Technologies Developed in different Agro Climatic Zones

2015-16 to 2021-22

ANGRAU

ACHARYA N.G. RANGA AGRICULTURAL UNIVERISTY
ADMINISTRATIVE OFFICE, LAM, GUNTUR - 522 034, A.P.

Integrated farming systems (IFS)

Farm Machinery in Agriculture

ANGRAU

ACHARYA N. G. RANGA AGRICULTURAL UNIVERSITY

LAM, GUNTUR, ANDHRA PRADESH

TECHNOLOGIES DEVELOPED IN DIFFERENT AGRO-CLIMATIC ZONES

2015-16 to 2021-22

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ANGRAU

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FOREWORD

Acharya N. G. Ranga Agricultural University in its fifty plus years of endeavor proved its elegance in the field of human resource development, problem solving technological innovations and reaching the farmers' with scientific agriculture on day to day basis. One of the University mandates is to develop science based problem solving technologies for the farming community through its vast network of location specific agro climatic area wise established 33 research stations, 41 All India Coordinated Research Projects and three GOI schemes.

The research activities were carried out as per the location specific, demand driven and need based Research Agenda formulation to give the most suitable scientific technologies based resources, methods, practices, tools, machines, processes and other aspects to the farmers'. These technologies need some commercial efforts to use and apply them at the field level in the form of supply of critical inputs and associated products. Some newly generated technologies need to amalgamate in to a readily usable product or unit so that the clients can be used with efficiency.

Success of any technology depends on availability of information and the critical inputs required using that particular technology. In this scenario, this compilation will help the scientists, farmers', extension functionaries, entrepreneurs and students to get aware of the newly generated technologies by ANGRAU.

I compliment the efforts put in by the editorial and compilation team to bring out this edition titled "Technologies developed in different Agro-climatic Zones: 2015-16 to 2021-22" and this publication will be periodically updated with the generation of new technologies in ANGRAU. The technologies listed here are by no means exhaustive. There are many more technologies available in the University research system for which the prospective users may refer the probable links provided in the compilation to obtain more information.

(A. VISHNUVARDHAN REDDY)

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PREFACE

Acharya N. G. Ranga Agricultural University brings out large number of technologies every year for solving different problems and benefiting the farming community. Many a times the generated technologies find place in the University technical proceedings and scientific journals and this warrants bringing out a simple and comprehensive compilation of all these generated technologies from research at the University level in a periodical manner. To carryout the transfer of technology and promote the entrepreneurship, the need for compiling them in a single volume has been felt very long time. This publication is an effort to fulfill that need.

This publication titled "Technologies developed in different Agro-climatic Zones: 2015-16 to 2021-22" presents the salient technologies and achievements of the University beginning with the practices for higher productivity, followed by means and methods for control of plant diseases and pests. Subsequently, diagnostic protocols and processes, instrumentation, products, pilot plants and Tools and machines etc. during the period between 2015-16 and 2021-22 were emphasized. The intent of the publication is to present the salient details of the technologies in the common format and provide the needed links so that the user may obtain the required information on the technology of his choice/ requirement without any delay. This publication will be periodically updated from time to time for the benefit of the users.

I appreciate sincerely the support of all the Research Stations for responding to the needs of this publication and making valuable information available for the purpose. I thank the compilation group for their efforts in bringing this publication very timely. It is our hope that this publication will enhance the commercialization and adoption of novel, cost effective and efficient technologies.

L. Prasanthi

(L. Prasanthi)

ANGRAU

Preamble:

One among the Acharya N. G. Ranga Agricultural University mandates is to develop science based problem solving technologies for the farming community through its vibrant network of location specific agro climatic area wise established research stations and schemes. There are 33 research stations, 37 All India Coordinated Research Improvement Projects (AICRPs) and three GOI schemes functioning in the University across the state falling under six agro climatic zones in which the location specific problems were taken as research projects to give the most suitable scientific technologies based resources, methods, practices, tools, machines and other aspects to the farmers. ANGRAU remains vigilant and responsive to changing scenario through development of novel technologies and by promoting problem-solving knowledge products.

The comprehensive initiatives earlier taken by the University have led to notable accomplishments in development and release of 469 trait specific improved crop varieties, natural resource management, input use efficiency, climate resilience and economic transformation of farmers though technological interventions.

An effective agricultural invention-and innovation continuum would play a crucial role in addressing a number of supply-side obstructions and in harnessing numerous demand-side opportunities. The preconditions for making agriculture sector more remunerative and sustainable would be to evolve effective technologies and mechanisms for technology delivery so as to enhance capacity of all stakeholders in the invention-innovation continuum.

The University acknowledges importance of partnerships and synergies of different stakeholders in providing technological solutions for agriculture. ANGRAU is expanding its reach for generating and disseminating new knowledge to its wide range of stakeholders in the production and food value-chain. Developments in molecular biology, biotechnology, nanotechnology, information technology and geo-spatial technology are expected to provide significant new opportunities for productivity enhancement. University is strengthening its partnerships with the national and the international organizations, various government departments, farmers and farmers' organizations, non-governmental organizations and private sector involved in agriculture in cutting-edge science and technology development.

ANGRAU has made impressive progress in the recent past in different research areas of Agriculture and Agriculture Engineering and Technology. Publication of research recommendations of the university is a key reflection of the scientific endeavor. This publication contains location specific and need based technologies developed by ANGRAU scientists of different faculties. The crop-wise salient technologies and achievements of the University during 2015-16 to 2021-22 on the processes and practices for higher productivity, means and methods of controlling the diseases and pests, diagnostic protocols, kits, instrumentation, products, pilot plants, tools and machines are presented hereunder.

Rice

1. Name of the Technology : **Effective Insecticide Molecules Against Stem Borer in Rice**

Description of the Technology : Spraying of chlorantraniliprole 20 SC @ 0.3 ml L^{-1} of water is recommended against stem borer. It recorded 78% reduction in stem borer damage, with 19.71% increase in grain yield (6825 kg ha^{-1}), over control (5702 kg ha^{-1}) with BC ratio of 2.41

Year of conclusion : 2015

Developed by : Department of Entomology, RARS, Maruteru

Status of the Technology : Abstract was published. Refer Annexure II, S. No. 1

Included in package of practices of rice in Vyavasaya Panchangam of ANGRAU

Stemborer adult

Dead heart with chaffy grain

2. Name of the Technology : **Effective Insecticide Molecules against Planthoppers in Rice**

Description of the Technology : Spraying of dinotefuran 20 SC @ 0.40 g L^{-1} of water is recommended against planthoppers. It recorded 80% reduction in BPH population with an increase of grain yield by 31.47% (7496 kg ha^{-1}) over control (5702 kg ha^{-1}) with BC ratio of 5.74.

Year of conclusion : 2015

Developed by : Department of Entomology, RARS, Maruteru

Status of the Technology : Abstract was published. Refer Annexure II, S. No. 1

Included in package of practices of rice in Vyavasaya Panchangam of ANGRAU

3.	Name of the Technology	:	**Sustained Baiting of Bromadiolone through PVC Pipe Bait Stations for Rodent Control in Rice**
	Description of the Technology	:	 Baiting of 0.005% bromadiolone (96 parts broken rice + 2 parts bromadiolone powder + 2 parts edible oil) in 3- inch diameter, 1.5 ft length PVC pipe bait stations is effective for rodent control in rice. Placement of 10 PVC pipe bait stations on field bunds of one acre is recommended for rodent control in rice.
	Year of conclusion	:	2015
	Developed by	:	AINP on VPM, RARS, Maruteru
	Status of the Technology	:	Paper Published. Refer Annexure I, S. No. 1 for more information

4.	Name of the Technology	:	**Weed Management Practices for Direct Seeded Rice**
	Description of the Technology	:	Pre-emergence application of pendimethalin 30% EC @ 5 ml L^{-1} of water followed by hand weeding at 35 DAS is recommended for higher yields (4659 kg ha^{-1}) with BC ratio of 3.30
	Year of conclusion	:	2016
	Developed by	:	Dept. of Agronomy, ARS, Reddipalle, Anantapuramu
	Status of the Technology	:	Included in ZREAC recommendations

5.	Name of the Technology	:	**Integrated Nutrient Supply (INS) system in Rice-Rice Crop Sequence**
	Description of the Technology	:	Integrated application of 50% N through FYM (3.5 t ha^{-1}) or 50% N through Green Manure (*Sesabania* @ 2 t/ha) along with 50% RDF (45-30-30 kg NPK ha^{-1}) during *kharif* and 100% RDF (180-90-60 NPK ha^{-1}) during *rabi* is recommended in Rice-Rice Cropping system over farmers practice of 100% chemical fertilization in both the seasons. The system grain yield of 11060kg ha^{-1} for both *kharif*and *rabi* together resulted in yield advantage of 15.3% and B:C ratio of 3.37 with 50% N substitution through FYM and 11020 kg ha^{-1} grain yield and 14.97% yield advantage and BC ratio of 3.44 with 50% N substitution through *Sesbania* green manure over farmers practice (System grain yield of 9370 kg ha^{-1} and BC Ratio of 2.91)
	Year of conclusion	:	2017
	Developed by	:	AICRP on IFS Scheme, Dept. of Agronomy, RARS, Maruteru

Status of the Technology : Papers Published and OFT completed

For detailed information refer Annexure-I, S. No. 4,5,6

Field view of Integrated Nutrient Supply (INS) system in Rice-Rice Crop Sequence experiment

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6. Name of the Technology : **Organic Farming Practices for Rice-Rice Cropping System**

Description of the Technology : Application of FYM + Vermicompost + Neem cake on N equivalent basis to supply 90 kg N ha^{-1} (*kharif*) and 180 kg N ha^{-1} (*rabi*) in Rice-Rice cropping system is recommended under Organic rice cultivation.

The system grain yield of 8305 kg $ha^{-1}$with BC ratio of 2.75 and yield advantage of 4.87% was realized over farmers practice of chemical farming (7901 kg ha^{-1} grain yield and 2.36 B:C ratio). Soil organic carbon content was also improved upto 31.6% over initial soil values from 0.80 to 1.17

Year of conclusion : 2017

Developed by : AICRP on IFS Scheme, Dept. of Agronomy, RARS, Maruteru

Status of the Technology : Paper Published and OFT completed

For detailed information refer Annexure-I, S. No. 7,8,9

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7. Name of the Technology : **Reclamation of abandoned aqua ponds**

Description of the Technology : Reclamation package consisting of levelling of aqua ponds, preparation of field channels, application of gypsum-based on soil test value, leaching of soluble salts, incorporation of green manure, application of 50% extra dose of recommended N and increased plant population (150%) resulted in an increase in grain yield (6800 kg ha^{-1}) over non reclaimed paddy fields (3300 kg ha^{-1}).

Year of conclusion : 2017

	Developed by	:	SWS, Bapatla
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 10 for more information

8.	Name of the Technology	:	**Revised Fertilizer Dosage for Rice in North Coastal Zone**
	Description of the Technology	:	Application of 120-80-60 kg NPK along with 12.5 kg $ZnSO_4$ + 5 tonnes FYM ha^{-1} is recommended for kharif rice in North coastal zone for realising 15% higher yields (6650 kg ha^{-1}) with 1.40 BC ratio compared to existing fertilizer dose of 80-60-40 kg NPK + 10 tonnes FYM ha^{-1} (5780 kg ha^{-1}).
	Year of conclusion	:	2017
	Developed by	:	RARS, Anakapalle, Visakhapatnam
	Status of the Technology	:	OFTs were conducted.

9.	Name of the Technology	:	**Plant Sensor Based Real Time Nitrogen Management**
	Description of the Technology	:	Green Seeker directed N application recorded higher grain yield (5500 kg ha^{-1}) and an amount of 45 N kg ha^{-1} can be saved compared to the recommended dose of nitrogen (240 kg ha^{-1}) with a BC ratio of 2.76.
	Year of conclusion	:	2017
	Developed by	:	NARP- Soil Science, RARS, Nandyal
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 11 for more information

10.	Name of the Technology	:	**Rescheduling of Fertilisers and Fertilisation Strategies for Rice Crop**
	Description of the Technology	:	Soil test based fertilization (STBF) along with Vermicompost @ 2 t ha^{-1} resulted in highest grain yield (5714 kg ha^{-1}) over application of NPK using Soil test crop response (STCR) equation (4626 kg ha^{-1}) with a benefit cost ratio of 2.60.
	Year of conclusion	:	2017
	Developed by	:	NARP- Soil Science, RARS, Nandyal
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 12 for more information

11.	Name of the Technology	:	**Chemical Weed Management Practices in Aerobic Rice**
	Description of the Technology	:	Pre-emergence application of pendimethalin 30 EC @ 5 ml L^{-1} of water within two days after sowing followed by florpyrauxifen benzyl 2.5% EC @ 3 ml L^{-1} of water as post emergence application at 4-7 leaf stage of weeds (grasses, sedges, broad leaved weeds) is recommended for higher grain yield (5369 kg ha^{-1})with weed control efficiency of 92.3% in aerobic rice.
	Year of conclusion	:	2017
	Developed by	:	ARS, Ragolu, Srikakulam
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 13 for more information

12.	Name of the Technology	:	**Post Emergence Chemical Weed Management in Aerobic Rice**
	Description of the Technology	:	Post emergence application of Bispyribac sodium 10% SC @ 0.5 ml L^{-1} of water at 20 DAS followed by Ethoxysulfuron 15 WDG @ 20 g + Fenoxypop P ethyl 9.3 EC @ 1.25 ml L^{-1} of water at 40 DAS resulted in high weed control efficiency of 83% with increased grain yield (6567 kg ha^{-1}) and BC ratio (1.85) in Aerobic Rice.
	Year of conclusion	:	2017
	Developed by	:	ARS, Ragolu, Srikakulam
	Status of the Technology	:	OFT conducted. Paper published. Refer Annexure-I, S. No. 14 for more information

13.	Name of the Technology	:	**Effective Fungicide for Management of Sheath Blight in Rice**
	Description of the Technology	:	Spraying with azoxystrobin 11% + tebuconazole 18.3% SC @ 1.5 ml L^{-1} of water has recorded 93.10% reduction in sheath blight incidence, 87% reduction in sheath blight severity over control with an increase in grain yield by 36% (6891 kg ha^{-1}) over control (5040 kg ha^{-1}) with BC ratio of 1.81.
	Year of conclusion	:	2017
	Developed by	:	Department of Pathology, RARS, Maruteru
	Status of the Technology	:	Research article Published For detailed information refer Annexure-I, S. No. 15. Included in Vyavasaya Panchangam of ANGRAU.

14.	Name of the Technology	:	**Revised Fertilizer Recommendation for Rice in YSR District of Southern Zone of Andhra Pradesh**
	Description of the Technology	:	Application of 180 – 90 – 60 kg NPK ha^{-1} along with 12.5 kg $ZnSO_4$ ha^{-1} to rabi rice resulted in 18% improvement in grain yield of (7045 kg ha^{-1}) compared to RDF (120-60-40 kg NPK ha^{-1}) (5931kg ha^{-1}) with BC ratio of 3.2 in YSR district of southern zone of Andhra Pradesh
	Year of conclusion	:	2018
	Developed by	:	Department of Soil Science, ARS, Utukur
	Status of the Technology	:	Submitted for publication.

