plan based on cloud computing to integrate and publish the digital agricultural information resources efficiently and timely is proposed (URL : https://angrauew.blogspot.com/)

VI.ANGRAU YouTube Channel:

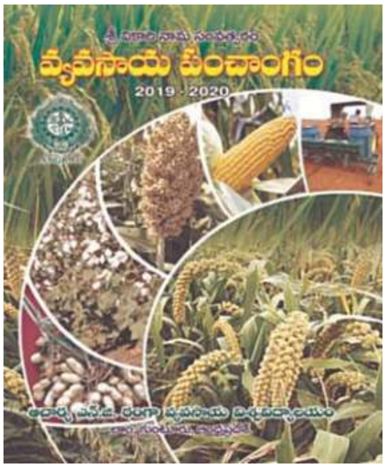
An effective tool to reach the needy with video content. It was inaugurated by the Hon'ble Vice-Chancellor on 13th October, 2017. About 610 Subscribers with 40502+ views, this media founds very promising to reach the unreached(URL: https://www.youtube.com/channel/UCD8_GxXQpdBogS5AwwFkKTQ/featured).

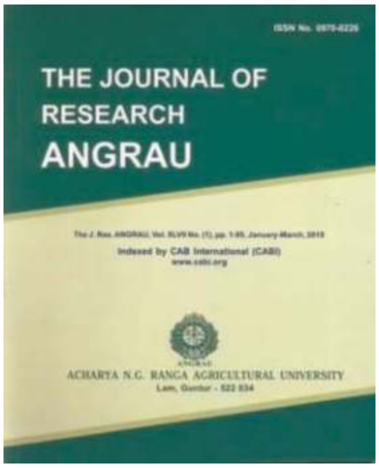
7.TECHNICAL PUBLICATIONS

Agricultural Information and Communication Centre (AI & CC), Guntur has brought out the following publications during the year, 2018-'19.

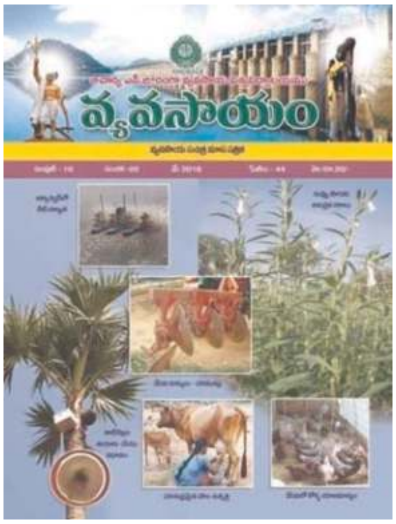
- VyavasayaPanchangam, 2019-2020
- Journal of Research, ANGRAU (Quarterly)
- Vyavasayam – Monthly Telugu Farm Magazine
- ANGRAU e-News Letter

VyavasayaPanchangam 2018-19 was released by the Principal Secretary, Department of culture, Governmentof Andhra Pradesh on 06.04.2019 during Ugadi celebrations held at Vijayawada





Vyavasaya Panchangam The Journal of Research ANGRAU



VyavasayamANGRAU e-NEWS letter

Release of Vyavasaya Panchangam 2019-'20 by the Principal Secretary, Dept. of Agriculture, Govt.of A.P. on UGADI Day Celebrations at Vijayawada

8. DIPLOMA IN AGRICULTURE EXTENSION SERVICES FOR INPUT DEALERS (DAESI)

One year long duration training under DAESI programme for 120 inputs dealers was organized at two KVKs viz., Kalikiri and Utukur and at DAATTC, Vizianagaram during the year 2018-'19 to transform them as para-extension professionals. The trainings were organized as classroom teaching and field visits during Sundays or on local market holidays. The field visits intended to acquaint the input dealers with location-specific field problems and expose them to relevant technologies. The programme is spread over a period of 48 weeks, with 40 classroom sessions and 8 field visits to various institutions and farmers' fields.

Training to Input Dealers at DAATTC, Vizianagaram and KVK, Kalikiri

9. TECHNOLOGY WEEKS

In order to sensitize the farmers about the technologies at Instructional farm and to inculcate the habit of visiting KVKs and also for direct interaction of farmers with the scientists, **technology week** for duration of 1-5 days were organized at KVKs at Kalikiri and Amadalavalasa in which 1160 farmers participated,at KVK, Amadalavalasa this programme was organized on "Agriculture and Allied Sectors". At KVK, Kalikiri, the topics covered under this programme were a) Farmer Scientist Interaction Programme; b) World Soil Day Programme; and c) Pre-Rabi Sammelan.

10. ATTRACTING AND RETAINING YOUTH IN AGRICULTURE (ARYA)

Attracting and Retaining Youth in Agriculture (ARYA) is a flagship project of ICAR that was launched during March, 2015 as one of the components of National Agricultural Innovations Fund. The main objectives of the programme are to attract rural youth to take up various agriculture, allied and service sector enterprises, to enable youth to establish network groups to take up capital and resource intensive activities like processing,value addition and marketing and to demonstrate linkages with different stake holders for sustainable development of youth.ARYA has been implemented by two KVKs in ANGRAU viz., Nellore and Utukur. The KVK, Utukur was added at the end of financial year, 2018-'19.

KVK, Nellore established 55 enterprise units related to vermin compost production (20 No), mushroom production (15 No.) and production of vegetable and fruit nurseries (20 No.) benefitting 115 rural youth in the district. KVK, Nellore organized 3 different skill training programmes on vermin composting, raising of fruit and vegetable

Vermicompost Unit

nursery, construction of shade nets and portray nursery technology and mushroom production benefitting 361 rural youth. In respect of KVK, Utukur, four enterprises *viz.,* vermicomposting, value addition to millets, mushroom production and raising of nursery under shade net. KVK formed nine groups with 21 members in the identified four enterprises.

11. VILLAGE ADOPTION PROGRAMME

This programme enables adoption of agricultural technologies developed at research stations of ANGRAU without any time lag. The objective of this village adoption programme is to develop the selected/adopted village. All the RARS, few research stations and Colleges of ANGRAU have adopted one village during this year. The programme works by adoption of one village by each of these stations and implementation of technologies through utilization of Farmer-Scientist Linkages in technology transfer. During 2018-19, about 30 centres comprising 11 colleges including Advanced PG Centre, Guntur, six Regional Agricultural Research Stations and 13 Agricultural Research Stations (Ragolu, Seetampet, Vizianagaram, Peddapuram, Garikapadu, Vuyyur, Bapatla, Darsi, Nellore, Podalakur, Perumallapalli, Reddipalli and Kadiri) conducted 271 diagnostic team visits covering 2,258 farmers, 90 demonstrations on 1,408 farm holdings, 118 training programmes benefitting 3,217 farmers, 11 animal health camps covering 1,520 animals and 880 mobile advisories to 1,622 farmers besides seed replacement in 385.20 ha area in rice, millets, pulses and oilseeds. Tree plantation also was taken up in some of the adopted villages.

12. T & V MEETINGS (Training & Visit Meetings)

The Training & Visit meetings were conducted during the 1st Saturday of every month at all the 13 lead research stations of ANGRAU. Interaction takes place between the Scientists and Officials of Department of Agriculture and other line departments such as Joint Director, Assistant Directors on crop condition, field problems, impact points

T & V Workshop at RARS, Nandyal

T & V Workshop at ARS, Amadalavalasa

13. ERUVAKA PURNIMA

Eruvaka Purnima was celebrated on 28th June, 2018 and on this occasion all the best management practices were showcased for the benefit of the farmers, the active participation of DAATTs and KVKs in all the districts of state. Farmers were also educated about the critical interventions impacting the productivity, good agricultural practices leading to cost reduction and profitable farming.

Participation of KVK, Banavasi in (Eruvaka Purnima)

Participation of KVK, Reddipalli

14. POLAM PILUSTONDI

All the Scientists of DAATTCs and KVKs of ANGRAU have actively participated in the POLAM PILUSTUNDI organized by the State Government in all the districts of AP held on Tuesday and Wednesday of every month during the year under report

15. AMC LEVEL INTERACTION MEETINGS:

All the Scientists of DAATTCs and KVKs of ANGRAU have actively participated in the AMC level interaction meetings organized by the State Government in all the districts of AP held on 1st and 16th of every month during the year under report.

16. POLAMBADI:

The activities of Polambadi organized by the Official / Functionaries of Department of Agriculture given active support by the scientists of concerned KVKs, DAATT centres, RARS and ARS of ANGRAU for the officials / functionaries of State Department of Agriculture during 2018–'19.

17. JANMABHOOMI – MAA OORU

All the Scientists of DAATTCs and KVKs of ANGRAU have actively participated in the Janmabhumi – Maa Ooru programme during 2018-19. This is an opportunity for the Scientist to conduct exhibition, have exposure to farmer problems, interact and recommend the package of practices with farmers and suggest the remedial measures on the spot.

18. NATIONAL INITIATIVE ON CLIMATE Resilient Agriculture (NICRA)

National Innovations in Climate Resilient Agriculture (NICRA)is a multi-institutional and multi-disciplinary network project launched by ICAR in 2011.The project aims to enhance resilience of Indian agriculture to climate change and climate variability through strategic research and technology demonstrations.The Technology Demonstration Component (TDC) of NICRA was implemented through 3 KVKs *viz.,* Amadalavalasa, Undi and Reddipalli in ANGRAU. KVKs conducted demonstrations, capacity building and extension activities on climate resilient technologies in NRM, crop production, livestock & fisheries and institutionalCFLD on sesame at KVK, Garikapadu Renovation of Check Dam (Reddipalli), Effect of Check dam filled with water (Reddipalli) interventions. A total of 44 demonstrations were organized in 566 ha benefiting 1097 farmers under NRM interventions. Under institutional interventions, custom hiring center, a total of 204 farmers were benefited. Through capacity building and extension activities, awareness on climate resilient technologies was brought about benefitting 775 and 1009 farmers through 49 and 60 activities respectively.

Natural Resource Management

Renovation and desilting of check dams

KVK, Anantapur Three check dams situated near NICRA village at Anantapur were desilted during 2018-'19, increasing their dimensions from 26 x 11 x 0.5m, 55 x 04 x 0.5 m and 92 x 11 x 0.5 m to 78 x 12 x 2.0 m, 60 x 12 x 2.0 m and 100 x 17 x 2.0 m and storage capacity to 18,72,000; 14,40,000 and 34,00,000 liters of water, respectively. The water stored in the check dam was used for supplemental irrigation with drip and sprinkler system for crops and as drinking water for livestock. Bore wells (15) and open wells (6) in the vicinity of the check dams were recharged and 14 beneficiary farmers could take up cultivation of crops like pomegranate, yellow jowar, tube rose, curry leaf, sweet orange and red gram in 96.5 acres of area.

Crop Production :

Up scaling was done with the previous successful interventions in the adjoining villages by the KVKs.

Flood tolerant varieties:

Flood tolerant rice varieties MTU-1061, RGL-2537 and MTU-1064 were demonstrated at KVK, Amadalavalasa and had been found continuously performing well during floods, compared to Swarna MTU (7029) and Samba mahsuri in flood prone areas. With this intervention, yield loss due to floods was reduced to an extent of 16.6 % due to inundation of rice for 3-4 days and 14.10 per cent in low inundated areas (1-2 days). These varieties had spread to other villages considerably. Zero tillage maize: Zero tillage maize was demonstrated at KVK, Amadalavalasa against normal method of maize cultivation and in place of blackgram (as crop diversification), which is very much affected byYMV due to low temperature in winter resulted in cost reduction by Rs. 3300/ha and additional return of Rs. 7520/- per ha. (KVK, Amadalavalasa).

Flood tolerant variety MTU 1149 (Bhima) was demonstrated at KVK, Undi against Swarna and Bhima was found to give average grain yield of 7657 kg/ha as against 7040 kg/ha in check variety.

Integrated Farming System with rice, horticulture and fish was demonstrated in adopted village of KVK, Undi and was yielded toadditional income of Rs. 63,750/- per ha.

Crop diversification with drought resistant jowar variety, NJ-2446- at KVK, Anantapur against groundnut was demonstrated to reduce the risk from delayed sowings in view of the late onset of monsoon and higher returns (Rs. 29750/- per ha) were recorded.

Livestock and Fisheries

Evaluation of Probiotic (CIBASP) for water quality management in shrimp culture ponds: In order to maintain good quality water in shrimp ponds, KVK, Undi demonstratedthe use of probiotics in an area of 10 ha covering 5 farmers to avoid stress, disease incidence and sudden mortality of shrimps. The treated pond recorded 55.55 % improved yield with an additional net income of Rs.4,08,222/- ha with favourable B:C ratio of 2.18 over the farmers practice. In order to maintain good quality water in shrimp ponds, demonstrations on use of probiotics were taking.

Institutional interventions

Custom hiring center

Custom Hiring Centers are maintained by the Village Risk Management (VCRMC) in the NICRA adopted villages at three centres indicated that 139 farmers utilized the implements for undertaking field operations in an area of 574 ha and revenue credited into bank accounts was Rs. 66,479/-.

19. AWARENESS ON PROTECTION OF PLANT VARIETIES & FARMERS RIGHTS ACT 2001

The KVK, Rastakuntubai organized PPV&FRA programme on 5th December, 2018 with an objective of creation of awareness among farmers and other stakeholders about the provisions of Protection of Plant Varieties and Farmers Right Act 2001. The participant farmers were made aware of the provisions of the protection of plant varieties by conducting trainings, awareness programmes and registration of farmer's variety. Distributed information material and organized exhibitions on different types of seeds and plant bio-diversity.A total of 256 participants attended the programme including farmers, scientists, public representatives, extension officials, other stake holders and students of agricultural colleges.

20. PARTNERSHIP ACTIVITIES OF ANGRAU WITH RELIANCE FOUNDATION

Reliance Foundation Information Services (RFIS) provides validated information services with help of Acharya N.G. Ranga Agriculture University expertise to different livelihood information seekers using modern Information and Communication Technologies (ICT). The Information is disseminated though audio, dial out conferences, local cable TV scrolls, live-phone-in programmes, agro advisories on daily basis, weather news bulletins, Voice advisories, text SMSs, Jio Chat, What's app and field based programmes such as knowledge on wheels, plant clinics and training programmes covering agriculture and allied sectors. During Titily cyclone during October, 2018, the farmers were alerted well in advance to take the necessary steps to reduce the crop losses through timely precautionary alerts and advisories received from ANGRAU.

During the year, 2018-'19, 644 advisories were sent to 13, 66,116 farmers covering 1564 villages organized 302 field based interactive programmes benefitting 11,373 farmers, answered 18,366 queries and developed 24 short video advisories (1to 3 minutes) in coordination with ANGRAU scientists.

Participation of ANGRAU scientists in different activites of Reliance Foundation information Services

Partnership with SERP under APRIGP:

In order to upgrade the knowledge and skills of the members of Farmers Producer Organizations (161 mandals) assisted by the Society for Elimination of Rural Poverty (SERP), the University had entered MoU with SERP and implementing the project entitled "Collaborative Strategies of ANGRAU – SERP in enhancing the livelihoods of small and marginal farmers & Nutri & Hygiene entrepreneurship promotion in Andhra Pradesh" under Andhra Pradesh Rural Inclusive Growth Project (APRIGP). Capacity building programmes and establishing demo units at FPOs and institutions were proposed.A workshop on planning and execution of was organized by the University on 19th November, 2018 at ANGRAU, Lam, Guntur and it was decided to prepare the action plan for organizing the capacity building programmes in all the districts simultaneously besides providing the quality seed of improved varieties.. During 2018-19, a total of 255 capacity building programmes were organized at district level and at FPO mandal level on commodities to FPO members and on nutri-gardens, backyard poultry and value addition to millets to SHGs benefitting 10,200 members. In addition, 16 apiary units were established at KVKs/research stations/ colleges.

26. WORLD SOIL DAY- SOIL HEALTH CARDS

The KrishiVigyanKendras celebrated World Soil Day on 5th December, 2018 involving technical personnel, local ministers, members of parliament, MLCs, MLAs and other public representatives and farmers. Soil health cards aimed at helping farmers to improve productivity through judicious use of inputs. During 2018-19, the KVKs in ANGRAU were provided with mini soil testing kits. All KVKs of ANGRAU had analysed 10,196 soil samples with the Soil Testing Laboratories (STL) established and Mini Soil Testing Laboratories (MSTL). A total of 10,391 soil health cards were distributed benefitting 8,778 farmers from 1,635 villages.

Distribution of soil health cards at KVK Darsi and KVK Ghantasala

27. TRIBAL SUB PLAN (TSP)

Three KVKs at Darsi, Rastakuntubai and Kondempudi have been identified by the ICAR for implementing the activities under Tribal Sub-Plan, with an aim to provide physical and financial security to the members of the tribal areas against any kind of oppression and exploitation. Certain activities were taken up by these KVKs to improve the socio-economic conditions, reducing poverty and unemployment in the operational area and include technology assessment (OFTs), FLDs, capacity building programmes (training to farmers,

Distribution of Improved breeds of poultryKadaknath breed

rural youth, extension personnel and skill development training programmes), extension activities and physical assets/micro-enterprises creation for income generation.During 2018-19, the KVKs organized 18 skill development programmes benefitting 785 farmers on poultry, value addition to millets, fruits and vegetables, vermicomposting, apiary, nursery raising, pruning and canopy management in mango and cashew, mushroom cultivation, management of problem soils, fortification of locally available foods etc. A total of 70 physical assets such as vermicomposting units, backyard poultry, egg incubator, mushroom production units, pulverizes, mini rice mill, shade net, tarpaulin sheets, sheep unit, IFS units, multi grain floor mill, and apiary units were created benefitting 871 tribal farmers. Two exposure visits were also undertaken to IIHR, Bangalore and Veterinary College, RARS, Tirupati and ARS, Perumallapalli by KVKs of Darsi and Kondempudi benefitting 45 tribal farmers. A total of 1,556 soil samples were analysed by Darsi (1000 no), Rastakuntubai (229 no.), Kondempudi (327 no) and distributed 1,542 soil health cards.

29. CFLDS ON OILSEEDS UNDER NMOOP

CFLDs on oilseeds were conducted under the National Mission on Oilseeds and Oil Palm (NMOOP) during kharif, rabi and summer seasons on groundnut, sesame, sunflower, castor, and safflower.A total of 680 Cluster FLDs on groundnut were conducted during kharif (144 ha: 335 demos) and rabi (150 ha; 345 demos), covering an area of 294 ha; 25 Cluster frontline demonstrations on sunflower were conducted during rabi season in an area of 10 ha,95 cluster FLDs in Castor were conducted covering an area of 40 ha both in kharif (10 ha: 20 demos) and rabi (30 ha: 75 demos) seasons anda total of 196 cluster FLDs in Sesamum were conducted in six districts covering an area of 80 ha in rabi (40 ha; 96 demos) and Summer (40 ha; 100 demos) with Sarada (YLM 66)..

30. SEED HUBS ON PULSES

“Seed Hub Project” on pulses was initiated by Ministry of Agriculture and Farmers Welfare, Govt. of India during 2018-19 with an aim of production of quality seed in pulses.In ANGRAU, three KVKs were identified for implementing Seed Hub programme viz., Reddipalli, Ghantasala and Amadalavalasa.The total quantity of 607.5 quintals of certified and foundation seed of blackgram LBG 752, 787, TBG 104, redgram LRG 52, PRG 176 and greengram WGG 42 produced under the project.

31. REACH EVERY PANCHAYAT

Reach every Panchayat is a unique programme formulated and implemented by ANGRAU with a goal of reaching every Panchayat of the state to disseminate improved technologies developed by the University. As a part of the programme, one key informant farmer is identified in each Panchayat who will influences other farmers’ decisions in farming. The key farmer along with Sarpanch of the Panchayat are trained and oriented with the best management practices, critical interventions for increasing the productivity of major crops grown in that area, government schemes and ICT applications. They were provided with prestigious publication of the University ‘VyavasayaPanchangam’ and subscription to ‘Vyavasayam’ telugu agriculture magazine published by University This programme was implemented in six districts by three DAATTCs (Amadalvalasa, Peddapuram, Guntur) and three KVKs (Kondempudi, Garikapadu and Banvasi). These centres organized training programmes benefitting 1,260 farmers covering 630 villages.


Reach Every Panchayat programmes at DAATTCs Peddapuram and Guntur

33. FLAG METHOD OF EXTENSION

The DAATTC/KVK scientists during their tour, visited the road side / nearby farmer's fields, the yellow / conspicuously visible 'Flag' containing name of the centre, contact no, date of visit, crop, problem identified and remedial measures, is placed in the farmers field with any of the plant material at a strategic point to be visible to the farmer. Whenever the flag is seen by the concerned farmer, he / she read the message written on the flag, he/she can take instant action based on the recommendations. During the year under report, all the DAATTCs and KVKs of ANGRAU practiced the flag method of extension. All the DAATTCs and KVKs of ANGRAU arranged 458 Flags.

34. DEVELOPMENT OF FARMER MASTER TRAINERS

It is the process wherein an identified 15-20 farmers selected from different villages spread over 2-3 mandals of a district, are being provided training (knowledge & skills) at critical stages of the identified crop. The training is staggered over the crop season to the same farmers who will be exposed to technologies at different critical stages of crop cycle, (4-5 trainings of 1 day duration) facilitating the Farmers as Master Trainers. Once they have developed mastery over the crop selected, they are in turn used as Resource Farmer for training other farmers of their locality. During the period under report, the DAATTCs and KVKs of ANGRAU put together organised 21 trainings to make Farmers as Master Trainers on the crops such as paddy, maize, ragi, foxtail millet, groundnut, and beekeeping, mushroom cultivation and backyard poultry.

35. INNOVATIVE FARMERS NETWORK

The Innovative Farmers Network was initiated by ANGRAU in 2012. One innovative farmer among the five farmers felicitated by the DAATTC during its Foundation day celebrations was identified as Coordinator of the Innovative Farmers Network. The main objective of this network is to promote farmer to farmer extension.The Coordinators of network were provided with technology support by the DAATTCs and KVKs to update their knowledge and skills, who in turn need to share their skills and knowledge to other farmers of the network (30 members) in the district. DAATTC, Guntur organized review workshop on the activities of innovative farmers of 13 districts (13 no.) was held on 3rd and 4th July, 2018 at Agricultural College, Bapatla. From the year 2019-2020, second co-ordinator was also identified for each Innovative Farmers Network.

36. ANNAPURNA - AN ALTERNATE "ICT MODEL"

Interactive Information Dissemination System (IIDS) named as Annapurna Krishi Prasaar Seva (AKPS) is an integrated model to address the problems of farmers by using ICT applications. IIDS is a Web, Mobile and IVRS based application, where the farmers are required to be registered with their farm and other details. This system enables data to be transferred from farmers to experts and back in the form of voice, text, images and videos. The model is operational in all 13 districts of Andhra Pradesh through eight KVKs and five DAATTCs (KVKs – Nellore, Amadalavalasa, Utukur, Reddipalli, Darsi, Garikapadu, Undi, Kalikiri and DAATTCs Banavasi, Guntur, Vizianagaram, Peddapuram, Kondempudi). Total number of farmers registered are 14,558, no of Queries solved centre and discipline wise 2,929, no.of messages messages (Text and Voice) are 1,675 (Text messages) and 1,675 (voice messages) during 2018-2019.

37. MOBILE APPLICATIONS

Several android based mobile applications were developed and kept for downloading by the farmers free of cost from Google Play Store. The applications developed /supported from ANGARU are

- **Eruvaka**: Developed by DAATTC, Visakhapatnam in 2015 and provides information on complete package of practices for rice, sugarcane, pulses, cotton, maize and oil seeds in Telugu and Englishand about 700 downloads were made during 2018-19 with a rating of 4.5. The app is updated with additional features of IMD Weather Forecast & AKPS Toll Free Number.
- **Krishi Vigyan:**Developed by KVK, Amadalavalasa in 2016 and provides information on complete package of practices for rice, blackgram and greengram, coconut and maize in Telugu with photographs, video clips with additional feature of telephone directory of research and extension centres of ANGRAU.A total of 2456 members had downloaded during the year 2018-19, with a progressive total of 33,747 members.The app is having a rating of 4.3/5.
- **ManaVerusanaga:** Developed by RARS, Tirupati in 2016 and provides information on complete package of practices for Groundnut in Telugu with photo graphs and about 1500 downloads were made during 2018-19 with a rating of 4.8/5.
- **Fertilizer Calculator :** App developed by Krishi Vigyan Kendra, Banavasi, Kurnool district under Acharya N.G. Ranga Agricultural University and ATARI, Zone-X, Hyderabad in the year 2019 and is useful to the farming community as well as for academicians, scientists, extension personnel, students (Undergraduates and Postgraduates) and also to input dealers in agriculture and other stake holders engaged in agriculture sector with a rating of 4.8/5 and 840 downloads during the year, 2018-19.
- **ANGRAU Pasuposhan :** App developed by Krishi Vigyan Kendra, Banavasi, Kurnool district during 2018. It caters to the needs of livestock which covers cattle management, sheep and goat rearing, poultry (layer & broiler), strategies for doubling the farmers income, best management practices along with good quality pictures. This App has a rating of 4.8/5 and 400 downloads during the year, 2018-19.

ANGRAU PasuposhanFertilizer Calculator Krishi Vigyan App

37. AGRICULTURAL TECHNOLOGY HUB:

A ICT initiative in RARS, Tirupati was initiated on 16-3-2016 (on Kisan Mela day) for providing mobile based agro advisory services through mobile voice calls, SMS, existing social media networks like (whatsapp). For this purpose, a smart phone and a BSNL mobile connection bearing number 9441670829 was taken and made popular among the farmers in the Southern Zone. Three whatsapp groups were created each for one district in the Southern Zone and agro-advisory services are being provided.

38. POCKET CARDS

An innovative low cost extension methodology in transfer of technology was introduced. The critical crop interventions were published on a single small card of size 3"X4", in multi colour on either side highlighting the important points of the technology with attractive pictures and easily fits into the pockets of the farmers is a pocket card. The card also contains the details of key contact persons for further information. KVKs and DAATTCs had used these pocket cards for fall armyworm and pink bollworm during 2018-19.

39. SWACHHTA HI SEWA

The Swachhta Hi Sewaprogrammes were organized at 13 KVKs from 15.9.2018 to 02.10.2018. KVKs performed Shramdhan in 151 villages benefitting 4298 participants and contributed towards cleanliness and hygiene in adopted villages/ public places. Rallies, awareness campaign in schools and colleges, cleaning of office, farmers' hostel, laboratories, weeding in demonstration plots, awareness camps in adopted villages, training programmes on cleanliness and sanitation, cleaning of public places, display of banners, etc. were undertaken during the period. Local public representatives and officials took part in this programme.

40. MAHILA KISAN DIWAS

Women comprise a major workforce in Indian agriculture and they play multi-dimensional role in agriculture and allied sectors. According to the Food and Agriculture Organization (FAO), women participate in 48 per cent of agriculture-related employment in India and around 7.5 crore women are actively involved in livestock management. In this back drop,all KVKs and DAATTCs organized Mahila Kisan Diwas on 5th December 2018 and also participated in the meetings, organized by State Department of Agriculture in all the districts of Andhra Pradesh. Agricultural Exhibitions were arranged on the occasion. About 786 farm women participated in the event.State level meeting was organized at Vijayawada, wherein the promising and breathing entrepreneurof KVK, Reddipalli, Smt. B.Nirmala Naik was felicitated on the occasion.

Felicitating the progressive farm women by KVK, Darsi

Mahila Kisan Diwas at KVK, Banavasi

Pradhan Mantri Kisan Samman Nidhi (PM-Kisan):

The Pradhan Mantri Kisan Samman Nidhi (PM-Kisan) was inaugurated through live web cast held at Varanasi on 24th February 2019 by Hon'ble Prime Minister of India, Shri Narendra Modi was telecasted by all 13 KVKs of ANGRAU, in which local Public Representatives and officials of the respective districts apart from farmers participated. A total of 687 farmers participated in the programme. The Prime Minister's speech was explained in local language (Telugu) to the participants after completion of the web cast.

Live webcasting of inauguration of Pradhan Mantri Kisan Samman Nidhi

Parthenium Awareness Week:

All the KVKs and DAATTCs of ANGRAU have organized *Parthenium* awareness week from 16th to 22nd August, 2018 and conducted 65 programmes on this eve,benefitting 2157 farmers. The activities like *Parthenium* uprooting, releasing of Mexican beetles as a means of biological control, herbicides application, composting of uprooted biomass, demonstrations and exhibitions, student' rallies to create awareness among the farmers and general public to keep their premises *Parthenium* free. Also organized awareness programmes in schools and more number of students were created awareness.

Parthenium awareness campaign

42. DISASTER MANAGEMENT

Srikakulam district was severely affected with heavy rains and heavy winds due to 'Titli' cyclone on 11th and 12th October 2018 and damaged the standing rice, maize, cotton, sugarcane, cashew, coconut, mango crops to the extent of 81,506.8 ha. The scientist teams from different research stations (ARSs/ RARS) and extension centres (KVK, DAATTC) of the North Coastal Zone visited the cyclone affected fields and suggested the remedial measures like draining excess water from the fields, application of 15 kg urea+ 15 kv MOP as booster dose in rice at advanced panicle initiation state, application of hexaconazone @ 2mll^{-1} to manage sheath rot and blight in rice, pruning and COC application in cashew and mango and replacement of coconut plantation etc. and wide publicity was also given through print and electronic media so as to minimize the loss.

An area of 3070.19 ha of rice in East Godavari and 2550 ha of rice in West Godavari districts, damaged due to occurrence of heavy rains during 20th to 28thAugust 2018. The scientists of DAATTC, Undi and Peddapuram, suggested remedial measures, due to which 30 per cent of the crop was recovered.

An area of 14,040.2 haof rice damaged due to Pethai cyclone in Krishna and East Godavari districts occurred during 16th to 19th December, 2018. Scientists from KVK, Ghantasala and DAATTC, Peddapuram havevisited the affected fields and suggested the measures *i.e.,*to drain out excess water, spraying of 5 % salt solution on sheaves, drying of sheaves, heaps and threshed grains, application of crystalsalt at50 kgacre^{-1}on heaps, application of booster dose of Urea and potash, spraying of Carbendazim @1gl^{-1} and chloropyriphos @2mll^{-1} as a prophylactic measure.

Heavy rains occurred due to cycloneduring 11th to 19th August, 2018 in Krishna district caused damage to rice, (11,724 ha), cotton (10,915 ha), chillies (2,362 ha), greengram (3,939 ha), maize (883 ha and blackgram (644 ha) total crops (30,467 ha) and the crops were either submerged or inundated. The scientists of KVK, Garikapadu visited the cyclone affected fields and suggested the ameliorative measures to save the crops.

The Kurnool district experienced severe drought during September to December, 2018 affected 1.50 lakh ha area covered with cotton, redgram, bengalgram, sorghum and groundnut crops. The suggestions given by the scientists of KVK and DAATTC, Banavasi (spraying urea 2% & 13-0-45 10gl^{-1}) could reduce the loss and yield increase was observed to some extent.

Scientists visit to Titli cyclone affected rice and coconut fields in Srikakulam District

43. WORKSHOP

Annual Action Plan workshop of Krishi Vigyan Kendras of Andhra Pradesh was organized at RARS, Lam, Guntur on 29-30th April, 2019. Dr. V. Damodara Naidu, Hon'ble Vice-Chancellor was the Chief Guest and the meeting was presided over by Dr.Y.G. Prasad, Director, ICAR-ATARI, Zone X, Hyderabad. Dr. N.V. Naidu, Director of Research, Dr. P. Rambabu, Director of Extension, Dr. L.Uma Devi, Dean of Home Science, Dr. R.V.S.K. Reddy, Director of Extension, Dr YSRHU, Dr. J.Dilip Babu, Director of Research, Dr YSRHU, Dr. D. Srinivasulu, Director of Extension, SVVU have participated in the workshop. Programme Coordinators and Subject

Matter Specialists of 23 KVKs of Andhra Pradesh (ANGRAU, YSRHU, SVVU, ICAR and NGOs) actively participated and presented their action plan discipline wise for the year,2019-‘20.

Hon’ble Vice-Chancellor addressing the participants

44. EXTENSION STUDIES

Extension Scientists of RARSs, ARSs, DAATTCs and KVKs have undertaken 13extension studies during 2018-19 to draw some valid conclusions while preparing action plan of the concerned centres.

45. RECOGNITIONS AND AWARDS

1. KVK, Reddipalli has received “ Best KVK Award, 2018-’19" from Acharya N. G. Ranga Agricultural University for the year 2018-‘19
2. KVK, Rastakuntabai has received “Krishi Kalyan Abhiyan I”, “Krishi Kalyan Abhiyan II” collaborative awards at National Level and “Best Fact Sheet Award” (Professional) during 2018-‘19.
3. Dr. K. L. Rao KVK, Garikapadu, Krishna district has received certificates on “Best Fact Sheets” and “Best Performance in CFLD (Oil seeds) project” during Annual Zonal Workshop of KVKs held from May 24 to 26, 2019 at NAARM, Hyderabad.
4. Among 117 aspiration districts in India, Visakhapatnam achieved 1st position in implementing the activities of “Krishi Kalyan Abhiyan” (KKA) by KVK, Kondempudi.

The Programme Coordinator, KVK, Redipalli,the Coordinator, DAATTC, Darsi receiving the award from the Hon’ble Vice-Chancellor, ANGRAU

VI. PLANNING AND MONITORING CELL

The Planning & Monitoring Cell (P&M Cell) was established during the year 1986 in ANGRAU. Previously, this Cell was headed by the Director (Planning & Monitoring). However, since December 2017, the post of Director was withdrawn and is now headed by Dean of Post Graduate studies, who also acts as Transparency Officer of the University and oversees fulfilling the obligations of "Section 4 of the RTI Act, 2005, duly maintaining the transparency in implementation. This P & M Cell works with the overall objectives of planning, monitoring and evaluation of various developmental programmes and activities of the University.

The P&M Cell acts as a liaison office between ANGRAU with other Government and Non-Government Institutions. This Cell does the job of compilation and submission of data and information in ANGRAU in different formats to various agencies at National and International level. It is also responsible for the maintenance and up-gradation of human resource data base of the University; information provider to statutory bodies; preparation of convocation report of the Vice Chancellor reflecting the objectives and achievements of University etc.

The P & M Cell submits reports from time to time to State and Central Governments. Majorly, the reports submitted to State Govt. of AP include information on University to the AP Legislative Assembly through the address given by His Excellency, the Governor of Andhra Pradesh and the Budget Speech of the Hon'ble Minister of Finance, Govt. of AP. It also submits reports to State Govt. of AP in the form of a) Monthly Report of ANGRAU to be included in Hon'ble Governor's report for submission to Hon'ble President of India and b) "Monthly Appraisal Report of ANGRAU" submitted to "The Deputy Secretary to Govt. Agrl & Cooperation (Agrl IV Dept.), Govt. of AP". Besides, the P & M Cell also prepared "Significant Events of ANGRAU" to be presented at the "Meetings of Board of Management-ANGRAU".

As a "Nodal Officer" for the ICAR, the Principal Scientist (P&M Cell) discharges duties relating to day to day correspondence on various issues in general to information pertaining to Indian Rankings; ICAR Rankings of ANGRAU; Preparation and submission of Annual Reports of ANGRAU to be submitted to ICAR under "Strengthening and Development Grant"; uploading the information regarding JRF/SRF, NTS UG/PG, Student Ready Programme; Strengthening of Library Facilities; Audit Utilization Certificates etc. in ICAR Education Portal. Broadly, the job description of P&M Cell is categorized as below.

S. No	Activity/Report Submission (for the year 2018-'19)
I.	**Specific works at University level**
1	Significant events for BoM meetings
2	Updating information pertaining to RTI Act (website)
3	Annual Convocation Reports & Annual Reports of ANGRAU
4	Preparation and updating University Profile, University Brochure, Telephone Directory of ANGRAU
II.	**Job Description at State Level (AP)**
1	Monthly Report of ANGRAU to be included in Hon'ble Governor's report for submission to Hon'ble President of India
2	Monthly Appraisal Report of ANGRAU" to be submitted to "The Deputy Secretary to Govt. Agrl. & Cooperation (Agrl. IV Dept.), Govt. of AP
3	Information to Outcome Budget Book for Hon'ble Governor's speech.
4	Other works on regular correspondence with Govt. of AP
III.	**ICAR Works**
1	Tribal Sub Plan Report
2	ELU Report
3	Impact Assessment Report and Library Impact Assessment Report
4	Strengthening and Development of Higher Agricultural Education
5	Uploading of demand proposals of ELP/JRF-SRF/Library strengthening/Niche area of excellence/NTS (UG/PG)/Student Ready/TSP/Development Grants/Rural Agricultural Work Experience Program (RAWEP)/International Fellowship, Merit cum Means Scholarship etc.
6	Expenditure details of ANGRAU
7	Submission of AUC and UC with purchase orders and proceedings
8	ICAR Annual Progress Report
9	Civil work proposals for technical vetting
10	Indian Rankings (NIRF) & Related
11	Questionnaires
12	Compliance Reports & Action Taken Reports
13	Direct Benefit Transfer Information – Upload in the DBT DARE portal;

14	Participation in ICAR Ranking of ANGRAU along with other Agricultural Universities
15	Demand under scheme being implemented in ANGRAU under Strengthening and Development Grant
16	Experiential Learning Success Stories
17	Compilation and submission of reports on "International Yoga Day" & "Agricultural Education Day" & Related.
17	Nodal Officer for ICAR
IV.	**UGC**
1.	Consolidated Statistical Data
V.	**Others**
1	All India Survey on Higher Education (AISHE)-DCF & TIF consolidation report (12 Colleges + 6 Private colleges) & other proformae related to AISHE.
2	Agenda points of IAUA and other related communication with IAUA
3	Information to Rashtriya Uchchatar Shiksha Abhiyan (RUSA) for MIS portal
4	Answers to agriculture related queries in Parliament (Lok Sabha & Rajya Sabha)
5	Answers to agriculture related queries in Legislative Assembly & Legislative Council of AP
6	APSCHE-Publication of Diary information
7	Implementation of monitoring of live interaction programmes of Hon'ble Prime Minister like "Pariksha Pe Charcha 2.0"; "Pradhan Mantri Kisan Sammelan" etc at University level in different research stations, colleges, KVKs etc and submission of report to UGC from time to time.
ANGRAU Website Development & Maintenance	
	• Web Portal Administration and security • Audit inspection of the official website • Content uploads from time to time • Handling of both fake and valuable contents of ANGRAU in Google search engine • Inspection and uploading of the domains of different colleges, RARSs, KVKs and DAATTCs

VII. FINANCE AND BUDGET

The major financial grants to the University come from the Andhra Pradesh State Government under Plan and Non-Plan Schemes. The Non-Plan assistance is by way of Block grants for running the University. The Block grant approved in the Budget for the year 2018-'19 and released Rs.32992.03 lakhs.

The ICAR assistance was Rs.5563.35 lakhs and the Government of India assistance was Rs.233.51 lakhs. During the year, an amount of Rs.2515.92 lakhs was received under RKVY. During the financial year 2018-19, an amount of Rs.383.72 lakhs released under other agencies (including NABARD-RIDF).

Thus, the total Finances of the University during the year 2018-19 was Rs.60,888.50 lakhs (Rs.32992.03 lakh + Rs.27,896.47lakh) as detailed below:

Funding Sources - 2018-19

(Rupees in lakhs)

S.No.	Particulars	Grants-in-Aid & Other Grants-in-Aid	(%)	Expenditure	(%)
1	Direct Receipts	2357.47	3.87	2264.26	3.77
2	Revenue Expenditure (Earlier Non-Plan)	32992.03	54.18	32134.98	53.56
3	Dept.Sponsored Schemes	239.34	0.39	245.93	0.41
4	NABARD-RIDF	39.48	0.06	2975.72	4.96
5	R.K.V.Y	2515.92	4.13	658.55	1.10
6	I.C.A.R. Plan	5563.35	9.15	5927.40	9.88
7	Government of India	233.51	0.38	179.78	0.30
8	Other Agencies	344.24	0.57	264.31	0.44
9	Other Accounts	16603.16	27.27	15350.37	25.58
	TOTAL	60,888.50	100.00	60,001.30	100.00

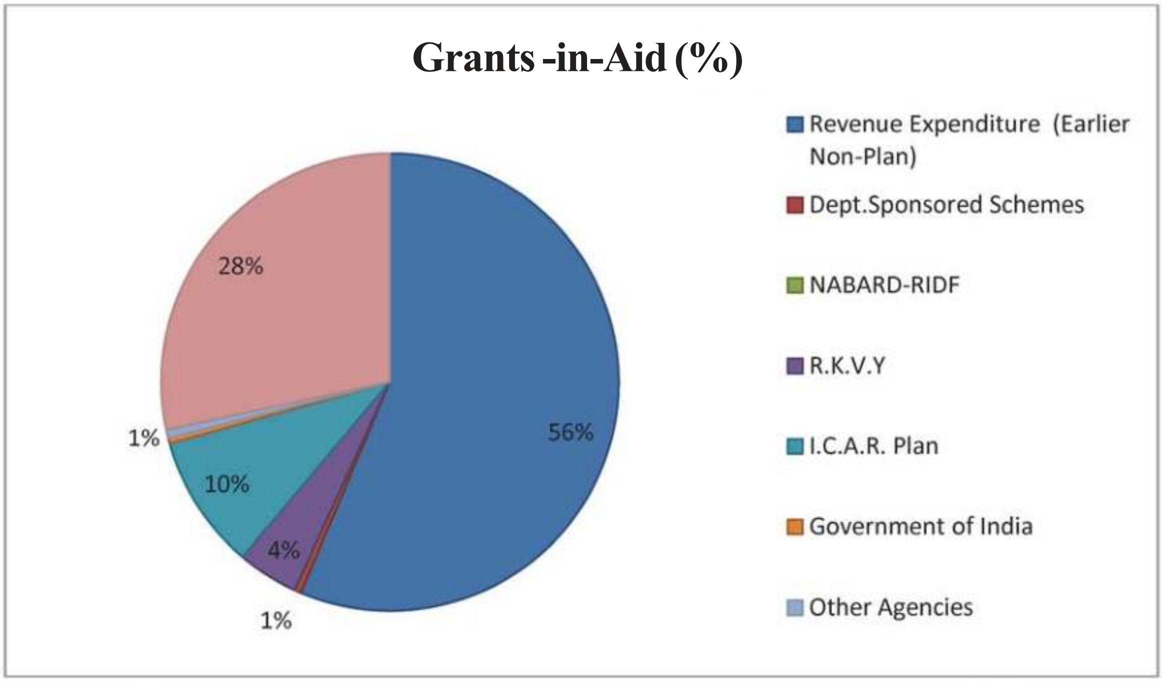


Fig 9. Grants-in-Aid

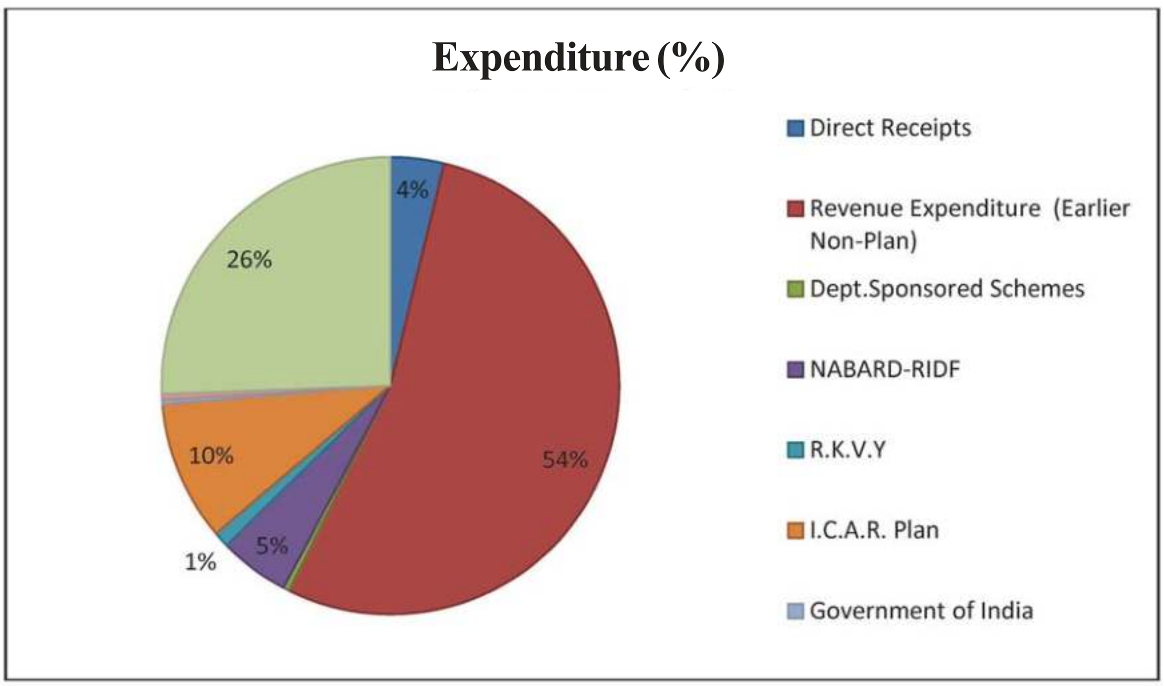


Fig 10. Expenditure

Funding budget by State Government and ICAR

Budget Heads		Total Funding from State Government		Funding support from ICAR				Total ICAR support (5+6+7+8 =9)	Any other Central funding **	Grand Total
	Plan	Non-Plan	Total (2+3=4)	Educa-tionDivn.	AICRP	KVK	Any other ICAR suport			
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)
Salary	—	29492.03	29492.03	—	2888.85	2085.28	9.71	4983.84	—	34475.87
Capital	—	39.48	39.48	—	—	—	—	—	—	39.48
Revenue	—	3500.00	3500.00	579.51	—	—	—	579.51	—	4079.51
Total	—	33,031.51	33,031.51	579.51	2888.85	2085.28	9.71	5563.35	—	38594.86

VIII. BUILDINGS AND CONSTRUCTION PROGRAMMES

During the period under report, the following civil works worth Rs.65.0 crores were completed by the Engineering Department of the University.

- Construction of Agricultural Experiential Learning Programme Building at Naira, Srikakulam Dist. under NABARD for an amount of Rs.200.00 lakhs.
- Construction of Girls Hostel at Naira, Srikakulam Dist. under NABARD for an amount of Rs.225.00 lakhs.
- Construction of Boys Hostel at Naira, Srikakulam Dist. under NABARD for an amount of Rs.225.00 lakhs.
- Construction of Seed Godown at Naira, Srikakulam Dist. for an amount of Rs.60.00 lakhs.
- Construction of Seed Godown and Seed Processing Unit at Amadalavalasa, Srikakulam Dist. for an amount of Rs.35.00 lakhs.
- Construction of Mushroom Unit at KVK, Amadalavalasa, Srikakulam Dist. for an amount of Rs. 18.50 lakhs.
- Construction of Custom hiring centre at KVK, Amadalavalasa, Srikakulam Dist. for an amount of Rs.10.20 lakhs.
- Construction of Bio-fertilizer unit at Anakapalle, Visakhapatnam Dist. for an amount of Rs.90.00 lakhs.
- Construction of Jaggery godown at Anakapalle, Visakhapatnam Dist. for an amount of Rs.20.00 lakhs.
- Construction of Liquid Bio-fertilizer building at Amaravathi, Guntur Dist. for an amount of Rs.72.63 lakhs.
- Construction of Powder Bio-fertilizer building at Amaravathi, Guntur Dist. for an amount of Rs.41.58 lakhs.
- Construction of Seed godown at Amaravathi, Guntur Dist. for an amount of Rs.08.00 lakhs.
- Construction of Seed processing unit at Guntur for an amount of Rs.50.00 lakhs.
- Construction of Farm shed, Threshing floor at Lam, Guntur for an amount of Rs.20.00 lakhs.
- Construction of Administrative building at College of Home Science, Lam, Guntur under NABARD for an amount of Rs.500.00 lakhs.
- Construction of Girls Hostel building at College of Home Science, Lam, Guntur under NABARD for an amount of Rs.350.00 lakhs.
- Construction of Examination hall at Agricultural College, Bapatla, Guntur Dist. for an amount of Rs.52.00 lakhs.
- Construction of Girls Hostel at College of Agricultural Engineering at Bapatla, Guntur Dist. for an amount of Rs.112.00 lakhs.
- Construction of 2nd floor Girls Hostel at Agricultural College, Bapatla for an amount of Rs.91.06 lakhs.
- Construction of Central Instrumentation

Cell at Agricultural College, Bapatla, Guntur Dist. under NABARD for an amount of Rs.532.00 lakhs.

- Construction of Girls Hostel at Agricultural College, Bapatla under NABARD for an amount of Rs.450.00 lakhs.
- Construction of Boys Hostel building at College of Agricultural Engineering, Bapatla, Guntur Dist. under NABARD for an amount of Rs.150.00 lakhs.
- Construction of Girls Hostel building at College of Agricultural Engineering, Bapatla, Guntur Dist. under NABARD for an amount of Rs.150.00 lakhs.
- Construction of Experiential Learning Programme Building at College of Agricultural Engineering, Bapatla, Guntur Dist. under NABARD for an amount of Rs.400.00 lakhs.
- Construction of Boys Hostel building at College of Food Science & Technology, Bapatla, Guntur Dist. under NABARD for an amount of Rs.150.00 lakhs.
- Construction of Girls Hostel building at College of Food Science & Technology, Bapatla, Guntur Dist. under NABARD for an amount of Rs.150.00 lakhs.
- Construction of Experiential Learning Programme building at College of Food Science & Technology, Bapatla, Guntur Dist. under NABARD for an amount of Rs.400.00 lakhs.
- Construction of Ag. Polytechnic Building at Somasila, Nellore Dist. for an amount of Rs.150.00 lakhs.
- Construction of Boys hostel at Somasila, Nellore Dist. for an amount of Rs.95.00 lakhs.
- Construction of Bio-fertilizer building at S.V. Agricultural College, Tirupati, Chittoor Dist. for an amount of Rs.58.80 lakhs.
- Construction of Seed godown at S.V. Agricultural College, Tirupati, Chittoor Dist. for an amount of Rs.13.00 lakhs.
- Construction of Boys Hostel building at Madakasira, Anantapuramu Dist. under NABARD for an amount of Rs.200.00 lakhs.
- Construction of Girls Hostel building at Madakasira, Anantapuramu Dist. under NABARD for an amount of Rs.200.00 lakhs.
- Construction of Experiential Learning Programme building at Madakasira, Anantapuramu Dist. under NABARD for an amount of Rs.150.00 lakhs.
- Construction of Bio-Fertilizer building at Utukur, Kadapa Dist. for an amount of Rs.41.58 lakhs.
- Construction of Electronic building at Nandyal, Kurnool Dist. under NABARD for an amount of Rs. 380.70 lakhs.
- Construction of Seed Processing Unit at Mahanandi, Kurnool Dist. for an amount of Rs. 60.00 lakhs.
- Construction of Boys Hostel building at Mahanandi, Kurnool Dist. under NABARD for an amount of Rs. 225.00 lakhs.
- Construction of Girls Hostel building at Mahanandi, Kurnool Dist. for an amount of Rs. 225.00 lakhs.
- Construction of Experiential Learning Programme building at Mahanandi, Kurnool Dist. under NABARD for an amount of Rs. 200.00 lakhs.

IX. OTHER EVENTS OF THE YEAR

During the year 2018-19 several important events have occurred at different institutes of the university. An account of significant events, workshops, conferences, meetings, extension activities and other events that took place during the period under report is as follows.

Significant Events

Inauguration

- KVK, Undi inaugurated "Village Agricultural Knowledge Center" at NICRA adopted Village of Matsyapuri by Smt Gowsiya Bhegam, Joint Director of Agriculture, West Godavari Dist. and Dr P.Munirathnam, ADR, RARS, Maruteru on 06.09.2018.
- The state-of-the-art Soil Spectroscopy lab was inaugurated at Institute of Frontier Technology, RARS, Tirupati, ANGRAU on 14.11.2018. This is second of its kind in Indian Agricultural Universities of our country. This initiative of Soil Spectroscopy lab is an outcome of support from Bill & Melinda Gates Foundation in partnership with CIMMYT, Department of Agriculture (Government of Andhra Pradesh), APSAC and the Acharya N.G. Ranga Agricultural University. Shri. B. Rajsekhar, Spl. Chief Secretary, Department of Agriculture and Cooperation, Government of Andhra Pradesh and Dr. V. Damodara Naidu, Vice Chancellor of ANGRAU, e-launched the Soil Spectroscopy lab in the presence of Dr. N.V. Naidu, Director of Research ANGRAU, Dr. K.V. Ramana, Vice Chair, APSAC, Dr. Andrew Mc Donald and Dr. Balwinder Singh, from CIMMYT, Dr Prabhu Prasadini, ADR (HQ) & Univ. Head and Mrs. Padmavatiand Dr PanneerSelvam, CIMMYT at secretariat.
- Hon'ble Minister for Agriculture inaugurated the liquid and powder biofertilizer units at ARS, Amaravati in presence of Hon'ble MLA, Pedakoorapadu, Hon'ble Vice-chancellor, Director of Research and other University authorities of ANGRAU on 15.11.2018.
- Advanced Soil Physics Laboratory and Rain out shelters at RARS, Tirupati were inaugurated by Dr.N.V.Naidu, Director of Research, ANGRAU in the presence of Dr.P.Rajasekhar, Associate Director of Research, RARS, Tirupation 20-12-2018.
- Inauguration of Home Science College and Girls Hostel at Lam, Guntur by Sri Somireddy Chandra Mohan Reddy, the Hon'ble Minister for Agriculture, Horticulture, Sericulture and Agricultural Processing, Government of A.P. on 22.01.2019.
- Inauguration of three buildings (Experimental learning Building, Girls Hostel and Boys Hostel) at Dr. NTR College of Food Science and Technology, Bapatla by Sri Somireddy Chandra Mohan Reddy, the Hon'ble Minister for Agriculture, Horticulture, Sericulture and Agricultural Processing, Government of A.P. on 22.01.2019.
- Inauguration of three buildings (Experimental learning Building, Girls Hostel and Boys Hostel) at Dr. NTR College of Agricultural Engineering, Bapatla by Sri Somireddy Chandra Mohan Reddy, the Hon'ble Minister for Agriculture, Horticulture, Sericulture and Agricultural Processing, Government of A.P. on 22.01.2019.
- Inauguration of four buildings (Student Knowledge Centre, Central Instrumentation Cell, Girls Hostel and KreedaPranganam) at Agricultural College, Bapatla by Sri Somireddy Chandra Mohan Reddy, the Hon'ble Minister for Agriculture, Horticulture, Sericulture and Agricultural Processing, Government of A.P. on 22.01.2019.

- Dr.M.B.Chetty, Hon'ble Vice Chancellor of University of Agricultural Sciences, Dharwad and Dr.V.Damodara Naidu, Hon'ble Vice Chancellor, ANGRAU, Lam, Guntur inaugurated the PG Mess Block (Boys Hostel) at S.V. Agricultural College, Tirupati on 07.03.2019.

- Inauguration of 150 KWP Solar Power Supply Station at RARS, Tirupati - 06.03.2019 and 50KWP Solar Power Supply Station at Admn. Building, Lam, Guntur on 08.03.2019 by Dr. V. Damodara Naidu, Hon'ble Vice-Chancellor, ANGRAU.

- Liquid Biofertilzer Laboratory & Modern Jaggery Plant were inaugurated by Hon'ble Vice Chancellor, Dr. V. Damodar Naidu in the presence of Dr. N.V. Naidu, Director of Research on 25.05.2019 at RARS, Anakapalle.

Laying Foundation Stone

- Hon'ble Minister for Agriculture, Horticulture, Sericulture and Agri processing, Sri Somireddy Chandra Mohan Reddy garu, Hon'ble Minister for Industries, Food Processing, Agribusiness, Commerce and Public Enterprises, Sri N.Amarnatha Reddy garu, Hon'ble Vice Chancellor, Dr.V. Damodara Naidu garu, local MLA and MLC laid foundation stone for Liquid Bio Fertilizer Laboratory and inaugurated Solid Bio Fertilizer unit on 10-12-2018.

- Foundation stone laying ceremony of Seed cum Soil Testing Laboratory at RARS, Maruteru by Sri Somireddy Chandra Mohan Reddy, Hon'ble Minister for Agriculture, Horticulture, Sericulture & Agri-processing, Govt. of A.P, Sri Pitani Satyanarayana garu, Hon'ble Minister for Labour and Employment, Training and Factories, Govt. of A.P. on 08.01.2019.

- Foundation Stones for four Research buildings of PHTC, FIM, SWS and ARS at College farm, Agricultural College, Bapatla by Sri Somireddy Chandra Mohan Reddy, the Hon'ble Minister for Agriculture, Horticulture, Sericulture and Agricultural Processing, Government of A.P. on 22.01.2019.

- Unveiling of foundation stone of Seed Processing Unit& Storage Godowns at ARS, Bapatla was done by Hon'ble minister for Agriculture Sri Somireddy Chandra Mohan Reddy, the Hon'ble Minister for Agriculture, Horticulture, Sericulture and Agricultural Processing, Government of A.P. on 22.01.2019

Foundation stones were laid by Sri Somireddy Chandramohan Reddy, Honb'le Minister for Agriculture, Horticulture, Sericulture and Agri-Processingon06-02-2019 for the following works

- Central Instrumentation cell (NABARD RIDF XX & XXII funds), Seed godown, Agricultural Experimental Learning Programme Building, Girls Hostel & Boys Hostel at Naira, Research Building at Ragolu and Seed godown and Seed processing Unit at Amadalavalasa, Srikakulam Dist.

- Millets Processing & Value AddedProducts production centre at Agricultural Research Station, Vizianagaram.

- Technology Dissemination Centre, Research and Experimental Centre at Chintapalle, Visakhapatnam Dist.

- Post-Harvest Technology and Value Added Products Production Centre at KVK, Undi, WestGodavari Dist.

Foundation stones were laid by Sri Somireddy Chandramohan Reddy, Honb'le Minister for Agriculture, Horticulture, Sericulture and Agri-Processing on 13-02-2019 for the following works.

- Bhoomi Pooja (Laying foundation stone)of NABARD (under Tranche XXII) & RKVY Buildings at Lam, Guntur.

- Post-Harvest Technology Centre, Agricultural Machinery Exhibition Centre, Seed Godown and Soil Testing Centre at Kalikiri& Agricultural Mechanization Centre, Tirupati, Chittoor Dist.
- Agricultural UtensilsShed & Tomato Processing Unit at KVK, Banavasi

  Foundation stones were laid by Sri SomireddyChandramohan Reddy, Honb'le Minister for Agriculture, Horticulture, Sericulture and Agri-Processing on27-02-2019 for the following works

- Seed Godown & Green House at ARS, Nellore.
- Seed Godown and Seed Processing Unit &Covered Threshing Floor at ARS. Thotapalli, Guntur.
- Agricultural Polytechnic Building and Students Hostel at Agricultural Polytechnic, Somasila, SriPottisreeramulu Nellore Dist.