15.	Name of the Technology	:	**Botanicals against Stem Borer in Rice**
	Description of the Technology	:	Spraying of neemazal @ 5 ml L^{-1} of water effectively controlled stem borer with 24.89 % reduction in dead hearts. Highest grain yield of 4998 kg $ha^{-1}$was recorded with neemazal over untreated check (4328 kg ha^{-1}) with BC ratio of 1.70.
	Year of conclusion	:	2018
	Developed by	:	Department of Entomology, ARS, Nellore
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 16

16.	Name of the Technology	:	**New Fungicidal Combinations for Control of Sheath Blight in Rice**
	Description of the Technology	:	Spraying with combination fungicide i.e., Azoxystrobin 5.6% + tebuconazole 10% + prochloraz 20% EC @ 3.5 ml L^{-1} of water has recorded 88.1% reduction in sheath blight incidence, 82.5% reduction in sheath blight severity over control with an increase in grain yield by 63% (6131 kg ha^{-1}) over control (3768 kg ha^{-1}) with BC ratio of 1.35.
	Year of conclusion	:	2018
	Developed by	:	Department of Pathology, RARS, Maruteru
	Status of the Technology	:	Abstract Published. Refer Annexure-II, S. No. 3 for more information

Sheath blight symptoms

Rhizoctonia solani culture

17.	Name of the Technology	:	**Integrated Weed management in Organic Rice**
	Description of the Technology	:	Summer ploughing followed by green manuring @ 2 t ha^{-1} and puddling twice at three weeks interval followed by one Cono weeding at 15 DAT and need based hand weeding at 40 DAT recorded weed control efficiency of 77.7% with grain yield of 6540 kg ha^{-1} and BC ratio of 1.50.
	Year of conclusion	:	2019
	Developed by	:	ARS, Ragolu, Srikakulam
	Status of the Technology	:	Under OFT

Field view of Organic farming plot

18.	Name of the Technology	:	**New anticoagulant rodenticide 'flocoumafen' for rat control in rice**
	Description of the Technology	:	Application of 'flocoumafen 0.005% RB' @ one pellet (8g) $burrow^{-1}$ is effective in reducing the live burrow counts (LBC) ha^{-1} by 71.3% and tiller damage by 62.8% in rice over bromadiolone 0.005% loose bait @10g $burrow^{-1}$, which recorded reduction of LBC ha^{-1} by 57.2% and tiller damage by 51.1 % only.
	Year of conclusion	:	2019
	Developed by	:	AINP on VPM, RARS, Maruteru
	Status of the Technology	:	Paper Published. Refer Annexure-I, S. No. 17

19.	Name of the Technology	:	**Nitrogen Management for Rice in Southern Zone**
	Description of the Technology	:	Application of 200 kg N ha^{-1} was recommended for *kharif* rice to realize higher yields (6655 kg ha^{-1}) with B C ratio (4.21) in YSR district of Andhra Pradesh.
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, ARS, Utukur, Kadapa
	Status of the Technology	:	OFT 2nd year & Paper Published. Refer Annexure-I, S. No. 18 for more information

20.	Name of the Technology	:	**Bio-intensive Pest Management (BIPM) in Rice**
	Description of the Technology	:	Seed treatment with *Pseudomonas flourescens* @ 10 g L^{-1} of water kg^{-1} seed followed by field release of egg parasitoid, *Trichogrammachilonis*@ 50,000ha^{-1}/release, 3 times for leaf folder and *Trichogrammajapanicum*@50,000 ha^{-1}/ release, 3 times for stem borer from 25 DAT in rice along with spraying of *Pseudomonas flourescens* @ 5 g L^{-1} of water twice from 30 and 40 DAT against foliar diseases (blast and sheath blight), compared to farmers practice (Application of carbofuran 3G granules @ 25 kg ha^{-1} at 30 DAT followed by two sprayings with chlorpyriphos 20 EC @ 2.5 ml L^{-1} of water and acephate 75 SP @ 1.5 g L^{-1} and two sprays with propiconazole 25 EC @ 1.0 ml L^{-1} of water). BIPM in rice resulted in reduction in leaf folder damage by 77.04 %; stem borer damage by 84.13 % and sheath blight incidence by 42.16 % which resulted in 12.81 % yield increase (5740 kg ha^{-1}), compared to farmers practice (5090 kg ha^{-1}) with BC ratio of 2.36.in BIPM.
	Year of conclusion	:	2020
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	OFT & Large-scale Demonstrations conducted. Recommendation included in POP. Paper published. Refer Annexure-I, S. No. 20

21.	Name of the Technology	:	**Effective Entomopathogenic Fungus, *Beauveria Bassiana*on Silica Enriched Rice Crop against Leaf Folder.**
	Description of the Technology	:	Two sequential applications of potassium silicate @ 80 mg L^{-1} of water (two weeks after transplantation and at active tillering stage) followed by the application of *Beauveria bassiana* @ 1 ml L^{-1} of water when leaf folder incidence crossed 1 or 2 damaged leaves/hill reduced leaf folder incidence by 42.80 per cent over control.
	Year of conclusion	:	2020
	Developed by	:	Department of Entomology, ARS, Nellore
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 21 for more information

22.	Name of the Technology	:	**Integrated Management of Stem Rot in Rice**
	Description of the Technology	:	Soil application of enriched *Trichoderma asperellum* (5 kg ha^{-1}) with FYM (225 kg ha^{-1}) and Neem cake (25 kg ha^{-1}), FYM @ 10 tonnes ha^{-1}, growing and incorporation of Dhaincha (25 kg ha^{-1}) with two sprays of propiconazole 25 EC @ 1.0 ml L^{-1} of water at booting to panicle emergence was found effective against stem rot of rice with 83.51% reduction in stem rot incidence over control with 51.9% increase in grain yield (8359 kg ha^{-1}) over control (4022 kg ha^{-1}) with BC ratio of 1.93.
	Year of conclusion	:	2020
	Developed by	:	Department of Plant Pathology, ARS, Nellore
	Status of the Technology	:	Publication under progress

Stem rot pathogen culture

Stem rot effected tiller

23.	Name of the Technology	:	**Management of Plant Hoppers in Rice with New Insecticide**
	Description of the Technology	:	Spraying with triflumezopyrim 10 SC @ 0.48 ml L^{-1} of water is recommended against planthoppers with 93.20% reduction in BPH population over untreated control and an increase in grain yield by 35.74% (4747 kg ha^{-1}) over untreated control (3497 kg ha^{-1}) with BC ratio of 2.34.
	Year of conclusion	:	2020
	Developed by	:	Department of Entomology, RARS, Maruteru
	Status of the Technology	:	Included in package of practices of rice in VyavasayaPanchangam of ANGRAU. Paper published. Refer Annexure-I, S. No. 22

24.	Name of the Technology	:	**Effectiveness of New Pesticide Combinations for Control of Brown Planthopper and Sheath Blight in Rice**
	Description of the Technology	:	Spraying with pymetrozine 50 WG @ 0.6 g L^{-1} and azoxystrobin 25 SC @ 1.0 ml L^{-1} of water is effective against BPH and sheath blight and resulted in 92.40% and 54.85% reduction in BPH population and sheath blight severity, respectively with an increase of grain yield by 71.0% (5980 kg ha^{-1}) over untreated control (3497 kg ha^{-1}) with BC ratio of 3.55. **or** Spraying with triflumezopyrim 10 SC @ 0.48 ml L^{-1} and azoxystrobin 25 SC @ 1.0 ml L^{-1} of water is effective against BPH and sheath blight and resulted in 92.58% and 53.10% reduction in BPH population and sheath blight severity, respectively, with an increase of grain yield by 64.23% (5743 kg ha^{-1}) over untreated control (3497 kg ha^{-1}) with BC ratio of 2.46. **or** Spraying of pymetrozine 50 WG @ 0.6 g L^{-1} and azoxystrobin11% + tebuconazole 18.3% SC @ 1.5 ml/l of water is recommended against BPH and sheath blight and resulted in 94.11% and 53.10% reduction in BPH population and sheath blight severity, respectively with an increase of grain yield by 64.74% (5762 kg ha^{-1}) over untreated control (3497 kg ha^{-1}) with BC ratio of 3.97. **or** Spraying of triflumezopyrim 10 SC @ 0.48 ml L^{-1} and azoxystrobin 11% + tebuconazole 18.3% SC @ 1.5 ml L^{-1} of water is effective against BPH and sheath blight and reduced BPH population by 95.12% and sheath blight severity by 57.94%, respectively, with an increase of grain yield by 73.03% (6051 kg ha^{-1}) over untreated control (3497 kg ha^{-1}) with BC ratio of 3.26.
	Year of conclusion	:	2020
	Developed by	:	Department of Entomology, RARS, Maruteru
	Status of the Technology	:	OFT in three locations was conducted by DAATTC, Peddapuram during *kharif,* 2019, 2020 & 2021. Paper published. Refer Annexure-I, S. No. 22

25.	Name of the Technology	:	**Botanicals for Control of Lesser Bandicoots in Rice**
	Description of the Technology	:	Botanical baits containing 20 g of seed powder of Nerium/ Datura/ Jatropa mixed with 80 g of wheat flour results in 60-80% mortality in rats within 9 to 14 days. Field bunds sprayed with castor based ecodon^{R} @ 20 ml L^{-1} of water also results in 55% reduction in rodent incidence in rice.
	Year of conclusion	:	2020
	Developed by	:	AINP on VPM, RARS, Maruteru
	Status of the Technology	:	Paper Published. Refer Annexure-I, S. No. 23 for more information

26.	Name of the Technology	:	**Use of Bio and Chemical Fertilizers in Rice**
	Description of the Technology	:	Application of 75% RDF (90-45-30 NPK kg ha^{-1}) along with use of bio-fertilizers *viz*., Azospirillum, PSB and KRB @ 5 kg ha^{-1} gave highest grain yield of 5174 kg ha^{-1} over RDF of 90-45-30 NPK kg ha^{-1} (4946 kg ha^{-1}) with a BC ratio of 1.6.
	Year of conclusion	:	2021
	Developed by	:	Department of Soil Science, ARS, Utukur
	Status of the Technology	:	OFT 2nd year

27.	Name of the Technology	:	**Organic Farming Package for *Kharif* Rice**
	Description of the Technology	:	Green manuring (10 t ha^{-1}), FYM (10.0 t ha^{-1}) as basal followed by Neem cake @ 500 kg or vermicompost @ 1250 kg ha^{-1} at tillering and PI stage is recommended. Weed control with *Azolla* live mulching followed by hand weeding at 25 and 50 days after transplanting is suggested. Pest and disease management through clipping of leaf tips, clean cultivation and destruction of stubbles, erection of pheromone traps @ 10 ha^{-1} and bird perches @ 15-20 ha^{-1} followed by spraying of 5% neem seed kernel extract or neem oil or neem formulations (1500 ppm) @ 5 ml L^{-1} of water at 20 and 30 days after transplanting along with alleyways formation, alternate wetting and drying in addition to seed treatment / seedling dip before sowing/ transplanting for 20 minutes with *Pseudomonas fluorescens* @ 10 g kg^{-1} seed / 20 g L^{-1} of water for blast disease is recommended. Yield reduction of 16.4 to 40% in organic farming was recorded over chemical farming after 12-14 years of experimentation. The Organic carbon status was highest in organic plot (0.60%) compared to the inorganic plot (0.36%).
	Year of conclusion	:	2021
	Developed by	:	ARS, Ragolu; RARS, Nandyal; ARS, Nellore

	Status of the Technology	:	Under OFT. Paper published. Refer Annexure-I, S. No. 24, 25 for more information

Weed management practises under organic farming

28.	Name of the Technology	:	**Use of Potassium Humate Fertilizers in Vertisols for Rice Cultivation**
	Description of the Technology	:	Application of 100% RDF (240-80-80 kg NPK ha^{-1}) along with Humic acid as soil application @ 30 kg ha^{-1} resulted in highest grain yield (6074 kg ha^{-1}) over no fertilizer application (2453 kg ha^{-1} grain yield).
	Year of conclusion	:	2021
	Developed by	:	NARP- Soil Science, RARS, Nandyal
	Status of the Technology	:	Accepted for publication in Environment, Ecology and conservation Journal (Scopus indexed journal)

29.	Name of the Technology	:	**Use of Trap Barrier System (TBS) for Controlling Rats in Rice**
	Description of the Technology	:	Erecting plastic fence of 40 GSM up to 2.0 ft height around the rice crop duly keeping 10-12 multiple catch traps $acre^{-1}$ near and behind the holes made in the fence resulted in 100% protection against rodents in nurseries and 90% protection in main field. It costs about Rs. 3500/- per acre.
	Year of conclusion	:	2021
	Developed by	:	AINP on VPM, RARS, Maruteru
	Status of the Technology	:	Completed 3 years of OFT.FLDs are under progress Paper Published. Refer Annexure-I, S. No. 26

30.	Name of the Technology	:	**Integrated Rodent Management in Rice**
	Description of the Technology	:	Trapping of rodents using butta traps @ 20 acre^{-1} followed with bromadiolone 0.005% poison baiting (96 parts of rice brokens + 2parts bromadiolone powder + 2 parts edible oil) and burrow smoking resulted in 65.2% reduction of rat live burrows ha^{-1} and 66.5% reduction in tiller damage. This integration of rodent management practices resulted in BC ratio of 4.6.
	Year of conclusion	:	2021
	Developed by	:	AINP on VPM, RARS, Maruteru
	Status of the Technology	:	Paper Published. Refer Annexure-I, S. No. 27 for more information

31.	Name of the Technology	:	**Organic Weed Management Practices in Rice Based Cropping System (Rice-Sweet Corn)**
	Description of the Technology	:	Mulching with locally available weed mulch @ 2 t ha^{-1} followed by one hand weeding at 20-25 days after planting is the best organic weed management practice (25.70 t ha^{-1} system yield) with yield advantage of 11.87% and BC ratio 5.13 in rice-sweet corn cropping system over manual hand weeding twice at 20 and 40 days after planting (22.65 t ha^{-1} and 4.36).
	Year of conclusion	:	2022
	Developed by	:	AICRP on IFS Scheme, Dept. of Agronomy, RARS, Maruteru
	Status of the Technology	:	Paper Published and proposed for OFT during 2022-23 For detailed information refer Annexure-I, S. No. 28,29,30, 31, 32 for more information

Organic Weed Management Practices in Rice Based Cropping System (Rice-Sweet Corn)

Maize

1.	Name of the Technology	:	**Weed Management in Rice Fallow Maize**
	Description of the Technology	:	Application of atrazine 50%WP @ 2 g L^{-1} + paraquat 24% EC @ 1.2 ml L^{-1} immediately after sowing followed by topramezone 33.6 SC @ 0.05g L^{-1} recorded 72.2% increased grain yield (10400 kg ha^{-1}) over unweeded check (6038 kg ha^{-1}) with a benefit cost ratio of 2.13.
	Year of conclusion	:	2015
	Developed by	:	RARS, Lam
	Status of the Technology	:	Included in Vyavasaya Panchangam

2.	Name of the Technology	:	**Improving the Productivity of Maize with Different Green Manures in North Coastal Zone**
	Description of the Technology	:	*In situ* incorporation of daincha green manure along with 75% RDF (150-45-38 kg ha^{-1} of N, P_2O_5, K_2O) increased the yields (6160 kg ha^{-1}) by 10.39 % with BC ratio of 3.24 when compared to sole crop of maize (5580 kg ha^{-1}) with 100% RDF (200-60-50 kg ha^{-1} of N, P_2O_5, K_2O) which recorded BC ratio of 2.88.
	Year of conclusion	:	2017
	Developed by	:	ARS, Vizianagaram
	Status of the Technology	:	Paper Published. Refer Annexure-I, S. No. 33.