  Foundation stones were laid by the Hon'ble Vice-Chancellor, ANGRAU on27-02-2019 for the following works

- Experimental Centre, Seed Godown, Seed Processing, Renovated Meeting Hall & Renovated Guest House at ARS, Nellore
- Webcast of RUSA (Rashtriya UchchatarShikshaAbhiyan), digital foundation stone laying ceremony and inauguration of projects worth of 3000 crores for the benefit of students by Hon'ble Prime Minister Sri Narendra Modi was arranged on 03.02.2019 and students of CFST, Pulivendula have participated.

MoUs

- ANGRAU entered MoU with A.P. Police Housing Corporation Ltd., on 21.08.2018 for constructing civil structures sanctioned under RKVY during 2017-18, Non-plan and ICAR plan in research/teaching and extension units of ANGRAU.
- MoU with K. Kotapadu farmer was made for imparting jaggery powder technology by PHET at RARS, Anakapalle on 12.10.2018.
- A MoU with the farmer of Aganampudi (V), Visakhapatnam (dt.) was obtained for imparting Pootarekulu technology by PHET, RARS, Anakapalle on 01.11.2018.

Significant Events

- All the Research Stations, Krishi Vigyan Kendras and DAATTCs have actively participated "Eruvaka Pournami" festival on 28.06.2018. The programme Coordinator, KVK, Amadalavalasa and other scientists had an opportunity to interact with the Hon'ble Chief Minister of Andhra Pradesh Shri N. Chandrababu Naidu. The University Centres arranged agricultural exhibitions in all the districts on the occasion. The Ministers, other public Representatives and line Department Officers participated in the festival.
- KVK, Kalikiri established a Apiary unit with Italian bee *Apismellifera* and Indian bee *Apisceranaindica*.
- World Breast Feeding Week (1^{st}- 7^{th} August) was celebrated at Pedana on 3.08.2018 in Anganwadi centers in collaboration with Women Development and Child Welfare Department. SMS (Home Science), KVK, Ghantasala participated and created awareness about the importance of breast feeding and the foods to be taken by pregnant and lactating women. Mrs.Vijaya Lakshmi,ICDS urban supervisor, Anganwadi workers, anganwadi helpers, 30 pregnant and lactating women participated in the programme.
- KVK, Rastakuntabai, Vizianagaram (district)got 1^{st} rank in the Nation in implementing the Krishi KalyanAbhiyan programme initiated by GOI.
- KVK, Utukur conducted Nutri – Sensitive Agricultural Resources and Innovation

(NARI) programme in Tadigotla village of C.K.Dinnemandal on 14.08.2018. About 60 women had participated. The objectives of the NARI programme and the importance of nutrition on health was explained to the participants.

- The students of S.V. Agricultural College, Tirupati Miss. AffiaPhenica (I Ph.D, Extension) and Khairunnisa Begum (II B.Sc. (Ag.) received the commendation certificate along with a memento from Hon'ble Chief Minister, Sri N.Chandra Babu Naidu garu in the "JnanaBheri" workshop on 04.08.2018 for their excellent presentation of commendable programme of ANGRAU on "Village Adoption – Transfer of Technology for sustainable Agriculture. Another Ph.D. scholar Miss H.B.Shruthi (GPBR) also received commendation certificate and memento for her cultural event performance in solo classical mix.
- **KVK, Kondempudi bagged All India First Rank** in Krishi Kalyan Phase – I and received it from Hon'ble DG, ICAR in the Annual workshop of KVKs at ATARI, Hyderabad on 20.09.2018.
- Programme Coordinator, KVK, Kalyandurg presented a poster on 'Fertigation scheduling to attain quality yields in musk melon' on 21.09.2018 in the poster session conducted by ICAR-ATARI.
- **KVK, Darsi received two awards** i.e., Best poster award and Maximum soil tests and highest soil health cards in the Annual Zonal workshop of KVKs – Zone X held at Hyderabad on 20th -22nd September 2018.
- **The KVKs of Rastakuntubai, Kondempudi, BCT and Utukur havereceived Certificate of appreciation** from the Director General, ICAR for achieving Rank-I in undertaking the activities under KKA – Aspirational districts during Phase-I.
- Dr. P. Ram Babu, Director of Extension, Dr. B. Vijayabhinandana, PS (Extn) and all the Programme Coordinators of KVKs of ANGRAU have participated in the Annual Zonal workshop from 20.09.2018 to 22.09.018 at ATARI, Hyderabad. The Director of Extension has chaired 3 technical sessions.

Hon'ble Vice-Chancellor, Dr. V. Damodara Naidu has participated in the inauguration of Apex building of ATARI, Zone-X at CRIDA campu. Hyderabad on 21.09.2018.Dr. T. Mohapatra, Director General (ICAR) & Secretary (DARE); Dr. A.K.Singh, Dy. Director General (Agril.Extension); Dr. V.P. Chahal, ADG (Extn); Dr. K. Ramasamy, VC, TNAU; Dr. V. Praveen Rao, VC, PJTSAU; Dr. Y.G. Prasad, Director, ICAR-ATARI, Zone-X and Dr. P. Ram Babu, Director of Extension, ANGRAU were present on the occasion. Dr. V. Damodara Naidu, Hon'ble Vice-Chancellor has indicated the necessity of having second KVK in Srikakulam, Vizianagaram and Guntur districts under ANGRAU.

Three Booklets of KVK, Kalyandurg were released during annual review workshop from 20th to 22nd September 2018.

1. Fall Army Worm - Devastating insect pest of maize and its identification, damage and control
2. Value added products of minor millets
3. Scientific management practices in tuberose

- Interviews for the award of Bayer Fellowship in the disciplines of Agronomy, Soil Science, Genetics and Plant Breeding, Molecular Biology and Biotechnology, Plant Pathology and Entomology in both M.Sc. (Ag.) and Ph.D. Courses were conducted by Dean of PG Studies, Administrative Office, ANGRAU on 25/09/2018 and 26/09/2018.
- Dr. K. Suseela, Assistant Professor, Department of Agricultural Economics,

Agricultural College, Bapatla, won World Championship 2018 in Agriculture Science (Dryland) and Certified as Fellow, Directorate of Agriculture, IASR (Lifetime membership) for outstanding scientific contributions.

- Dr. N. V. Naidu, Director of research and Dr. N. P. Eswar Reddy, Principal scientist & University Head of Biotechnology were elected as a 'Fellow of A.P. Academy of Sciences' and awarded in A. P. Science Congress meeting, held at Yogi Vemana University, Kadapa from 09.11.2018 to 11.11.2018.
- The 48th Research and Extension Advisory Council (REAC) Meeting was organized at RARS, Tirupati on 19.12.2018&20.12.2018 and reviewed the research achievements of 2017-18 and formulated the strategies for the future research and extension activities under the chairmanship of the Hon'ble Vice-Chancellor, ANGRAU.

  Principal Scientist (Agronomy) & Head and Principal Scientist (Plant Breeding) attended the 48th REAC meeting and received the **Best Research Station Award to Agricultural Research Station, Ragolu in 'B' category for 2017-2018** from Hon'ble Vice Chancellor Dr.V.Damodara Naidu garu and Director of Research Dr.N.V.Naidugaru in the presence of Board members of the university and REAC members.

  Principal Scientist (Agronomy) &Univ. Head attended the 48th REAC meeting and received the **Best Research Station Award to Agricultural Research Station, Anantapuramu in 'A' category for 2017-2018** from Hon'ble Vice Chancellor Dr.V.Damodara Naidu garu and Director of Research Dr.N.V.Naidugaru in the presence of Board members of the university and REAC members.
- College of Home Science, Guntur organized orientation programme on 'Collaborative strategies of ANGRAU and SERP in enhancing the livelihoods of small and marginal farmers and Nutrition and hygiene entrepreneurship promotion in Andhra Pradesh' under Andhra Pradesh Rural Inclusive Growth Project (APRIGP) at College of Home Science, Guntur on 06.12.2018.
- Fifteen NSS volunteers of ANGRAU have participated in NSS State Level Youth Festival held at Acharya Nagarjuna University, Guntur for two days on 13th – 14th December 2018. Mrs. SharmilaGulzar, IV year B.Sc. (Hons) Home Science student of College of Home Science, Guntur won 3rd prize in mono action at state level.
- Two final year students of CFST, Pulivendula, Mr. G. Ranjith and K. Naveen Kumar got selected to represent ANGRAU in javelin throw and high jump respectively in 19thAll Indian Inter Agricultural Universities meet, to be held at PAU, Ludhiana from 2nd to 5th January, 2019.
- **Agricultural Research Station, Vijayarai arranged Bee Keeping exhibition at RARS, Maruteru on the eve of Foundation Stone laying of Seed cum Soil Testing Laboratory at RARS, Maruteru on 08.01.2019.**
- Students *viz.,*Ms.Y.AswiniTeja, NA.2018-009, Mr.K.Vara Prasad, NA.2015-092, ShaikSazid, NA.2015-079, Mr.P.Viswaraj, NA.2016-177, Sri G.Nehru, NA.2015-051 of Agril. College, Naira participated in XIX All India Agricultural University Sports and Games Meet 2018-'19 from 2-5th January 2019 at Punjab Agricultural University, Ludhiana.
- One student from Faculty of Home Science, APGC, Lam, GunturMs. V.P. Sushmita was

selected to participate in 19th All India Inter Agricultural Universities Youth Festival (AGRIUNIFEST) – 2018-'19 to be held from 03.02.2019 to 07.02.2019 at SardakrushinagarDantiwada Agricultural University (SDAU), Sardarkrushinagar, Gujarat.

- Mr. G. Ravindranadh, I.D.No. BAM 17-64, Dept. of Agronomy, Student of Agricultural College, Bapatla participated in the Republic Day Parade at New Delhi on 26.01.2019.
- Five students of final Year B.Sc.(Ag.) students were selected for 4thAgrivision – 2019 National Convention on "Integrated Agriculture Prosperous Bharat" which is being organized by VidyarthiKalayanNyas, Bhopal in Collaboration with Ministry of Agriculture & Farmers Welfare MHRD, Dept. of Chemicals and Fertilizers, MFPI, ICAR and NABARD during 28-29, January, 2019 at IARI, New Delhi.
- ANGRAU secured 2nd position at ICAR's All India Entrance Examination for Post Graduate Scholarship Award and the award was received by the Hon'ble Vice – Chancellor from the union minister for A & FW at New Delhi on 31.01.2019.
- All the KVKs and DAATTCs Telecasted / Webcasted thelaunching of PradhanManthri Kisan SammanNidhi (PM-KISAN) scheme on 24-02-2019 by the Hon'ble Prime Minister Shri Narendra Modi.
- The student,Mr. Sibaish Sahoo, ID No. ME-16-033 of third year B.Tech. (Ag. Engg.), CAE, Madakasira has won 4th place in cartooning during the 19th All India Inter Agricultural Universities Youth Festival (AGRIUNIFEST) 2018-19 jointly organized by SardakrushinagarDantiwada Agricultural University (SDAU), Sardakrushinagar, Government of Gujarat and Indian Council of Agricultural Research, New Delhi from 03.02.2019 to 07.02.2019.
- JRF coaching cell – Under SC & ST cell was inaugurated on 06.02.2019 at Ag College, Rajamahendravaram for providing coaching to the students for ICAR - All India Entrance Examination for admission to Post graduate degree programme (JRF).
- Centralized server was established under KOHA Library Management System (LMS)in all colleges of ANGRAU for Library Management and WEB-OPAC for the first time in University Library, Lam, Guntur.
- **KVK, Rastakuntubai, Kondempudi, Utukur received Certificates of appreciation on securing first rank at all India level in implementation of Krishi KalyanAbhiyan (KKA) Phase II** during Annual Zonal Review workshop of KVKs, held at NAARM, Hyderabad on 24th May 2019.
- **KVK, Garikapadu received appreciation certificate for "Best Fact Sheets" and "Best performance in CFLD (Oil Seeds) project"** during Annual Zonal Review workshop of KVKs held at NAARM, Hyderabad during 24-05-2019 to 26-05-2019.
- **KVK, Amadalavalasa, Darsi and Banavasi received "Best Oral Presentation Award"** during Annual Zonal Review workshop of KVKs, held at NAARAM, Hyderabad during 24-05-2019 to 26-05-2019.

Agricultural Education Day

"Agricultural Education Day" was organized on 03.12.2018 in a befitting manner at all Colleges and Polytechnics of the Acharya N.G. Ranga Agricultural University on the eve of the birthday of Bharat Ratna Dr. Rajendra Prasad, the first President of Independent India.

Other Significant Events

S. No.	Event	Date	Venue
1	Nava Nirmana Deeksha	02.06.2018	All Centres of the ANGRAU
2	The fourth International Yoga Day	21.06.2018	All Centres of the ANGRAU
3	Farmer Scientist Interaction programme	20.06.2018	KVK, Amadalavalasa
4	Sri AlluriSita Rama Raju Jayanthi	04.07.2018	All the institutions under ANGRAU
5	ARS, Vizianagaram conducted Bee keeping awareness programme	03.07.2018	Coringa Bio diversity Centre, Coringa, Kakinada, East Godavari District
6	DAATTC, Guntur has organized the Review meeting of Innovative Farmers Network Coordinators of 13 districts of Andhra Pradesh	03.07.2018	Agricultural College, Bapatla
7	KVK, Reddipalli conducted awareness programme on cost effective technologies in cotton	07.07.2018	DFI village, Virupapuram
8	KVK, Amadalavalasa conducted Teleconferencing on balanced diet and management of anemia with womenin convergence with reliance foundation	13.07.2018	Garamandal
9	KVK, Rastakuntubai conducted Audio conference with tribal women	23.07.2018	Dasaripeta village
10	KVK, Kondempudi conducted a method demonstration on waste decomposer preparation	27.07.2018 and its uses	Chimalapadu
11	DAATTC, Kondempudi conducted farmer scientist interaction meeting	27.07.2018	Anantavaram village, Padmanabhammandal
12	Soil health campby KVK, Darsi	03.08.2018	Venkatadripalem and Kommarolu (Y.G. palemmandal)
13	Parthenium Awareness Week	16.08.2018 to 22.8.2018	All the KVKs under ANGRAU
14	KVK and DAATTC, Banavasi conducted method demonstration for the control of fall armyworm in maize using poison bait preparation	18.08.2018	Pamulapadu and Nandikotkur
15	KVK, Reddipalli in collaboration with Reliance Foundation organized dial out conference with farmers	21.08.2018	Khaderpet village, Pamidimandal

S. No.	Event	Date	Venue
16	Farmers Scientists Interaction Programme	24.08.2018	KVK, Amadalavalasa
17	Blood Donation Awareness Campaign	22.09.2018	Agricultural College, Rajamahendravaram
18	Farmers orientation programme	11.09.2018	KVK Amadalavalasa
19	Mahila Kisan Diwas	15.10.2018	All KVKs and DAATTCs
20	Farmers Orientation Programmes on 'Implementation of activities in selected villages' under DBP-Bio KISAN Hub project	05.10.2018	KVK, Kalyandurg and DAATTC, Kurnool
21	Multi location conference	15.12.2018	KVK, Kalikiriin collaboration with Reliance Foundation
22	World Soil Day	05.12.2018	All the colleges, research stations and KVKs
23	Farm Mechanization Demonstration Mela	15.02.2019	RARS, Anakapalle
24	Farmers Scientist Interaction Meeting	06.02.2019	KVK, Kalikiri
25	Road safety week and awareness on driving licencemela	04.02.2019	CFST, Pulivendulain coordination with AP Transport and AP Police Departments
26	International Women's Day	08.03.2019	At all Institutions under ANGRAU
27	World Water Day	22.03.2019	At all Institutions under ANGRAU
28	Kisan Melas	20.11.2018 28.11.2018 12.12.2018 22.01.2019 30.01.2019 07.02.2019 23.02.2019 27.02.2019 28.02.2019 26.03.2019 30.03.2019	ARS, Kadiri RARS, Anakapalle RARS, Nandyal RARS, Lam, Guntur ARS, Vizianagaram RARS, Chintapalle KVK & DAATTC Amadalavalasa ARS, Nellore ARS, Peddapuram RARS, Maruteru Agricultural College, Naira

Meetings Organized

S. No.	Event	Date	Venue	Organized by
1	Mid-term project review meeting with Satellite Based Rice Monitoring System for Andhra Pradesh (SRMS) Project Advisory Committee members	27.06.2018	Block no. 4, Secretariat, Velagapudi	ANGRAU under the chairmanship of Special Chief Secretary (Agri.), Govt. of Andhra Pradesh
2	Convergence meeting on conducting demonstrations of Cotton ICM with a special reference on controlling the pink boll worm	12.06.2018	Advanced Post Graduate Centre, Lam, Guntur	ANGRAU in coordination with DAATTC, Guntur, KVK, Lam and State Department of Agriculture
3	A review meeting on RKVY Project Operational Research of Research, Teaching and Extension units of ANGRAU	13.08.2018	Advanced Post Graduate Centre, Lam, Guntur	Director of Research, ANGRAU
4	An interaction meeting was conducted with Dr. K. J. Ramesh, Director General, IMD, Ministry of Earth Science, New Delhi, scientists working in Agricultural Agromet Services and the University Officers in the presence of Hon'ble Vice Chancellor, ANGRAU	18.08.2018	Administrative Office, Lam, Guntur	ANGRAU
5	An interaction meeting with Dr. Arvind Kumar, IRRI, scientists working in rice research and the University Officers in the presence of Hon'ble Vice Chancellor, ANGRAU	20.08.2018	Administrative Office, Lam, Guntur	ANGRAU
6	KVK Scientists of Banavasi organized Contingency crop plan meeting to farmers	09.08.2018	KVK, Banavasi	KVK, Banavasi
7	Meeting on Digitalization of the University	01.08.2018	Administra-tive Office, Lam, Guntur	ANGRAU

S. No.	Event	Date	Venue	Organized by
8	An orientation meeting was conducted on publication of Diagnostic Bulletins on Paddy, Maize, Pulses, Cotton and Sugarcane	09.10.2018	Advanced PG Centre, Lam, Guntur	ANGRAU
9	State Seed Sub Committee meeting for 14 varieties release	26.11.2018	Velagapudi, Amaravathi	ANGRAU
10	Review meeting on "Implementation of Village Adoption Programme"	18.01.2019	RARS, Lam	Directorate of Extension, ANGRAU
11	RKVY Geo tagging meeting	08.02.2019	RARS, Lam, Guntur	ANGRAU
12	Crop diagnostics bulletin meeting	08.02.2019	RARS, Lam, Guntur	ANGRAU
13	Crop Physiology Club meeting	09.02.2019 & 10.02.2019	RARS, Lam, Guntur	ANGRAU
14	Agro advisory council meeting	12.02.2019	RARS, Anakapalle	RARS, Anakapalle
15	DLCC Meeting	19.02.2019	RARS, Lam	DAATTC, Guntur
16	Seed Processing Plant Equipment meeting	26.02.2019	RARS, Lam	ANGRAU
17	Farmer-Scientist Interaction Meeting	15.03.2019	Swarna Bharat Trust, Atkur	ARS, Ghantasala as a part of Kisan Mela
18	ZREAC Meetings			
	HAT Zone	01.04.2019 & 02.04.2019	Parvathipuram	ANGRAU
	North Coastal Zone	03.04.2019 & 04.04.2019	Vizianagaram	ANGRAU
	Krishna Zone	15.04.2019 & 16.04.2019	RARS, Lam, Guntur	ANGRAU
	Godavari Zone	17.04.2019 & 18.04.2019	RARS, Maruteru	ANGRAU
	Southern Zone	22.04.2019 & 23.04.2019	ARS, Nellore	ANGRAU

S. No.	Event	Date	Venue	Organized by
12	Scares Rainfall Zone	24.04.2019 & 25.04.2019	RARS, Nandyal	ANGRAU
	SLTP Meetings	29.04.2019 to 14.05.2019	Different venues of the University	ANGRAU
	SLTP for Agricultural Economics	29.04.2019	RARS, Lam, Guntur	ANGRAU
	SLTP for Statistics & Computer Applications	30.04.2019	RARS, Lam, Guntur	ANGRAU
	State Level Technical Programme Meeting of Extension Centres	08.05.2019 & 09.05.2019	RARS, Lam, Guntur	ANGRAU
	SLTP	13.05.2019 & 14.05.2019	RARS, Lam, Guntur	ANGRAU

Training Programmes / Short Courses / Orientation Programmes Organized

S. No.	Event	Date	Venue	Organized by
1	Training programme and method demonstration on 'chisel plough'	01.06.2018	Chennapuram village	KVK, Banavasi
2	One day training programme to the farmers on 'production technologies in redgram'	02.06.2018	Veerayapalem of Darsi Mandal	DAATTC, Darsi
3	Pre Kharif season training programme on 'major agricultural and horticultural crops'	04.06.2018	Y.Thanda and Yalagalavanka	KVK, Kalyandurg
4	Three days inter-state training programme on 'Good Agricultural Practices'	5.6.2018 to 8.6.2018	RARS, Tirupati	RARS, Tirupati
5	Training programme on 'Climate resilient paddy varieties and nursery management'	13.06.2018	Mathsyapuri village, Veeravasara-mmandal	KVK, Undi
6	Training programme on 'Pink boll worm Management in Cotton'	13.06.2018	Gottigundala village, Kondapura-mmandal	DAATTC and KVK, Nellore

S. No.	Event	Date	Venue	Organized by
7	Training to extension officials (MPEOs) on 'production technologies of major horticultural crops growing in the kurnool district'	14.06.2018	KVK, Banavasi	KVK, Banavasi
8	Training programme on 'Importance of soil testing and method collection of soil samples'	19.06.2018	Surayapalem village, Podalakur mandal	KVK, Nellore
9	Training programme to BTMs and ATMs of Chittoor district on 'Pest Management in major crops of Chittoor District'	21.06.2018	KVK, Kalikiri	KVK, Kalikiri
10	Conducted training to the farmers on 'Disease management in citrus'	22.06.2018	Kapatrala village, Devanakonda manadal	KVK, Banavasi
11	Conducted training programme on 'Integrated nutrient management in rice'	23.06.2018	Siraladoddi village	KVK, Banavasi
12	Training programme on 'Vermi compost and Raising of Fruits and Vegetable nursery under shade net'	25.06.2018	KVK, Nellore	KVK, Nellore
13	Training-cum-awareness programme on 'Production technology and management aspects of groundnut, castor and major horticultural crops'	25.06.2018	Bathalapalli and Tadima-rrumandal	KVK, Reddipalli
14	Skill development training programme on 'Vegetable Cultivation'	26.06.2018 to 28.6.2018	KVK, Nellore	KVK, Nellore in collaboration with Save the Children
15	Training programme on 'Sucking pest management in chilli'	02.07.2018	H. Muravaani village	KVK, Banavasi
16	Awareness cum demo programme on 'Drudgery reduction implements'	02.07.2018	Muravaani village	KVK, Banavasi
17	Training programme on 'Organic farming' sponsored by ATMA	03.07.2018	KVK, Nellore	KVK, Nellore
18	Training programme on 'Groundnut management'	04.07.2018	Narekellapalli	KVK, Nellore

S. No.	Event	Date	Venue	Organized by
19	Residential training programme on 'Mushroom cultivation & Kitchen gardening'	05.07.2018 to 07.07.2018	KVK, Utukur	KVK, Utukur
20	Training programme on 'Bee keeping'	07.07.2018	ARS, Seethampeta	ARS, Seethampeta with ATMA funding
21	Training programme on 'Best management practices in cotton'	10.07.2018	Yerraballi village, Podalakur mandal	KVK, Nellore
22	Pre Kharif season training programme to CFLD redgram and greengram farmers on 'Production and protection technologies in redgram and greengram crops'	10.07.2018	KVK, Kalyandurg	KVK, Kalyandurg
23	Skill development training programme on 'Mushroom production technology'	11.07.2018	KVK, Nellore	KVK, Nellore
24	Training programme on 'Seed treatment in greengram'	12.07.2018	Nagabotlapalem village	KVK, Darsi
25	Training on 'ICM in chillies and also identification of beneficiary farmers for the OFT on LCH-111 variety of chillies'	13.07.2018	Mitta somapuram village, Nanda-varammandal	KVK, Banavasi
26	Off campus training programme on 'Integrated crop management practices in onion'	13.07.2018	Pobbarlapalli village	KVK, Kalyandurg
27	Training programme on 'Importance of nutrition garden'	13.07.2018	KVK, Nellore	KVK, Nellore
28	Training program on 'Water and weed management and drought mitigation techniques in cotton'	18.07.2018	Bodibanda village	KVK, Banavasi
29	Training cum method demonstration on 'PBW management in cotton and seed treatment method in cotton and groundnut'	18.07.2018	KVK, Banavasi	KVK, Banavasi

S. No.	Event	Date	Venue	Organized by
30	Training programme to multipurpose Extension officers on 'Rice production technology'	19.07.2018	Vinjamur division	KVK, Nellore
31	Training programme to farmers on 'Paddy Nursery Management'	20.07.2018	Nagayyapeta village,Devara-pallimandal	DAATTC, Kondempudi
32	Training programme on 'Contingent crop planning and management of livestock to increase livelihood for farmers under drought condition'	20.07.2018	KVK, Reddipalli	KVK, Reddipalli
33	Residential training programme 'Bee keeping'	20.07.2018 to 26.07.2018	KVK, Utukur	KVK, Utukur in coordination with Dr. YSR Horti-cultural University.
34	Conducted training programme to multipurpose Extension officers on 'Production and protection Paddy, Groundnut, Bajra, Greengram, Blackgram, Redgram, Bengalgram and Cotton'	21.07.2018	Udayagiri division	KVK, Nellore and DAATTC, Nellore
35	Training programme to shepherds on 'Best managemental practices and enlightened them regarding diseases and preventive measures to be followed'	25.07.2018	Mugathi	KVK, Banavasi
36	Training programme on 'Selection of planting material and orchard establishment of cashew'	02.08.2018 to 03.08.2018	8 different mandals of KVK, Rastakuntubai	KVK, Rastakuntubai
37	Training programme on 'Livestock management and contingent crop planning'	04.08.2018	KVK, Reddipalli	KVK, Reddipalli
38	Training programme on 'Value added jaggery products'	06.08.2018	RARS, Anakapalle	RARS, Anakapalle
39	Training programme on 'Production and protection aspects in groundnut'	06.08.2018	Peravali village	KVK, Reddipalli

S. No.	Event	Date	Venue	Organized by
40	On campus training programme to 20 MPEOs of Horticulture and Agriculture department on 'Cashew orchard management'	07.08.2018 & 08.08.2018	KVK, Rastakuntubai	KVK, Rastakuntubai
41	Training programme on 'Growing of vegetable field bean in orchards'	07.08.2018	KVK, Reddipalli	KVK, Reddipalli
42	Off-campus training programme on 'Low cost reduction technologies in paddy'	08.08.2018	Daivalraavuru of Korisapadumandal	DAATTC, Darsi
43	Training programme on 'Pest and disease management in rice crop'	09.08.2018	Kapileswarapuram	DAATTC, Ghantasala
44	Off-campus training programme on 'Management of Pink boll worm in cotton'	09.08.2018	Nagarujupalli of Marturumandal	DAATTC, Darsi
45	Training programme on 'Enterprise promotion and establishment and maintenance of nutrition garden'	09.08.2018	Ramannapalem village of Mogalthurmandal	KVK, Undi
46	Skill development training programme on 'Mushroom production technology'	09.08.2018 & 10.8.2018	KVK, Nellore	KVK, Nellore
47	Training programme on 'Micro irrigation'	10.08.2018	ARS, Nellore	KVK, Nellore
48	Training programme on 'Hands on Training Programme on Bee keeping'	13.8.2018 to 18.8.2018	ARS, Vijayarai	ARS, Vijayarai
49	Training programme on 'Importance of Nutrition garden'	18.08.2018	Mallikarjuna-puram village, TP Gudurmandal	KVK, Nellore
50	Training programme on 'Groundnut cultivation, pest and disease management practices'	21.08.2018	Kukkalapalli village of Yadamarimandal	DAATTC, Kalikiri
51	On campus training programme to the tribal women farmers on 'Nutri – Sensitive Agricultural Resources and Innovation (NARI)'	23.8.2018 & 24.8.2018	KVK, Rastakuntubai	KVK, Rastakuntubai

S. No.	Event	Date	Venue	Organized by
52	Off campus training programme on 'Scientific rearing of sheep and goat'	24.08.2018	Pendiyala village	KVK, Garikapadu
53	Training programme on 'Sugarcane cultivation, pest and disease management practices'	25.08.2018	Yerlampalli village of Iralamandal	DAATTC, Kalikiri
54	Training programme on 'Improving anganwadi environment through play way method'	29.08.2018	Machilipatnam	KVK, Ghantasala
55	Training programme on 'Turmeric and Banana'	01.09.2018.	Buggalapalli Village of C.K.Dinnemandal	DAATTC, Kadapa
56	Training programme to farmers on 'Infectious bovine rhinotracheitis'	05.09.2018	Arekal village	KVK, Banavasi
57	Training programme on 'Contingency crop plans and drought mitigation measures in kharif crops like cotton, groundnut, redgram etc.'	06.09.2018	Malkapuram village of Pedda-kaduburmandal	KVK and DAATTC, Banavasi
58	Training programme on 'Rodent Management in different crops'	06.09.2018	Mastyapuri village	KVK, Undi
59	Training programme on 'Effective delivery of animal husbandry schemes to farmers'	07.09.2018	Banavasi village	KVK and DAATTC, Banavasi
60	Training programme on 'Management practices of fall army worm in maize'	10.09.2018	Bobbili	KVK, Rastakuntubai
61	Training programme on 'Beekeeping'	14.09.2018	KVK, Kalikiri	KVK and DAATTC, Kalikiri
62	Training programme for farmers on 'Key production recommendations of Bengalgram'	15.09.2018	Reddipalli village of Pendlimarrimandal	DAATTC, Kadapa
63	Training programme on 'Vermicompost Production Techniques'	15.09.2018	KVK, Nellore	KVK, Nellore
64	Training programme on 'Package of practices on rabi groundnut and bengalgram crops'	18.09.2018	Ralladoddi, Kalugotla villages	KVK and DAATTC, Banavasi

S. No.	Event	Date	Venue	Organized by
65	Training programme on 'Plant protection in kharif crops under Tribal Youth Network programme'	17.09.2018 to 18.09.2018	KVK, Amadalavalasa	KVK, Amadalavalasa
66	Training programme on 'Value addition to Millets based nutrition biscuits making programme'	17.09.2018 to 19.09.2018	Pydichintapadu village of Bhimadolemandal	KVK, Undi in collaboration with LEDP
67	Training programme on 'Value addition to millets for women'	17.09.2018 to 22.09.2018	KVK, Kalikiri	KVK, Kalikiri
68	Training programme cum demonstration on 'Value added products of jaggery'	18.09.2018 &19.09.2018	PHET, RARS, Anakapalle	KVK, Kondempudi
69	Training programme on 'Value addition of millets'	18.09.2018 & 19.09.2018	KVK, Nellore	KVK, Nellore
70	Training programme on 'Bee keeping'	19.09.2018	Tadikallapudi Village, West Godavari District	ARS, Vijayarai in collaboration with Department of Horticulture, West Godavari District
71	Off-campus training programme to 25 farmers on 'Redgram production technologies'	22.09.2018	Veerayapalem of Darsimandal	DAATTC, Darsi
72	Training programme on 'Mushroom production technology'	24.09.2018	KVK, Nellore	KVK, Nellore in collaboration with ICICI Foundation
73	Training programme on 'Cultivation technologies in horticultural crops and use of bio fertilizers in horticultural crops'	24.09.2018	KVK, Nellore	KVK, Nellore
74	Training programme to 25 farmers on 'Weed management in different crops and pink boll worm management in cotton'	24.09.2018	Kurichedu of Kurichedumandal	DAATTC, Darsi
75	Off-campus training programme to 25 farmers on 'Mechanization in paddy'	27.09.2018	Samanthapudi of Darsimandal	DAATTC, Darsi
76	Training programme on 'Fish management practices and Pro Biotics'	03.10.2018	Mastyapuri village	KVK, Undi

S. No.	Event	Date	Venue	Organized by
77	Training programme on 'Pink boll worm management in cotton'	03.10.2018	Virupapuram (DFI village)	DAATTC, Reddipalli
78	Training cum method demonstration on 'Erection of pheromone traps for managing the pink boll worm in cotton'	10.10.2018	Cheenapuram village	KVK, Banavasi
79	Training programme on 'Best managemental practices on sheep and goat to jeevamitras'	10.10.2018	KVK, Banavasi	KVK, Banavasi
80	Training programme on 'Integrated pest management practices'	16.10.2018	Mastyapuri village	KVK, Undi
81	Training programme on 'Value addition to leafy vegetables'	16.10.2018	KVK, Rastakuntubai	KVK, Rastakuntubai
82	Training programme on 'Basics in Genomic Information Systems (GIS) and Quantum GIS (QGIS)'	22.10.2018 to 27.10.2018	Geospatial Technology Centre, Lam, Guntur	Geospatial Technology Centre, Lam, Guntur
83	Training programme on 'Cultivation of vegetable crop nurseries under shadenet'	23.10.2018 to 27.10.2018	KVK, Garikapadu	KVK, Garikapadu
84	Training programme on 'Rice production technologies and pulse production technologies'	24.10.2018	Vinjamur division	KVK, Nellore
85	Training programme on 'Energy and water conservation measures and demand site management in Agriculture sector'	31.10.2018	KVK, Reddipalli	KVK, Reddipalli
86	Training programme on 'Importance of nutritional kitchen garden'	01.11.2018	Chamalur	KVK, Reddipalli
87	Training programme on 'Post-Harvest Technology of Groundnut'	03.11.2018	Chandakacharla	College of Agri. Engineering, Madakasira
88	Vocational training programme on 'Vegetable seedling production under shade net'	13.11.2018 & 14.11.2018	KVK, Amadalavalasa	KVK, Amadalavalasa
89	Training programme on 'Hybrid maize seed production'	14.11.2018	Nidigatla village	Agricultural College, Rajama-hendravaram

S. No.	Event	Date	Venue	Organized by
90	Training programme on 'Self-employment opportunities for farm women'	16.11.2018	Nidigatla village	Agricultural College, Raja-mahendravaram
91	Training programme on 'Farm mechanization in dryland agriculture'	27.11.2018	Gundumala	College of Agri. Engineering, Madakasira
92	Training programme on 'Own Seed Production in Rice'	01.12.2018	Thorredu, East Godavari district	Agricultural College, Raja-mahendravaram
93	Training programme on 'Energy & water conservation measures and Demand side management in agriculture sector'	01.12.2018	KVK, Nellore	KVK, Nellore
94	Training programme to the farmers on 'Awareness programme on fall army worm in jowar and maize'	03.12.2018 & 07.12.2018	Kadaluru village of Tada Mandal and Krishnampalli village of Udayagiri Mandal	DAATTC, Nellore
95	Skill training programmes to Rural Youth (one week duration) in coordination with ATMA, Srikakulam on 'Vermi composting and IPM – Vegetables'	3.12.2018 to 8.12.2018 & 17.12.2018 to 23.12.2018		
96	Training programme on 'Fall army worm'	4.12.2018 & 09.12.2018 respectively	Thatirammana-gudem of Jeelugumilli-mandal and Jogganapalem of Dendulurumandal	ARS, Vijayarai
97	Training programme on 'Short duration varieties in paddy'	4.12.2018 & 7.12.2018 respectively	Mastyapuri and Koparru	KVK, Undi
98	Training programme on 'Management practices in rabi crops'	4.12.2018 to 5.12.2018	KVK, Amadalavalasa	KVK, Amadalavalasa
99	Skill development training programme on 'Backyard poultry'	05.12.2018	KVK, Darsi	KVK, Darsi

S. No.	Event	Date	Venue	Organized by
100	Training programme to farmers on 'Usage of waste decomposer and distributed mango saplings to farmers'	5.12.2018 to 07.12.2018	K.J.Puram(V) of Madugula (M) & Ravikavatham (V&M)	DAATTC, Visakhapatnam
101	Training programme on 'Seed treatment'	06.12.2018	Mastyapuri village	KVK, Undi
102	Training programme on 'Sustainable sugarcane production through drip irrigation and fertigation'	10.12.2018	Chodavaram Sub division	RARS, Anakapalle
103	Training programme on 'Procedures of e-procurement'	11.12.2018	Advanced P G Centre, Lam, Guntur	Director of Research, ANGRAU
104	Training programme on 'Management of fall army worm in maize'	11.12.2018	Bhimilli division	DAATTC, Visakhapatnam
105	Training programme on 'Innovative knowledge and promoting advance technology in agriculture'	11.12.2018	Aspari and Aloor division	KVK, Banavasi
106	Training programme on 'Plasmid Gene Cloning'	10.12.2018 to 13.12.2018	APGC, Lam, Guntur	APGC, Lam, Guntur in association with Himedia labs, Mumbai
107	Vocational training programme on 'Value added products of Fruits and Vegetables'	17.12.2018 to 21.12.2018	KVK, Kalikiri	KVK, Kalikiri
108	Training programme on 'Water quality management in aquaculture'	22.12.2018	Mastyapuri	KVK, Undi
109	Training programme on 'FAW management in rabi maize'	02.01.2019	Podaralla village	KVK, Reddipalli
110	Training program on 'Agriculture and apprenticeship in farm mechanization'	03.01.2019 to 08.01.2019	DAATTC, Srikakulam	DAATTC, Srikakulam in sponsorship of ATMA

S. No.	Event	Date	Venue	Organized by
111	Training programme on 'Skill Training to Rural Youth-Agricultural Apprenticeship'	03.01.2019 to 08.01.2019	KVK, Amadala-valasa	KVK and DAATTC Amadalavalasa in collaboration with MANAGE, Hyd. and ATMA, Srikakulam
112	Training program on 'Quality Jaggery Making'	07.01.2019	Veeravasam Vil., Badangimandal, Vizianagaram Dt.	RARS, Anakapalle
113	Training programme on 'Bengalgram – measures for increasing productivity'	07.01.2019	Mylavaram and Peddamudium-mandal at Jammalamadugu	Agricultural Research Station, Utukur, Kadapa in the sponsorship of SERP (Society for Elimination of Rural Poverty)
114	Training programme on 'Scientific aspects of rearing sheep & goats, backyard poultry'	08.01.2019	Peddakadubur village	KVK, Banavasi in convergence with animal husbandry department
115	Training programme on 'Nutrition awareness to women & children's'	11.01.2019	Bommagani Pallivanka Thanda village	KVK, Kalyandurg
116	Model Training Course (MTC) on 'Seed Quality Control System to meet the National and International Standards'	18.01.2019 to 25.01.2019	Lam, Guntur	ANGRAU
117	Training programme on 'Rodent Pest Management'	24.01.2019	Ravulapalem, East Godavari district	Agricultural College, Rajama-hendravaram in collaboration with ATMA, East Godavari district
118	Skill Development Training on 'Seed Quality Maintenance of New Varieties of Jute, Mesta and Sunhemp'	25.01.2019	ARS, Amadalavalasa	ARS, Amadalavalasa with the support of CRIJAF

S. No.	Event	Date	Venue	Organized by
119	Training programme on 'Mushroom cultivation aspects'	03.02.2019	KVK, Banavasi	KVK, Banavasi
120	Training programme on 'Rodent pest management in different crops and rodenticide application techniques'	04.02.2019	Maredumaka	DAATTC, Ghantasala
121	Training programmes on 'Organic grower and Mushroom grower'	18.02.2019 to 14.03.2019	KVK, Rastakuntubai	KVK, Rastakuntubai
122	Training programme on 'Best management practices on major crops'	19.02.2019	Kotha Sanambatla	S.V. Ag College, Tirupati
123	Training programme on 'IPM in Groundnut'	21.02.2019	Chattevaripalem village of Chinna-gottigallumandal	S.V. Ag College, Tirupati
124	Training programme on 'Udyanapantalalo viluvaaadharitha uthpathulu'	22.02.2019	Nallamotuvari- palem village	Ag College,
125	Training programme on 'Personality development'	23.02.2019 & 24.02.2019	S.V. Ag College, Tirupati	S.V. Ag College, Tirupati
126	Training programme on 'Paired row planting in sugarcane'	26.02.2019	RARS, Anakapalle	DAATTC, Kondempudi
127	Skill development training programme on 'Fabric embellishment through embroidery and painting and glass painting'	21.02.2019 to 28.02.2019	Bommaganapalli Vanka Thanda	KVK Kalyandurg
128	Training programme on 'Key production recommendations of Rabi paddy'	01.03.2019	Machanapalli village of Duvvurmandal	DAATTC, Kadapa
129	Training programme on 'Bakery foods on ready to use foods with Millets'	05.03.2019 & 06.03.2019	KVK, Kadapa	KVK, Kadapa sponsored by ATMA, Kadapa
130	Training programme on 'Diagnostic production practices survey using open data tool kit' under Cereal System Initiative for South Asia (CSISA)	06.03.2019 & 07.03.2019	Lam, Guntur	Directorate of Extension, ANGRAU

S. No.	Event	Date	Venue	Organized by
131	Training programme on 'Attracting rural youth towards agriculture'	11.03.2019	Vajrapukotturu Mandal	DAATTC, Amadalavalasa
132	Training programme on 'Value added products from finger millet and foxtail millet – Ready to eat snacks'	12.03.2019	CFST, Pulivendula	College of Food Science & Technology, Pulivendula
133	Training programme on 'Maize Production Technologies'	14.03.2019	ARS, Vijayarai	ARS, Vijayarai
134	Training programme on 'Soil Health Awareness Programme'	16.03.2019	Vejendla village	DAATTC, Guntur
135	Training programme on 'On farm production of microbial pesticides at farmers' level'	20.03.2019 to 26.03.2019	KVK, Garikapadu	Dr. K. L. Rao Krishi Vigyan Kendra, Garikapadu in collaboration with ATMA
136	Training programme on 'Personality Development Programme'	01.04.2019 to 06.04.2019	Dr. NTR College of Agricultural Engg. Bapatla	Dr. NTR College of Agricultural Engineering, Bapatla under IDP
137	Training programme on 'Overall Personality Development'	15.04.2019 to 20.04.2019	Agricultural College, Bapatla	Agricultural College, Bapatla
138	Training programme on 'Overall Personality Development'	22.04.2019 to 26.04.2019	Dr. NTR College of Agricultural Engineering, Bapatla	Dr. NTR College of Agricultural Engineering, Bapatla under IDP
139	Skill Training for Rural Youth (STRY) training programme on "Integrated Pest and Disease Management"	03.05.2019 to 09.05.2019	ARS, Utukur	ARS, Utukur funded by ATMA, Kadapa
140	Training programme on "Raising of single node seedlings of Ginger and Turmeric through portray technology"	06.05.2019 to 09.05.2019	KVK, Kondempudi	KVK, Kondempudi

S. No.	Event	Date	Venue	Organized by
141	Training programme on "Importance soil testing and soil test based fertilizer application"	10.05.2019	Kumbala camp village Kowth-lammandal, Kurnool district	KVK, Banavasi
142	Training programme on "Major cultivation aspects in *kharif* groundnut"	16.05.2019	DAATTC, Anantapuramu	DAATTC, Anantapuramu
143	Skill development training programme on "Mushroom cultivation"	16.05.2019 &17.05.2019	KVK, Nellore	KVK, Nellore
144	Off-campus training programme on "Value addition and nutritional importance of millets"	16.05.2019	Marutla village	KVK, Reddipalli
145	Training programme on "Pest and diseases management in millets"	21.05.2019	Ongole	KVK, Darsi
146	Skill training on "Mushroom cultivation and nutritional importance"	25.05.2019	KVK, Reddipalli	KVK, Reddipalli
147	Training programme on "Administrative and Financial Procedures"	28.05.2019 & 29.05.2019	RARS, Lam, Guntur	Directorate of Extension, ANGRAU
148	Skill Training for Rural Youth (STRY) on "Millet Production Technology and Value Addition"	28.05.2019 to 03.06.2019	KVK, Undi	KVK, Undi sponsored by ATMA, Eluru

Workshops/ Seminars / Conferences/Symposia Organized

S. No.	Event	Date	Venue	Purpose
1	DBT- Biotech – Kisanhub orientation cum training workshop	11.09.2018	KVK, Amadalavalasa	KVK & DAATTC, Amadalavalasa
2	Three days' workshop to the ELP directors and one student from each unit of all the Agricultural Colleges with the theme "Reformulating Agribusiness Strategies of Experiential learning units towards attaining viability and self-sustainability"	27.09.2018 to 29.09.2018	S.V. Agricultural College, Tirupati	ANGRAU
3	workshop cum training programme on the project "Biotech Kisan Hub" funded by Department of Biotechnology	03.10.2018	KVK, Kalyandurg	KVK, Kalyandurg
4	workshop on "DBT - BIOTECH KISAN HUB" to groundnut, redgram and bengalgram crop farmers	05.10.2018	KVK, Banavasi	KVK, Banavasi
5	University Level AGRICARNIVAL – 2018 with a theme of "Innovations in Agriculture for Economic Sustainability of Indian Farmers" for the Academic Year 2018-'19	09.10.2018	Agricultural College, Bapatla	ANGRAU
6	Workshop on "Energy efficiency" to the farmers	10.10.2018	KVK, Rastakuntubai	KVK, Rastakuntubai
7	Workshop on 'Strategy to get into Government Jobs'	24.11.2018	S.V. Agricultural College, Tirupati	S.V. Agricultural College, Tirupati
8	Workshop to fellowship farmers of groundnut, bengalgram and redgram under DBT-Biotech kisan hub	02.11.2018	DAATTC, Banavasi	DAATTC, Banavasi
9	State level workshop on 'Planning and Execution of APRIGP under ANGRAU - SERP partnership'	19.11.2018	APGC, Lam, Guntur	ANGRAU
10	KVK Rastakuntubai organized workshop on 'Micro Irrigation' on 04.12.2018			

S. No.	Event	Date	Venue	Purpose
11	Multi location conference	15.12.2018	KVK, Kalikiri in collaboration with Reliance Foundation	
12	A seminar on "Incubation Center"	07.01.2019	College of Agricultural Engineering, Madakasira	College of Agricultural Engineering, Madakasira
13	The two day workshop on Promoting the concept of "Farming Systems for Nutrition" - a path way to address malnutrition in A.P.	10.01.2019 & 11.01.2019	RARS, Lam, Guntur	ANGRAU in collaboration with M.S. Swami-nathan Research Foundation, Chennai
14	Workshop on "Networking of organic farmers to create mutually aided cooperative society for promoting self-marketing of organic products"	18-01-2019	KVK, Banavasi	KVK, Banavasi
15	Industry Interactive Meet 'SAMVADA 2019'	22.02.2019	S.V. Ag College, Tirupati	S.V. Ag College, Tirupati
16	National Conference for PG students (NCPGS-2019) on "Novel Approaches for Doubling Farmer's income through Sustainable Agricultural Production Systems"	07.03.2019 & 08.03.2019	S.V. Agricultural College	S.V. Agricultural College
17	National Conference on "Strategies and approaches for improving the performance of Agricultural Universities"	19.03.2019 & 20.03.2019	Dr. B. V. Nath Auditorium, Agricultural College, Bapatla and Dr.NTR College of Agril. Engg., Bapatla	Agricultural College, Bapatla and Dr. NTR College of Agricultural Engineering, Bapatla
18	Annual Groundnut Workshop	25.05.2019 to 27.05.2019	Andhra University, Visakhpatnam	RARS, Anakapalle

Participation / Visits of Vice-Chancellor

S. No.	Event	Date	Venue	Purpose
1	4th round Nava Nirmana Deeksha 2018 program	02.06.2018	Administrative Office, Lam, Guntur	Participation
2	4th round Nava NirmanaDeeksha 2018 program (Farmers Welfare – Food Security)	04.06.2018	APGC, Lam, Guntur	Participation
3	Sensitizing Workshop of Agrinnovate India Limited	06.06.2018	NASC Complex, New Delhi	Participation
4	Review meeting on MoUs with Deans and Directors	07.06.2018	Administrative Office, Lam, Guntur	Participation
5	Convened meeting with University Officers and reviewed various on-going activities	11.06.2018	Administrative Office, Lam, Guntur	Chairman
6	100thAcademic Council meeting	15.06.2018	APGC, Lam, Guntur	Chairman
7	4th International Yoga Day	21.06.2018	Administrative Office, Lam, Guntur	Participation
8	286th Urgent meeting of the Board of Management	21.06.2018	Administrative Office, Lam, Guntur	Chairman
9	XXIV regional meeting of ICAR, organized by Central Institute of Freshwater Aquaculture	22.06.2018 & 23.06.2018	Bhubaneswar, Odisha	Participation
10	An interaction meeting between Mega Seed Park members and students (on international exposure to students)	26.06.2018	Agricultural College, Bapatla	Chairman
11	Interaction meeting with IRRI Scientists on Work Plan & Progress of the Project "IRRI – Satellite based rice monitoring and crop insurance system for Andhra Pradesh"	27.06.2018	Administrative Office, Lam, Guntur	Participation

S. No.	Event	Date	Venue	Purpose
12	Birth Anniversary of Sri Alluri Seetha Ramaraju	04.07.2018	Administrative Office, Lam, Guntur	Participation
13	Meeting with Director, International Cooperation, NIBIO, Ministry of Agriculture, Norway – Talk on "Bio Economy: A future pathway for Agriculture Development"	05.07.2018	Administrative Office, Lam, Guntur	Participation
14	Spot Counselling 2018-19	09.07.2018	RARS, Lam, Guntur	Participation
15	Diploma Counselling2018-19	10.07.2018	RARS, Lam, Guntur	Participation
16	Convened University Officers meeting	11.07.2018	Administrative Office, Lam, Guntur	Chairman
17	Inspected RARS, Anakapalle and KVK, DAATTC, Kondempudi	16.07.2018	-	Inspection
18	50th Meeting of the Board of Management of Dr.Y.S.R. Horticultural Univ.	17.07.2018	Chintapalle	Participation
19	Inspected RARS, Chintapalle	17.07.2018	-	Inspection
20	NSS University Advisory Committee meeting	20.07.2018	Administrative Office, Lam, Guntur	Participation
21	Visited construction buildings at Agricultural College, Bapatla, College of Agricultural Engineering, Bapatla and College of Food Science and Technology, Bapatla	21.07.2018	-	Visit
22	KOHA (Open Source Integrated Library System) meeting	25.07.2018	Administrative Office, Lam, Guntur	Participation
23	Released brochure pertaining to National Conference on 'Challenges and Opportunities in Statistics and Informatics for Futuristic Humanosphere Especially in Agriculture'	25.07.2018	S.V. Agricultural College, Tirupati	Release

S. No.	Event	Date	Venue	Purpose
24	Training programme on Organic Farming organised by Rythu Nestham Foundation	29.07.2018	Guntur	Participation
25	Chief Guest for the Inauguration of AC & ABC training programme	30.07.2018	Swarna Bharath Trust, Atukur	Participation
26	"Digitalization of Admissions, Examinations and Academic Activities" of the University by TCS iON	01.08.2018 Lam, Guntur	Admn. Office,	Participation
27	Directors Meeting of Andhra Pradesh State Mega Seed Park Ltd.	06.08.2018	A.P. Secretariat, Velagapudi	Participation
28	Inspected S.V. Agricultural College and RARS, Tirupati	07.08.2018, 08.08.2018 & 09.08.2018		Inspection
29	Presided the University Officers meeting	10.08.2018	Admn. Office, Lam, Guntur	Chairman
30	"Student Academic Repository" meeting	10.08.2018	Admn. Office, Lam, Guntur	Participation
31	Presided the meeting on status of building constructions works of ANGRAU	10.08.2018	Admn. Office, Lam, Guntur	Chairman
32	The meeting on presentation on "Digital Farming Initiatives" of the University by TCS iON	10.08.2018	Admn. Office, Lam, Guntur	Participation
33	Inaugurated the review meeting on progress of the RKVY projects allocated from 2013-'14 to till date	13.08.2018	APGC, Lam, Guntur	Inauguration
34	72nd Independence Day Celebrations	15.08.2018	Administrative office, Lam, Guntur	Participation
35	Meeting with Dr. K. J. Ramesh, Director General, IMD, Ministry of Earth Science, New Delhi	18.08.2018	Administrative Office, Lam, Guntur	Participation

S. No.	Event	Date	Venue	Purpose
36	287th Meeting of Board of Management	20.08.2018	Administrative Office, Lam, Guntur	Chairman
37	Interaction meeting with Dr. Arvind Kumar, IRRI	20.08.2018	Administrative Office, Lam, Guntur	Participation
38	Interaction with Scientists	21.08.2018	Bapatla	Participation
39	Inaugural session of U.G. Counseling	25.08.2018	Regional Agricultural Research Station, Lam, Guntur	Participation
40	Bimonthly review meeting with the ADRs and ADs	28.08.2018	Admn. Office, Lam, Guntur	Chairman
41	Inspected U.G. Counseling	29.08.2018	Regional Agricultural Research Station, Lam, Guntur	Inspection
42	Inspected U.G. Counseling	30.08.2018	Regional Agricul-tural Research Station, Lam, Guntur	Inspection
43	Field Visits and Building inspection	30.08.2018	ARS, Amaravathi	Participation
44	Inspected U.G. Counseling	31.08.2018	Regional Agricultural Research Station, Lam, Guntur	Inspection
45	Meeting on Digitalization of Admission, Examinations and Academic activities with the collected data of Agricultural College, Bapatla by TCS iON	10.09.2018	Admn. Office, ANGRAU	Participation
46	University Officers meeting	12.09.2018	Admn. Office, ANGRAU	Chairman

S. No.	Event	Date	Venue	Purpose
47	Interaction Meeting with IRRI Scientists	17.09.2018	Admn. Office, Lam, Guntur	Participation
48	U.G. Counselling for Bi.P.C. stream	17.09.2018	RARS, Lam, Guntur	Participation
49	Advisory Committee Meeting of the Academic Council	20.09.2018	Admn. Office, Lam	Participation
50	Inaugural Ceremony of ANNEXE of ATARI building, Hyderabad	21.09.2018	Hyderabad	Participation
51	Blood donation camp meetings (NSS meetings) and also monitored the progress of constructions of new buildings at Bapatla campus	24.09.2018	Agricultural College, CAE and CFST, Bapatla	Visit
52	Interaction meeting on 'Fall Armyworm on Maize'	27.09.2018	APGC, Lam	Participation
53	Inaugural function of I phase ANGRAU Intercollegiate Sports, Games, Cultural and Literary competitions 2018	03.10.2018	Agricultural College, Bapatla	Participation
54	Integrated Administrative Building" BHUMI POOJA"	04.10.2018	Lam, Guntur	Participation
55	Orientation Meeting on Crop Diagnostic Bulletins (Booklets)	09.10.2018	APGC, Lam	Participation
56	AGRICARNIVAL 2018	09.10.2018	Agricultural College, Bapatla	Participation
57	Technical and Office inspection	12.10.2018	RARS, Lam	Inspection
58	Workshop cum training programme to input dealers on Pink Bollwarm Management in Cotton	12.10.2018	RARS, Lam	Convener
59	Visited the affected areas of Titli Cyclone and attended the Teleconference with Hon'ble Chief Minister, Government of Andhra Pradesh on 15.10.2018	15.10.2018 & 16.10.2018	Srikakulam district	Visit

S. No.	Event	Date	Venue	Purpose
60	Visited farmers' fields	20.10.2018	Chilakaluripeta, Guntur district	Visit
61	Valedictory Function of 3rd Phase Inter Collegiate Sports, Games, Cultural and Literary Meet 2018-'19 College, Tirupati	24.10.2018	S.V. Agricultural	Participation
62	Visited and evaluated the implementation technical programme work	25.10.2018	RARS, Tirupati	Visit
63	288th Board of Management meeting	27.10.2018	Administrative Office, Lam, Guntur	Convener
64	118th Birthday Celebrations of Acharya N.G. Ranga	07.11.2018	Administrative Office, Lam Guntur	Participation
65	Research/teaching activities of different zones/colleges at Bimonthly meeting of the Associate Directors of Research and Associate Deans	09.11.2018	Admn. Office, Lam, Guntur	Convener
66	Inaugurated Journal of Research Website	08.11.2018	Admn. Office, Lam, Guntur	Inauguration
67	51st Meeting of the Board of Management	10.11.2018	International Guest House, Univ. Campus, Dr.Y.S.R. Horticultural Univ., Venkataramanna-gudem	Participation
68	Participated in DPC meeting	12.11.2018	Admn. Office, Lam, Guntur	Participation
69	Participated in retired Scientists Association meeting	13.11.2018	Admn. Office, Lam, Guntur	Participation
70	Participated in Soft launch of Spectroscopy laboratory at IFT, Tirupati	14.11.2018	Chambers of Special Chief Secretary, Secretariat, Velagapudi	Participation

S. No.	Event	Date	Venue	Purpose
71	University Officers meeting	14.11.2018	Admn. Office, Lam, Guntur	Convener
72	Participated in Opening of Bio fertilizer Units	15.11.2018	ARS, Amaravathi	Participation
73	Participated as Chief Guest for National Traditional Seed Mela	17.11.2018	Sri Venkateswara University, Tirupati	Participation
74	Participated in Workshop on "Planning & Execution of APRIGP under SERP-ANGRAU Partnership"	19.11.2018	APGC, Lam, Guntur	Participation
75	Participated in Farmers meet "Rythu Rakshna Vedika"	21.11.2018	Kornepadu	Participation
76	Participated in IAUA Golden Jubilee International Conference	23.11.2018 to 25.11.2018	NASC, Pusa, New Delhi	Participation
77	Participated in Kisan Mela	28.11.2018	RARS, Anakapalle	Participation
78	Visited ARS, Seethampeta, KVK, Rasthakuntabai, ARS, Amadalavalasa	29.11.2018 to 30.11.2018		Visit
79	Inspected Academic & Administrative activities	01.12.2018	Agricultural College, Naira	Inspection
80	Participated in Dr. B.R.Ambedkar 62nd Death Anniversary	06.12.2018	Administrative Office, Lam, Guntur	Participation
81	Participated in review meeting of	06.12.2018	Administrative Office, Lam, Guntur	Participation
82	Participated in Laying of Foundation Stone and Opening Ceremonies of Groundnut, Agromet, Nano, PHT, HRD	10.12.2018	RARS, Tirupati	Participation
83	Kisan Mela	12.12.2018	RARS, Nandyal	Participation
84	Visited Agricultural College, Mahanandi	13.12.2018		Visit
85	Presided and participated in 101st Academic Council meeting	15.12.2018	Advanced P.G. Center, Lam, Guntur	Convener

S. No.	Event	Date	Venue	Purpose
86	University Officers meeting	17.12.2018	Administrative Office, Lam, Guntur	Convener
87	Participated in 48th REAC Meeting	19.12.2018 & 20.12.2018	RARS, Tirupati	Participation
88	Participated in ASSOCHAM – National Conference on Doubling the Farmer's Income – Challenges & Strategies	21.12.2018	RARS, Lam, Guntur	Participation
89	Participated in Laying of Foundation Stone for Modern Agricultural Research Building Complex and Inauguration of Seed Processing and Storage Unitby Sri SomireddyChandramohan Reddy, Hon'ble Minister for Agriculture	21.12.2018	RARS, Lam, Guntur	Participation
90	Participated in the Seminar on "Sustainability of Small Farmer in Changing Agricultural Scenario"	22.12.2018	RICARIA – PJTSAU, Hyderabad	Participation
91	Participated in inauguration of Compound Wall and in Foundation Laying Stoneby Sri Somireddy Chandramohan Reddy, Hon'ble Minister for Agriculturefor Research Building & Agricultural Polytechnic	28.12.2018	ARS, Podalakur	Participation
92	289th Meeting of Board of Management	29.12.2018	Administrative Office, Lam, Guntur	
93	Participated in Foundation Laying Stone for office cum Laboratory building by Sri Nimmakayala Chinarajappa, Hon'ble Deputy Chief Minister	30.12.2018	ARS, Peddapuram	Participation
94	Participated in inauguration of Student Knowledge Center, Girls Hostel, Central Instrumentation Cell, Rajeev Gandhi KreedaPranganam buildings at Agricultural College, Bapatla and Boys	31.12.2018	College of Agricultural Engineering, Bapatla	Participation