3.	Name of the Technology	:	**Post Emergence Weed Management in Maize**
	Description of the Technology	:	Tank mix formulation of tembotrione 42%SC @ 0.3 ml L^{-1} + atrazine 50%WP @ 2 g L^{-1} at 15 days after seeding has recorded highest weed control efficiency (95.3%) and grain yield (9130 kg ha^{-1}) which was on par with hand weeding twice at 20 and 40 DAS (92.8% weed control efficiency and 9250 kg ha^{-1} grain yield). Further it resulted in 8.57% increase in BC ratio as compared to hand weeding twice at 20 and 40 DAS (2.80) at ARS, Vizianagaram. Application of tembotrione 42%SC @ 0.5 ml L^{-1} + atrazine 50%WP @ 3 g L^{-1} at 15 DAS or atrazine 50%WP @ 4 g L^{-1} (PE) followed by tembotrione 42%SC @ 0.5 ml L^{-1} at 25 DAS was found better with respect to weed control efficiency (84% & 81%, respectively), grain yield (6718 kg ha^{-1} & 6677 kg ha^{-1}, respectively) and net returns (Rs. 68456 & Rs.67031 ha^{-1}, respectively) than control (4702 kg ha^{-1} and Rs. 36917 ha^{-1}, respectively) in maize at ARS, Peddapuram.
	Year of conclusion	:	2017
	Developed by	:	ARS, Vizianagaram and ARS, Peddapuram

	Status of the Technology	:	Completed two years of OFT testing. Paper Published. Refer Annexure-I, S. No. 34.

4.	Name of the Technology	:	**Crop Geometry & Nutrient Management in Sweet Corn**
	Description of the Technology	:	 The crop geometry of 60 cm x 20 cm along with application of 250 – 90 – 60 N, P_2O_5 & K_2O kg ha^{-1} through fertigation (N & K in five splits at 10, 20, 30, 40 & 50 DAS) gave higher green cob yield (19500 kg ha^{-1}), green fodder yield (33500 kg ha^{-1}) and net returns (Rs.2,12,138 ha^{-1}) with BC ratio of 3.04 in sweet corn. Control with 45 cm x20 cm with 150-70-50 N, P_2O_5 & K_2O kg ha^{-1} recorded 149000 kg ha^{-1} green cob yield and Rs.139924 ha^{-1} net returns and BC ratio of 2.3.
	Year of conclusion	:	2018
	Developed by	:	Department of Agronomy, RARS, Tirupati
	Status of the Technology	:	Full length abstract presented. Refer Annexure-II, S. No. 4.

5.	Name of the Technology	:	**Studies on Depth, Interval of Irrigation and Fertigation on Growth and Yield of Maize**
	Description of the Technology	:	Irrigating maize crop with 10 mm depth of irrigation @ 3 days interval and providing either 100% recommended dose (180 – 60 – 50 kg/ha) of water soluble fertilizers or 75% recommended dose of water soluble fertilizers (135 – 45 – 37.5 kg ha^{-1}) was effective to get higher grain yield of 5044 kg $ha^{-1}$and 4966 kg ha^{-1} respectively with net returns of Rs 51,247 ha^{-1} and Rs 51,456 ha^{-1} as well as higher water use efficiency of 16.1 kg / ha mm and 15.9 kg / ha mm . The BC ratio was highest (2.2) with maize irrigated with 10 mm depth of irrigation @ 3 days interval and providing 75% of recommended dose of fertilizers through fertigation.
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, ARS, Reddipalle
	Status of the Technology	:	Research highlights were brought out in the form of a booklet & distributed to farmers

6.	Name of the Technology	:	**Nitrogen Requirement for Sweet Corn**
	Description of the Technology	:	In rabi, application of 125% RDN (250 kg N ha^{-1}) was found better for getting higher sweet corn yield (13957 kg ha^{-1}) than the recommended dose of N of 200 kg N ha^{-1} (12827 kg ha^{-1}). Similarly, highest net returns and BC ratio of Rs. 64052 ha^{-1} and 2.02, respectively were recorded with application of 125% RDN than 100 % RDN (Rs. 54512 ha^{-1} and 1.88 net returns and BC ratio respectively).
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, ARS, Peddapuram
	Status of the Technology	:	Proposed for OFT during 2022

7.	Name of the Technology	:	**Management of Turcicum Leaf Blight with Chemical Fungicides in Maize**
	Description of the Technology	:	Spraying of azoxystrobin 18.2% w/w + difenoconazole 11.4% w/w SC @ 1ml L^{-1} against turcicum leaf blight recorded lowest PDI of 16.6 with maximum percent disease control of 78.61% and highest grain yield of 7820 kg ha^{-1} with BC ratio of 2.06 when compared to untreated check (PDI 77.6, 2660 kg ha^{-1} and BC ratio of 0.74).
			 Turcicum leaf blight
	Year of conclusion	:	2020
	Developed by	:	Department of Pathology, ARS, Peddapuram
	Status of the Technology	:	Proposed for OFT during 2022

8.	Name of the Technology	:	**Sowing Window for *Kharif* Maize**
	Description of the Technology	:	June II Fortnight is optimum sowing window for *kharif* maize which recorded highest yield of 2895 kg ha^{-1} compared to July I FN (2543 kg ha^{-1}), II FN (2098 kg ha^{-1}) and august I FN (1499 kg ha^{-1}) sowings.
	Year of conclusion	:	2020
	Developed by	:	Department of Agrometeorology, RARS, Tirupati
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 36, 37, 38 & 39.

9.	Name of the Technology	:	**Management of Fall Army Worm, *Spodoptera Frugiperda* in Maize using Biocontrol Agents and Biopesticides**
	Description of the Technology	:	Release of biocontrol agent, *Trichogramma pretiosum* @ 50,000 ha^{-1} or *Trichogramma chilonis* @ 1,00,000 ha^{-1} from 7

days after seedling emergence, 2 times at weekly interval and spraying biopesticides, *Bacillus thuringiensis* (NBAIR Bt 25) @ 2 ml L^{-1} or *Metarhizium anisopliae* (NBAIR Ma 35) @ 5 g L^{-1} from 20 days after seedling emergence 3 times at 10 day interval for the management fall army worm , *Spodoptera frugiperda* in maize is recommended. Benefit cost ratio was high in *Trichogramma* releases with *Metarhizium anisopliae* (18.98) followed by insecticidal check (16.54) and Trichogramma releases with *Bacillus thuringiensis* (13.04)

Year of conclusion : 2020

Developed by : RARS, Anakapalle

Status of the Technology : OFT & Large scale Demonstrations conducted. Recommendation included in POP.



10. Name of the Technology : **IPM Module for Fall Armyworm, *Spodoptera Frugiperda***

Description of the Technology :

- Seed treatment with cyantraniliprole 19.8% + thiamethoxam 19.8% @ 6 ml kg^{-1} seed.
- Spraying of azadirachtin 1500 ppm @ 5 ml L^{-1} or NSKE 50 ml L^{-1} at 25 DAS to suppress egg masses and first instar larvae.
- Direct the spray into whorls.
- Poison bait: Mix 10 kg rice bran + 2 kg jaggery in 2 liters of water and fermented for 24 hours. Next day add thiodicarb 75 SP @ 100 g and make into pellets and drop in the whorls @ 50 kg ha^{-1} at 35 DAS.
- Apply chlorantraniliprole 18.5 SC @ 0.4 ml L^{-1} or spinetoram 11.7 SC @ 0.5 ml L^{-1} at 50 DAS.

The IPM module recorded highest yield of 7833 kg ha^{-1} over control (5836 kg ha^{-1})with a BC ratio of 3.0

Year of conclusion : 2020

Developed by : RARS, Lam, Nandyal, Tirupati; ARS, Vijayarai & Utukur

Status of the Technology : Included in the Vyavasaya Panchangam

Paper published. Refer Annexure-I, S. No. 35

11.	Name of the Technology	:	**Potassium Mobilization from Waste Mica through KSB**
	Description of the Technology	:	Supply of potassium through waste mica in maize @ 10 t ha^{-1} along with *Bacillus mucilaginosus (or) Fraturia aurantia* @ 5 kg ha^{-1} with recommended dose of nitrogen and phosphorus (RDN: RDP: 200-60 kg ha^{-1}) resulted in 4795 kg ha^{-1} grain yield which is 1.3 times higher over RDF and with a BC Ratio of 1.8 as compared to 3699 kg ha^{-1} grain yield with BC Ratio of 1.2 in RDF (RDN: RDP: RDK 200-60-50 kg ha^{-1}) alone during *kharif* season.
	Year of conclusion	:	2020
	Developed by	:	Department of Soil Science, ARS, Utukur
	Status of the Technology	:	Publication in review

12.	Name of the Technology	:	**STCR Equation for Maize**
	Description of the Technology	:	FN = 4.25 T - 0.24 SN - 0.25 M FP_2O_5 = 0.90 T - 0.30 SP - 0.22 FK_2O = 141T - 0.05 SK - 0.18 M **Where,** **FN, FP_2O_5, and FK_2O** are nutrients to be applied **through fertilizers** "T" refers to yield target (Eg., 50, 60 and 70 q ha^{-1}) SN, SP and SK refers to Soil Available nutrients "M" refers to nutrients supplied through organic manures like FYM and vermicompost. This method of fertilizer recommendation is comprehensive approach which includes soil test values, nutrient requirement of crops, contributions of nutrients from soil, manures, fertilizers and fixing yield targets. Helps in precise quantitative adjustment of fertilizer doses under varying soil test values and targeted levels
	Year of conclusion	:	
	Developed by	:	Soil Science department, ARS, Utukur.
	Status of the Technology	:	Publication in progress

13.	Name of the Technology	:	**Management of Fall Army Worm, *S. Frugiperda* in Maize with Seed Treatment, Biocontrol Agents and Biopesticides**
	Description of the Technology	:	Seed treatment with cyantraniliprole 19.8% + thiamethoxam 19.8% (fortenza duo) @ 6 ml kg^{-1} seed, followed by release of egg parasitoids, *Trichogramma chilonis* @ 1,00,000 ha^{-1} at 20 DAS, spraying of biocontrol agents *Bacillus thuringiensis* @ 2gL^{-1} (24.93%) and *Metarhizium anisopliae* (26.66%) @ 5g L^{-1} at 30 and 40 days respectively reduces the damage caused by *Spodoptera frugiperda* as compared with untreated control (51.61%). Highest yield and BC ratio is with *Bacillus thuringiensis* (6593 kg ha^{-1}, 1.12) followed by *Metarhizium* (6467 kg ha^{-1}, 1.10) compared to untreated control which gave a yield of 4054 kg ha^{-1} with BC ratio of 0.69 at RARS, Tirupati. Seed treatment with cyantraniliprole 19.8%w/w + thiamethoxam 19.8%w/w @ 6.0 $mlkg^{-1}$ seed + release of egg parasitoids *T. pretiosum* @ 1,25,000 ha^{-1} or *T. chilonis*@ 2,50,000 ha^{-1} at 20 days after sowing + spraying of *Nomuraea rileyi* @ 5.0 g L^{-1} at 30, 40 and 50 days after sowing resulted in highest yield 8798 kg ha^{-1} over control (6567 kg ha^{-1}) with a BC ratio of 1.81 compared to control (1.40) at ARS, Vijayarai   
	Year of conclusion	:	2021
	Developed by	:	RARS, Tirupati and ARS, Vijayarai
	Status of the Technology	:	OFT 1st year

14.	Name of the Technology	:	**Evaluation of Biorationals against Fall Army Worm, *Spodoptera frugiperda* in Maize.**
	Description of the Technology	:	Among the biorational insecticides, *Nomuraea rileyi* @ 5.0 g L^{-1} was highly effective against fall army worm in maize with 49.83% reduction over control with highest yield of 7714 kg ha^{-1} over control (5370 kg ha^{-1}) with a BC ratio of 1.77 compared to control (1.22).

No foliar damage in *Nomuraea rileyi*

FAW damage in control

Year of conclusion : 2021

Developed by : ARS, Vijayarai

Status of the Technology : Included in ZREAC recommendations

15. Name of the Technology : **Evaluation of Insecticides against Fall Army Worm, *Spodoptera Frugiperda* in Maize.**

Description of the Technology : Chlorantraniliprole 18.5% SC @ 0.4 ml L^{-1} it was effective in reducing the Fall army worm infestation in maize to an extent of 79.02 % with an yield of 9006 kg ha^{-1}over control (6332 kg ha^{-1}) with a BC ratio of 2.42 compared to control (1.8).

In another trial, novaluron 10 EC @ 1.5 ml and spinetoram 11.7 SC @ 0.5 ml $litre^{-1}$ were highly effective against fall army worm in maize with 84.17 and 81.14 per cent reduction over control with highest yield of 8585 and 8339 kg ha^{-1} over control (5447 kg ha^{-1}) with a BC ratio of 1.97 and 1.77, respectively compared to control (1.27).

Year of conclusion : 2021

Developed by : ARS, Vijayarai

Status of the Technology : Included in ZREAC recommendations and one publication in progress

16.	Name of the Technology	:	**Evaluation of Insecticides as Whorl Application against Fall Army Worm in Maize.**
	Description of the Technology	:	Among whorl application of insecticides, poisonous bait with thiodicarb was highly effective against fall army worm in maize with 72.50 percent reduction over control with highest yield of 6948 kg ha^{-1} over control (4729 kg ha^{-1}) with a BC ratio of 1.50 & 1.16 respectively. Poisonous bait: Rice bran 10 kg+ Jaggery 2 kg + 2 l of water + 300 g thiodicarb 75 SP

No foliar damage in Thiodicarb poisonous bait treated plots

Severe foliar damage in control plot

	Year of conclusion	:	2020-21
	Developed by	:	ARS,Vijayarai
	Status of the Technology	:	Publication is under progress

Sorghum

1.	Name of the Technology	:	**Fertilizer Management in Sorghum**
	Description of the Technology	:	Significantly higher yield attributes and grain yield were recorded with 60-50-30 NPK kg ha^{-1} + Enriched Vermicompost 3 [50 kg vermicompost ha^{-1} + 11.25 kg $ZnSO_4$ ha^{-1}] + 50 kg vermicompost ha^{-1} + 11.25 kg $FeSO_4$ ha^{-1} 3714 kg ha^{-1} with BC ratio 4.00 which is on par with 60-50-30 NPK kg ha^{-1} + Enriched FYM 4 [50 kg FYM ha^{-1} + 15.0 kg $ZnSO_4$ ha^{-1}] + 50 kg FYM ha^{-1} + 15.0 kg $FeSO_4$ ha^{-1} 3695 kg ha^{-1}
	Year of conclusion	:	2019
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 40

2.	Name of the Technology	:	**Use of Biofertilizers in Sorghum**
	Description of the Technology	:	Higher grain yield (3774 kg ha^{-1}) obtained with 60-50-30 NPK kg ha^{-1} + FYM @ 3-5 t ha^{-1} + seed treatment with Azospirllum @ 2 ml + PSB @ 4 ml kg^{-1} seed as compared to 60-50-30 NPK kg ha^{-1} + FYM @ 3-5 t ha^{-1} (RDF) (3171 kg ha^{-1})

	Year of conclusion	:	2019
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 41

3.	Name of the Technology	:	**Weed Management in Sorghum**
	Description of the Technology	:	Pre-emergence application of atrazine 50% WP @0.60 kg ha^{-1} followed by 2,4 -D sodium salt 80 % WP @ 0.8 kg ha^{-1} obtained higher grain yield (4403 kg ha^{-1}) which was on par with hand weeding at 20 & 30 DAS (4823 kg ha^{-1}). The practice increased grain yield by 24.71 per cent over unweeded check (3315 kg ha^{-1}).
	Year of conclusion	:	2020
	Developed by	:	RARS, Lam
	Status of the Technology	:	Included in Vyavasaya Panchangam

4.	Name of the Technology	:	**Weed Management in Sorghum**
	Description of the Technology	:	Preemergence application of atrazine @ 2.0 kg ha^{-1} fb POE application of metribuzin @ 0.6 g L^{-1} at 35 DAS recorded higher grain yield (4386 kg ha^{-1}) and lowest was observed with PE application of atrazine @ 2.0 kg ha^{-1} fb POE application of metsulfuron + chlorimuron @ 0.08 g L^{-1} at 35 DAS (2907 kg ha^{-1}).
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	Publication under progress

5.	Name of the Technology	:	**Sorghum Based Intercropping System**
	Description of the Technology	:	Among different sorghum based intercropping systems, sorghum + black gram in 2:2 ratio recorded higher net returns of Rs. 82,637 ha^{-1} and BC ratio of 2.2 where as sole sorghum crop recorded 2403 kg ha^{-1} yield.
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, ARS, Podalakur
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 66