S. No.	Event	Date	Venue	Purpose
	Hostel and Girls Hostel buildings at Dr. NTR College of Food Science & Technology, Bapatla and ELP, Boys Hostel and Girls Hostel buildings			
95	Participated in Foundation Laying Stone ceremony of Farm Implements Testing Center, Seed Processing & Storage Unit, Water Management Center, Saline Water Scheme	31.12.2018	Agricultural College Farm, Bapatla	Participation
96	Reviewed research/teaching activities of different zones/colleges at bimonthly meeting of the ADRs and ADs	03.01.2019 & 04.01.2019	Administrative Office, Lam, Guntur	Chairman
97	Visitedand monitored research activities	07.01.2019	ARS, J.M.Puram	Chairman
98	Visitedand monitored research activities	09.01.2019	ARS, Darsi	Chairman
99	Participated in Workshop on "Farming System for Nutrition – A Pathway for addressing Malnutrition in India"	10.01.2019	APGC, Lam, Guntur	Participation
100	Visitedand monitored research activities	11.01.2019	ARS, Garikapadu	Chairman
101	Participated in Village Adoption programme / Training Courses on Seed Quality Control System to meet National & International Standards	18.01.2019	Lam, Guntur	Participation
102	Participated in Kisan Melaby Sri Somireddy Chandramohan Reddy, Hon'ble Minister for Agriculture	22.01.2019	RARS, Lam	Participation
103	Participated in inauguration of College of Home Science and Hostel building by Sri Somireddy Chandramohan Reddy, Hon'ble Minister for Agriculture	22.01.2019	Lam, Guntur	Participation
104	Participated in foundation stones laying function for four research building	22.01.2019	PHTC, FIM, SWS and ARS at College Farm, Agri. College, Bapatla	Participation

S. No.	Event	Date	Venue	Purpose
105	Participated in inauguration for three buildings (Experiential Learning Building, Girls Hostel and Boys Hostel)	22.01.2019	Dr NTR College of Food Science and Technology, Bapatla	Participation
106	Participated in inauguration for three buildings (Experiential Learning Building, Girls Hostel and Boys Hostel)	22.01.2019	Dr NTR College of Agricultural Engineering, Bapatla	Participation
107	Participated in inauguration for four buildings (Students Knowledge Centre, Central Instrumentation Cell, Girls Hostel and KreedaPranganam)	22.01.2019	Agricultural College, Bapatla	Participation
108	University Officers meeting	24.01.2019	Admn. Office, Lam, Guntur	Convener
109	Participated in 1st Anniversary Function of AP AGRIS' JAC	25.01.2019	RARS, Lam	Participation
110	Participated in Valedictory function of MTC on Seed Quality Control to meet the National & International Standards	25.01.2019	APGC, Lam, Guntur	Participation
111	Participated in 70th Republic Day celebrations	26.01.2019	Administrative Office, Lam, Guntur	Participation
112	Participated in Annual Conference of Vice-Chancellors (VCs) of AUs and Interface meeting with Directors' of ICAR Institute	30.01.2019 to 01.02.2019	NASC Complex, New Delhi	Participation
113	Participated in IV Convention of Association of Meat Scientists & Technologists on Food Sovereignty: Innovations at Intersections of Technology, Quality & Production	06.02.2019	NTR College of Veterinary Science, Gannavaram	Participation
114	Participated in Foundation Stone Laying and Inauguration Function of Civil structures in Costal Districts by Sri SomireddyChandramohan Reddy, Hon'ble Minister for Agriculture		RARS, Lam	Participation

S. No.	Event	Date	Venue	Purpose
115	Convened IDP – Selections for faculty of five colleges	08.02.2019	—-	Convener
116	Participated in 43rd VC's Convention	09.02.2019 to 13.02.2019	PAU, Ludhiana	Participation
117	Participated in inauguration of renovated ARS building	15.02.2019	Agricultural College Farm, Bapatla	Participation
118	Convened IDP - Selections for students of five colleges	15.02.2019	—-	Convener
119	Convened University Officers meeting	18.02.2019	Admn. Office, Lam	Convener
120	Participated in Interaction meeting with the Nimbus Agritech Consultancy and University administration & crop scientists on consultancy services for registration of crop varieties released by ANGRAU under PPV & FRA act meeting	19.02.2019	Admn. Office, ANGRAU, Lam, Guntur	Participation
121	Participated in Laying of Foundation Stone of Polytechnic & Hostel buildings by Smt. ParitalaSunitha, Hon'ble Minister for SERP, Women Empowerment, Child Welfare, Disabled and Senior Citizens Welfare of A.P.	20.02.2019	APT, Ramagiri	Participation
122	Participated in Sri Uyyalawada Narasimha Reddy Death Anniversary	22.02.2019	Admn. Office, ANGRAU, Lam, Guntur	Participation
123	Participated in Stakeholders meeting under RKVY-RAFTAAR Project "Establishment of Agricultural Market Intelligence Centre"	22.02.2019	RARS, Lam	Participation
124	Participated in Laying of Foundation Stone, Unveiling of Plaques and participation in Kisan Mela	27.02.2019	ARS, Nellore	Participation

S. No.	Event	Date	Venue	Purpose
125	Meeting with International delegates from New Mexican State University, USA for exploring possibility of future collaboration in Agricultural Engineering	28.02.2019	—-	Participation
126	Bi-Monthly meeting of ADRs and ADs with the University Officers	01.03.2019 & 02.03.2019	Admin. Office, Lam, Guntur	Convener
127	Participated as "Distinguished Guest" in the National conference of PG Students – 2019 on "Novel Approaches for Doubling Farmer's Income through Sustainable Agricultural Production Systems"	07.03.2019	SVAC, Tirupati	Participation
128	Inaugurated the Roof Top Solar Grid	08.03.2019	Administrative Building, Lam, Guntur	Inauguration
129	Farmers and Scientists interaction meeting at Kisan Mela	15.03.2019	RARS, Lam at Swarna Bharat Trust, Atkuru	Participation
130	Convened University Officers meeting	15.03.2019	Admn. Office, Lam	Convener
131	InspectedARS, KVK, and Polytechnic, Ghantasala	16.03.2019	—-	Inspection
132	IAB monthly review meeting	18.03.2019	Admn. Office, Lam	Participation
133	"Distinguished Guest" in the National Conference on Strategic Approaches for Developing World Class Agricultural Universities	19.03.2019	Dr. NTR CAE, Bapatla	Participation
134	Kisan Mela	26.03.2019	RARS, Maruteru	Participation
135	Convened 290th Meeting of Board of Management	27.03.2019 & 28.03.2019	Administrative Office, Lam, Guntur	Convener
136	Participated and reviewed on 'Integrated Farming Systems'	28.03.2019	APGC, Lam, Guntur	Participation

S. No.	Event	Date	Venue	Purpose
137	IAB meeting	29.03.2019	Admn. Office, Lam, Guntur	Participation
138	Kisan Mela	30.03.2019	Agricultural College, Naira	Participation
139	Inspected Agricultural Research Station, KVK & DAATTC, Amadalavalasa and ARS, Ragolu	30.03.2019	—-	Inspection
140	ZREAC meeting	15.04.2019	RARS, Lam	Participation
141	Convened University Officers meeting	15.04.2019	Admin. Office, Lam, Guntur	Convener
142	10th Annual College and Hostel day Celebrations	16.04.2019	Ag. College, Rajamahendravaram	Participation
143	Inaugurated the Shuttle Badminton Court	22.04.2019	APGC, Lam, Guntur	Inauguration
144	8th Convocation of Sri Venkateswara Veterinary University, Tirupati	23.04.2019 A.N. to 25.04.2019	—-	Participation
145	Convened Bi-Monthly meeting with all ADs and ADRs	26.04.2019	Admin. Office, Lam, Guntur	Convener
146	Convened 291st Meeting of Board of Management	27.04.2019	Administrative Office, Lam, Guntur	Convener
147	Annual Action Plan Workshop of KVKs of A.P.	29.04.2019	RARS, Lam, Guntur	Participation
148	SLTP for Agricultural Economics	29.04.2019	RARS, Lam, Guntur	Participation
149	SLTP for Statistics & Computer Applications	30.04.2019	RARS, Lam, Guntur	Participation
150	Annual Research Workers' Group Meeting of Sunflower, Castor, Sesame & Niger, 2019	02.05.2019	RARS, Tirupati	Participation
151	College Day Celebrations	03.05.2019	College of Home Science, Lam, Guntur	Participation

S. No.	Event	Date	Venue	Purpose
152	Interaction meeting with Private Polytechnics	07.05.2019	RARS, Lam, Guntur	Participation
153	SLTP (Extn.)	08.05.2019	RARS, Lam, Guntur	Participation
154	SLTP (Agro.)	08.05.2019	APGC, Lam, Guntur	Participation
155	SLTP	09.05.2019	RARS, Lam, Guntur	Participation
156	College Day celebrations	09.05.2019	Ag. College, Bapatla	Participation
157	SLTP	13.05.2019	RARS, Lam, Guntur	Participation
158	SLTP	14.05.2019	RARS, Lam, Guntur	Participation
159	Convened University Officers meeting	15.05.2019	Administrative Office, Lam, Guntur	Convener
160	Axis Bank ATM opening	16.05.2019	Ag. College campus, Bapatla	Participation
161	Inaugural function of Group Meeting of AICRP –MULLaRP and Network Programme on Arid Legumes by Sri M.Venkaiah Naidu, Hon'ble Vice-President, Govt. of India	19.05.2019	RARS,Lam, Guntur	Participation
162	Inauguration of AELP, Girls & Boys Hostel buildings	20.05.2019	CAE, Madakasira	Participation
163	Valedictory programme of Group Meeting of AICRP – MULLaRP and Network Programme on Arid Legumes	21.05.2019 Lam, Guntur	RARS,	Participation
164	Inauguration of buildings	22.05.2019	Ag. College, Mahanandi and RARS, Nandyal	Participation
165	Annual Groundnut Workshop	25.05.2019	Andhra University, Visakhapatnam	Participation

S. No.	Event	Date	Venue	Purpose
166	Refresher Training Programme on Administrative and Financial Procedures	28.05.2019	RARS, Lam	Participation
167	Annual Group meeting of Cotton	30.05.2019	RARS, Lam, Guntur	Participation
168	Training programme to the Probationary Deputy Collectors	30.05.2019	Admn. Office, Lam, Guntur	Participation
169	Valedictory function of Annual Group meeting of Cotton	31.05.2019	RARS, Lam, Guntur	Participation

Visitors

S. No.	Event	Date	Venue	Purpose
1	Dr. Sobhan Babu Sajja, Scientist (Finger Millet Breeding) from ICRISAT	19.09.2018	ARS, Vizianagaram	Visit
2	Dr. D.V.K. Nageswara Rao, Principal Scientist (Soil Science), ICAR-IIRR, Hyderabad	25.09.2018	RARS, Maruteru	To gather soil fertility in paddy and meeting rice progressive farmers in West Godavari Dist. to gather information pertaining to Geo-informatics.
3	Deputy Director General, IRRI, Philippines – Dr. Jaqualene Huges	16.10.2018	ANGRAU headquarters	Visited and interacted with all the University Officers. Associate Director of Research (HQ) presented the Research Profile of ANGRAU
4	The representatives from "Dalberg Global Development Advisors", New York, USA	16-10-2018	KVK, Garikapadu	Visited and interacted with the scientists to know about extension activities and soil health analysis etc.

S. No.	Event	Date	Venue	Purpose
5	A team from National Research Centre for Groundnut, Junagadh	24-10-2018	KVK, Reddipalli	Visited and monitored the progress of *Pseudomonas*seed treated groundnut plots
6	Distinguished Professor of Plant Sciences, Dr. Kent J. Bradford, Interim Director, World Food Centre, College of Agricultural and Environmental Sciences, University of California	01.11.2018	RARS, Tirupati	Visited and discussed about estimation of seed moisture content, safe seed storage methods and equipment for estimation of moisture content and relative humidity
7	IIRR, Hyderabad Monitoring team	05.11.2018	ARS, Ragolu	Visited and verified the ARS, Ragolu AICRIP trials of Plant Breeding, Entomology & Agronomy
8	Dr. Santhanu Chowdhary, Director, NRSC, Hyderabad; Dr. C. S. Murthy, PS, NRSA, Hyderabad; Dr. Abhishek Chakravarthy, Scientist, NRSA, Hyderabad and Er. Adithya, Engineer, NRSA, Hyderabad	23.11.2018	RARS, Maruteru	Visited and monitored the National Carbon Project and interacted with scientists
9	Dr. P. Gopal Reddy, College of Veterinary Medicine, *Tuskegee University*, USA	23.11.2018	Post-Harvest Engineering and Technology Center, RARS, Tirupati	visited and interacted with the scientists regarding technical activities at the center

S. No.	Event	Date	Venue	Purpose
10	The DBT Team, New Delhi headed by Dr. B. Venkateswarlu garu, Ex Director of CRIDA, and Dr. Aslam, Advisor DBT, New Delhi	15.12.2018	RARS, Anakapalle	visited and interacted with the scientists of RARS, Anakapalle
11	Seed monitoring team from ICRA-CRIJAF are visited ARS, Amadalavalasa. Dr C.S. Kar and Dr. S.K. Pandey, Principal Scientists from CRIJAF, Barrackpore were inspected the seed production plots along with Sri. Balakrishna Manager, AP Seeds, Srikakulam and Mrs. S. Yamini, Senior Trainee (Marketing) from National Seeds Corporation are also attended.	05.01.2019	ARS, Amadalavalasa	—-
12	Sri G. Vinai Chand, Additional Director-II & Nodal Officer, PILIP-II, Sri. D. Hari Babu Chowdary, Joint Director of Agriculture (FM) and Dr. NDRK Sarma, Agricultural Expert, Nippon Koei India Pvt. Ltd.,	09.01.2019	RARS, Maruteru	Visit of the AILIP team for inspecting site to establish AMTC
13	Dr. Ramesh, Scientist (Agronomy) Indian Institute of Oil Seeds Research, Rajendranagar, Hyderabad	10.01.2019	ARS, Yellamanchili	Visited along with scientists of BCT-KVK, Haripuram and observed the ongoing sesame experiments
14	Visit of Dr. Rajeev Varshney, Research Programme Director, ICRISAT	22.01.2019	RARS, Nandyal	To organized Field Day at Alluru village, Uyyalawada
15	Campus Challenge Director, Ms. Anne Legeland from Amsterdam, the Netherlands and the Indian Project director R. L. N. Sharma.	11.02.2019	The department of Horticulture, Agricultural College Naira	Visited, seeking a helping hand in finalizing the course curricula of Horticulture to the

S. No.	Event	Date	Venue	Purpose
				disabled children. They further visited AELP units and college farm
16	Dr. Chari Appaji, PS (Extn), ICAR-ATARI, Zone-X, Hyderabad	19-02-2019	KVK, Utukur	Visited and reviewed KVK activities
17	Dr. Raghuvardhana Reddy, Former Vice Chancellor, ANGRAU along with Dr. N. Sreerama Reddy, Ex Dean of Agriculture, Dr. Bucha Reddy, Ex Associate Dean, College of Agriculture, Rajendranagar Hyderabad	20.02.2019	Agricultural College, Bapatla	visited the Newly Constructing buildings with NABARD Funds and Multipurpose Indoor Sports Hall
18	Dr.Rami A Reddy, Director, School of Agriculture University of Wisconsin	21.03.2019	Dr. NTR College of Agril. Engg., Bapatla	Interacted with faculty and students of Dr.NTR College of Agril. Engg., Bapatla regarding career in abroad, placements and project proposals
19	Dr. Edward William, FAO Expert on IDP of ICAR	21-03-2019	Dr. NTR College of Food Science & Technology, Bapatla	Visited Experiential Learning Units and interacted with third year students

X. RESEARCH PUBLICATIONS

1. Agriculture

Books and Chapters

1. Gurumurthy P, Santosh B, Yasmin C, Sudhakar Rao D & Ramyakrishna T, 2019, "Soil plant water and seed testing", *Educreation publishers*, RZ94 Sector-6, Dwaraka, New Delhi, ISBN No.9789353731069.

Research Papers

1. Revathi K, SreeRekha M, Venkata Lakshmi N & Prasuna Rani P, 2019, "Effect of planting densities and nitrogen levels on nutrient uptake of *Rabi* maize (*Zea mays* L.)", *Green Farming*, 10(1)1-6.
2. Kanchati Mrunalini, SreeRekha M, Murthy VRK and Jayalalitha K, 2019, "Impact of harvest aid defoliants on yield and economics of high density cotton", *Indian Journal of Agricultural Research,* 53(1) 116-119.
3. Jaishankar Babu B, Satish Y, Lal Ahamed M and Srinivasa Rao V, 2018, "Genetic Variability, Heritability and Genetic Advance Studies for Yield and Fibre Quality Traits in American Cotton (GossypiumhirsutumL.)", The Andhra Agricultural Journal, 65(2) 305-309.
4. Hari Ram Kumar B, Satyanarayana P V, Ratna Babu D, Chamundeswari N, Srinivasa Rao V and Krishnam Raju S, 2018, "Genetic Variability, Heritability and Genetic Advance for Grain Yield, its Components and Quality Traits in Rice (Oryza sativa L.)", The Andhra Agricultural Journal, 65(2) 310-314.
5. Ravikanth B, Satyanarayana P V, Chamundeswari N, Ashoka Rani Y, Srinivasa Rao V and Ratna Babu D, 2018, "Genetic Variability Studies on Agronomic and Physiological Traits Suitable for Direct Seeding in Rice (Oryza sativa L.)", The Andhra Agricultural Journal, 65(2) 315-319.
6. Sudhakar Reddy B, Girija Rani M, Satyanarayana Rao V and Srinivasa Rao V, 2018, "Character Association Studies for Yield and Lodging related Parameters in Rice (Oryza sativa L.)", The Andhra Agricultural Journal, 65 (2) 320-325.
7. Almaszabeen Badekhan, Uma Devi K, Paul K S R and Srinivasa Rao V, 2018, "Cost and Returns of Cotton Cultivation with Special Reference to Pesticide Usage in Dharwad District of Karnataka", The Andhra Agricultural Journal, 65(2) 451-455.
8. Deepthi V, Rambabu P, Gopikrishna T, Vishnu Sankar Rao D and Srinivasa Rao V, 2018, "Relationship Between Profile with Attitude of Agripreneurs Towards Agri Entrepreneurship", The Andhra Agricultural Journal, 65(2) 463-466.
9. Prasantha Kumar T, Vijayabinandana B, Sivanarayana G, Pulla Rao Ch and Srinivasa Rao V, 2018,"A Study on Organizational Effectiveness and Job Performance in ANGRAU", The Andhra Agricultural Journal, 65(2) 467-473.
10. Akhisha P A, Srinivasa Rao V, Nafeez Umar Sk and Umadevi K, 2018, "Time Series Modeling of Monthly Rainfall in the Districts of Kerala", A Statistical Approach, The Andhra Agricultural Journal, 65(2) 491-495.

11. Mounika K, Lal Ahamed M, Vijaya Lakshmi B and Nafeez Umar Sk, 2018, "Studies on Variability Parameters in Maize (*Zea mays* L.)", The Andhra Agricultural Journal, 65 (2) 301-304.

12. Sarath Babu B, Radha Y, Subba Rao D V and Nafeez Umar Sk, 2018, "Economics of Chilli Cultivation in Guntur district of Andhra Pradesh", The Andhra Agricultural Journal, 65(2) 456-462.

13. Praveen Babu, Sivanarayana G, Rambabu P, Martin Luther M and Nafeez Umar Sk, 2018, "Constraints in Communication Behavior of Extension Personnel", The Andhra Agricultural Journal, 65(2) 487-490.

14. Sri Lakshmi P, Chamundeswari N, Lai Ahamed M and Srinivasa Rao V, 2018, "Assessment of Genetic Variability Studies in Wet Direct Sown Rice", The Andhra Agricultural Journal, 65(3) 555-560.

15. Hari Ram Kumar B, Satyanarayana P V, Ratna Babu D, Srinivasa Rao V, Chamundeswari N and Krishnam Raju S, 2018, "Character Association and Path Analysis of Yield, Yield Components and Grain Quality Characters of Rice Cultivars", The Andhra Agricultural Journal, 65(3) 561-567.

16. Ravikanth B, Satyanarayana P V, Chamundeswari N, Ashoka Rani Y, Srinivasa Rao V and Ratna Babu D, 2018, "Evaluation of Genetic Diversity in Rice (*Oryza Sativa* L.) for Direct Seeding Traits Using SSR Markers", The Andhra Agricultural Journal, 65(3): 568-572.

17. Pedda Ghouse Peera Sk, Prasad P R K, Ratnaprasad P, Venkateswarlu B and Srinivasa Rao V, 2018, "Influence of Graded Levels of $ZnSO_4.7H_2O$ with Rice Straw Compost and Microbial Consortium on Yield and Zn Uptake in Maize", The Andhra Agricultural Journal, 65(3) 586-59.

18. Rama Rao A, Ravi Babu G, Hemakumar H V, Bhaskara Rao D and Srinivasa Rao V, 2018, "Study on Various Polymers for Replacement of Cast Iron Components in Pulley Operated Centrifugal Pump", The Andhra Agricultural Journal, 65(3): 664-674.

19. Deepthi V, Rambabu P, Gopi Krishna T, Vishnu Sankar Rao D and Srinivasa Rao V, 2018, "Attitude of Agripreneurs towards Agri Entrepreneurship", A Study in Andhra Pradesh, The Andhra Agricultural Journal, 65(3) 706-710.

20. Krishna Priya N, Sivanarayana G, Rambabu P, Raghunadha Reddy G and Srinivasa Rao V, 2018, "Profile of SHG Members and their Relationship with Attitude", The Andhra Agricultural Journal, 65 (3): 711-719.

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23. Praveen Babu, Sivanarayana G, Rambabu P, Martin Luther M and Nafeez Umar Sk, 2018, "Profile Characteristics of Extension Personnel of Andhra Pradesh", The Andhra Agricultural Journal, 65(3) 726-729.

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26. Sateesh Babu J, Ramana M V, Lal Ahmed M, Adinarayana M, Naidu T C M and Srinivasa Rao V, 2018, "Correlation and Path Analysis for Yield Components in Blackgram", The Andhra Agricultural Journal, 65(4): 844-847.

27. Devi M, Jyothula D P B, Krishnaveni B and Srinivasa Rao V, 2018, "Studies on Variability, Heritability and Genetic Advance in Rice (Oryza Sativa L.) Hybrids", The Andhra Agricultural Journal, 65(4) 851-854.

28. Pedda Ghouse Peera Sk, Prasad, Ratna Prasad P, Venkateswarlu B and Srinivasa Rao V, 2018. "Influence of Graded Levels of $ZnSO_4.7H_2O$ with Rice Straw Compost and Microbial Consortium on Zinc Release Characteristics of Sandy Loam Soils", The Andhra Agricultural Journal, 65(4) 855-858.

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33. Priyanka M, Hyma Jyothi S, Umadevi K and Nafeez Umar Sk, 2018, "Economics of Rice Cultivation in West Godavari District of Andhra Pradesh", The Andhra Agricultural Journal, 65(4) 961-967.

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41. Ananda Babu D, Ramana C, Joseph Reddy S, Edukondalu L and Srinivasa Rao V, 2018, "Performance Evaluation of High Clearance Tractor Sprayer for Cotton Crop", The Andhra Agricultural Journal, 66(1) 195-199.

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XI. AWARDS AND HONOURS

Dr. V. Srinivasa Rao, Professor & Univ. Head, Department of Statistics & Computer applications, Agricultural College, Bapatla received AP State Best Teacher Award 2018.

Dr. P. V. SathyaGopal, Professor & Head, Department of Agricultural Extension, Agricultural College, Bapatla received AP State Best Teacher Award 2018.

Dr. D. Subramanyam, S.V. Agricultural College, Tirupati received fellow of Indian Society of Weed Science-2017 award for significant contributions in the field of weed science at Directorate of Weed Research, Jabalpur on 24-11-2018.

Dr. P. BalaHussain Reddy, S.V. Agricultural College, Tirupati Received Young Scientist Award – 2018 at National Education Congress Conference organized by Society of Extensional Education Agra, ICAR complex NEH Region and Central Agricultural University, Imphal at Ganagtok, Sikkim on 14th to 17th November.

Dr. P. Sudhakar, Professor & Head, S.V. Agricultural College, Tirupati selected in Editorial committee for the Indian journal of Plant Physiology and Journal Research, ANGRAU.

Dr. Prabhakar Reddy, Professor, S.V. Agricultural College, Tirupati received state best teacher award given by Govt. of Andhra Pradesh.

V.P. SreeBala, Agricultural College, Rajamahendravaram received NAARM, ABM award.

M.V.J. Ravichandra, Agricultural College, Rajamahendravaram received IRMA, ABM award.

Dr. A. Mani, Associate Dean, Dr. NTR College of Agricultural Engineering, Bapatla received State Best Teacher Award by Government of Andhra Pradesh.

Dr. A. Ashok Kumar, Assistant Professor, Dr. NTR College of Agricultural Engineering, Bapatla received Student Gold Medal for Ph.D. research work.

Dr. K. Ashok Kumar, Assistant Professor (Agronomy), College of Agricultural Engineering, Madakasira received Outstanding Faculty in Agriculture - Venus International Faculty Awards- VIFA 2018 on 07.07.2018 at Radha Regent, Chennai, India.

Dr. Lal Ahamed M., Associate Professor, APGC, Lam, Guntur received as the Associate Fellow of the Andhra Pradesh Akademi of Sciences for the year 2018.

Dr.Ch.Mukunda Rao, Principal Scientist (Crop Physiology), RARS, Anakapalle received Bharat JyotiPuraskar for 2018 from Best Citizen Partnership Home, New Delhi.

Dr. M. Visalakshi, Principal Scientist (Entomology), RARS, Anakapalle received Sri Sudarshana Raju Memorial Prize for the Best Research Worker in sugarcane during 60th Kisan Mela celebrations held on 28th November, 2018 at RARS, Anakapalle.

Dr G.Rama Rao, RARS, Lam received **Fellow of Academy of Environment and Life Sciences -2018** by Academy for Environment and Life Sciences, Agra. (National Level).

Dr G.Rama Rao, RARS, Lam **Prof. M.S. Swaminathan Best Scientist Award -2018** by Bose Science Society and Tamilnadu Scientific Research Organization and Department of Science & Technology, Govt. of India.

Dr. Y. Rama Reddy, Principal Scientist (Br), RARS, Nandyal, felicitated by Hon'ble Vice Chancellor Dr. V.Damodara Naidu and farmers in the Field day of Srirama cotton organized at Guntur on 26-11-18.

Dr. V. Jayalakshmi, Principal Scientist (Br), RARS, Nandyal, Felicitated by Hon'ble minister of Agriculture Sri. S. Chandra Mohan Reddy for outstanding work in bengalgram on 12.02.19 at RARS, Nandyal.

Dr. N.K. Gayatri, Senior scientist (Seed Tech.), RARS, Nandyal, received Certificate of Commendation received by Government of Andhra Pradesh on Independence day on 15.08.2018.

Dr. S. Neelima, Senior Scientist (Br), RARS, Nandyal, received Certificate of Commendation from District Magistrate, Kurnool on Republic day on 26.01.2019.

Dr. R.P. Vasanthi, Principal Scientist (Pl. Breeding), RARS, Tirupati received best scientist awardfrom the District Collector & Magistrate, Chittoor on the eve of Republic daycelebrations on 26-01-2019.

Dr. A. Prasanthi, Principal Scientist (Pl.Breeding), RARS, Tirupati received best scientist awardfrom the District Collector & Magistrate, Chittoor on the eve of Republic daycelebrations on 26-01-2019.

Dr. M.V. Ramana, Principal Scientist (Ag. Engg), RARS, Tirupati received Leader shipaward 2018 from Soil Conservation Society of India, New Delhi.

Dr. A. Ramakrishna Rao, Principal Scientist (Entomology), RARS, Tirupati received best scientistaward from The District Collector & Magistrate, Chittoor on the eve of Republicday celebrations on 26-01-2019.

Dr. K. Viswanath, Scientist (Pl.Path), RARS, Tirupati received Certificate of Appreciation on the70th Republic Day from the District Collector, Chittoor Dist. Andhra Pradesh.

Dr. K. John, Principal Scientist (Pl. Breeding), RARS, Tirupati received the "Excellence inResearch Award" in the National Conference held at Trichy from 09-02-2019 to 10-02-2019.

Dr. B.V. Bhaskara Reddy, Principal Scientist (Pl.Path), RARS, Tirupati received certificate ofAppreciation on the 70th Republic Day from the District Collector, Chittoor Dist. Andhra Pradesh.

Dr. TNVK Prasad, Principal Scientist (Soil Physics), RARS, Tirupati received Certificate of Appreciation on the 70th Republic Day from the District Collector, Chittoor Dist. Andhra Pradesh.

ARS, Anantapuramu received "Best Institution Award" - Research and Extension Advisory Council (REAC) Meeting of ANGRAU, RARS, Tirupati on 19-12-2018.