6.	Name of the Technology	:	**Efficacy of Insecticides against Sorghum Spotted Stem Borer, *Chilo Partellus* (Swinhoe)**
	Description of the Technology	:	Application of chlorantraniliprole 18.5 SC @ 0.3 ml L^{-1} or spinosad 45 SC @ 0.35ml L^{-1} or chlorantraniliprole 0.4 G @ 10kg ha^{-1} or carbofuran 3G @10 kg ha^{-1} at 25 and 40 days after sowing is effective against *C. partellus* with higher yields and benefit cost ratio.
	Year of conclusion	:	2020
	Developed by	:	Department of Entomology, RARS, Nandyal
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 43

7.	Name of the Technology	:	**Fertilizer Management in Sorghum**
	Description of the Technology	:	The highest grain yield were recorded with application of 100 % NPK (80-60-40 NPK kg ha^{-1}) (4752 kg ha^{-1}) followed by application of 100 % NK (4362 kg ha^{-1}), 100 % NP (4223 kg ha^{-1}) whereas, lower yields was noticed with omission of all major nutrients to the crop ie., control (2286kgha^{-1}).
	Year of conclusion	:	2021
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	Publication under progress

8.	Name of the Technology	:	**Effect of Tillage and Mulch Practices on Sorghum Grain Yields**
	Description of the Technology	:	Maximum gross (Rs 118659/-) and net returns (Rs78579/-) were observed with zero tillage with residue mulch practice in grain sorghum with a grain yield of 3868 kg ha^{-1}. Lowest gross (Rs 97411/-) and net returns (Rs 37623/-) were observed with Conventional tillage with no residue mulch with a grain yield of 3117 kg ha^{-1}.
	Year of conclusion	:	2021
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	Publication under progress

Pearl millet (Bajra)

1.	Name of the Technology	:	**Weed Management in Pearl Millet**
	Description of the Technology	:	Pre-emergence application of atrazine 50% WP @ 0.5 kg ha^{-1} followed by chlorimuron ethyl + metsulfuron methyl 20 % WP @ 4 g ha^{-1} at 20-25 DAS resulted in higher grain yield (4298 kg ha^{-1}) and increased the grain yield by 35.0% over unweeded check (2793 kg ha^{-1}).
	Year of conclusion	:	2017
	Developed by	:	RARS, Lam
	Status of the Technology	:	Included in Vyavasaya Panchangam

2.	Name of the Technology	:	**Zinc Ferti-Fortification in Pearl Millet**
	Description of the Technology	:	Zinc fertilization through soil ($ZnSO_4$ @ 50 kg ha^{-1}) and foliar application ($ZnSO_4$ @ 2 g L^{-1} at 45 DAS) along with RDF (60:30:20 NPK kg ha^{-1}) resulted in grain yield of 3889 kg ha^{-1} and 3224 kg ha^{-1} respectively. The treatment receiving zinc gives 1.2 times higher grain yield with a BC ratio of 1.5 as compared to 1.1 in the control.
	Year of conclusion	:	2019
	Developed by	:	Department of Soil Science, ARS, Utukur
	Status of the Technology	:	Oral presentation was made & Full paper was communicated and in review.

3.	Name of the Technology	:	**Identification of New Strains of Pathogens**
	Description of the Technology	:	Identified and characterized new phytoplasma, *Candidatus Phytoplasma aurantifolia* related strain (16SrII-D) infecting Pearl millet for first time in South India.
	Year of conclusion	:	2022
	Developed by	:	Department of Plant Pathology, ARS, Perumallapalle
	Status of the Technology	:	Publication accepted.

Finger millet (Ragi)

1.	Name of the Technology	:	**Blast Disease Management in Finger Millet**
	Description of the Technology	:	Foliar spray of tebuconazole (25.9%EC) @ 1 ml L^{-1} at tillering and flowering stages reduces the incidence of leaf blast severity by 65.54%, neck blast incidence by 78.7% and finger blast incidence by 78.8% over control and gave additional yield of 1433 kg ha^{-1} with highest BC ratio of 1.80.

	Year of conclusion	:	2015
	Developed by	:	Department of Plant Pathology, ARS, Perumallapalle
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 44

2.	Name of the Technology	:	**Weed Management in Finger Millet**
	Description of the Technology	:	Pre-emergence application of oxyflurofen 23.5 EC @ 1.5 ml L^{-1} + one hand weeding at 20 days after transplanting effectively controls weeds and increases grain yield of 3360 kg ha^{-1} with benefit cost ratio of 1.59 which is 43 % higher over control (2350 kg ha^{-1}, 1.39).
	Year of conclusion	:	2016
	Developed by	:	Department of Agronomy, ARS, Perumallapalle
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 45

3.	Name of the Technology	:	**Nutrient Management in Finger Millet**
	Description of the Technology	:	Application of zinc sulphate @ 50 kg ha^{-1} along with 100% RDF (60-30-20 kg N -P_2O_5 - K_2O ha^{-1}) gave 36% higher grain yield (3605 kg ha^{-1}) with BC ratio of 1.82 over 100% RDF (2648 kg ha^{-1} of grain yield and 1.43 of BC ratio).
	Year of conclusion	:	2016
	Developed by	:	Department of Soil Science, ARS, Perumallapalle
	Status of the Technology	:	OFTs completed and proposed for ZREAC recommendations.

4.	Name of the Technology	:	**Pre and Post Emergence Herbicides in Finger Millet**
	Description of the Technology	:	Pre-emergence application of bensulfuron methyl (0.6%) + pretilachlor (6%) @ 5 kg ha^{-1} recorded higher grain yield (1152 kg ha^{-1}) which is on par with the conventional practice of hand weeding at 20 & 40 DAS (1183 kg ha^{-1}). Application of post emergence weedicide 2,4-D amine 58% EC @ 1.0 litre ha^{-1} without pre-emergence weedicide recorded higher grain yield of 829 kg ha^{-1} (52.1%) and proved superior over weedy check (545 kg ha^{-1}).
	Year of conclusion	:	2017
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	OFT conducted Paper published. Refer Annexure-I, S. No. 46

5.	Name of the Technology	:	**Weed Management in Direct Seeded Finger Millet**
	Description of the Technology	:	In direct sown finger millet, pre emergence application of isoproturon 75 WP @ 1.5 g L^{-1} along with one inter cultivation at 25-30 DAS and Pre emergence application of bensulfuron methyl 0.6% + pretilachlor 6% @ 5 kg ha^{-1} along with one inter cultivation at 25-30 DAS have comparable weed control efficiencies (89.7% and 84.3% respectively) with weed free check (91.3%). Further grain yields (2230 kg ha^{-1} and 2198 kg ha^{-1}) and B C ratios (1.88 and 1.70) were also comparable with weed free check (2381 kg ha^{-1} & B C ratio 1.83)
	Year of conclusion	:	2017
	Developed by	:	ARS, Vizianagaram
	Status of the Technology	:	Paper Published. Refer Annexure-I, S. No. 47

6.	Name of the Technology	:	**Intercropping of Finger Millet with Bhendi in 8:2 Ratio**
	Description of the Technology	:	 Finger millet + bhendi (8:2 ratio) was found as highly productive and profitable intercropping system than finger millet sole cropping under rainfed conditions as it produced higher finger millet equivalent yield of 6740 kg ha^{-1} as against the sole finger millet crop yield of 3189 kg ha^{-1}
	Year of conclusion	:	2017
	Developed by	:	ARS, Vizianagaram
	Status of the Technology	:	Recommended at AICRP (Small millets), Paper Published. Refer Annexure-I, S. No. 48.

7.	Name of the Technology	:	**Nutrient Management in Finger Millet in Red Sandy Loam Soils of North Coastal Zone**
	Description of the Technology	:	In finger millet application of 150% R.D.F (90-60-45 kg ha^{-1} of N, P_2O_5 and K_2O) + Foliar spray of $ZnSO_4$ 0.5% + $FeSO_4$ 0.2% (3490 kg ha^{-1}) has increased the grain yields by 27.5 % with BC ratio of 2.63 over 100% RDF (2530 kg ha^{-1}) with BC ratio of 2.24.
	Year of conclusion	:	2018
	Developed by	:	ARS, Vizianagaram
	Status of the Technology	:	Paper Published. Refer Annexure-I, S. No. 49.

8.	Name of the Technology	:	**Development of Agro Techniques for Finger Millet**
	Description of the Technology	:	Transplanting of 21 days aged seedlings at spacing of 25 cm x 25 cm increased grain yield of finger millet (3320 kg ha^{-1}) by 17.6% along with benefit cost ratio (3.20) over transplanting of 15 days aged seedlings at a spacing of 30 cm x 30 cm (2830 kg ha^{-1}) with benefit cost ratio of (2.46).
	Year of conclusion	:	2019
	Developed by	:	Department of Agronomy, ARS, Perumallapalle
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 50

9.	Name of the Technology	:	**Eco Friendly Management of Finger Millet Blast**
	Description of the Technology	:	Seed treatment with chitosan @ 2 g kg^{-1} seed + two foliar sprays with *Pseudomonas fluorescens* @10 g L^{-1} at panicle initiation stage and grain filling stage resulted in low incidence of neck blast (8.3%) and finger blast (7.7%) and highest yield (1910 kg ha^{-1}) & BC ratio 1.68 (as against the control (neck blast: 80.0% and finger blast: 77.7%) with yield 1320 kg ha^{-1} and BC ratio 1.
	Year of conclusion	:	2020
	Developed by	:	ARS, Vizianagaram
	Status of the Technology	:	Recommendation included in POP of AICRP –Small millets.

10.	Name of the Technology	:	**Validation of "Guli Method of Finger Millet Cultivation"**
	Description of the Technology	:	Guli planting at 30 cm x 30 cm spacing with guli package (20 days old seedlings), two seedlings per hill, 10 t FYM ha^{-1} (as basal 15-20 days before final ploughing) + 100% RDF (Total P & K as basal, 50% N as basal + 50% at 30-40 DAT), dragging of wooden log over the crop between 15-45 DAT for 2-3 times at 5 days interval, intercultivation with cycle weeder for 2-3 times after dragging of wooden log has given 2479 kg ha^{-1} with BC ratio of 1.58 against the yield obtained in broadcasting (1430 kg ha^{-1}) and BC ratio of 1.52.
	Year of conclusion	:	2020
	Developed by	:	ARS, Vizianagaram
	Status of the Technology	:	Under first year OFT testing Booklet published. Refer Annexure-I, S. No. 51

11.	Name of the Technology	:	**Eco-Friendly Management of Borers in Finger Millet**
	Description of the Technology	:	 Emamectin benzoate 5 SG @ 0.4 g L^{-1} was most effective in reducing the borer incidence (3.2%) followed by *Metarhizium anisopliae* @ 5.0 g L^{-1} (4.1%) compared to check (12.2%) at 15-20 DAS and 35-40 DAS. The yield recorded was 2620 kg ha^{-1} in emamectin benzoate (0.4 g L^{-1}), 2530 kg ha^{-1} in *Metarhizium anisopliae* @ 5.0 g L^{-1} compared to 2490 kg ha^{-1} in monocrotophos 36 SL @ 1.6 ml L^{-1}. The BC ratio recorded was 1.61 in emamectin benzoate (0.4 g L^{-1}) and 1.55 in *Metarhizium anisopliae* @ 5.0 g L^{-1} compared to 1.52 in monocrotophos (1.6 ml L^{-1})
	Year of conclusion	:	2020-21
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	OFT conducted in 2021-22.

12.	Name of the Technology	:	**Organic Farming Package in Finger Millet**
	Description of the Technology	:	Seven years of application of FYM @ 4 t ha^{-1} + vermin compost @ 1 t ha^{-1} + bio fertilizers (Azospirillum and PSB @ 5 kg ha^{-1} each mixed with 100 kg FYM and applied to soil as basal) gave yield of 2850 kg ha^{-1} which is at par with 100% NPK (60-30-20 kg N-P_2O_5-K_2O ha^{-1}) (3020 kg ha^{-1}). Organic farming practice gave BC ratio of 1.36 whereas it was 1.62 with 100% NPK.
	Year of conclusion	:	2021
	Developed by	:	Department of Soil Science, ARS, Perumallapalle
	Status of the Technology	:	Published in a book "Organic farming research in ANGRAU". Published paper. Refer Annexure-I, S. No. 52

13.	Name of the Technology	:	**Finger Millet Trait Specific Germplasm Registered with NBPGR**
	Description of the Technology	:	Identified resistant germplasm lines • Neck blast resistance: VR 1081 (INGR20022) , IE 2871 (INGR21047), VR 1128 (INGR22030) • Finger Blast resistance: IE 2883 (INGR21048), VR 1122 (INGR22023) • Finger & neck blast resistance: VR 1062 (INGR21044), VR 1070 (INGR21132), VR 1087 (INGR21133) • Banded blight resistance: VR 1141 (INGR22022)
	Year of conclusion	:	2021
	Developed by	:	ARS, Vizianagaram
	Status of the Technology	:	Registered with NBPGR

VR1122 **VR1128** **VR 1141**

14.	Name of the Technology	:	**Nutrient Management for Higher Grain Yields of Finger Millet under Zero Tillage Conditions in Rice Fallows**
	Description of the Technology	:	In finger millet, application of 125% RDF (75-50-38 kg ha^{-1} of N, P_2O_5, K_2O) + 1% Multi KNO_3 foliar spray (2 sprays at the time of flowering and 15 days after flowering) (3309 kg ha^{-1}) has increased the yields by 17.29% with B C ratio 2.42 over 100% RDF (60-40-30 kg ha^{-1} of N, P_2O_5, K_2O) (2821 kg ha^{-1}) and BC ratio 2.14 under zero tillage conditions during *rabi* season.
	Year of conclusion	:	2021
	Developed by	:	ARS, Vizianagaram
	Status of the Technology	:	Under 1st year OFT

15.	Name of the Technology	:	**Registration of Resistant Line in Finger Millet**
	Description of the Technology	:	Identified blast resistant line in finger millet, PPR-2885 and registered with NBPGR.
	Year of conclusion	:	2022
	Developed by	:	Department of Plant Pathology, ARS, Perumallapalle
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 53.

Foxtail millet (Korra)

1.	Name of the Technology	:	**Identification of Banded Blight Disease Resistant and Susceptible Checks in Foxtail Millet**
	Description of the Technology	:	Identified resistant (SiA 3282) (10.8% incidence of banded blight) and susceptible (SiA 3367) (96.7% incidence of banded blight) checks for banded blight in foxtail millet.
	Year of conclusion	:	2018
	Developed by	:	ARS, Vizianagaram
	Status of the Technology	:	Utilizing continuously in AICRP trials since 2018

2.	Name of the Technology	:	**Weed Management with Herbicides in Foxtail Millet**
	Description of the Technology	:	Significantly higher grain yield (3358 kg ha^{-1}) in foxtail millet was obtained with the application of oxadiargyl 80WP @ 250 g ha^{-1} + one intercultivation at 30 DAS compared to hand weeding twice at 20 and 40 DAS (2882 kg ha^{-1}) and the lowest grain yield was recorded with unweeded check (1427 kg ha^{-1}).
	Year of conclusion	:	2021
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	Paper Published. Refer Annexure-I, S. No. 54

3.	Name of the Technology	:	**Inter Cropping in Foxtail Millet**
	Description of the Technology	:	Highest grain yield was recorded with foxtail millet + redgram in 6:1 ratio (4,498 kg ha^{-1}) with a B C ratio (3.52) against sole crop with low yield 2613 kg ha^{-1} and BC ratio 2.46.
	Year of conclusion	:	2021
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 54

4.	Name of the Technology	:	**Management of Rust Disease in Foxtail Millet**
	Description of the Technology	:	Foliar spray of hexaconazole 5% EC @ 2 ml L^{-1} proved most effective by recording minimum PDI of 7.9 % with grain yield of 1,585 kg ha^{-1} and 46.25 % increase in grain yield and BC ratio of 2.8 compared to PDI of 51.6 %, grain yield of 799 kg ha^{-1} in control.
	Year of conclusion	:	2021

Rust Disease

Developed by	:	Department of Plant Pathology, RARS, Nandyal
Status of the Technology	:	Got acceptance from the Journal "Ecology, Environment and Conservation" and will be published in January, 2023

5.	Name of the Technology	:	**Nutrient Management in Foxtail Millet**
	Description of the Technology	:	Application of potassium @ 20 kg ha^{-1} along with 20 kg nitrogen and 20 kg ha^{-1} phosphorus gave higher grain yield of 2,158 kg ha^{-1} with BC ratio of 1.44 which is 28% higher than zero potassium application (1,690 kg ha^{-1}) with BC ratio of 1.55.
	Year of conclusion	:	2022
	Developed by	:	Department of Soil Science, ARS, Perumallapalle
	Status of the Technology	:	Proposed for OFT in 2022.