Dr. M. Vijaya Sankar Babu, ARS, Anantapuramu received Distinguished Scientist Award - Venus International Foundation - 4th Contemporary Academic Meet at Radha Regent, Chennai 18th July, 2018.

Dr K.V. Ramana Murthy, Principal Scientist (Agronomy) & Head, ARS, Ragolu was awarded Sri KonathalaRamu Naidu best scientist of NC Zone in the Kisan Mela at RARS, Anakapalli on 28-11-18.

Dr. K.V. Ramana Murthy, Principal Scientist (Agronomy) & Head and Dr. D. Adilakshmi, Principal Scientist (Plant Breeding) attended the 48th REAC meeting and received the **Best Research Station Award to Agricultural Research Station, Ragolu in 'B' category for 2017-2018** from Hon'ble Vice Chancellor Dr. V. Damodara Naidu garu and Director of Research Dr. N.V. Naidugaru in the presence of Board members of the university and REAC members on 19.12.2018.

Dr. T.S.S.K. Patro, ARS, Vizianagaram received **Professor JP Verma memorial award -** Indian Phytopathological Society, New Delhi.

Dr. N. Anuradha, ARS, Vizianagaram received **Best Women Scientist Award in North Coastal Zone -** Kisan Mela, RARS, Anakapalli.

Dr. M.M.V. Srinivasa Rao, OFR Agronomist, ARS, Vizianagaram received Best Scientist (North Coastal Zone) award in category of Sri Ragulakollu

China Veeraiah Memorial Prize - Kisan Mela , RARS, Anakapalli.

Dr. V. Shilpakala, Scientist (PP), DAATTC, Utukur, Kadapa got **best oral presentation award** for presenting "the Molecular characterization of Brown Planthopper populations collected from various places of India" (Ph.D. work) in *National Conference for Post Graduate Students on Novel Approaches for doubling farmers income through sustainable Agricultural Production Systems* held at S.V. Agricultural College, Tirupati, ANGRAU on 08.03.2019.

KVK, Darsi

- **Best poster award** received from ICAR, ATARI, Zone X - "Impact of pigeonpea variety LRG 52 in Prakasam Dist., (21/09/18)
- **Appreciation Award** received from ICAR, ATARI, Zone X for analyzing **highest soil samples in Zone X.** (21/09/18)
- **Sri. G.Ch. Narayana, PA, Soil testing laboratory** received **Appreciation award** from the Collector and District Magistrate, Prakasam Dist. (15/08/18)
- **Best oral presentation ,** ICAR, ATARI, Zone X – Annual Zonal workshop of KVKs 2019 held at NAARM, Hyderabad (24-26 May, 2019)
- Dr. K. L. Rao Krishi Vigyan Kendra, Garikapadu, Krishna District has got appreciation certificates on **"Best fact sheets" and "Best performancein CFLD (Oil seeds) project" during Annual Zonal Workshop of KVKs held from 24th to 26th May, 2019 at NAARM, Hyderabad.**
- KVK, Kondempudi, Visakhapatnam among 117 aspiration districts in India, Visakhapatnam achieved first position in implementing the activities of KKA by Krishi Vigyan Kendra, Kondempudi.
- KVK, Reddipalle - Best KVK Award 2018-19 – from Acharya NG Ranga Agriculture University – 2018-19
- Organized Krishi Kalyan Abhiyan first phase and second phase programmes and also received appreciation certificate for best performance in KKA programme (KVK, Utukur)
- SMS crop production, KVK, Banavasi, Kurnool dist. received Young Professional award in INTERNATIONAL CONFERENCE ON ADVANCES IN AGRICULTURE AND ALLIED SCIENCE TECHNOLOGIES FOR SUSTAINABLE DEVELOPMENT on 10 and 11 February 2018 conducted by GENESIS URBAN AND RURAL DEVELOPMENT SOCIETY (GUARD).
- Programme Coordinator, KVK, Banavasi, Kurnool dist.received **Best Oral Presentation** award from the Director, ICAR-ATARI, Zone-X, Hyderabad during Annual Zonal Review Workshop of KVKs of Zone-X of ICAR-ATARI, Hyderabad held at NAARM, Hyderabad from 24-26, May, 2019.
- ARS, Ragolu received **Best Research Station Award** under category B during 48th REAC meeting
- ARS, Anantapuramu received **Best Research Station Award** under category A during 48th REAC meeting
- MULLaRP, RARS, Lam received **best AICRP centre** for 2018-19
- Dr. T.N.V.K.V. Prasad, Principal Scientist (Soil Physics), RARS, Tirupati has received an **Australian Endeavour Ambassador Award-2018** from Australian High Commissioner to India.

ANNEXURE I

MEMBERS OF THE 100th ACADEMIC COUNCIL

OTHER UNIVERSITIES

Vice-Chancellor
Andhra University
Waltair, Visakhapatnam District

Vice-Chancellor
Sri Venkateswara University
Tirupati – 517 502

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Government of Andhra Pradesh
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Vice-Chancellor

Dr D Bhaskara Rao
Registrar

Dr J Krishna Prasadji
Dean of Agriculture

Dr D Balaguravaiah
Dean of Post Graduate Studies

Dr K Yella Reddy
Dean of Agricultural Engineering & Technology

Dr L Uma Devi
Dean of Home Science

Dr S R Koteswara Rao
Dean of Student Affairs

Dr N V Naidu
Director of Research

Dr P Rambabu
Director of Extension

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ANGRAU, Guntur

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Tirupati - 517 502

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Region Office, NABARD, RTC x Road
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ANGRAU, Guntur

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Tamil Nadu Agricultural University, Tiruchapalli

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Principal, KVR Agricultural Polytechnic, Thimmapuram (V), Banaganapalli (M), Kurnool district

Sri V Vedadri
Principal, NBKR Agricultural Polytechnic, Vidyanagar, Kota (M), Nellore district

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College of Agricultural Engineering
Bapatla - 522 101, Guntur Dist.

Dr P V K Jagannadha Rao
Associate Dean & University Head
Dept. of Processing & Food Engineering,
College of Agricultural Engineering,
Madakasira - 515 301, Ananthapuram Dist.

Dr D Vishnu Shankar Rao
Associate Dean
Professor (CAS) & University Head
Dept. of Agricultural Economics
College of Food Science & Technology
Bapatla - 522 101, Guntur Dist.

Dr D D Smith
Professor (CAS) & Associate Dean
College of Food Science & Technology,
Pulivendula - 516 390, YSR Kadapa Dt.

Dr L Uma Devi
Associate Dean i/c, College of Home Science
Door No: 238, Chinmaya Balanivas
S.V.N. Colony, Guntur - 522 006

Dr N Trimurthulu
Special Officer & University Head
Dept. of Agril. Microbiology,
Advanced Post Graduate Centre,
Lam, Guntur

UNIV. HEADS & OTHERS

Faculty of Agriculture

Dr L Vijaya Bhaskar
Professor & Head
Dept. of Entomology
Agricultural College,
Mahanandi – 518 502

Dr Ch Syam Raj Naik
Professor (CAS) & Head,
Dept. of Crop Physiology,
Agricultural College,
Rajamahendravaram-533 103

Dr R Sekhar Babu
Professor (CAS) & Head,
Dept. of Agril. Economics
Agricultural College,
Rajamahendravaram - 533 103

Dr P Israel
Professor (CAS) & Head,
Dept. of Agril. Extension,
Agricultural College,
Rajamahendravaram – 533 103

Dr B Sahadeva Reddy
Professor (Direct)
Dept. of Agronomy
Agricultural College
Rajamahendravaram – 533 103

Dr S Krishnam Raju
Professor (CAS) & Head,
Dept. of Plant Pathology,
Agricultural College,
Rajamahendravaram – 533 103

Dr A Appala Swamy
Professor (CAS) & Head
Dept. of Genetics & Plant Breeding,
Agricultural College, Naira

Dr R Sarada Jayalakshmi Devi
Professor (CAS) & Head,
Dept. of Plant Pathology,
S.V. Agricultural College, Tirupati – 517 502

Dr G Mohan Naidu
Professor (CAS) & Head,
Department of Statistics & Computer
Applications, S.V. Agricultural College, Tirupati

Dr S V Prasad
Professor (CAS) & Head
Department of Agricultural Extension
S.V. Agricultural College, Tirupati - 517 502

Dr Ch Chiranjeevi
Professor (CAS) & Head
Dept. of Entomology
Agricultural College, Bapatla - 522 101

Dr V Srinivasa Rao
Professor (CAS) & Univ. Head
Dept. of Statistics and Mathematics
Agricultural College, Bapatla – 522 101

Dr E Narayana
Professor (CAS) & Head,
Dept. of Agronomy
Agricultural College, Bapatla – 522101

Dr P Rama Krishna Prasad
Professor (CAS) & Head
Dept. of Soil Science & Agril. Chemistry,
Agricultural College, Bapatla – 522101

Dr K Chandra Sekhar
Professor (CAS) & Head
Dept. of Agronomy,
Advanced Post Graduate Centre, Lam, Guntur

Dr R Veeraraghavaiah
Principal Scientist & University Head,
Dept. of Agronomy,
Agricultural Research Station, Anantapuramu

Dr V Srilatha
Assistant Professor & University Head
Dept. of Horticulture
S.V. Agricultural College,
Tirupati - 517502

Dr K N Ravi Kumar
Professor (CAS) & Head
Dept. of Agril. Economics,
Agricultural College, Mahanandi - 518 502

Dr K V Seetharamaiah
Professor (CAS) & Head
Dept. of Genetics & Plant Breeding,
Agricultural College,
Rajamahendravaram - 533 103

Dr K Madhavi
Professor (CAS) & Head
Dept. of Agronomy,
Agricultural College,
Rajamahendravaram - 533 103

Dr S Dayakar
Professor (CAS) & Head
Dept. of Entomology
Agricultural College,
Rajamahendravaram - 533 103

Dr A V Ramana
Professor (CAS) & Head,
Dept. of Agronomy,
Agricultural College, Naira - 532 185

Dr A Upendra Rao
Professor (CAS), Dept. of Agronomy,
Agricultural College, Naira – 532185

Dr G Karuna Sagar
Professor (CAS) & Head, Dept. of Agronomy
S.V. Agricultural College,
Tirupati – 517502

Dr I Bhavani Devi
Professor (CAS) & Head & Member of BoM,
S.V. Agricultural College, Tirupati - 517 502

Dr T Giridhara Krishna
Professor (CAS) & Head,
Department of Soil Science & Agril. Chemistry,
S.V. Agricultural College, Tirupati

Dr N P Eswar Reddy
Principal Scientist& University Head,
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IFT, RARS, Tirupati – 517502

Dr Y Radha
Professor (CAS) & Head,
Dept. of Agril. Economics,
Agricultural College,
Bapatla - 522 101

Dr P V Satya Gopal
Professor (CAS) & Head,
Dept. of Agril. Extension,
Agricultural College,
Bapatla – 522 101

Dr P Anil Kumar
Professor & Head
Department of Plant Pathology,
Agricultural College,
Bapatla - 522 101

Dr Y Ashoka Rani
Professor (CAS) and Head
Dept. of Crop Physiology
Agricultural College,
Bapatla - 522 101

Dr (Mrs.) G V Lakshmi
Professor and University Head
Department of Environmental Science & Technology
Advanced P.G. Centre, Lam, Guntur

Dr K Radhika
Professor (CAS) & Head
Dept. of Seed Science & Technology
Advanced Post Graduate Centre,
Lam, Guntur

Dr A Vijaya Gopal
Professor (CAS) & Head,
Dept. of Agricultural Microbiology,
Advanced P.G. Centre, Lam, Guntur – 522034

Dr B Vijayabhinandana
Principal Scientist & University Head,
Dept. of Agril. Extension,
O/o Director of Extension,
Admn. Office, Lam, Guntur

Dr P Prabhu Prasadini
Associate Director of Research (Hq) &
University Head
Dept. of Environmental Science & Technology
ANGRAU, Guntur

Faculty of Agricultural Engineering and Technology

Dr T V Satyanarayana
Professor (Direct) & University Head
Dept. of Soil and Water Engineering,
College of Agricultural Engineering,
Madakasira

Dr Ch V V Satyanarayana
Professor (CAS) & University Head,
Department of Food Process & Engineering,
College of Food Science & Technology,
Bapatla - 522 101

Dr C Ramana
Associate Dean & Professor (CAS) &
University Head
Dept. of Farm Machinery & Power
College of Agricultural Engineering
Madakasira - 515 301
Ananthapuram Dist.

Dr H V Hema Kumar,
Professor (CAS),
Department of Soil & Water conservation
Engineering,
College of Agricultural Engineering,
Bapatla – 522101

Dr B V S Prasad
Professor (CAS) & University Head
Dept. of Food Science & Technology &
Dept. of Agril. Process & Food Engineering and
Farm Machine Power,
College of Agril. Engineering,
Bapatla-522 101

Dr G Ravi Babu
Professor (CAS), Department of Irrigation &
Drainage Engineering,
College of Agricultural Engineering,
Bapatla

Dr B Sarojini Devi
Professor (CAS) & Head
Irrigation and Drainage Engineering,
College of Agricultural Engineering,
Madakasira - 515 301,
Anantapur District

Faculty of Home Science

Dr T Neeraja
Professor (Direct) & University Head,
Dept. of R.M.C.S.,
College of Home Science, Guntur – 522 006

Dr J Lakshmi
Professor (CAS) & University Head,
Department of Foods & Nutrition,
College of Home Science, Guntur – 522 006

Dr M S Chaitanya Kumari
Professor (CAS) Department of H.E.C.M.,
College of Home Science, Guntur

Dr Bilquis
Associate Professor University Head,
KVK, Rastakuntabai, Dept. of APTX,
College of Home Science, Guntur

ANNEXURE II

MEMBERS OF RESEARCH AND EXTENSION ADVISORY COUNCIL (REAC)

Chairperson

Dr V Damodara Naidu
Vice-Chancellor

Convener and Secretary

Dr N V Naidu
Director of Research, ANGRAU

Members

Members of the Board of Management

Dr D S Koteswara Rao
Professor (Retd.), ANGRAU

Sri B C Janardhan Reddy MLA,
Banaganapalli, Kurnool Dist.

Sri Bobbili Chiranjeevulu
Hon'ble Member of Legislative Assembly,
Parvathipuram, Vizianagaram – 535 501

Sri T V Muralinatha Reddy
Progressive Agriculturist, Tirupati

Sri Mekala Lakshmi Narayana
Progressive Agriculturist, Guntur

Sri Chapara Ganapathi Rao
Progressive Agriculturist, Srikakulam

Sri P. Rajsekhar, ZPTC
Mummudivaram,
East Godavari dist.

Members

Academic Council Member

Dr I Bhavani Devi
Dept. of Agriculture, Economics,
S V Agricultural College,
Tirupati

Ex-Officio Members

Special Commissioner of Agriculture,
Govt. of A.P

Managing Director,
A.P. State Seeds Development Corporation Ltd.,
D.No.4-150, Prasadampadu,
Ramavarappadu Post, Vijayawada-521 108

Director,
Women and Child Welfare, Govt. of A.P

Special Invitees

The Commissioner & Director of Agril. Marketing
Chuttugunta Circle, Murikipeta,
MaharshiDayanand Nagar,
Guntur, Andhra Pradesh – 522 003
The Chief Executive Officer
Society for Elimination of Rural Poverty
2nd floor, NTR Administrative Block,
PNBS, Vijayawada – 520 001

University Officers

Dr J Krishna Prasadji
Dean of Agriculture

Dr D Balaguravaiah
Dean of Post Graduate Studies

Dr K Yella Reddy
Dean of Agricultural Engineering & Technology

Dr L Uma Devi
Dean of Home Science

Dr S R Koteswara Rao
Dean of Student Affairs

Dr N V Naidu
Director of Research

Dr P Rambabu
Director of Extension

Eminent Scientists

Dr N Srirama Reddy
Ex-Dean of Agriculture,
ANGRAU

Dr L GGiri Rao
Ex. Director of Extension,
ANGRAU

Dr P Venkata Ramaiah
Professor (Rtd.),
ANGRAU

Dr P Gidda Reddy
Ex. Director of Extension,
ANGRAU

Associate Directors of Research

Dr P Jamuna
North Coastal Zone

Dr P Munirathnam
Godavari Zone

DrV Satyanarayana Rao
Krishna Zone

Dr P Rajasekhar
Southern Zone

Dr M Subba Rao
Scarce Rainfall Zone

Dr D V Ramana Reddy
High Altitude and Tribal Area Zone

Associate Deans of Colleges

Dr D Lokanadha Reddy
Associate Dean, Agricultural College
Bapatla - 522 101, Guntur Dist.

Dr P Ramesh Babu
Associate Dean
S V Agricultural College
Tirupati - 517 502, Chittoor Dist.

Dr P V Krishnayya
Associate Dean & Univ. Head
Dept. of Entomology
Agricultural College, Naira-532 185
Srikakulam District

Dr B Narendra
Associate Dean &Professor (CAS),
Dept. of Genetics & Plant Breeding
Agricultural College
Mahanandi - 518 502, Kurnool Dist.

Dr G V Nageswara Rao
Associate Dean
Agricultural College
SKVT Degree College Campus
Near 'Y' Junction
Rajamahendravaram - 533 103
East Godavari Dist.

Dr A Mani
Associate Dean& Professor (CAS),
Dept. of Genetics & Plant Breeding,
College of Agricultural Engineering
Bapatla - 522 101, Guntur Dist.

Dr P V K Jagannadha Rao
Associate Dean & University Head
Dept. of Processing & Food Engineering,
College of Agricultural Engineering,
Madakasira - 515 301, Ananthapuram Dist.

Dr D Vishnu Shankar Rao
Associate Dean
Professor (CAS) & University Head
Dept. of Agricultural Economics
College of Food Science & Technology
Bapatla - 522 101, Guntur Dist.

Dr D D Smith
Professor (CAS) & Associate Dean
College of Food Science & Technology,
Pulivendula - 516 390, YSR Kadapa Dt.

Dr L Uma Devi
Associate Dean i/c, College of Home Science
Door No: 238, ChinmayaBalanivas
S.V.N. Colony, Guntur - 522 006

Dr NTrimurthulu
Special Officer &University Head
Dept.of Agril. Microbiology,
Advanced Post Graduate Centre,
Lam, Guntur

Progressive Farmers

Sri Ramanjaneyulu
Sanjeevapuram, Ananthapuramu

Sri M Madhava Reddy
8-11, Lingayapalli (V), Vallur (M),
YSR Kadapa District

Sri Doddapaneni Babu Rao
Amancharla Village & P.O.
Nellore Rural Mandal

Sri Balijepalli Venkata Ramana Murthy
Akkivalasa (V), Amadalavalasa (M),
Srikakulam District

Sri ChalumuriMadhava Rao
Khasapeta / L.Kota, Vizianagaram District

Sri Katta Ramakrishna
Obannapalem (V), Naguluppalapadu (M),
Prakasam Dist.

Sri Vadlamudi Raveendranadh
Nidumukkala (V & P), Tadikonda (M),
Guntur District

Sri N Nageswara Raju
Swamirajukandriga, N R Kandiga (PO),
Karvetinagaram (M)
Chittoor District), Pin: 517582

K Rama Chandra Reddy
Akuledu Village, Singanamala (M),
Anantapuramu District

Agro Business Consortium

Sri P Suryaprakashreddy
H.No.1-67, Tapalakothuru,
Katarukonda (PO), Krishnagiri (M),
Dhone Taluka, Kurnool Dist.-518 222

Sri Korrapati Rama Rao
Chairman,
KKR Group of Companies 10-2-10,
2nd Lane, Sambasivarao Pet, Guntur

Woman Farmer

Sri Savara Masamma
Vajjaguda, Santhamalli (via),
Seethampeta (M)

Smt K Mamatha
Gobbillamitta (V),
Penumur (P&M)-517 126,
Chittoor Dist.

Smt Manthena Shanti
W/o M Sri Rama Raju,
Jonnada, Vizianagaram Dist.

Smt Kasi Sujatha
W/o K Krishna Murthy
Chippalapalem (V),
Mummidivaram (M),
East Godavari Dist.-533 216

Smt Kondisetti Venkata Lakshmi
W/o K Siva Shankara Rao
Komadavollu (V), Eluru (M)

Special Invitees

Dr A Nageswara Rao
Associate Dean (Retd.),
S.V. Agricultural College, Tirupati

Sri G Padmanabha Naidu
Hon’ble Member, BoM, Dr. YSRHU

Sri M Gopala Naidu
Progressive Farmer,
South Amuluru,
Nellore Dist. – 524 002

Sri G Venkaiah Naidu
Progressie Farmer,
South Amuluru,
Nellore Dist. – 524 002

Sri Aadi Seskara Reddy
Putur, Nellore Dist.

Sri A Venkata Ramanaiah Naidu
D.No.16-15-958, NN Complex,
Srinilayam Apartments, Childernspark,
Saibaba Temple backside,
Nellore – 524 003

Sri Pitcheswara Rao
RaavivariPalem, Mopidevi (M),
Krishna Dist.

Representative from KVKs (operated by NGOs)

Dr Srinivasarao
Programme Coordinator,
KVK, Karakambadu

Dr Sailaja
Programme Coordinator,
KVK, BCT, Yelamanchili

Dr Dhanalakshmi
Programme Coordinator,
KVK, Yegantipalli

Principal Scientists of crops / disciplines

Principal Scientist (Rice),
RARS, Maruteru.
Principal Scientist (Millets) & Head,
ARS, Perumallapalle, Chittoor district.

Principal Scientist (Pulses),
RARS, Lam, Guntur.
Principal Scientist (Groundnut),
ARS, Kadiri, Anantapuramu district.

Principal Scientist (Sugarcane),
RARS, Anakapalle,
Visakhapatnam district.

Principal Scientist (Cotton),
RARS, Lam, Guntur.

Principal Scientist (Farm Mechanization),
RARS, Tirupati, Chittoor district.

Principal Scientist (Microbiology) & Head,
ARS, Amaravati, Guntur district.

Principal Scientist (Dryland Agriculture) & Head,
ARS, Anantapuramu.

Principal Scientist (Agronomy),
Integrated Weed Management Scheme,
RARS, Lam.

Principal Scientist (Seeds),
STR & PC, Thangadancha,
via Jupadu Bunglow,
Kurnool district.

University Heads of Departments

Dr T Ramesh Babu
Professor (Direct) & University Head
Dept. of Entomology,
S.V. Agricultural College, Tirupati

Dr R Ankaiah
Professor (CAS) & University Head
Dept. of Crop Physiology
Agricultural College,
Rajamahendravaram

Dr C P Dorai Rajan
Principal Scientist (CAS) and University Head
Dept. of Plant Pathology
Agricultural Research Station,
Nellore - 524 002

Dr (Mrs.) G V Lakshmi
Professor and University Head
Department of Environmental Science & Technology
Advanced P.G. Centre, Lam, Guntur

Dr V Srinivasa Rao
Professor (CAS) & Univ. Head
Dept. of Statistics and Mathematics
Agricultural College, Bapatla – 522 101

Dr N Trimurthulu
Principal Scientist & University Head
Dept. of Microbiology
Agricultural Research Station, Amaravathi

Dr R Veeraraghavaiah
Principal Scientist & University Head,
Dept. of Agronomy,
Agricultural Research Station, Anantapuramu

Dr B Vijayabhinandana
Principal Scientist & University Head,
Dept. of Agril. Extension, O/o Director of Extension,
Admn.Office, Lam, Guntur

Dr V Srilatha
Assistant Professor & University Head
Dept. of Horticulture
S.V. Agricultural College,
Tirupati – 517502

Dr P Prabhu Prasadini
Associate Director of Research (Hq) & University Head
Dept. of Environmental Science & Technology
ANGRAU, Guntur

Dr T V Satyanarayana
Professor (Direct) & University Head
Dept. of Soil and Water Engineering,
College of Agricultural Engineering, Madakasira

Dr Ch V V Satyanarayana
Professor (CAS) & University Head,
Department of Food Process &Engineering,
College of Food Science & Technology,
Bapatla - 522 101

Dr P V K Jagannada Rao
Principal Scientist & University Head
Dept. of Agricultural Process and Food Engineering,
RARS, Anakapalle

Dr B V S Prasad
Professor (CAS) & University Head
Dept. of Food Science & Technology &
Dept. of Agril. Process &
Food Engineering and Farm Machine Power,
College of Agril. Engineering, Bapatla - 522101

Dr M Raghu Babu
Professor (Academic) & University Head
Dept. of Irrigation & Drainage Engineering,
O/o the Dean of Agril.Engg.& Technology,
ANGRAU, Guntur

Dr T Neeraja
Professor (Direct) & University Head,
Dept. of R.M.C.S.,
College of Home Science, Guntur – 522 006

Dr J Lakshmi
Professor (CAS) & University Head,
Department of Foods & Nutrition,
College of Home Science, Guntur – 522 006

Coordinators of DAATTCs

Coordinator
DAATT Centre
Regional Agricultural Research Station
Lam, Guntur–
522 034
Guntur Dist.

Coordinator
DAATT Centre
Agricultural Research Station Premises
Vizianagaram –
535 001
Vizianagaram Dist.

Coordinator
DAATT Centre
Agril.Research Station Premises
Peddapuram –
533 437
East Godavari Dist.

Programme Coordinators of KVKs

Programme Coordinator
Krishi Vigyana Kendra
Reddipalli – 515 701
Bukkarayasamudram (M)
Anantapuram Dist.

Programme Coordinator
Dr. K.L. Rao – Krishi Vigyana Kendra
Garikapadu – 521 175
Krishna Dist.

Programme Coordinator
Krishi Vigyana Kendra
Rastakuntabai – 535 523
(Via) Gummalaxmipuram
Vizianagaram Dist.

Programme Coordinator
Krishi Vigyana Kendra
Agril. Research Station
Amadalavalasa –532 185
Srikakulam Dist.

Programme Coordinator
Krishi Vigyana Kendra
Utukur – 516 003
YSR Kadapa Dist.

Programme Coordinator
Krishi Vigyana Kendra
Opp. to Civil Supply Godown
Undi – 534 199
West Godavari Dist.

Programme Coordinator
Krishi Vigyana Kendra
Agril. Research Station
Nellore – 524 004
Nellore Dist.

Programme Coordinator
Krishi Vigyana Kendra
Agril. Research Station
Darsi – 523 247
Prakasam Dist.

Programme Coordinator
Smt. Lakshmi Devi - Krishi Vigyana Kendra
Garudapuram – 515 761
Kalyandurg
Anantapuram Dist.

Programme Coordinator
Krishi Vigyana Kendra
Banavasi
Yemmiganur
Kurnool Dist.

Programme Coordinator
Krishi Vigyana Kendra
Kalikiri – 517 234
Chittoor Dist.