Other Small Millets

1.	Name of the Technology	:	**Ecofriendly Management of Banded Blight in Small Millets**
	Description of the Technology	:	The soil application of *Pseudomonas fluorescens* +*Trichoderma asperellum* + *Bacillus subtilis* @ 1 kg each talc formulation mixed in 25 kg FYM or vermicompost incubated for 15 days not only minimized banded blight but also increased grain yield to 127.5% with B:C ratio of 26.3.
	Year of conclusion	:	2018
	Developed by	:	ARS, Vizianagaram
	Status of the Technology	:	Recommendation included in POP of AICRP –Small millets.

2.	Name of the Technology	:	**Identification of Banded Blight Disease Resistant and Susceptible Checks in Barnyard Millet and Proso Millet**
	Description of the Technology	:	Identified resistant PRB 903 (11.4% incidence of banded blight) and susceptible LDR 1 (98.0 % incidence of banded blight) checks in barnyard millet. Identified resistant (TNPm 230) (18.6% incidence of banded blight) and susceptible (Nolovoor local) checks (98.6% incidence of banded blight) in proso millet.
	Year of conclusion	:	2018
	Developed by	:	ARS, Vizianagaram
	Status of the Technology	:	Utilizing continuously in AICRP trials since 2018

3.	Name of the Technology	:	**Identification and Registration of Trait Specific Germplasm in Little Millet**
	Description of the Technology	:	Identified germplasm lines with early maturity (80 days): VS 25 (INGR21131) against the early check BL 6 (90 days)
	Year of conclusion	:	2021
	Developed by	:	ARS, Vizianagaram
	Status of the Technology	:	Registered with NBPGR

4.	Name of the Technology	:	**Fertilizer Doses for Andu Korra**
	Description of the Technology	:	Application of 80 kg of nitrogen per hectare (2009 kg ha^{-1}) and 30 kg of phosphorus per hectare have recorded higher yield (1770 kg ha^{-1}) than recommended fertilizer doses 50 N kg ha (864 kg ha^{-1}), 50 kg of phosphorus per hectare (724 kg ha^{-1}). 
	Year of conclusion	:	2022
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	Disseminated through T&V meetings & ZREAC meetings

5.	Name of the Technology	:	**Identification of New Strain of Pathogen in Little Millet**
	Description of the Technology	:	Reported new phytoplasma strain *i.e.*, *Candidatus* Phytoplasma asteris' (16Sr I-B) associated with phyllody disease of *Panicum sumatrense* (Little millet) in India**.**
	Year of conclusion	:	2022
	Developed by	:	Department of Plant Pathology, ARS, Perumallapalle
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 55

6.	Name of the Technology	:	**Improving the Shelf Life of Millets**
	Description of the Technology	:	Roasting of the foxtail millet & Barnyard millet at 100°C for 10 minutes has no significant loss of nutritive components such as tyrosine, antioxidant activity and moderate increase in antinutritional factors such as total polyphenols (18%) and tannins (19%) with significant reduction in acid value (39-50%).
	Year of conclusion	:	2021
	Developed by	:	Department of Biochemistry, RARS, Tirupati
	Status of the Technology	:	Publication is in progress.

Redgram (Pigeonpea)

1.	Name of the Technology	:	**IPM module in pigeonpea**
	Description of the Technology	:	• Seed treatment with *Trichodermna viride* @ 10 g and vitavax @ 2 g kg^{-1} • Intercropping with green gram (1:7). • Monitoring through pheromone traps @ 10 ha^{-1} • Erecting bird perches @ 50 ha^{-1} and spraying of NSKE 5% or azadirachtin 1500 ppm @ 5 ml L^{-1} at flower bud initiation. • Need based spray of chlorantraniliprole @ 0.3 ml L^{-1} (at 50% flowering), indoxacarb @ 0.75 mlL^{-1} or flubendiamide @ 0.2 ml L^{-1} or emamectin benzoate @ 0.4 g L^{-1} and dimethoate @ 2.0 ml L^{-1} at 10 days interval. IPM module realized a BC ratio of 3.2 over 2.1 in non-IPM.
	Year of conclusion	:	2015
	Developed by	:	RARS, Lam
	Status of the Technology	:	Under FLDs. Paper published. Refer Annexure-I, S. No. 56 for more information

2.	Name of the Technology	:	**Potassium nutrition for quality improvement in pigeonpea**
	Description of the Technology	:	The highest yield of 1284 kg ha^{-1} is obtained with 60 kg ha^{-1} of potash application with BC ratio of 2.84 as compared to 840 kg ha^{-1} in RDF with BC ratio of 0.92.
	Year of conclusion	:	2016
	Developed by	:	Department of Soil Science, ARS, Utukur
	Status of the Technology	:	Full paper was communicated and is in review.

3.	Name of the Technology	:	**Potassium mobilization from waste mica through KSB**
	Description of the Technology	:	Application of waste mica @ 10 t ha^{-1} along with *Bacillus mucilaginosus or Fraturia* @ 5 kg ha^{-1} along with RDF (20 :50 N P kg ha^{-1}) resulted yield of 873 kg ha^{-1} which is 1.3 times higher with BC ratio of 2.4 as compared to 696 kg ha^{-1} with BC ratio of 1.5 in RDF.
	Year of conclusion	:	2016
	Developed by	:	Department of Soil Science, ARS, Utukur
	Status of the Technology	:	Publication in review

4.	Name of the Technology	:	**Potassium & Zn nutrition**
	Description of the Technology	:	The highest yield of 1481 kg ha^{-1} was recorded with the application of recommended dose of nitrogen, phosphorus, and potassium @ 60 kg ha^{-1} along with 25 kg ha^{-1} $ZnSO_4$ as compared to 1166 kg ha^{-1} in RDF which is 1.3 times higher with net returns of Rs 23,100 ha^{-1} and BC ratio of 2.56 as against 1.56 in RDF at ARS, Utukur. Application of potassium @ 60 kg ha^{-1} and $ZnSO_4$ @ 25 kg ha^{-1} as basal along with RDF (20:50) enhances the yield (1809 kg ha^{-1}) by 22.3 % over RDF (1405 kg ha^{-1}) with an additional income of Rs. 14,800 ha^{-1} and BC ratio of 2.14 as compared to RDF (1.81) at RARS, Tirupati.
	Year of conclusion	:	2017
	Developed by	:	Department of Soil Science, ARS, Utukur & RARS, Tirupati
	Status of the Technology	:	OFT 2nd year
5.	Name of the Technology	:	**Insecticidal schedule for management of pod borer complex in redgram.**
	Description of the Technology	:	Insecticidal schedule consisting of chlorantraniliprole 18.5 SC @ 0.3 ml L^{-1}, followed by flubendiamide 480 SC @ 0.2 ml L^{-1} and dimethoate 30 EC @ 2.0 ml L^{-1} at 10 days intervals starting from 50% flowering recorded low pod borers damage of 15.2%, with a yield of 1974 kg ha^{-1} and highest Incremental Cost Benefit Ratio (10.6). Control plot recorded yield of 788 kg ha^{-1} with 63.9% damage by pod borers.
	Year of conclusion	:	2017
	Developed by	:	RARS, Lam
	Status of the Technology	:	OFT completed. Paper published. Refer Annexure-I, S. No. 57 for more information
6.	Name of the Technology	:	***Bacillus thuringiensis* (NBAIR Bt G4) against pod borer complex in pigeon pea**
	Description of the Technology	:	Spraying *Bacillus thuringiensis* (NBAIR Bt G) @ 2 ml L^{-1} in three sprays at pre-flowering, flowering, and pod formation stages in pigeon pea against pod borer complex in comparison with chemical sprays (chlorpyriphos @ 2.5 ml L^{-1} at pre flowering, acephate @ 1.5 g L^{-1} at flowering, chlorantraniliprole @ 0.3 ml L^{-1} at pod formation). In three years of field experimentation from 2012-13 to 2014-15, *Bt* strain NBAIR-*Bt* G4 @ 2% is at par with insecticidal check in respect of pod damage (5.30%), seed damage (3.91%) and yield (1530 kg ha^{-1}). The *Bt* strain NBAIR-*Bt* G4 @ 2% ranked next best to the insecticidal spray in recording surviving

		larval population of *H. armigera* (av. 1.01 larvae / plant) and *M. vitrata* (av. 1.10 larvae/inflorescence) at ARS, Darsi. In large scale field demonstrations from 2015-16 to 2018-19 conducted by RARS, Anakapalle, foliar spray with ICAR-NBAIR Bt G4 @2 ml L^{-1} three times effectively reduced *Maruca* leaf webber with 37.9% reduction in leaf webbing damage; 22.88% reduction in pod damage and higher pod yield (676.7 kg ha^{-1}) with 48.62 % yield increase over untreated control. Biocontrol gave increased returns (Rs. 9308 ha^{-1}) over untreated control with an incremental benefit cost ratio of 2.5.
	Year of conclusion	: 2019
	Developed by	: RARS, Anakapalle and ARS,Darsi
	Status of the Technology	: The recommendation is included in POP. Paper published. Refer Annexure-I, S. No. 58

7.	Name of the Technology	:	**Management of pod bugs in redgram**
	Description of the Technology	:	Spraying of deltamethrin 2.8 EC @ 0.9 ml L^{-1} twice at 10 days interval at the pod development stage recorded 7.3% shrivelled seeds with a yield of 1664 kg ha^{-1} and high ICBR (11.1). Control plot recorded 23.7 % shrivelled seeds and a yield of 1232 kg ha^{-1}.
	Year of conclusion	:	2019
	Developed by	:	RARS, Lam
	Status of the Technology	:	Proposed for OFT during 2022-23

8.	Name of the Technology	:	**Management of pod fly**
	Description of the Technology	:	 Application of thiamethoxam 25 WG @ 0.4 g L^{-1} + jaggery (5 g L^{-1}) twice at 15 days interval starting from the pod initiation stage registered 5.4% seed damage as against 17.1% in control with the highest incremental cost benefit ratio of 10.3.
	Year of conclusion	:	2021
	Developed by	:	RARS, Lam
	Status of the Technology	:	Proposed for OFT

Black gram (Urdbean) and Green gram (Mungbean)

1.	Name of the Technology	:	**Management of powdery mildew in blackgram**
	Description of the Technology	:	Spraying of carbendazim @ 1.0 g L^{-1} results in lowest percent disease index 34.15 % with a yield of 925 kg ha^{-1} & BC ratio of 1.68 as compared to control with the highest percent disease index (58.4), lowest yield (723 kg ha^{-1}) and BC ratio of 1.16. 
	Year of conclusion	:	2016
	Developed by	:	Department of Plant Pathology, ARS, Utukur
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 59 for more information

2.	Name of the Technology	:	**Weed management with post-emergence herbicides in *rabi* blackgram**
	Description of the Technology	:	Post-emergence application of clodinofop propargyl 8% EC + Na-aceflourfen 6.5% SL @ 2 ml L^{-1} at 2-3 leaf stage of weeds is non-phytotoxic on the crop with effective control of weeds with a yield of 1360 kg ha^{-1} and BC ratio of 1.84 comparable to two hand weedings at 15 and 30 DAS with yield of 1420 kg ha^{-1} & BC ratio of 1.16.
	Year of conclusion	:	2018
	Developed by	:	Department of Agronomy, RARS, Tirupati
	Status of the Technology	:	OFT 2nd year, Paper published. Refer Annexure-I, S. No. 60

3.	Name of the Technology		**Weed management in rice fallow blackgram**
	Description of the Technology	:	Application of pendimethalin @ 5 ml L^{-1} (sand mix application) as pre-emergence and fomesafen @ 220 g + fuzifop butyl @ 2 ml L^{-1} as post-emergence at 20 DAS recorded marked reduction in weed density (9.1 m^{-2}) and dry weight (7.6 g m^{-2}) with higher seed yield (1056 kg ha^{-1}), net returns (Rs. 30,711 ha^{-1}) and BC ratio (2.08) with 38.60% improvement in yield over control plot (weedy check) which recorded highest weed density (36.2 m^{-2}) and dry weight (14.8 g m^{-2}) with lowest seed yield (762 kg ha^{-1}) , net returns (Rs.18, 572 ha^{-1}) and BC ratio (1.77).
	Year of conclusion	:	2018
	Developed by	:	ARS, Ghantasala

	Status of the Technology	:	OFT conducted by KVK, Ghantasala during the years 2020-21 and 2021-22 resulted in 20.83 % improvement in yield (14.50 q/ha) over farmers' practice.

4.	Name of the Technology	:	**Suitable varieties for Rice fallow blackgram and greengram**
	Description of the Technology	:	• Black gram varieties for early sown conditions (second fortnight of November) - LBG 752 and LBG 787. • Late sown conditions (first fortnight of December) - LBG 752 and PU 31. • Green gram varieties for early sown conditions (second fortnight of November) LGG 460 and IPM 2-14. • Late sown conditions (first fortnight of December) - LGG 460 and WGG 42.
	Year of conclusion	:	2018
	Developed by	:	ARS, Ragolu
	Status of the Technology	:	Paper published. Refer Annexure-II, S. No. 5

5.	Name of the Technology	:	**Nutrient Management in *rabi* blackgram**
	Description of the Technology	:	Application of 20-75-20-20 kg NPKS ha^{-1} under irrigated conditions during *rabi* season recorded 19% higher seed yield in black gram (2187 kg ha^{-1}) with net returns of Rs. 79,633/-ha^{-1} & BC ratio of 2.95 compared to 20-50 kg NP ha^{-1} (RDF) which recorded seed yield of 1843 kg ha^{-1}, with net returns of Rs.63,865 ha^{-1} and BC ratio of 2.70.
	Year of conclusion	:	2019
	Developed by	:	Department of Agronomy, ARS, Utukur
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 61

6.	Name of the Technology	:	**Management of sucking pests in blackgram**
	Description of the Technology	:	Seed treatment with imidacloprid 600 FS@5ml kg^{-1} seed and spraying of spinetoram 12% SC at 25 and 45 DAS results in lowest number of thrips /twig (0.70) and whitefly/twig (2.00), with highest yield of 1458 kg ha^{-1} and BC ratio of 2.69 as compared to control which recorded highest number of thrips/twig (6.08), whitefly (10.28), lowest yield (799 kg ha^{-1}) and BC ratio (1.68).
	Year of conclusion	:	2019
	Developed by	:	Department of Entomology, ARS, Utukur
	Status of the Technology	:	OFT 3rd year

7.	Name of the Technology	:	**Foliar nutrition for pulses**
	Description of the Technology	:	Foliar spray of 3% NPK (19-19-19) and 1% $KN0_3$ at 30 and 45 DAS produced higher Seed yield (1375 kg ha^{-1}) with BC ratio of 0.93 over control (741 kg ha^{-1}, BC ratio 0.19).
	Year of conclusion	:	2019
	Developed by	:	ARS, Ragolu
	Status of the Technology	:	OFT conducted

8.	Name of the Technology	:	**Integrated Pest Management module against major insect pests in blackgram.**
	Description of the Technology	:	• Seed treatment with imidacloprid 600 FS@5.0 ml kg^{-1} • Growing of 4 rows sorghum around the field as barrier crop, • Monitoring with yellow sticky trap @ 50 ha^{-1} • Monitoring of *Helicoverpa* from flower initiation stage with pheromone traps @ 10 ha^{-1} • Spraying of neem based insecticides at 30 days after sowing • Need based application of the insecticides in rotation at 10 days intervals IPM module realized high BC ratio of 2.8 over 1.86 in farmers practice.
	Year of conclusion	:	2019
	Developed by	:	RARS, Lam
	Status of the Technology	:	OFT conducted during 2019-20

9.	Name of the Technology	:	**Evaluation of different modules for the management of viral diseases of mungbean and urdbean.**
	Description of the Technology	:	• Seed treatment with imidacloprid 600 FS@ 5.0 ml kg^{-1} • Growing of 4 rows sorghum around the field as barrier crop, • Monitoring with yellow and blue sticky trap @ 50 ha^{-1} • Monitoring of *Helicoverpa* from flower initiation stage with pheromone traps @ 10 ha^{-1} • Foliar spray of fipronil @ 1.5 ml L^{-1} or azadirachtin 10000 ppm @ 1.0 ml L^{-1} at 20-25 days and • Foliar spray of difenthiuron 1.2 g L^{-1} or spinosad @ 0.3 ml L^{-1} at 30-35 DAS IPM module recorded the lowest mean PDI of MYMV (15.15), leaf curl/ bud necrosis (5.23%) and leaf crinkle (4.41%) with mean highest grain yield (1313 kg ha^{-1}) compared to unprotected control (393 kg ha^{-1}) with YMV severity (31.49%), leaf curl (14.71%) and leaf crinkle incidence (30.9%).
	Year of conclusion	:	2019
	Developed by	:	RARS, Lam
	Status of the Technology	:	OFT conducted during 2019-20

10.	Name of the Technology	:	**Weed Management in Blackgram in NC zone**
	Description of the Technology	:	Hand weeding at 15 and 30 DAS or Post-emergence application of fluazifop-p-butyl + fomesafen @ 2.4 ml L^{-1} or Post-emergence application of sodium aciflourfen + clodinofop propargyl @ 1.5 ml L^{-1} at 25 DAS resulted high weed control efficiency of 81.73%, 72.09 % and 57.23 % particularly on *Cuscuta* and *Xanthium spp*. with seed yields of 580.56 kg ha^{-1}, 493.06 kg ha^{-1} and 465.28 kg ha^{-1} respectively.
	Year of conclusion	:	2020
	Developed by	:	ARS, Ragolu
	Status of the Technology	:	OFT conducted

11.	Name of the Technology	:	**Foliar nutrition**
	Description of the Technology	:	100% recommended dose of fertilizers (20 N:50 P_2O_5 kg ha^{-1}) along with foliar sprays of $ZnSO_4$ @ 0.2% at 20 & 45 DAS improve the productivity (746 kg ha^{-1}) by 23.5% over RDF (571 kg ha^{-1}) with an additional income of Rs.10,450 ha^{-1} and BC ratio of 1.25 as compared to no spray (0.80).
	Year of conclusion	:	2020
	Developed by	:	Department of Soil Science, RARS, Tirupati
	Status of the Technology	:	OFT 2nd year

12.	Name of the Technology	:	**Standardization of Agroinoculation technique for MYMV**
	Description of the Technology	:	DNA based screening methods (Agroinoculation) by cloning virus full dimers in plant transformation vector was standardized to identify resistant blackgram genotypes for both the species of begomoviruses (MYMIV and MYMV).
	Year of conclusion	:	2020
	Developed by	:	Department of Plant Pathology, RARS, Tirupati
	Status of the Technology	:	Published. Refer Annexure-I, S. No. 62 & 63

13.	Name of the Technology	:	**Management of sucking pest in greengram with insecticides**
	Description of the Technology	:	Seed treatment with imidacloprid 600 FS @ 5.0 g L^{-1} followed by spraying of pyriproxyfen 10 EC @ 2.0 ml L^{-1} recorded yield of 1221 kg ha^{-1} with ICBR of 12.2 against 896 kg ha^{-1} in control.
	Year of conclusion	:	2021
	Developed by	:	RARS, Lam
	Status of the Technology	:	Proposed for OFT during 2022-23.

14.	Name of the Technology	:	**Influence of trap colour and height of its placement in trapping sucking pests and natural enemies.**
	Description of the Technology	:	Blue sticky traps were more attractive to thrips (11.59 nos./sq.cm), yellow sticky traps for whiteflies (3.45 nos./sq.cm) and leaf miners (11.01 $sq.cm^{-1}$), while, the yellow sticky traps were found detrimental to coccinellids when placed up to 2 ft above the crop canopy.
	Year of conclusion	:	2020
	Developed by	:	RARS, Lam
	Status of the Technology	:	The research paper published. Refer Annexure-I, S. No. 64 for more information.

15.	Name of the Technology	:	**Crop weather relationship**
	Description of the Technology	:	TBG-104 and PU-31 show maximum resistance to YMV followed by LBG-787 under varied climatic conditions. Further, October 1st & 2nd FN sowings are favorable for high yields and low incidence of YMV.
	Year of conclusion	:	2021
	Developed by	:	Department of Agrometeorology, RARS, Tirupati
	Status of the Technology	:	Generated thumb rules and used them in agro advisory preparation.

16.	Name of the Technology	:	**Identification of SSR markers for YMV resistance**
	Description of the Technology	:	Identification of SSR markers linked to YMV resistance in blackgram, QTL mapping, validation are done and useful for breeding programme
	Year of conclusion	:	2021
	Developed by	:	Department of Plant Pathology, RARS, Tirupati
	Status of the Technology	:	Paper Published. Refer Annexure-I, S. No. 65.

17.	Name of the Technology	:	**Disease management in Rice Fallow Blackgram and Greengram**
	Description of the Technology	:	Application of fungicide tebuconazole 50% + trifloxystrobin 25% WG @ 0.75 g L^{-1} was effective in managing powdery mildew and *Corynespora* leaf spot in blackgram with Percent Disease Incidence (PDI) of 10.9 and 12.2 respectively; powdery mildew and *Cercospora* leaf spot in greengram with PDI of 17. 50 and 17. 67 respectively. Control recorded high PDI of 50. 4 and 49. 4 in blackgram and 54.1 and 57. 1 in greengram respectively. Yield increase of 46.1% was observed in treated blackgram (1261 kg ha^{-1}) over control (863 kg ha^{-1}) and 49.8% increase in treated greengram (1104 kg ha^{-1}) over control (737 kg ha^{-1}).
	Year of conclusion	:	2021
	Developed by	:	ARS, Ghantasala
	Status of the Technology	:	Proposed for OFT.

Bengal gram (Chickpea)

1.	Name of the Technology	:	**Double cropping**
	Description of the Technology	:	Double cropping with foxtail millet in *kharif* (instead of fallow) followed by chickpea during *rabi* fetched higher net returns (Rs.41,480 ha^{-1}) compared to fallow Bengal gram (Rs.30,240 ha^{-1}). It improved the net returns (Rs. 11000 ha^{-1}) and also minimizes the soil borne diseases like *Fusarium* wilt and dry root rot in chickpea.
	Year of conclusion	:	2015
	Developed by	:	RARS, Nandyal and Lam
	Status of the Technology	:	Adopted by the Department of Agriculture, NGOs and farmers

2.	Name of the Technology	:	**Technology for low pod set in Chickpea (Mogili in Chickpea)**
	Description of the Technology	:	In chickpea (JG11 variety), the effect of fog/low temperature (mogili) on pod set was reduced with spraying of KNO_3 (2%) or sodium nitroprusside @ 150 µ M (17mg L^{-1}) or boron @ g L^{-1} of water at weekly interval during the flowering period. The pod set increased by 51% and pod yield (1544 kg ha^{-1}) increased by 17% as compared to control (1286 kg ha^{-1}).
	Year of conclusion	:	2016
	Developed by	:	AICRP on Dryland Agriculture, ARS, Ananthapuramu
	Status of the Technology	:	Awareness created among the farmers

Desiccation of flowers due to fog

3.	Name of the Technology	:	**Crop rotation / alternate crops to Chickpea**
	Description of the Technology	:	Sorghum and blackgram were found better alternate crops with monetary returns of Rs.50,500 ha^{-1} and Rs.44,800 ha^{-1}, respectively as against only Rs.34,000 ha^{-1} with chickpea. It minimizes the soil borne diseases like *Fusarium* wilt and dry root rot in chickpea.
	Year of conclusion	:	2017
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	Disseminated through T&V meetings & ZREAC meetings

4.	Name of the Technology	:	**Integrated Pest Management module**
	Description of the Technology	:	• Sowing of four thick rows of tall growing millets like jowar around the field and intercrop with coriander (16:4) • Erection of bird perches 50 ha^{-1} • Spraying of NSKE @ 5% at 15 days after germination • Need based spraying of indoxacarb 14.5 SC @ 1 ml L^{-1} against *H. armigera* and chlorantraniliprole 18.5% SC @ 0.2 ml L^{-1}.

			The IPM module recorded seed yield of 1300 kg ha^{-1}, which is 18.2 % higher over farmers practice (1098 kg ha^{-1}) with a BC ratio of 1.8. Farmers practice recorded a BC ratio of 0.9.
	Year of conclusion	:	2017
	Developed by	:	RARS, Lam
	Status of the Technology	:	Included in the Vyavasaya Panchangam

IPM in Chickpea

9.	Name of the Technology	:	**Seed treatment**
	Description of the Technology	:	Seed treatment with vitavax powder (carboxin 37.5%+thiram 37.5% DS) @1.5g kg^{-1} of seed or tebuconazole @1.5g kg^{-1} of seed significantly reduced the incidence of fusarium wilt in Chickpea
	Year of conclusion	:	2019
	Developed by	:	Department of Pathology, RARS, Nandyal
	Status of the Technology	:	Recommendation included in Vyavasaya Panchangam

10.	Name of the Technology	:	**Eco friendly approaches for management of gram pod borer, *Helicoverpa armigera* in chickpea**
	Description of the Technology	:	Lowest pod damage by *Helicoverpa armigera* was recorded in chlorantranilliprole 18.5 SC @ 2.5 ml L^{-1} followed by *Metarhizium anisopliae* @ 5g L^{-1}. The highest pod yield was recorded with chlorantranilliprole 18.5 SC @ 2.5 ml L^{-1} (1387 kg ha^{-1}) followed by *Bacillus thuringiensis kurstaki*, 127 SC @ 3 ml L^{-1} (1070 kg ha^{-1}).
	Year of conclusion	:	2020
	Developed by	:	Department of Entomology, RARS, Nandyal
	Status of the Technology	:	Manuscript is under preparation

11.	Name of the Technology	:	**Management of *Helicoverpa armigera***
	Description of the Technology	:	Spraying of insecticide chlorantranilliprole18.5 SC % @0.3 ml L^{-1} along with foliar fertilizer KNO_3 2% was compatible and is significantly effective to manage *H.armigera* infestation with high yield of 2169.4 kg $ha^{-1}$and BC ratio of 2.69.
	Year of conclusion	:	2021
	Developed by	:	Department of Entomology, RARS, Nandyal
	Status of the Technology	:	OFT is under progress for the year 2022-23

Cowpea

1.	Name of the Technology	:	**Suitable varieties and optimum sowing time for light soils of Prakasam.**
	Description of the Technology	:	Tirupati-1 variety recorded maximum seed yield (1323 kg ha^{-1}) compared to local brown (1158 kg ha^{-1}) and local white (906 kg ha^{-1}). Sowing of cowpea from 2nd fortnight of September to October recorded maximum seed yield (1918 kg ha^{-1}) compared November sowings (818 kg ha^{-1}).
	Year of conclusion	:	2019-20
	Developed by	:	ARS, Darsi
	Status of the Technology	:	Paper publication is in process

Rajmash

1.	Name of the Technology	:	**Identified efficient rhizobium (*Rhizobium leguminosarum bv. trifoli*) strain for rajmash crop**
	Description of the Technology	:	*Rhizobium leguminosarum* isolate was found effective in terms of nodulation, stem length, root length etc., among the tested cultures. Therefore, the same bacterial isolate sample was sent to MTTC, Chandigarh for identification through 16S ribosomal RNA analysis for conformation and obtained the **Nucleotide** sequence. The blast result revealed that, Nucleotide sequences of the isolate was producing significant alignments with *Rhizobium leguminosarum bv. trifoli* Sequences (Max.98.14%) and Zero Error value (E value).
	Year of conclusion	:	2020
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	OFT conducted

Groundnut

1. Name of the Technology : **Drought mitigation in groundnut**

Description of the Technology : Foliar spray of 0.5% 19:19:19 (NPK) @ 2.5 kg ha^{-1} twice at 10-15 days interval during moisture stress recorded 21% higher pod yield of 1327 kg ha^{-1} compared to stress control (1045 kg ha^{-1}) with BC ratio of 1.26 as against 0.96 in stress control.

Year of conclusion : 2015

Developed by : Department of Physiology, RARS, Tirupati

Status of the Technology : Under OFT 2nd year

2. Name of the Technology : **Management of leaf miner and *Spodoptera litura* in groundnut with biopesticides**

Description of the Technology : Two sprays of NSKE 5% at 30 and 55 DAS is effective in reducing leaf miner (71.9%) and tobacco caterpillar (64.0%) larval population which is comparable to the efficacy offered by insecticidal check quinolphos 25% EC (79.6 and 62.9 % reduction of leaf miner and tobacco caterpillar larval population, respectively). Significantly comparable yields and ICBR was recorded with NSKE 5% (2510 kg ha^{-1} and 18.7)) and quinolphos 25% EC (2570 kg ha^{-1} and 19.2).