Programme Coordinator
Krishi Vigyana Kendra
Ghantasala – 521 133
Krishna Dist.
Programme Coordinator
Krishi Vigyana Kendra
Kondempudi, Visakhapatnam

ANNEXURE III

CADRE-WISE FACULTY STRENGTH DURING 2018-'19

S. No.	Name of the College / Research Station / Extension Unit	Professor / Principal Scientist		Associate Professor / Senior Scientist		Assistant Professor / Scientist	
		S	I.P.	S	I.P.	S	I.P.
1	2	3	4	5	6	7	8
TEACHING							
1	Agricultural College, Bapatla	08	05	09	07	73	62
2	S.V. Agricultural College, Tirupati	05	04	10	08	56	50
3	Agricultural College, Naira	01	01	11	09	21	16
4	Agricultural College, Mahanandi	01	01	07	07	16	13
5	Agricultural College, Rajamahendravaram	02	01	11	06	22	14
6	Advanced P.G. Centre, Guntur	-	09	-	05	-	02
7	College of Agricultural Engineering, Bapatla	05	05	08	03	17	10
8	College of Agricultural Engineering, Madakasira	05	02	08	02	20	11
9	College of Food Science & Technology, Bapatla	01	01	05	02	09	06
10	College of Food Science & Technology, Pulivendula	05	01	13	01	18	06
11	College of Home Science, Guntur	-	-	-	-	10	07
12	Agriculture Polytechnic, Anakapalle	-	-	-	-	-	-
13	Agriculture Polytechnic, Maruteru	-	-	01	-	-	-
14	Agriculture Polytechnic, Podalakur	-	-	-	-	-	-
15	Agriculture Polytechnic, Reddipalli	-	-	-	03	-	01
16	Agriculture Polytechnic, Utukur	-	-	01	-	02	-
17	Agriculture Polytechnic, Garikapadu	-	-	-	-	-	-
18	Agriculture Polytechnic, Madakasira	04	-	-	-	-	-
19	Agriculture Polytechnic, Chintapalle	-	-	-	-	-	-
20	Agriculture Polytechnic, Nandyal	-	-	-	-	-	-
21	Agriculture Polytechnic, Tirupati	-	-	-	-	01	-
22	Agriculture Polytechnic, Kalikiri	-	-	01	-	04	01
23	Agriculture Polytechnic, Somasila	-	01	-	-	-	-
24	Agricultural Polytechnic, Rampachodavaram	-	01	-	-	-	-
25	Agricultural Polytechnic, J.M.Puram	-	-	01	01	-	-

S. No.	Name of the College / Research Station / Extension Unit	Professor / Principal Scientist		Associate Professor / Senior Scientist		Assistant Professor / Scientist	
		S	I.P.	S	I.P.	S	I.P.
1	2	3	4	5	6	7	8
26	Agricultural Polytechnic, Gantasala	-	-	03	02	01	01
27	Agricultural Polytechnic, Ramagiri	-	01	-	-	-	-
28	Agril. Polytechnic (Seed Technology), J.M.Puram	-	-	01	01	-	-
29	Agril. Polytechnic (Organic Farming) Chintapalle	-	-	-	-	-	-
30	Polytechnic of Agricultural Engineering, Kalikiri	-	-	-	-	01	-
31	Polytechnic of Agricultural Engineering, Anakapalle	-	-	-	-	-	-
	Sub Total (Teaching)	**37**	**33**	**90**	**57**	**271**	**200**
RESEARCH							
I.	**KRISHNA ZONE**						
Guntur District							
1	Regional Agricultural Research Station, Lam	01	01	04	04	08	06
2	Rice Research Unit, Bapatla	-	01	02	01	04	02
3	Post-Harvest Technology, Bapatla	-	-	01	01	04	04
4	Saline Water Research Scheme, Bapatla	02	02	-	-	-	-
5	AICRP on Sorghum	-	-	-	-	02	02
6	AICRP on FIM	-	-	01	01	-	-
7	Agricultural Research Station, Amaravati	-	-	-	-	02	01
8	Agricultural Research Station, J.M.Puram	-	-	-	-	03	03
Krishna District							
9	Agricultural Research Station, Vuyyuru	-	02	01	-	06	03
10	Agricultural Research Station, Machilipatnam	-	-	-	-	03	01
11	Agricultural Research Station, Garikapadu	01	01	02	01	02	-
12	Agricultural Research Station, Ghantasala	-	-	01	02	03	02
13	**Prakasam District**						
14	Agricultural Research Station, Darsi	-	-	01	01	04	02

S. No.	Name of the College / Research Station / Extension Unit	Professor / Principal Scientist		Associate Professor / Senior Scientist		Assistant Professor / Scientist	
		S	I.P.	S	I.P.	S	I.P.
1	2	3	4	5	6	7	8
II. GODAVARI ZONE							
West Godavari District							
15	Regional Agril. Research Station, Maruteru	02	01	02	02	14	07
16	Agricultural Research Station, Vijayarai	-	-	01	01	05	03
East Godavari							
17	Agricultural Research Station, Peddapuram	-	-	-	-	06	03
III. NORTH COASTAL ZONE							
Visakhapatnam District							
18	Regional Agril. Research Station, Anakapalle	03	01	06	04	16	11
19	Agricultural Research Station, Yelamanchili	-	-	01	-	03	02
Srikakulam District							
20	Agricultural Research Station, Amadalavalasa	-	-	01	01	05	05
21	Agricultural Research Station, Ragolu	-	-	01	01	03	01
Vizianagaram District							
22	Agricultural Research Station, Vizianagaram	01	02	-	-	04	03
IV. SOUTHERN ZONE							
Chittoor District							
223	Regional Agricultural Research Station, Tirupati	03	02	11	11	13	13
24	Agricultural Research Station, Perumallapalle	-	-	01	01	06	06
SPS Nellore District							
25	Agricultural Research Station, Nellore	-	-	03	02	04	04
26	Agricultural Research Station, Podalakur	-	02	01	01	05	02
27	Agricultural Research Station, Kavali	01	01	-	-	-	-
YSR (Kadapa) District							
28	Agricultural Research Station, Utukur	-	-	01	01	05	05
V. SCARCE RAINFALL ZONE							
Kurnool District							
29	Regional Agricultural Research Station, Nandyal	03	03	08	07	23	16

S. No.	Name of the College / Research Station / Extension Unit	Professor / Principal Scientist		Associate Professor / Senior Scientist		Assistant Professor / Scientist	
		S	I.P.	S	I.P.	S	I.P.
1	2	3	4	5	6	7	8
Anantapuramu District							
30	Agricultural Research Station, Anantapuramu	01	01	05	05	10	08
31	Agricultural Research Station, Reddipalli	01	01	-	-	-	-
32	Agricultural Research Station, Kadiri	01	01	05	05	02	01
VI.	**HIGH ALTITUDE AND TRIBAL AREA ZONE**						
	Visakhapatnam District						
34	Regional Agril. Research Station, Chintapalle,	01	01	01	-	08	05
Srikakulam District							
35	Agricultural Research Station, Seethampet	-	-	01	01	02	02
	Sub Total (Research)	**21**	**23**	**62**	**54**	**175**	**123**
Krishi Vigyan Kendras (KVKs)							
1	KVK, Reddipalli, Anantapuramu Dist.	-	-	01	01	06	05
2	KVK, Rastakuntabai, Vizianagaram Dist.	-	-	01	01	05	02
3	KVK, Amadalavalasa, Srikakulam Dist.	-	-	01	01	06	06
4	KVK, Utukur, YSR (Kadapa) Dist.	-	01	01	-	06	04
5	KVK, Undi, West Godavari Dist.	-	-	01	01	06	03
6	KVK, Darsi, Prakasam Dist.	-	01	01	-	06	05
7	KVK, Nellore, SPS Nellore Dist.	01	01	-	-	06	05
8	Dr. K. L.Rao KVK, Garikapadu, Krishna Dist.	-	-	01	01	06	04
9	KVK, Kalyandurg, Anantapuramu Dist.	-	-	01	01	06	03
10	KVK, Banavasi, Yammiganur, Kurnool Dist.	-	-	01	01	06	06
11	KVK, Kalikiri, Chittoor Dist.	-	01	01	-	06	04
12	KVK, Ghantasala, Krishna Dist.	01	01	03	03	02	02
13	KVK, Kondempudi, Visakhapatnam Dist.	-	-	01	01	06	04
District Agricultural Advisory & Transfer of Technology Centres (DAATTCs)							
14	DAATTC, Guntur District.	-	-	-	-	04	02
15	DAATTC, Machilipatnam, Krishna District.	-	-	-	-	03	01

S. No.	Name of the College / Research Station / Extension Unit	Professor / Principal Scientist		Associate Professor / Senior Scientist		Assistant Professor / Scientist	
		S	I.P.	S	I.P.	S	I.P.
1	2	3	4	5	6	7	8
16	DAATTC, Eluru, West Godavari District.	-	-	-	-	04	01
17	DAATTC, Kakinada, East Godavari District	-	-	-	-	03	02
18	DAATTC, Darsi, Prakasam District	-	-	-	-	03	02
19	DAATTC, Anakapalle, Visakhapatnam District.	-	-	-	-	03	02
20	DAATTC, Vizianagaram District.	-	-	-	-	03	02
21	DAATTC, Srikakulam District	-	-	-	-	02	02
22	DAATTC, SPS Nellore District.	-	-	-	-	02	02
23	DAATTC, YSR (Kadapa) District.	-	-	-	01	03	01
24	DAATTC, Kurnool District.	-	-	-	-	04	02
25	DAATTC, Anantapuramu District.	03	01	-	-	-	-
26	DAATTC,Chittoor District	-	-	01	-	03	02
Other Extension Centres							
27	Farmers Call Centre	-	-	-	-	03	05
	Sub Total (Extension):	**05**	**06**	**15**	**12**	**113**	**79**
	Administration	**10**	**33**	**-**	**01**	**05**	**06**
	Grand Total	**73**	**95**	**167**	**124**	**564**	**408**

ANNEXURE IV

STUDENTS' ENROLMENT BY COURSES, FIRST YEAR TO FINAL YEAR IN UNDER GRADUATE, POST GRADUATE, DOCTORAL AND DIPLOMA PROGRAMMES DURING 2018-'19

Course	Year	Total Student Enrolment			Enrolment Distribution													
					SC Students		ST Students		BC Students		OC Students		Muslim Minority		Physically Challenged Students		Foreign Students	
		Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Faculty of Agriculture																		
UG Programmes																		
B.Sc. (Ag)	I	301	424	726	47	66	20	26	125	186	97	134	14	10	01	01	-	01
	II	321	422	743	53	57	27	20	155	194	75	133	12	12	03	05	-	-
	III	317	430	747	43	72	24	22	159	177	81	142	09	12	04	08	-	-
	IV	251	318	569	37	47	25	11	95	131	91	115	07	06	04	04	-	-
Sub Total (UG)	**1190**	**1594**	**2785**	**180**	**242**	**96**	**79**	**534**	**688**	**344**	**524**	**42**	**40**	**12**	**18**	**-**	**01**	
PG Programmes																		
M.Sc. (Ag)	I	39	96	135	05	15	02	05	18	43	13	31	01	-	01	01	-	02
	II	53	81	131	06	14	03	06	21	29	18	29	02	02	01	-	-	-
	Total	92	177	266	11	29	05	11	39	72	31	60	03	02	02	01	-	02
M.Sc. (ABM)	I	08	06	14	01	-	-	-	08	03	02	-	-	-	-	-	-	-
	II	11	06	17	02	-	-	01	04	03	06	01	-	-	-	-	01	-
	Total	19	12	31	03	-	-	01	12	06	08	01	-	-	-	-	01	-
Sub Total (PG)	**111**	**189**	**297**	**14**	**29**	**05**	**12**	**51**	**78**	**39**	**61**	**03**	**02**	**02**	**01**	**01**	**02**	
Doctoral Programmes																		
Ph.D. (Ag.)	I	24	26	50	07	02	03	01	11	04	14	07	-	01	-	-	-	-
	II	18	22	45	03	04	01	01	09	10	10	03	01	-	01	-	-	-
	III	22	26	48	03	05	02	01	11	09	05	10	-	01	01	01	-	-
Sub Total (Ph.D.)	**64**	**79**	**143**	**13**	**11**	**06**	**03**	**31**	**23**	**29**	**20**	**01**	**02**	**02**	**01**	**-**	**-**	

Course	Year	Total Student Enrolment			Enrolment Distribution															
					SC Students		ST Students		BC Students		OC Students		Muslim Minority		Physically Challenged Students		Foreign Students	
		Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Diploma Programmes																		
Diploma (Agriculture)	I	198	281	441	57	58	13	17	122	150	25	27	06	05	01	01	-	-
	II	265	302	471	48	59	19	17	126	144	32	29	09	09	02	-	-	-
	Total	**403**	**583**	**912**	**105**	**115**	**32**	**34**	**248**	**294**	**57**	**56**	**15**	**14**	**03**	**01**	**-**	**-**
Diploma (Seed Technology)	I	05	18	23	02	02	-	01	03	09	-	04	01	01	-	-	-	-
	II	05	13	18	-	03	01	-	02	08	02	04	-	01	-	-	-	-
	Total	**10**	**31**	**41**	**02**	**05**	**01**	**01**	**05**	**17**	**02**	**08**	**01**	**02**	**-**	**-**	**-**	**-**
Diploma Organic Farming)	I	06	18	24	02	03	-	01	02	13	02	01	-	-	-	-	-	-
	II	07	13	22	02	03	02	-	02	10	01	02	-	-	-	-	-	-
	Total	13	31	46	04	06	02	01	04	23	03	03	-	-	-	-	-	-
SubTotal (Diploma)	426	627	999	111	126	35	36	257	334	62	67	16	16	-	-	-	-	
Sub Total (Agril.)	**403**	**583**	**912**	**105**	**115**	**32**	**34**	**248**	**294**	**57**	**56**	**15**	**14**	**03**	**01**	**-**	**-**	
Faculty of Agricultural Engineering and Technology																		
UG Programmes																		
B.Tech. (Ag.Engg.)	I	66	46	112	09	12	04	02	31	19	21	12	01	01	-	-	-	-
	II	64	42	106	03	07	03	01	30	22	22	12	01	-	01	-	-	-
	III	75	53	128	13	06	04	01	39	35	19	09	-	02	-	-	-	-
	IV	58	43	101	06	09	05	01	31	21	14	11	01	01	-	-	-	-
	Total	**263**	**184**	**447**	**31**	**34**	**16**	**05**	**131**	**97**	**76**	**44**	**03**	**04**	**01**	**-**	**-**	**-**

Course	Year	Total Student Enrolment			Enrolment Distribution													
					SC Students		ST Students		BC Students		OC Students		Muslim Minority		Physically Challenged Students		Foreign Students	
		Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
B.Tech																		
(Food Tech.)	I	47	53	100	05	07	06	02	22	21	14	21	-	02	-	-	-	-
	II	39	51	90	02	08	03	02	20	28	14	13	-	-	-	-	-	-
	III	23	27	50	06	02	03	-	06	12	07	13	01	-	-	-	-	-
	IV	40	50	90	08	11	04	-	18	17	10	21	-	01	-	-	-	-
	Total	**149**	**181**	**330**	**21**	**28**	**16**	**04**	**66**	**78**	**45**	**68**	**01**	**03**	-	-	-	-
Sub Total (UG)	**412**	**365**	**777**	**52**	**62**	**32**	**09**	**197**	**175**	**121**	**112**	**04**	**07**	**01**	-	-	-	
PG Programmes																		
M.Tech.																		
(Ag.Engg.)	I	09	08	17	-	03	01	01	07	01	01	03	-	-	-	-	-	-
	II	07	07	14	02	02	01	01	03	03	01	01	-	-	-	-	-	-
Sub Total (PG)	**16**	**15**	**31**	**02**	**05**	**02**	**02**	**10**	**04**	**02**	**04**	-	-	-	-	-	-	
Doctoral Programmes																		
Ph. D. (Ag.Engg.)	I	02	03	05	-	-	-	01	01	02	01	-	-	-	-	-	-	-
	II	05	01	06	-	-	-	-	03	01	02	-	-	-	-	-	-	-
	III	10	-	11	03	-	01	-	02	-	04	-	-	-	-	-	-	-
Sub Total (Ph.D.)	**17**	**04**	**22**	**03**	-	**01**	**01**	**06**	**03**	**07**	-	-	-	-	-	-	-	
Diploma Programmes																		
Diploma																		
(Ag.Engg.)	I	15	18	33	03	06	11	06	10	13	02	-	-	01	-	-	-	-
	II	15	20	35	03	05	05	08	13	09	-	05	-	02	-	-	-	-
	III	12	24	36	03	04	05	06	04	13	05	01	-	-	-	-	-	-
SubTotal (Diploma)	**426**	**949**	**111**	**126**	**35**	**36**	**257**	**334**	**62**	**67**	**16**	**16**	-	-	-	-	-	
Sub Total (Ag.Engg)	**42**	**62**	**104**	**15**	**21**	**20**	**27**	**35**	**07**	**06**	-	-	**03**	-	-	-	-	

Course	Year	Total Student Enrolment			Enrolment Distribution													
					SC Students		ST Students		BC Students		OC Students		Muslim Minority		Physically Challenged Students		Foreign Students	
		Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Faculty of Home science																		
UG Programmes																		
B.Sc. (HS)	I	-	70	70	-	17	-	06	-	31	-	11	-	05	-	-	-	-
	II	-	72	72	-	16	-	07	-	32	-	15	-	02	-	-	-	-
	III	-	92	92	-	19	-	11	-	41	-	16	-	05	-	-	-	-
	IV	-	35	35	-	11	-	03	-	13	-	06	-	02	-	-	-	-
Sub Total (UG)		**269**	**269**	**-**	**63**	**-**	**27**	**-**	**117**	**-**	**48**	**-**	**14**	**-**	**-**	**-**	**-**	
PG Programmes																		
M.Sc. (HS)	I	-	09	09	-	02	-	02	-	05	-	-	-	-	-	-	-	-
	II	-	13	13	-	04	-	01	-	06	-	02	-	-	-	-	-	-
Sub Total (PG)	-	**22**	**22**	**-**	**06**	**-**	**03**	**-**	**11**	**-**	**02**	**-**	**-**	**-**	**-**	**-**	**-**	
Ph.D. Programmes																		
Ph.D. (HS)	I	-	09	09	-	02	-	02	-	05	-	-	-	-	-	-	-	-
	II	-	13	13	-	04	-	01	-	06	-	02	-	-	-	-	-	-
	III	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Sub Total (Ph.D)	-	**22**	**22**	**-**	**06**	**-**	**03**	**-**	**11**	**-**	**02**	**-**	**-**	**-**	**-**	**-**	**-**	
Sub Total (HS)	-	**269**	**269**	**-**	**63**	**-**	**27**	**-**	**117**	**-**	**48**	**-**	**14**	**-**	**-**	**-**	**-**	
GRAND TOTAL	**2278**	**3244**	**5449**	**390**	**565**	**197**	**199**	**1121**	**1440**	**610**	**838**	**66**	**84**	**20**	**21**	**01**	**03**	

ANNEXURE V

COLLEGE-WISE STUDENTS STRENGTH -FIRST YEAR TO FINAL YEAR DURING 2018-19

S. No.	Name of the College	Year	Students Enrollment			SC Students		ST Students		BC Students		OC Students		Muslim Minority		Disability Students		Foreign Students	
			Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Faculty of Agriculture																			
		B.Sc. (Ag)																	
		I	92	165	257	13	25	04	12	47	82	23	41	05	05	-	01	-	-
		II	90	157	247	12	26	06	07	43	67	24	53	05	04	03	01	-	-
		III	91	154	245	11	31	07	06	44	51	24	58	05	08	01	05	-	-
		IV	76	139	215	09	26	11	04	25	63	29	41	02	05	03	02	-	-
1	Agricultural	**M.Sc. (Ag)**																	
	College,	I	16	35	51	01	06	01	01	09	16	05	12	-	-	01	-	-	-
	Bapatla	II	22	30	52	04	02	03	01	06	21	09	06	-	-	-	-	-	-
		Ph.D. (Ag)																	
		I	16	09	25	03	01	02	01	06	02	05	05	-	01	-	-	-	-
		II	08	11	19	01	01	-	01	05	07	02	02	-	-	-	-	-	-
		III	10	11	21	01	03	-	-	07	04	01	04	-	-	-	01	-	-
2	S.V.	**B.Sc. (Ag)**																	
	Agricultural	I	86	91	177	16	13	08	03	17	19	39	54	05	03	-	-	-	01
	College,	II	76	83	159	13	09	08	03	24	35	25	33	04	04	-	-	-	-
	Tirupati	III	79	97	176	12	15	08	06	30	31	26	42	03	03	-	-	-	-
		IV	60	74	134	12	08	04	02	10	24	30	40	03	-	-	-	-	-

S. No.	Name of the College	Year	Students Enrollment			SC Students		ST Students		BC Students		OC Students		Muslim Minority		Disability Students		Foreign Students	
			Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
		M.Sc.(Agril.)																	
		I	17	40	57	01	06	01	02	06	16	08	16	01	-	-	-	03	02
		II	24	29	53	04	04	01	02	08	08	09	13	02	02	-	-	05	-
		M.B.A. (Agril. Business Management)																	
		I	08	06	14	01	-	-	-	08	03	02	-	-	-	-	-	-	-
		II	11	06	17	02	-	-	01	04	03	06	01	-	-	-	-	01	-
		Ph.D. (Agril.)																	
		I	07	14	21	04	01	01	-	05	01	08	-	-	-	-	-	-	-
		II	09	15	24	01	03	01	-	04	03	08	-	01	-	01	-	01	-
		III	11	11	22	01	01	02	-	04	04	04	05	-	01	01	-	-	-
03	**Agricultural College, Naira**	**B.Sc.(Agril.)**																	
		I	59	62	121	07	08	03	05	29	37	19	07	04	01	01	-	-	-
		II	70	75	145	14	03	06	05	41	49	08	11	01	03	-	04	-	-
		III	73	78	151	09	05	03	03	51	56	09	07	01	01	03	03	-	-
		IV	52	44	96	03	04	06	02	32	26	14	04	02	-	01	02	-	-
		M.Sc.(Agril.)																	
		I	01	05	06	-	02	-	02	01	-	-	-	-	-	-	01	-	-
		II	02	03	05	01	01	-	01	01	01	-	-	-	-	-	-	-	-
04	Agricultural College, Mahanandi	**B.Sc.(Agril.)**																	
		I	39	57	97	06	09	01	05	21	25	11	18	-	01	-	-	-	-
		II	53	56	109	09	09	03	02	30	24	14	15	02	01	-	-	-	-
		III	44	58	102	08	09	04	03	14	23	18	23	-	-	-	-	-	-
		IV	48	31	79	09	05	03	01	22	09	14	15	-	01	-	-	-	-

S. No.	Name of the College	Year	Students Enrollment			SC Students		ST Students		BC Students		OC Students		Muslim Minority		Disability Students		Foreign Students	
			Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
		M.Sc.(Agril.)																	
		I	03	02	05	02	01	-	-	01	01	-	-	-	-	-	-	-	-
		II	02	05	07	-	02	01	02	-	01	-	01	-	-	-	-	-	-
		B.Sc.(Agril.)																	
05	**Agricultural**	I	25	49	74	05	11	04	01	11	23	05	14	-	-	-	-	-	-
	College,	II	32	51	83	05	10	04	03	17	19	04	21	-	-	-	-	-	-
	Rajamahen-	III	30	43	73	03	12	02	04	20	16	04	12	-	-	-	-	-	-
	dravaram	IV	15	30	45	04	04	01	02	06	09	04	15	-	-	-	-	-	-
		M.Sc.(Agril.)																	
06	**Advanced**		I	02	14	16	01	-	-	-	01	10	-	03	-	-	-	-	- -
	Post	II	06	09	15	-	01	-	-	03	03	04	03	-	-	-	-	01	-
	Graduate	**Ph.D. (Agril.)**																	
	Centre,	I	01	03	04	-	-	-	-	-	01	01	02	-	-	-	-	-	-
	Guntur	II	01	01	02	01	-	-	-	-	-	-	01	-	-	-	-	-	-
		III	01	04	05	01	01	-	01	-	01	-	01	-	-	-	-	-	-
Faculty of Agricultural Engineering & Technology																			
		B.Tech. (Agril. Engg.)																	
07	**College of**	I	44	26	70	07	06	03	01	19	10	14	08	01	01	-	-	-	-
	Agricultural	II	43	24	67	02	05	02	-	16	10	17	09	01	-	01	-	-	-
	Engineering,	III	48	37	85	09	04	03	01	20	24	16	06	-	02	-	-	-	-
	Bapatla	IV	38	31	69	04	06	03	01	19	16	10	07	01	01	-	-	-	-

S. No.	Name of the College	Year	Students Enrollment			SC Students		ST Students		BC Students		OC Students		Muslim Minority		Disability Students		Foreign Students	
			Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
		M.Tech. (Agril. Engg.)																	
		I	09	08	17	-	03	01	01	07	01	01	03	-	-	-	-	-	-
		II	07	07	14	02	02	01	01	03	03	01	01	-	-	-	-	-	-
		Ph.D. (Agril. Engg.)																	
		I	02	03	05	-	-	-	01	01	02	01	-	-	-	-	-	-	-
		II	05	01	06	-	-	-	-	03	01	02	-	-	-	-	-	-	-
		III	10	-	10	03	-	01	-	02	-	04	-	-	-	-	-	-	-
		B.Tech. (Agril. Engg.)																	
08	College of	I	22	20	42	02	06	01	01	12	09	07	04	-	-	-	-	-	-
	Agricultural	II	21	18	39	01	02	01	01	14	12	05	03	-	-	-	-	-	-
	Engineering,	III	27	16	43	04	02	01	-	19	11	03	03	-	-	-	-	-	-
	Madakasira	IV	20	12	32	02	03	02	-	12	05	04	04	-	-	-	-	-	-
		B.Tech. (Food Tech.)																	
09	College of	I	24	32	56	03	05	04	02	10	15	07	10	-	-	-	-	-	-
	Food Science	II	26	33	59	01	05	02	01	11	20	12	07	-	-	-	-	-	-
	& Technology,	III	14	20	34	05	01	03	-	03	10	03	09	-	-	-	-	-	-
	Bapatla	IV	30	30	60	06	06	02	-	14	10	08	14	-	-	-	-	-	-
		B. Tech. (Food Tech.)																	
10	College of	I	23	21	44	02	02	02	-	12	06	07	11	-	02	-	-	-	-
	Food Science	II	13	18	31	01	03	01	01	09	08	02	06	-	-	-	-	-	-
	&Technology,	III	09	07	16	01	01	-	-	03	02	04	04	01	-	-	-	-	-
	Pulivendula	IV	10	20	30	02	05	02	-	04	07	02	07	-	01	-	-	-	-

S. No.	Name of the College	Year	Students Enrollment			SC Students		ST Students		BC Students		OC Students		Muslim Minority		Disability Students		Foreign Students	
			Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
		B.Sc. (H. Sc.)																	
11	College of Home Science	I	-	70	70	-	17	-	06	-	31	-	11	-	05	-	-	-	-
		II	-	72	72	-	16	-	07	-	32	-	15	-	02	-	-	-	-
		III	-	92	92	-	19	-	11	-	41	-	16	-	05	-	-	-	-
		IV	-	35	35	-	11	-	03	-	13	-	06	-	02	-	-	-	-
12	Advanced PG Centre Guntur	M.Sc.(H. Sc.)																	
		I	-	09	09	-	02	-	02	-	05	-	-	-	-	-	-	-	-
		II	-	13	13	-	04	-	01	-	06	-	02	-	-	-	-	-	-
Diploma Programmes																			
13	Agricultural Polytechnic, Maruteru	Diploma (Agriculture)																	
		I	20	32	52	04	09	03	01	11	18	02	04	-	-	-	-	-	-
		II	23	31	54	08	08	02	01	10	17	03	05	-	-	-	-	-	-
14	Agricultural Polytechnic, Anakapalli	Diploma (Agriculture)																	
		I	26	36	62	06	05	02	03	16	25	01	04	01	-	-	-	-	-
		II	19	42	61	02	07	01	02	13	31	03	01	-	01	-	-	-	-
15	Agricultural Polytechnic, Podalakur	Diploma (Agriculture)																	
		I	-	23	23	-	06	-	-	-	14	-	01	-	02	-	-	-	-
		II	11	11	22	-	03	02	-	06	07	01	01	02	-	-	-	-	-
16	Agricultural Polytechnic, Reddipalli	Diploma (Agriculture)																	
		I	14	11	25	03	02	01	01	10	04	01	03	-	-	-	-	-	-
		II	11	16	27	-	03	02	02	06	09	03	02	-	-	-	-	-	-

S. No.	Name of the College	Year	Students Enrollment			SC Students		ST Students		BC Students		OC Students		Muslim Minority		Disability Students		Foreign Students	
			Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
	Polytechnic,	I	09	16	25	02	04	01	-	04	09	02	03	-	-	-	-	-	-
	Utukur	II	07	18	25	01	04	-	01	04	08	02	05	-	-	-	-	-	-
18	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	19	21	40	07	05	-	01	06	12	03	02	02	01	-	01	-	-
	Garikapadu	II	16	23	39	05	02	01	01	09	10	04	01	03	02	01	-	-	-
19	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	10	13	23	02	03	02	01	04	07	02	-	-	02	-	-	-	-
	Madakasira	II	13	08	21	01	04	01	-	08	03	02	01	01	-	-	-	-	-
20	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	06	18	24	02	03	-	01	02	13	02	01	-	-	-	-	-	-
	Chantapalle	II	07	15	22	02	03	02	-	02	10	01	02	-	-	-	-	-	-
21	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	11	15	26	03	02	-	02	07	07	-	03	-	-	-	-	-	-
	Nandyal	II	16	09	25	02	01	-	01	12	04	02	02	-	-	-	-	-	-
22	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	13	09	22	04	01	-	01	08	06	01	01	01	-	-	-	-	-
	Tirupati	II	12	11	23	03	03	01	-	05	02	03	06	-	-	-	-	-	-
23	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	09	13	22	01	04	-	01	04	05	03	03	01	-	-	-	-	-
	Kalikiri	II	10	13	23	02	03	-	01	06	07	01	-	01	02	-	-	-	-
24	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	17	-	17	09	-	-	-	06	-	01	01	-	-	-	-	-	-
	Somasila	II	11	08	19	03	01	01	-	05	04	03	-	-	02	-	-	-	-

S. No.	Name of the College	Year	Students Enrollment			SC Students		ST Students		BC Students		OC Students		Muslim Minority		Disability Students		Foreign Students	
			Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
25	Agricultural Polytechnic, Rampa-chodavaram	Diploma (Agriculture)																	
		I	20	-	20	03	-	02	-	15	-	-	-	-	-	-	-	-	-
		II	13	11	24	03	-	01	-	08	-	01	-	-	-	-	-	-	-
26	Agricultural Polytechnic, J.M. Puram	Diploma (Agriculture)																	
		I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		II	11	16	27	05	03	01	01	03	09	-	01	01	02	01	-	-	-
27	Agricultural Polytechnic, Gantasala	Diploma (Agriculture)																	
		I	05	33	-	07	01	01	02	17	02	07	-	01	-	01	-	-	-
		II	07	30	01	07	-	01	05	18	-	03	01	01	-	-	-	-	-
28	Agricultural Polytechnic, Ramagiri	Diploma (Agriculture)																	
		I	19	41	60	04	11	01	03	12	28	-	01	-	-	-	-	-	-
		II	18	40	58	04	14	03	02	11	23	-	01	-	-	-	-	-	-
29	Agricultural Polytechnic, J.M. Puram	Diploma (Seed Technology)																	
		I	05	18	23	02	02	-	01	03	09	-	04	01	01	-	-	-	-
		II	05	13	18	-	03	01	-	02	08	02	04	-	01	-	-	-	-
30	Agricultural Polytechnic, Chintapalle	Diploma (Organic Farming)																	
		I	06	18	24	02	03	-	01	02	13	02	01	-	-	-	-	-	-
		II	07	15	22	02	03	02	-	02	10	01	02	-	-	-	-	-	-
31	Polytechnic of Agricultural Engineering , Kalikiri	Diploma (Agricultural Engineering)																	
		I	03	03	06	01	01	10	05	03	04	-	-	-	01	-	-	-	-
		II	03	02	05	-	01	04	07	05	01	-	-	-	02	-	-	-	-
		III	02	06	08	02	-	05	05	-	01	-	-	-	-	-	-	-	-
	Agricultural Engineering, Anakapalle	I	12	15	27	02	05	01	01	07	09	02	-	-	-	-	-	-	-
		II	12	18	30	03	04	01	01	08	08	-	05	-	-	-	-	-	-
		III	10	18	28	01	04	-	01	04	12	05	01	-	-	-	-	-	-

ANNEXURE VI

AGRO-CLIMATIC ZONE-WISE LIST OF RESEARCH STATIONS AND THEIR FUNCTIONS

S. No.	Zone / Research Station	Functions		
		Main	Priorities	Verification
I.	**Krishna Zone**			
1.	Regional Agricultural Research Station, Lam -522 034. Phone: 0863-2524017	• Development of sustainable, profit-able technologies and Integrated cropping/ farming systems for rainfed/ I.D conditions in pulses, cotton, millets and oil seeds. • Extending of weather based agro advisory services, working out of viable effective price forecasting for major crops.	• Development of Short / medium duration cotton varieties / hybrids. • Development of ideotypes in cotton suitable for HDPS and mechanical picking. • Climate resilient production technologies (including organic farming) for cotton and cotton based cropping systems. • Sustainable integrated management technologies for biotic and abiotic stresses. • Mechanization in cotton. • Value addition in cotton. • Weather based Agro advisories to farmers. • Research on Socio-economic aspects of farming community.	• Control of weeds in rice fallow pulses.
2.	Agricultural Re-search Station, Machilipatnam	• Development of medium duration, salt tolerant / resistant rice varieties suitable to coastal ecosystem and management strategies for improving productiv-ity in salt affected areas.	• Development of medium duration and salt tolerant rice varieties. • Conduct of basic, applied and adaptive research on increasing and stabilizing rice productivity in coastal saline ecosystems. • Production technologies for improving productivity in salt affected areas. • Collection, evaluation, conservation of rice germplasm.	• Testing and identification of suitable blackgram varieties for salt affected areas.