Year of conclusion : 2015

Developed by : Department of Entomology, ARS, Darsi

Status of the Technology : Paper published. Refer Annexure-I, S. No. 67

3. Name of the Technology : **Management of root grub in groundnut**

Description of the Technology : Seed treatment with imidacloprid 600 FS @ 2 ml + 2. ml water per kg is effective with low cumulative percent plant mortality (3.26%) due to root grub, highest pod yield (1613 kg ha^{-1}) & BC ratio of 2.61 compared to control which recorded highest

			cumulative percent plant mortality (36.36%), lowest yield (658 kg ha^{-1}) and BC ratio (1.09).
	Year of conclusion	:	2016
	Developed by	:	Department of Entomology, ARS, Utukur
	Status of the Technology	:	OFT three years completed, Included in Vyavasaya Panchangam. Paper published. Refer Annexure-I, S. No. 68

4.	Name of the Technology	:	**Management of stem rot in groundnut**
	Description of the Technology	:	Seed treatment with tebuconazole @ 1.25 g kg^{-1} is effective in minimizing stem rot incidence (16.44 %), with pod yield of 1670 kg ha^{-1} and BC ratio of 1.73 when compared to control with highest cumulative stem rot incidence (36.0%), lowest yield (866 kg ha^{-1}) & BC ratio (1.04). 
	Year of conclusion	:	2016
	Developed by	:	Department of Plant Pathology, ARS, Utukur
	Status of the Technology	:	Disseminated through T & V meetings and ZREAC

5.	Name of the Technology	:	**Newer Insecticides Against Thrips and Leaf hoppers in Groundnut**
	Description of the Technology	:	Fipronil 80% WG (0.2 g L^{-1}) and Fipronil 5% SC (2 ml L^{-1}) were significantly superior with 62.0 (2152 kg ha^{-1}) and 57.6 % (1861 kg ha^{-1}) reduction of thrips, respectively. Whereas Diafenthiuron 50% WP @ 1.25 g L^{-1} (62.8%, 1708 kg ha^{-1}) and bifenthrin 10% EC @ 1.25 ml L^{-1} (59.4%, 1611 kg ha^{-1}) were on par in reducing leaf hopper. Fipronil 5% SC has the highest ICBR (29.7) followed by bifenthrin 10% EC (26.6) when sprayed at ETL 
	Year of conclusion	:	2016
	Developed by	:	Department of Entomology, ARS, Darsi
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 69

6.	Name of the Technology	:	**Compatibility of Insecticides and Fungicides for Pest and Disease Management in Groundnut**
	Description of the Technology	:	In groundnut, spinosad, thiamethoxam and acetamiprid were effective against leaf hopper and their combination with fungicides (mancozeb and carbendazim) recorded the highest reduction of leaf miner (87.8 %), *Spodoptera litura* (80%) and leaf spot disease (40%). Similarly, pod yields were also maximum in insecticide and fungicide combinations (578 to 1064 kg ha^{-1}) compared to insecticides alone (555 to 995 kg ha^{-1}) or fungicides alone (486 to 532 kg ha^{-1}) and control (untreated) (416 kg ha^{-1}).
	Year of conclusion	:	2017
	Developed by	:	Department of Entomology, ARS, Darsi
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 70, 71, 72

7.	Name of the Technology	:	**Evaluation of Cow Based Organics against Insecticides**
	Description of the Technology	:	Spraying of imidacloprid @ 0.4 ml L^{-1} of water results in the lowest per cent thrips damage (4.39% 6.42%, 7.78 % at 7, 14 and 21 days after spraying respectively) with the highest yield of 2139 kg ha^{-1} and BC ratio of 2.19 and superior over cow based organics like Neemastra, Agniastra, Bramhastra, NSKE and control with highest percent thrips damage (22.13%, 23.79%, 22.35 % at 7, 14 and 21 DAS respectively) with a yield of 1199 kg ha^{-1} and BC ratio of 1.20.
	Year of conclusion	:	2017
	Developed by	:	Department of Entomology, ARS, Utukur
	Status of the Technology	:	Published. Refer Annexure-I, S. No. 73.

8.	Name of the Technology	:	**Integration of Pheromone Mediated Mass Trapping with Sticky Liners in Groundnut to Control Leaf Miner and Sucking Pests.**
	Description of the Technology	:	Pheromone mass trapping techniques can be used efficiently for leaf miner management in groundnut in the farmers' fields. 20 delta sticky traps are to be installed ha^{-1} within 10-15 days of the emergence of the groundnut crop.
	Year of conclusion	:	2017
	Developed by	:	AICRP on Dryland Agriculture, Department of Entomology, ARS, Ananthapuramu

	Status of the Technology	:	Large-scale demonstrations were conducted and published. Refer Annexure-I, S. No. 74

9.	Name of the Technology	:	**Efficacy of Nano Zinc Oxide Particles on Peanut Stem Necrosis Disease**
	Description of the Technology	:	Spraying of nano zinc oxide particles @ 1000 ppm against Peanut stem necrosis disease (PSND) caused by *Tobacco streak virus* (TSV) of groundnut in green house conditions recorded maximum incubation period of TSV (local: 6 DPI; Systemic: 12 DPI) coupled with less percent incidence of PSND (38.0 %) and virus titer (0.14 O.D.) at 21 days post inoculation (DPI)
	Year of conclusion	:	2017
	Developed by	:	Department of Pathology, ARS, Kadiri
	Status of the Technology	:	Presented at the National conference of Agri NANO -2017. Manuscript submitted.

10.	Name of the Technology	:	**Weed Management in Rice Fallow Groundnut**
	Description of the Technology	:	In rice fallow groundnut, maximum pod yield of 4554 kg ha^{-1} and BC ratio of 2.38 was recorded with weed free and two hand weedings at 20 & 40 DAS (4118 kg ha^{-1} with BC ratio of 2.52) and on par with pre-emergence application of pendimethalin @ 5 ml L^{-1} followed by post emergence application of imazythapyr @ 1.5 ml L^{-1} of water at 20-30 DAS (3922 kg ha^{-1} with BC ratio of 3.08). The unweeded control results in poor pod yield of 1409 kg ha^{-1} with BC ratio of 0.98 only.
	Year of conclusion	:	2018
	Developed by	:	Department of Agronomy, ARS, Utukur
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 75

11.	Name of the Technology	:	**Revised Fertilizer Recommendation**
	Description of the Technology	:	Revised fertilizer application of 45 – 40 – 63 kg NPK ha^{-1} & $ZnSO_4$ @ 12.5 kg ha^{-1} & B @ 12.5 kg ha^{-1} recorded 3100 kg ha^{-1} yield when compared to RDF (30:40:50 kg NPK ha^{-1}) (2300 kg ha^{-1}). Improved practice results in 1.4 times higher pod yield with net returns of Rs 40000 ha^{-1} and BC ratio of 2.64 as compared to 1.52 in RDF.
	Year of conclusion	:	2018
	Developed by	:	Department of Soil Science, ARS, Utukur
	Status of the Technology	:	Submitted for publication and in review.

12.	Name of the Technology	:	**Integrated Disease Management of Peanut Bud Necrosis**
	Description of the Technology	:	Significantly high reduction of both Peanut bud necrosis disease (PBND) (2.2 %) and thrips damage (33.1 %) and high pod (1581 kg ha^{-1} a) and haulm yield (2028 kg ha^{-1} a) with ICBR of 2.7 were recorded by adopting integrated practices of module *viz*., Border crop with bajra (4 rows) + Seed treatment with imidacloprid 600 FS@ 1 ml kg^{-1} seed + Foliar sprays using thiocloprid 480 SC @ 150 ml ha^{-1} at 20 - 25 DAS followed by fipronil 5 SC @ 1ml L^{-1} @ 40 DAS and Acetamiprid 20 SP@ 100 g ha^{-1} at 35-40 DAS at ARS,Kadiri. The above IDM module is effective in reducing the incidence of PBND and PSND resulting in the increased pod yield (2700 kg ha^{-1}) over control (2064 kg ha^{-1}) with the highest incremental BC ratio of 2.4 at RARS, Tirupati also. 
	Year of conclusion	:	2018
	Developed by	:	Department of Pathology, ARS, Kadiri and RARS, Tirupati
	Status of the Technology	:	Included in ZREAC proceedings

13.	Name of the Technology	:	**Chemical Control of Foliar Diseases in groundnut**
	Description of the Technology	:	Seed treatment 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 recorded significantly less intensity of early leaf spot (36.0 % PDI), late leaf spot (24.7 % PDI), rust (21.3 % PDI) and *Alternaria* blight (25.9 % PDI) coupled with the highest pod (1419 kg $ha^{-1)}$ and haulm yield (2510 kg ha^{-1}) with highest ICBR of 12.5 .


Chemical spray control

Year of conclusion : 2018

Developed by : Department of Pathology, ARS, Kadiri

Status of the Technology : Includeded in Vyavasaya Panchagam

14. Name of the Technology : **Management of Collar Rot in Groundnut**

Description of the Technology : Seed treatment with tebuconazole @ 1.0 g kg^{-1} + Soil drenching with hexaconazole @ 2.0 ml L^{-1} at 10 and 20 DAS results in lowest percent disease index (4.0) with the highest pod yield of 1760 kg ha^{-1} and BC ratio of 1.54 whereas highest percent disease index (19.1), lowest pod yield (1341 kg ha^{-1}) and BC ratio of 1.21 in tebuconazole seed treatment alone recorded.

Year of conclusion : 2018

Developed by : Department of Plant Pathology, ARS, Utukur

Status of the Technology : Disseminated through T & V meetings and ZREAC

15. Name of the Technology : **Seed Treatment against Sucking Pests in groundnut**

Description of the Technology : Imidacloprid 600FS @ 2 ml + 4 ml water kg^{-1} seed gives the highest reduction of 78.18 and 72.70 per cent of thrips at 14 and 28 DAS and 54.00 per cent reduction in leaf hopper incidence at 28 DAS with the pod yield of 1420 kg ha^{-1} and BC ratio of 1.35 as compared to untreated control (920 kg ha^{-1} & BC ratio of 0.90).

Year of conclusion : 2018

Developed by : Department of Entomology, RARS, Tirupati

Status of the Technology : Included in Vyavasaya Panchangam

16.	Name of the Technology	:	**Pheromones for Red Hairy Caterpillar (RHC)**
	Description of the Technology	:	Identified four Pheromone components and made into silica and plastic septa. Silica septa with 3-5 mg were effective for trapping RHC males.
	Year of conclusion	:	2018
	Developed by	:	Department of Entomology, RARS, Tirupati
	Status of the Technology	:	Manuscript submitted for Biochemical and Biophysical Research Communications. Refer Annexure-I, S. No. 76.

17.	Name of the Technology	:	**Bruchid Management in Stored Groundnut Pods with Essential Oils**
	Description of the Technology	:	In groundnut bruchid management with essential oils along with chemical check, spinosad 45 SC @ 0.6 ml kg^{-1} recorded highest mean mortality of 91.6% bruchids followed by neem oil 10 % @ 10 ml L^{-1} with 90.0% mortality of bruchids.
			 **Neem Oil (10 %)** **Control**
	Year of conclusion	:	2019
	Developed by	:	Department of Entomology, ARS, Kadiri
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 77

18.	Name of the Technology	:	**Geometry Alterations to Maximise Yield in groundnut**
	Description of the Technology	:	Sowing of *rabi* groundnut at narrow spacing of 15 cm x 8 cm gives yield of 4681 kg ha^{-1} with BC ratio of 2.90 which was 18.56 % higher than the recommended spacing of 22.5cm x10 cm with 3812 kg ha^{-1} and BC ratio of 3.12.
	Year of conclusion	:	2019
	Developed by	:	Department of Agronomy, ARS, Utukur
	Status of the Technology	:	Paper published. Refer Annexure-I, S. No. 51

19.	Name of the Technology	:	**Foliar Nutrition**
	Description of the Technology	:	Application of 13-0-45 @ 0.5% twice on groundnut crop at 30 & 60 DAS along with RDF (30:40:50 kg NPK ha^{-1}) increases the yield (2801 kg ha^{-1}) by 26.9% over no foliar application (2207 kg ha^{-1}) during *rabi* with an additional income of

			Rs.30,000 ha^{-1} and BC ratio of 1.55 as compared to 1.23 in control.
	Year of conclusion	:	2019
	Developed by	:	Department of Soil Science, RARS, Tirupati
	Status of the Technology	:	Under OFT 2nd year

20.	Name of the Technology	:	**Management of Foliar Diseases in groundnut**
	Description of the Technology	:	Spraying with a combination fungicides of tebuconazole 50 % + trifloxystrobin 25 % WG @ 1.3 g L^{-1} at 40 and 65 DAS is effective in controlling early leaf spot, late leaf spot resulting in the increased pod yield (1963 kg ha^{-1}) over control (1205 kg ha^{-1}) with the highest incremental BC ratio of 2.2.
	Year of conclusion	:	2019
	Developed by	:	Department of Pathology, RARS, Tirupati
	Status of the Technology	:	Two years of OFT completed

21.	Name of the Technology	:	**Foliar Spray to Mitigate Mid-Season Drought in Groundnut**
	Description of the Technology	:	Foliar spray with 0.5% Potassium nitrate (13-0-45) to groundnut during dry spell at peg penetration to pod development stage, whenever there is a continuous dry spell of 10 days in between two rainfall events recorded 26.6 % increase in yield and BC ratio of 1.92 over control (1.56).
	Year of conclusion	:	2019
	Developed by	:	AICRP on Dryland Agriculture, ARS, Ananthapuramu
	Status of the Technology	:	Demonstrations conducted under NICRA in farmer fields

0.5% foliar sprays with KNO_3 **Control – No spray**

22.	Name of the Technology	:	**Phosphatic Bio-Fertilizer Consortium to Solubilize Native Soil Phosphorus in Rainfed Groundnut**
	Description of the Technology	:	Application of Soil test-based fertilizer (STBF) + P bio fertilizer consortium; (PSB @ 5 kg ha^{-1} + PSF @ 5 kg ha^{-1} + VAM @ 12.5 kg ha^{-1}) as basal dose at the time of sowing of rainfed groundnut increased 17.5% higher yield with BC Ratio of 1.78 over control 1.61.
	Year of conclusion	:	2019
	Developed by	:	AICRP on Dryland Agriculture, ARS, Ananthapuramu
	Status of the Technology	:	Disseminated through T & V meetings and ZREAC meetings.

STBF + P Biofertilizer consortium Control

23.	Name of the Technology	:	**Pest-Weather Relationship in Groundnut**
	Description of the Technology	:	A week with rainfall less than 10 mm and subsequently followed by a dry spell, favours leaf miner multiplication. If the weekly rainfall was less than 6.4 mm and sunshine hours per day reached 7.3, recorded >200 leaf miner webs per square meter. On the other hand, if the weekly rainfall is 13.0-30.0 mm, the leaf miner incidence was decreased (<50 leaf miner webs per square meter).
	Year of conclusion	:	2019
	Developed by	:	AICRP on Dryland Agriculture, ARS, Ananthapuramu
	Status of the Technology	:	Disseminated through T & V meetings, ZREAC and Vyavasayam magazine

24.	Name of the Technology	:	**Economising Phosphorous Use in Groundnut Production by Exploiting Phosphorous Build-Up in Soil.**
	Description of the Technology	:	Application of FYM @ 5 t ha^{-1} + 50% Recommended dose of P + DGRC2 (as seed treatment) recorded on par pod yield (980 kg ha^{-1}) with that of FYM @ 5 t ha^{-1}+100% P+DGRC2 (1016 kg ha^{-1}) and recorded highest net returns (Rs. 35647 ha^{-1}) and benefit cost ratio (1.82).
	Year of conclusion	:	2019
	Developed by	:	Department of Agronomy, ARS, Kadiri
	Status of the Technology	:	Conducted OFT in DAATTC & KVK, Anantapur.

25.	Name of the Technology	:	**Integrated Weed Management in Rabi Groundnut with Pre and Early Post Emergence Herbicides**
	Description of the Technology	:	Pre-emergence application of Pre mix combination herbicide Pendimethalin 30 EC + Imazethapyr 2 EC @ 2.5 Litre ha^{-1} as pre emergence followed by Quizalofop – p-ethyl @ 1 Litre ha^{-1} at 15-20 DAS has recorded higher pod yield (2232 Kg ha^{-1}) , higher weed control efficiency (80% at 30 DAS & 79 % at 60 DAS), higher net returns (Rs.59,635 ha^{-1}) and BC ratio of 1.93.
	Year of conclusion	:	2019
	Developed by	:	Department of Agronomy, ARS, Kadiri
	Status of the Technology	:	Included in ZREAC proceedings.

26.	Name of the Technology	:	**Alleviation of Moisture-Deficit Stress in Groundnut by Application of Endophytic Bacteria**
	Description of the Technology	:	Application of endophytic bacteria DGREB 2 as seed treatment @ 3.0 gm kg^{-1} seed resulted higher mean pod yield (1,424 kg $ha^{-1)}$ which is on par with DGREB 3 (1,328 kg ha^{-1}). Highest Net returns (Rs.36,850 ha^{-1}) and BC ratio (1.78) was recorded with DGREB-2.
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, ARS, Kadiri
	Status of the Technology	:	Results submitted to DGR.

27.	Name of the Technology	:	**Evaluation of Bio-Formulations in *Kharif* Groundnut Production**
	Description of the Technology	:	Application of bio formulation developed by DGR, "Bio grow" as seed treatment @ 5.0 ml kg^{-1} seed recorded higher pod yield (1733 kg ha^{-1}) but was on par with the application of NPK liquid formulation + Zinc formulation (1634 kg ha^{-1}). Application of 100 % RDF along with Biogrow recorded significantly higher pod yield (1700 kg ha^{-1}) but on par with 75 % RDF along with Biogrow treated seed (1637 kg ha^{-1}). Hence it can be recommended that, application of 75% RDF along with Biogrow will reduce 25 % recommended dose of fertilizer to the Groundnut crop.
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, ARS, Kadiri
	Status of the Technology	:	Results submitted to DGR.