S. No.	Zone / Research Station	Functions		
		Main	Priorities	Verification
3.	Agricultural Research Station, Ghantasala	• Development and identification of high yielding blackgram and greengram varieties suitable for rice fallows(rabi) and production and protection technologies for improving productivity.	• Development of short or medium duration greengram and blackgram varieties to escape terminal moisture stress and biotic stress with special emphasis on sucking pests & viral diseases. • Alternate crops to greengram and blackgram for rice fallows. • Mechanization in pulse crops. • Organic enrichment of soils to sustain rice fallow pulse cropping sequence.	• Identification of suitable mustard and maize varieties (Zero tillage) and production technologies under rice fallows.
4.	Agricultural Research Station, Vuyyuru, Krishna District	• Development of sugarcane varieties possessing high cane yield potential and sugar content coupled with tolerance / resistance to biotic and a biotic stresses and viable agro techniques suitable for Krishna - Godavari Zone.	• To develop high yielding sucrose rich varieties with climate resilience and multiratooning ability. • To develop cost effective comprehensive production technologies. • Water saving technologies to enhance water and nutrient productivities. • To develop technologies for soil health, management of ESB, INB and red rot. • To identify efficient clones under water logged conditions & clones with tolerance for post-harvest deterioration. • Agro-techniques for mechanized sugarcane cultivation.	• Identification of suitable rice varieties for kharif and blackgram varieties for rice fallow situation.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
5.	Agricultural Research Station, Garikapadu	• Research on water management of different crops grown under NSP left canal command area.	• To conduct research on crops and cropping systems and water management for NSP left command area.	• Testing and identification of suitable rice, pulses and soybean varieties for the tract. • Transfer of proven technologies through field demonstrations in farmers fields.
6.	Agricultural Research Station, Amaravati	• Research, production and quality control of Rhizobium and Azotobacter etc. • Research and mass production of biofertilizers and associated protocols.	---	• Testing efficacy of biofertilizers on mandatory crops of the zone.
7.	Post-Harvest Technology Centre Agricultural College campus,Bapatla-522101. Phone: 08643-225098.	• Design, fabrication, valuation of post - harvest equipments/ machinery for reducing the crop losses and enhancing value addition. • Research on bio-chemical quality factors in storage and impact of abiotic and biotic factors on storage of food grains and control methods of storage pests.	• Design and development of crop specific and location specific technologies and machineries for value addition and safe storage. • Development of value added products using innovative and novel technologies. Design and development of efficient storage structures for cereals, pulses and oilseeds and horticulture produces. • Design and development of low cost ripening chambers for fruits/ crops. • Utilization of innovative biotechnological approaches for preparation of value added products. • Development of complete protocol for agricultural waste management.	• Demonstration and popularization of post-harvest related equipment/ technologies.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
			• Design and development of Agro Processing Clusters based on production catchments of various agro climatic zones of the state.	
8.	Agricultural Research Station, Agricultural College Campus, Bapatla - 522101. Phone: 0863-225901	• Development of improved long duration rice varieties with good grain quality and sustainable agro-techniques suitable for black soils of Krishna Western Delta and NSP area.	• Development of climate resilient rice varieties for KW Delta and NSP area. • Development of varieties suitable for direct seeding. • Breeding long duration varieties with fine grain quality. • Evolving of cost reduction technologies. • Innovative and adaptable production and protection technologies. • Identification of efficient integrated farming systems.	
9.	Saline Water Scheme, Agricultural college campus, Bapatla - 522 101 Phone : 08643- 25098	• Research on water quality, soil survey & monitoring o benchmark sites and reclamation & fertility management of problematic soils.	• Water quality soil survey and monitoring of benchmark sities. • Up-coming problems of sea water in coastal sandy soils. • Reclamation of abandoned aqua ponds, sandy soils. • Effective management and utilization of thorough harvesting techniques and irrigation methods. • Reclamation of salt affected areas-aqua ponds.	• Testing and identification of crops/ varieties suitable for problematic soils.
10.	Agricultural Research Station, Jangamaheswarapuram	• Development of high yielding rice varieties with good grain quality and resistance to pest & diseases suitable to NSP right canal area.	• Development and identification of rice varieties suitable for NSP right canal area. • Evaluation of water saving technologies and micro irrigation systems to enhance water productivity.	• Identification of HYVs in greengram and redgram suitable for the tract.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
		• Production of breeder and foundation seed of different varieties of rice	• Seed research& seed production technologies for rice and pulses. • Standardization of seed production technologies for fodder and green manure crops.	
11.	Agricultural Research Station, Darsi	• Development of economically viable and efficient cropping system models, Agro-forestry system, water-shed manage-ment technologies suitable for NSP right canal area for enhancing the productivity of rainfed crops.	• Development of high yielding varieties with resistance to pests and diseases in millets, pulses and oilseeds. • Identification of crops and cropping systems suitable for NSP right canal area. • To identifya suitable Agro-forestry system matching soil and environmental conditions. • To evaluate different techniques of modification of crop microclimates for enhancing the water-use efficiencyand productivity of rainfed crops. • Development of suitable technologies for water harvesting and conserva-tion. • Identification of viable agro-technologies for crops suitable to the tract.	• Identification of alternative crops to Tobacco. • Introduction of drought tolerant oilseed crops viz., safflower and castor. • Screening of cowpea and horsegram varieties for their adaptability. • Introduction of millets in kharif season preceding to rabibengalgram. • Organic enrichment to improve the physical properties of the soil. • Testing & identifica-tion of greengram, blackgram, redgram varieties suitable for the tract.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
II.	**Godavari Zone**			
1.	Regional Agricultural Research Station, Maruteru, West Godavari District.	• Rice, Rice based sustainable/ integrated cropping/ farming systems through development of suitable varieties, sustainable crop production and protection technologies	• Development of climate resilient rice varieties. • Development of rice varieties for direct seeding. • Breeding for mid late duration rice varieties with fine grain. • Development of exportable rice. • Development of rice varieties for semi-deep water situations. • Bio-fortification in rice. • Cost reduction technologies. • Innovative and adaptable production technologies. • Processing and value addition. • Integrated farming systems. • Organic / natural farming. • Soil health management. • Mechanization in rice. • Research on summer pulses. • Imparting skill oriented training to farmers & extension functionaries. • Research on non-pesticide management. • Weather based Agro advisories to farmers. • Research on Socio-economic aspects of farming community.	• Identification of suitable maize varieties for *rabi season.*
2.	Agricultural Research Station, Vijayarai, West Godavari District	• Research on maize and maizebased cropping systems and on apiculture.	• Development of medium and short duration maize hybrids/ varieties. • Development of specialty corn varieties/hybrids. • Development of location specific innovative production technologies for maize. • Research on honeybees - Breeding for disease resistance, high yielding, non-pestiferous pollinators. • Capacity building on bee keeping	----

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
3.	Agricultural Research Station, Pulla, West Godavari District	• Development of rice varieties for semi-deep water situation. • The land (3.5 acres) at Pulla Village where deep water research was going on was taken over by Govt. of Andhra Pradesh for construction of Indirammagruhalu. • Due to fish ponds coming up around the remaining land of Research Farm resulting in inundation for more than 10 months in a year. In this regard, the committee constituted by University has recommended for closure of the research station and intensification of research on semi deep water rice at RARS, Maruteru. • Therefore the mandate of Agricultural Research Station, Pulla was shifted to RARS, Maruteru during 2005.	----	----
4.	Agricultural Research Station, Peddapuram, East Godavari District.	• Research on Finger millet, pulses (blackgram, greengram,redgram), maize and oilseeds (ground nut &sesamum).	• Development of climate resilient finger millet varieties and profitable production technologies. • Evaluation of varieties / hybrids of blackgram, greengram, redgram, maize, groundnut &sesamum.	-----
III.	**North Coastal Zone**			
1.	Regional Agricultural Research Station, Anakapalle, Visakhapatnam District	• Research on sugarcane, sugarcane based cropping systems, cost reduction technologies and value addition.	• Development of high yielding climate resilient varieties of sugarcane. • Development of INM, IPM and IDM strategies for sustainable sugarcane production.	• Testing & identification of thermo & photo insensitive varieties of sesame and groundnut.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
			• Development of cost reduction technologies for sustainable sugarcane production. • Processing and value addition of jaggery and sugarcane by products. • Identification of profitable and sustainable sugarcane based cropping systems for different agro climatic conditions. • Soil health, pest and disease management in multi ratooning. • Mechanization in sugarcane. • Development of water smart technologies for increasing the crop and water productivity. • Popularization of feasible and adaptable technologies (bio-pesticides, bio-fertilizers). • To encourage small and marginal farmers to set up industries for value addition. • Weather based Agro advisories to farmers. • Research on Socio-economic aspects of farming community.	• Evaluation of varieties / hybrids of maize suitable for Kharif andrabi. • Identification of suitable varieties in rice. • To evolve suitable package of practices for organic / natural farming.
2.	Agricultural Research Station, Vizianagaram, Vizianagaram District	• Research on ragi, ragi based cropping systems and minor millets (proso, kodo, ooda and foxtail).	• Development of climate resilient ragi varieties (with blast resistance and non-lodging nature) and production technologies. • Evaluation / identification of suitable varieties / hybrids in minor millets. • Evaluation / identification of groundnut varieties with biotic and abiotic stress tolerance. • Bio fortification, processing and value addition in ragi and other minor millets. • Identification of profitable ragi based cropping system including organic farming. • Mechanization in millets.	• Testing & identification of suitable varieties in greengram, blackgram, redgram, horsegram, maize and sunflower.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
3.	Agricultural Research Station, Ragolu, Srikakulam District	• Rice, Rice based cropping systems, climate resilient, sustainable / integrated cropping / farming systems, soil and water management forcanalfed and tankfed areas and research on rice fallow pulses.	• Development of fine grain, long and medium duration varieties for canalfed and rainfed areas. • Development of climate resilient short duration varieties for uplands. • Development of innovative and adoptable production technologies for different ecosystems (canal, tankfed and rainfed) including direct seeding. • Identification and popularization of profitable integrated farming systems. • Standardization of organic / natural farming practices. • Research on rice fallow pulses. • Development of cost reduction technologies (planting methods, bio fertilizers and bio control agents). • Bio fortification and value addition.	• Testing and identification of suitable varieties of groundnut, mustard, sunflower for rabi season.
4.	Agricultural Research Station, Amadalavalasa, Srikakulam District	• Research on mesta, mesta based cropping systems, post harvest technology and on pulses.	• Development of climate smart varieties of mesta with biotic and abiotic stress tolerance. • Identification of profitable and sustainable mesta based cropping systems. • Development of innovative and climate resilient production technologies. • Post-harvest technology and value addition.	• Verification function of cotton, redgram upland pulses, maize and rainfed sugarcane. • Identification of suitable sugarcane, maize and other crops for rainfed conditions. • Evaluation / identification of cotton hybrids / varieties and IPM practices suitable for rainfed situation.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
5.	Agricultural Research Station, Yelamanchili, Vishakhapatnam District	• Research on sesamum and sesamum based cropping systems.	• Development of climate resilient (Photo insensitive) sesame varieties and profitable production technologies. • Evolving varieties / hybrids of sunflower. • Breeding for improved varieties of groundnut suitable for North Coastal Zone	• Testing / Identification of varieties / hybrids of millets suitable for light soils &rainfedares of North Coastal Zone. • Identification of suitable varieties of sugarcane, greengram, horsegram and redgram for rainfed situations.
IV.	**Southern Zone**			
1.	Regional Agricultural Research Station, Tirupati, Chittoor District	• Research on groundnut and sustainable groundnut based cropping systems, pulses, soil and water management, farm mechanization and post- harvest technology.	• Development of drought tolerance, high yield, pest and disease resistance varieties in groundnut and pulses for the zone. • Research on groundnut based cropping systems, production and protection technologies. • Soil, water and nutrient management technologies for groundnut and pulses including arid legumes. • Evaluation of farm machinery and post-harvest technologies. • Testing, production and distribution of efficient strains of bio-fertilizers. • Weather based agro advisories to farmers. • Research on Socio- economic aspects of farming community.	• Identification of viable Integrated Farming Systems for Dryland / rainfed farmer. • Agro-climate advisory services for dry land/ rainfed farming. • Development of digital agricultural communication technologies for efficient transfer of technology. • Creation of farmers organizations and technology commercialization. • Testing / identification of HYVs of fodders, organic/ natural farming practices.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
2.	Agricultural Research Station, Perumallapalle, Chittoor District	• Research on sugarcane, maize, jowar and millets.	• Development of high yielding sugarcane varieties possessing tolerance to biotic and abiotic stresses and suitable for jaggery mechanization and diversified uses in Southern Zone. • Development of input use efficient cane management technologies. • Seed production of elite clones through conventional and micro propagation techniques. • Development of high yielding blast resistant finger millet varieties suitable for Andhra Pradesh. • Breeding varieties/hybrids of Jowar, Maize and Pearl millet. • Development of input use efficient crop production and protection practices for maize, jowar and millets.	• Testing and identification of HYVs of minor millets and value addition.
3.	Agricultural Research Station, Nellore, Nellore District	• Rice and rice based cropping systems.	• Development of rice varieties of different duration maturity groups suitable to southern zone. • Development of rice varieties resistant/ tolerant to blast. • Screening / identification of resistant donors for major insect pests and diseases. • Development of pest and disease management strategies. • Development of varieties and technologies for aerobic, direct seeding of rice. • Working out package for organic rice cultivation/natural farming. • Basic research on the resistance to insect pests with particular reference to Brown Plant Hopper. • Monitoring and identification of rice gall midge biotypes in Southern Zone. • Development of Integrated pest and disease management including biological control. • Research on the methods of non-pesticide management.	• Identification of suitable varieties in gingelly. • Identification of HYVs of sesamum. • Testing of pulses under rice fallows.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
4.	Agricultural Research Station, Podalakur, Nellore District	• Development of high yielding insect pest & disease tolerant varieties in pulses, jowar and evolving climate resilient suitable agro-techniques.	• Development of blackgram, greengram and redgram varieties with high yield and tolerance to insect pests and diseases. • Development of sorghum varieties suitable for rabirainfed conditions. • Research on sorghum based cropping systems. • Development of climate resilient agro techniques.	• Testing and identification of suitable groundnut varieties for the tract. • Evaluation of fodder sorghum, sunflower and gingelly varieties/hybrids. • Seed production in pulses, jowar and groundnut.
5.	Agricultural Research Station, Kavali, Nellore District.	• Agro-Forestry research	• Evaluation of different agro-forestry species including eucalyptus, casuarinas, Malabarvepa and red sanders clones.	• Evaluation/identification of varieties in rice, pulses and groundnut.
6.	Agricultural Research Station, Utukur, Y.S. R Kadapa District	• Rice and rice based cropping systems, water management and STCR research.	• Rice and rice based cropping systems. • Water management and dryland agriculture. • Mass multiplication of bio-fertilizers. • Basic and strategic research on soils. • Evaluation of fertilizer schedules for major crops.	• Identification of suitable oilseed and pulses.
V.	**Scarce Rainfall Zone**			
1.	Regional Agricultural Research Station, Nandyal, Kurnool District	• Development/ identification and popularization of suitable crops/ cropping systems, varieties and technologies pertaining to cotton, rice, jowar, small millets, chickpea, sunflower and tobacco	• Development of climate resilient varieties/hybrids in cotton, rice, jowar, small millets, chickpea, sunflower and tobacco. • Research on climate smart technologies to cope up with the weather aberrations in mandate crops. • Intensification of research for innovative and small farmer friendly mechanization for	• Evaluation of varieties/technologies of upcoming crops like maize, redgram, blackgram, soybean, safflower, mustard and castor. • Development of Agro techniques for rice fallow sorghum.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
			mandatory crops. • Soil health management in major crops/cropping systems. • Development of water smart technologies in major crops/ cropping systems. • To intensify quality seed production of newly released varieties of mandatory crops. • Working out organic production package of practices for small millets and blackgram. • Introduce hybrid rice research. • Weather based agro advisories to farmers. • Research on Socio-economic aspects of farming community.	
2.	Agricultural Research Station, Anantapuramu, Anantapuramu District	• Development and popularization of climate smart sustainable dryland agriculture technologies and groundnut, bajra integrated farming systems and extending weather based agro advisory servies.	• Development of climate resilient technologies in groundnut and other major rainfed crops/cropping systems. • Strengthening the research on climate smart technologies to cope up with weather aberrations in rainfed crops. • Intensification of research for innovative and small farmer friendly mechanization in rainfed crops. • Development of integrated farming system models for rainfed agriculture. • Soil health management under rainfed situations. • Development and evaluation of climate resilient varieties/hybrids in pearlmillet and arid legumes. • Development of crop-weather-pest relationships and dissemination of Agro advisories.	• Evaluation of varieties of sorghum castor, foxtail millet, redgram, horsegram and field bean.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
3.	Agricultural Research Station, Reddipalli, Anantapuramu District	• Development and popularization of climate and water smart sustainable oilseed crop based cropping systems.	• Development of climate resilient technologies in oilseed crops/cropping systems. • Soil health management for oilseed crops. • Development of water smart technologies for oilseed crops/cropping systems.	• Evaluation of varieties/ hybrids of oilseed crops, rice and redgram. • Transfer of technologies through OFTs.
4.	Agricultural Research Station,Kadiri, Anantapuramu District	• Development and popularization of suitable groundnut varieties and climate smart groundnut based cropping systems.	• Development of climate smart groundnut varieties for different situations. • Evolving of efficient and sustainable production technologies. • Screening of groundnut varieties for major pests and diseases. • Development of management strategies for major pests and diseases in groundnut. • Intensification of seed research and quality seed production of newly released groundnut varieties. • Basic studies on management of viral diseases in groundnut.	• Evaluation of redgram, arid legumes and sunflower varieties/ hybrids.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
VI.	**High Altitude and Tribal Zone**			
1.	Regional Agricultural Research Station, Chintapalle, Visakhapatnam District.	• Development/ identification and popularization of suitable crop varieties and technologies on watershed basis for improving the livelihood of tribal farmers	• Research on Rajamash and Niger. • Evaluation of varieties/hybrids in upland rice, maize, wheat, millets, sugarcane & redgram. • Development/evaluation of soil and water conservation practices. • Development of integrated farming system models. • Improving organic / natural farming practices. • Weather based Agro Advisories to farmers. • Research on Socio-economic aspects of farming community.	----
2.	Agricultural Research Station, Seethampeta, Srikakulam District.	• Identification and popularization of suitable crops/ crop varieties/ cropping systems and development & popularization of technologies on watershed basis for improving the live hood of tribal farmers	• Testing the performance of improved varieties of cereals, millets, pulses, oil seeds and fodder crops. • Soil and water conservation in the agency area. • Development of organic/natural farming package for major crops in the agency areas. • Identification of profitable and non-traditional crops and cropping systems. • Integrated farming system research for economic upliftment of tribals. • Promotion of processing and storage of millets.	• Identification of profitable cropping/ farming system.

ANNEXURE VII

LIST OF ICAR COORDINATED RESEARCH PROJECTS OPERATED IN RESEARCH STATIONS

I. NORTH COSTAL ZONE

1. AICRP on Sugarcane, RARS, Anakapalle
2. AICRP on PHE and Technology,RARS, Anakapalle
3. AICRP on Biological Control, RARS, Anakapalle
4. AICRP on Small Millets, ARS, Vizianagaram
5. AICRP on Jute and Allied Fibers, ARS, Amadalavalasa
6. AICRP on IFS, ARS, Vizianagaram

II. GODAVARI ZONE

7. AICRP on Rice, RARS, Maruteru
8. AICRP on Cropping System Research (MAE), RARS, Maruteru
9. AINP on Vertebrate Pests, RARS, Maruteru
10. AICRP on Honey Bee Research & Training, ARS, Vijayarai
11. AICRP on Maize, ARS, Peddapuram.

III. KRISHNA ZONE

12. AICRP on Pulses, MULLaRP, RARS, Lam
13. AICRP on Cotton, Main Centre, RARS, Lam
14. AICRP on Pulses (Pigeonpea), RARS, Lam
15. AICRP on Weed Management Voluntary Centre, RARS, Lam
16. AICRP on Management of Salt Affected Soils and Use of Saline Water, Bapatla
17. AICRP on Post-Harvest Technology, Bapatla
18. AICRP on Farm Implements and Machinery, Bapatla
19. AINP on Soil Biodiversity & Biofertilizers, ARS, Amaravathi
20. AICRP on MULLaRP, ARS, Ghantasala
21. AICRP on Dryland Agriculture, Voluntary Centre, ARS,Darsi

IV. SOUTHERN ZONE

22. AICRP on Groundnut, RARS, Tirupati
23. AICRP on Forage crops, Voluntary Centre, RARS, Tirupati

24. AICRP on Sesamum, RARS, Tirupati
25. AICRP on Rice, ARS, Nellore

V. SCARCE RAINFALL ZONE

26. AICRP on Cotton, Sub-Centre, RARS, Nandyal
27. AICRP on Improvement of Small Millets, RARS, Nandyal
28. All India Network Project on Tobacco, RARS, Nandyal
29. AICRP on Oilseeds, Sub-Centre on Sunflower, RARS, Nandyal
30. AICRP on Chickpea, RARS, Nandyal
31. AICRP on Sorghum, RARS, Nandyal
32. AICRP on Dryland Agriculture, ARS, Anantapuramu
33. AICRP on Pearl Millet Improvement Project, ARS, Anantapuramu
34. AICRP on Agro-meteorology, ARS, Anantapuramu
35. AICRP on Castor, ARS, Anantapuramu
36. AICRP on Oilseeds, Main Centre for Groundnut, ARS, Kadiri

IX. HIGH ALTITUDE AND TRIBAL ZONE

37. AICRP on Niger, ARS, Seethampet

ANNEXURE VIII

LIST OF PROJECTS UNDER RASHTRIYA KRISHI VIKAS YOJANA (RKVY)

Sl. No.	Title of the project	Research Station	Total budget allocation during 2017-18 (Rs. in Lakhs)	Budget released for 1st installment 2017-18 (Rs.in Lakhs)	Amount now released as 2nd Installment (Rs. in Lakhs)
I	**Research**				
1	Establishment of the medium term Seed Storage Bank in the Residual State of Andhra Pradesh	RARS, Nandyal	2,06,68,000	–	2,06,68,000
2	Establishment of Agricultural Market Intelligence Center	ANGRAU, Guntur	1,05,83,000	–	1,05,83,000
3	Advanced Centre for Agro Climate Research and Weather Forecasting	RARS, Tirupati	2,40,94,000	1,15,48,455	1,25,45,545
4	Establishment of Centre of Excellence in Post-Harvest Engineering & Technology	PHET, Bapatla	3,51,81,000	–	3,51,81,000
5	Establishment of Agro Processing Centre (APC) for preparation of value added products to cater the needs of farmers in North Coastal Districts of Andhra Pradesh	RARS, Anakapalle	19,35,000	19,35,000	–
6	Establishment of Farm Machinery Testing and Training centre	AICRP on FIM, CAE, Bapatla	73,03,000	73,03,000	–
7	Establishment of Soil Microbiology Laboratory	RARS, Tirupati	73,62,000	73,62,000	–
8	In situ Management of Indigenous Crop Diversity for improved Market Access by Value Addition in Rainfed and High Altitude Tribal Areas through Community Managed Seed Systems	ICAR-NBPGR, Regional Station, Hyderabad (Lead institute)	34,93,000	34,93,000	–
9	Strengthening of Infrastructure for research and capacity building for upscaling tribal livelihood by diversified	RARS, Chintapalle	84,44,000	–	84,44,000

Sl. No.	Title of the project	Research Station	Total budget allocation during 2017-18 (Rs. in Lakhs)	Budget released for 1st installment 2017-18 (Rs.in Lakhs)	Amount now released as 2nd Installment (Rs. in Lakhs)
	cropping / farming systems in high altitude areas of Andhra Pradesh				
10	Development of infrastructure facilities at RARS, Maruteru				
A	Construction of rattery cum animal house for rodent management experimentation	RARS, Maruteru	17,60,000	17,60,000	–
B	Strengthening and upgrading of irrigation and drainage facility at APRRI & RARS, Maruteru		65,97,000	--	65,97,000
II	**Agribiotech**				
1	Strengthening of Agribiotech Foundation, Reddipalli, Ananthapuramu	Agribiotech, Reddipalli, Ananthapuramu	1,02,85,000	25,68,440	77,16,560
III	**Agricultural Engineering**				
1	State of Art Training Centre for skill development and empowerment of rural youth on farm mechanization and allied farm engineering technology - network Centre	Lead centre - Madakasira Sub centers Ananthapuramu Tirupati Anakapalle	1,40,49,000	35,08,411	1,05,40,589
IV	**Extension**				
1	Strengthening of Krishi Vigyan Kendras and DAATTCs for enhancing their capacities in promoting extension services to the farmers in Andhra Pradesh	All KVKs and DAATTCs of ANGRAU	2,49,14,000	62,21,694	1,86,92,306
V	**Information Technology**	Lam, Guntur	63,32,000	–	63,32,000
1	Digitization of Agriculture cell at ANGRAU, Lam, Guntur				
		Total: Rs.	**18,30,00,000**	**4,57,00,000**	**13,73,00,000**

ANNEXURE IX

LIST OF EXTENSION CENTRES
DISTRICT AGRICULTURAL ADVISORY & TRANSFER OF TECHNOLOGY CENTRES (DAATTCs)

District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises Amadalavalasa – 532 185 Srikakulam Dist.	District Agricultural Advisory & Transfer of Technology Centre Agricultural Research Station Premises Gajularega - 535 003 Vizianagaram Dist.
District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises Kondempudi – 531026 Butchayyapeta Mandal, Visakhapatnam Dist.	District Agricultural Advisory & Transfer of Technology Centre Agricultural Research Station Premises Peddapuram - 533 437 East Godavari District.
District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises Undi – 534 199, Bhimavaram Road, West Godavari District.	District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises Ghantasala - 521 133 Krishna District.
District Agricultural Advisory & Transfer of Technology Centre Extenstion Education Unit Regional Agricultural Research Station Premises, Lam, Guntur – 522 034.	District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises Darsi - 523 247, Prakasam District.
District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises B.V.Nagar, Nellore – 524 004. SPSR Nellore District.	District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises Kalikiri - 517 234, Chittoor District.
District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises Banavasi, Yemmiganur – 518 360 Kurnool District.	District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises Utukur, Kadapa - 516 001 YSR Kadapa District
District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises Reddipalle – 515 701 Anantapuramu District	

LIST OF EXTENSION CENTRES
KRISHI VIGYAN KENDRAS (KVKs)

Krishi Vigyana Kendra Amadalavalasa - 532 185 Srikakulam Dist.	*Krishi Vigyan Kendra* Rastakuntabai - 535 523 (via) Gummalaxmipuram Vizianagaram Dist.
Krishi Vigyan Kendra Undi - 534 199 West Godavari Dist.	*Krishi Vigyan Kendra* Ghantasala - 521133 Krishna Dist.
Dr. K.L. Rao Krishi Vigyan Kendra Garikapadu - 521 175 Krishna Dist.	*Krishi Vigyan Kendra* Agricultural Research Station Darsi - 523 247 Prakasam Dist.
Krishi Vigyan Kendra Agricultural Research Station Nellore - 524 004 SPS Nellore Dist.	*Krishi Vigyan Kendra* Kalikiri - 517 234 Chittoor Dist.
Krishi Vigyan Kendra Agricultural Research Station Utukur - 516 003 YSR (Kadapa) Dist.	*Krishi Vigyan Kendra* Banavasi, Yemmiganur Kurnool - 518 003 Kurnool Dist.
Krishi Vigyan Kendra Bukkarayasamudram, Reddipalli Anantapuramu - 515 001 Anantapuramu Dist.	*Krishi Vigyan Kendra* Garudapuram, Kalyandurg - 515 761 Anantapuramu Dist.
Krishi Vigyan Kendra Kondempudi, Dr.No: 6-89, Opp. Sakha Grandhalayam Main Road, Ravikamatham Visakhapatnam. Dist. - 531 025	

FARMERS CALL CENTRE

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Agricultural Information & Communication Centre

Flat 402, Srinivasa Citadel, Opp. Hosanna Mandir, Guntur – 522 034

National Conference for Post Graduate Students (NCPGS-2019) at S.V. Agricultural College, Tirupati

Hon'ble Vice Chancellor & Board Member Visit to ARS, Vijayarai

Demonstration of the Drone Technology