28.	Name of the Technology	:	**Evaluation of Potassium Feldspar on Productivity of Rainfed Groundnut.**
	Description of the Technology	:	Application of potassium feldspar to the soil as mulch @ 25 tons ha^{-1} significantly increased pod yield (1238 kg ha^{-1}) in rainfed groundnut compared to control (kg ha^{-1}). Similarly weed density was also lower comparatively in the crop where potassium feldspar was applied .Values not given
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, ARS, Kadiri
	Status of the Technology	:	Results are disseminated to farmers and DoA staff.

29.	Name of the Technology	:	**Use of Liquid Biofertilizers in Groundnut**
	Description of the Technology	:	Liquid *Rhizobium* (1.25 L ha^{-1}) + PSB (1.25 L ha^{-1}) + 50 % STBF + FYM 2.5 t ha^{-1} gives higher pod yield (2914 kg ha^{-1}) which is 3.99 % higher compared to 100 per cent soil test based fertilizer application (STBF) (2869 kg ha^{-1}) and results in Rs.10290/- higher net returns with BC ratio of 2.23 compared to 2.13 in STBF alone.
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, RARS, Tirupati
	Status of the Technology	:	Publication under progress

30.	Name of the Technology	:	**Weed Control with Pre-Emergence Application of Herbicides**
	Description of the Technology	:	Pre emergence application of pendimethalin + imazethapyr (Premix) herbicide @ 5 ml L^{-1} effectively controlled grassy and broad leaf weeds and results in on par yield (3066 kg ha^{-1}) with two hand weedings at 20 & 40 DAS (3250 kg ha^{-1}). In addition, herbicide application reduced the cost of cultivation by Rs. 22,500 ha^{-1} with BC ratio of 3.96 against 2.90 in control.
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, RARS, Tirupati
	Status of the Technology	:	OFT 2^{nd} year

31.	Name of the Technology	:	**Growing of Legumes with Summer Rainfall Preceding to *Kharif* Groundnut**
	Description of the Technology	:	Sowing cowpea (1744 kg ha^{-1}), green gram (1699 kg ha^{-1}) and sunhemp (1609 kg ha^{-1}) during summer by utilizing summer rainfall is best for improved yields of *kharif* groundnut compared to fallow (1478 kg ha^{-1}) with additional benefit of highest fungal population (28.3 x 10^4 cfu g^{-1} of soil) and

			actinomycetes population (24 x 10^4 cfu g^{-1} of soil) in sunhemp cultivated plots.
	Year of conclusion	:	2020
	Developed by	:	Department of Agrometeorology, RARS, Tirupati
	Status of the Technology	:	Included in ZREAC proceedings

32.	Name of the Technology	:	**Shale Application in Groundnut**
	Description of the Technology	:	Application of 75 % RDF (15-40-50 kg NPK ha^{-1}) along with shale mineral @ 200 tonnes ha^{-1} (≈45 tractor loads) once in three years results in highest pod yield (2115 kg ha^{-1}) and was on par with 50 % RDF + shale mineral @ 250 tonnes ha^{-1} once in three years (1988 kg ha^{-1}) with BC ratio of 2.84 & 2.92 respectively and 26.5 & 18.9 % higher pod yield than 100% RDF+FYM @ 5 t ha^{-1} (1671 kg ha^{-1}) with BC ratio of 2.31 by improving soil hydro-physical and physical properties of heavy textured rainfed black soils.
	Year of conclusion	:	2020
	Developed by	:	Department of Soil Physics, RARS, Tirupati
	Status of the Technology	:	OFT 2nd year by KVK, Utukuru and Abstract published. Refer Annexure II, S. No. 6 for more information

33.	Name of the Technology	:	**Evaluation of DAPG-Producing Fluorescent Pseudomonas for Enhancing Nutrient Use Efficiency, Bicontrol of Soil Borne Disease and Yield of Groundnut.**
	Description of the Technology	:	**Pseudomonas fluorescens** FP-86 strain has recorded significantly higher pod yield (948 kg ha^{-1}) over all other inoculants and was on par with DAPG-2. Dry root rot was significantly lowest with DAPG-2 which was on par with DAPG-4, FP-86 and Trichoderma spp. Stem rot incidence was significantly lower with the application of different DAPG producing Pseudomonas fluorescence compared to control.
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, ARS, Kadiri
	Status of the Technology	:	Results submitted to DGR, Junagadh.

34.	Name of the Technology	:	**Foliar Nutrition for *Rabi* Groundnut**
	Description of the Technology	:	Foliar spray of 1.5% multi nutrient mixture (MNM) at 30 and 60 DAS during *rabi* results in 16.64 % higher groundnut pod yield (3885 kg ha^{-1}) over control (3330 kg ha^{-1}) reaping Rs 26,313 ha^{-1} additional net returns with BC ratio of 2.03 compared to 1.58 in control (no spray).

	Year of conclusion	:	2021
	Developed by	:	Department of Agronomy, RARS, Tirupati
	Status of the Technology	:	OFT 1st year

35.	Name of the Technology	:	**Conjunctive Use of Liquid Biofertilizers with RDF in Rabi Groundnut**
	Description of the Technology	:	Application of 75 % RDF (22.5-40-50 kg NPK ha^{-1}) + Liquid Biofertilizer consortium @ 3.75 L ha^{-1} through fertigation results in 12.3 per cent higher pod yield (3522 kg ha^{-1}) with BC ratio of 2.42 over 100 per cent RDF (30-40-50 kg NPK ha^{-1})(3137 kg ha^{-1} & BC 1.73) .
	Year of conclusion	:	2021
	Developed by	:	Department of Agronomy, RARS, Tirupati
	Status of the Technology	:	Included in ZREAC proceedings

36.	Name of the Technology	:	**Nutrient Management in Bold Seeded groundnut during *kharif***
	Description of the Technology	:	Application of 150% RDF (30-60-75 kg NPK ha^{-1}) +50 kg ha^{-1} $ZnSO_4$ + 10 kg ha^{-1} Borax results in higher pod yield (3555 kg ha^{-1}) over 100% RDF (30-40-50 kg NPK ha^{-1})(2769 kg ha^{-1}) in bold seeded groundnut with 28.38 % increase and additional income of Rs.28,600/- ha^{-1} with BC ratio of 1.87 as against 1.53 in 100 % RDF.
	Year of conclusion	:	2021
	Developed by	:	Department of Soil Science, RARS, Tirupati
	Status of the Technology	:	Included in ZREAC proceedings

37.	Name of the Technology	:	**Zn Critical Limits for groundnut**
	Description of the Technology	:	The critical limit of Zn for sandy loam soils for groundnut is fixed at 0.83 ppm as against 0.65 ppm based on Cate and Nelson and statistical models. However, $ZnSO_4$ @ 25 kg ha^{-1} is sufficient for the soil application for every *rabi* season.
	Year of conclusion	:	2021
	Developed by	:	Department of Soil Science, RARS, Tirupati
	Status of the Technology	:	Included in ZREAC proceedings & disseminated to DoA & Soil Science dept.

38.	Name of the Technology	:	**Identification of Iron Deficiency Chlorosis Tolerant (IDC) Genotypes**
	Description of the Technology	:	Genotypes *viz.*, TCGS 1624, 1616 and TCGS 2018 were identified as Iron Deficiency Chlorosis Tolerant.
	Year of conclusion	:	2021
	Developed by	:	Department of Physiology, RARS, Tirupati
	Status of the Technology	:	Published. Refer to Annexure I, S. No. 78

39.	Name of the Technology	:	**Efficacy of Native *Bt* Strain for Management of *Spodoptera Litura* in Groundnut**
	Description of the Technology	:	*Bacillus thuringiensis* C33 strain is superior in reduction of *Spodoptera* damage upto 75.72% where the defoliation is only 20-25% with pod yield of 1085 kg ha^{-1} with C33 as compared to control (810 kg ha^{-1}).
	Year of conclusion	:	2021
	Developed by	:	Department of Entomology, RARS, Tirupati
	Status of the Technology	:	OFT 2nd year

40.	Name of the Technology	:	**Dwarfing Mechanism for Groundnut Productivity**
	Description of the Technology	:	Growth regulator Paclobutrazol @ 50 ppm concentration at 50 days after emergence recorded 16% increase in pod yield (2650 kg ha^{-1}) compared to control (No growth regulator) (2282 kg ha^{-1}).
	Year of conclusion	:	2021
	Developed by	:	Department of Agronomy, ARS, Vizianagaram
	Status of the Technology	:	Under the first year of OFT testing

41.	Name of the Technology	:	**Endophytes for Drought Mitigation for Rainfed Groundnut in Scarce Rainfall Zone of A.P.**
	Description of the Technology	:	Chemical seed treatment with imidacloprid @ 2 ml kg^{-1} seed and mancozeb @ 3 g kg^{-1} seed followed by Endophyte culture (J -22 / S – 29/ R – 51) @ 6g kg^{-1} seed + ANGRAU Package of practice + Intercultural operations once in 15 days (3 times, up to 45 days) in rainfed groundnut recorded 9.5% increase in yield with BC ratio of 1.71 over control (1.63).
	Year of conclusion	:	2021
	Developed by	:	AICRP on Dryland Agriculture, Department of Agronomy, ARS, Ananthapuramu
	Status of the Technology	:	Endophytes developed

Endophyte culture , intercultural operation

42.	Name of the Technology	:	**Optimum Sowing Time and Irrigation Requirement for *Kharif* and Summer Groundnut**
	Description of the Technology	:	During *kharif* season, July sown crop resulted in significantly higher (22%) pod yield (1123 kg ha^{-1}) compared to August sown crop (816 kg ha^{-1}) under rainfed situation. Under irrigated situation in kharif, July sown crop irrigated at 0.6 IW/ CPE required 416 - 521 mm and resulted in higher (19%) pod yield (2102 kg ha^{-1}) compared to August sown crop (1680 kg ha^{-1}), which required 347 mm (0.6 IW/ CPE). During summer season, sowing of groundnut in 1st week of May resulted higher mean pod yield (2575 kg ha^{-1}) compared to sowing in March and April months. (pod yield)
	Year of conclusion	:	2021
	Developed by	:	Department of Agrometeorology, ARS, Ananthapuramu and Kadiri
	Status of the Technology	:	Disseminated through T & V meetings and ZREAC and recommendation given in Vyavasayam

43.	Name of the Technology	:	**Integrated Disease Management for Soil Borne Diseases**
	Description of the Technology	:	• Deep summer ploughing with mould board plough + • Soil application of *Trichoderma asperellum* @ 4 kg ha^{-1} enriched in 250 kg FYM ha^{-1} + • Seed treatment with Tebuconazole 2DS @ 1.5 g kg^{-1} seed followed by seed treatment with *Pseudomonas fluorescens* @ 625 g ha^{-1} of seed + • Soil application of *Trichoderma asperellum* @ 4 kg ha^{-1} enriched in 250 kg FYM ha^{-1} at 35 and 70 DAS. Significantly recorded low incidence of dry root rot (4.4 %) and stem rot (5.7 %) and significantly high pod (1613 kg ha^{-1} kg ha^{-1}) and haulm yield (2330 kg ha^{-1}) with high ICBR of 1:3.9.
	Year of conclusion	:	2022
	Developed by	:	Department of Plant athology, ARS, Kadiri
	Status of the Technology	:	First year OFT

44.	Name of the Technology	:	**Organic Farming**
	Description of the Technology	:	Application of 10 t ha^{-1} FYM+ Neem oil sprays (need based) + pheromone traps (20 ha^{-1}) + border crop + hand weeding gives on par average yield (1935 kg $ha^{-1)}$ with ICM practice (1870 kg ha^{-1}) over five years with BC ratio of 1.38 in OF as against 1.60 in ICM.
	Year of conclusion	:	Ongoing
	Developed by	:	Department of Soil Science, RARS, Tirupati
	Status of the Technology	:	Under OFT 2nd year

Sunflower

1.	Name of the Technology	:	**Bio Intensive Management of Powdery Mildew Disease in Sunflower**
	Description of the Technology	:	Spraying of propiconazole @ 0.1% for two times at 45 and 60 days after sowing reduced the disease severity (PDI) by 68.55% with 43.12% yield advantage (1273 kg ha^{-1}) and BC ratio of 0.95 followed by spraying of NSKE @ 5 ml L^{-1} at 45 DAS + difenconazole @ 0.05 % at 60 DAS which reduced the disease severity (PDI) by 59.89% with an yield advantage of 42.3% and BC ratio of 0.85 over control with PDI of 56.6%, yield of 724 kg ha^{-1} and BC ratio of 0.21.
	Year of conclusion	:	2015
	Developed by	:	Department of Plant Pathology, RARS, Nandyal
	Status of the Technology	:	OFT completed and research paper published. Refer Annexure I, S. No. 79 for more information


Powdery mildew

2.	Name of the Technology	:	**Integrated Disease Management in Sunflower**
	Description of the Technology	:	Seed priming with *Trichoderma viridae* @ 10 g kg^{-1} seed + two sprays of propiconazole @ 0.1% + azadarictin @ 1.5 ml L^{-1} recorded less Alternaria leaf spot of 44.2% (PDI), necrosis incidence of 7.2% with higher yield of 1588 kg ha^{-1} and BC ratio of 0.81 compared to control which recorded Alternaria leaf spot of 67.5%, necrosis incidence of 9.6%, with lower yield of 1144 kg $ha^{-1}$and BC ratio of 0.38.
	Year of conclusion	:	2016

Developed by	:	Department of Plant Pathology, RARS, Nandyal
Status of the Technology	:	OFT completed and Paper was published. Refer Annexure I, S. No. 80 for more information

Necrosis

3.	Name of the Technology	:	**Management of Alternaria Leaf Blight of Sunflower**
	Description of the Technology	:	Seed treatment with *P.fluorescens* @ 10 g kg^{-1} followed by spraying of propiconazole @ 0.1% at 45 and *P.fluorescens* @ 1% at 60 days after sowing recorded 41.48% less disease severity with PDI of 31.9% with 28% higher yield compared to control (1375 kg ha^{-1}) and B:C ratio of 1.8. Whereas control recorded PDI of 54.52% with low yield of 986 kg ha^{-1} and BC ratio of 1.55
	Year of conclusion	:	2017
	Developed by	:	Department of Plant Pathology, RARS, Nandyal
	Status of the Technology	:	OFT completed and published. Refer Annexure I, S. No. 81

Alternaria leaf blight symptoms

4.	Name of the Technology	:	**Nutrient Management in Sunflower**
	Description of the Technology	:	Application of site specific target yield NPK + Sulphur (20 kg ha^{-1}) + 5t FYM ha^{-1} + black gram crop residue incorporation @ 1.0 t ha^{-1} with 2.5 kg ha^{-1} of *Trichoderma viridae* recorded 35% increase in yield (2271 kg ha^{-1}) and Net returns (Rs.46483 ha^{-1}) and BC ratio of 2.1 followed by Site Specific (soil test based) target yield NPK + S + Zn with yield of 2055 kg ha^{-1} , net returns Rs.39671/- and BC ratio of 2.4). Whereas check (100% RDF) recorded seed yield of 1682 kg ha^{-1}.
	Year of conclusion	:	2019
	Developed by	:	Department of Agronomy, RARS, Nandyal

	Status of the Technology	:	OFT completed

Nutrient management in sunflower

5.	Name of the Technology	:	**Management of Sucking Pests in Sunflower with New Insecticides.**
	Description of the Technology	:	Foliar spray with Flonicamid (78.8%), fipronil (72.1%), acephate (60.4%) and acetamiprid (58.9%) led to significant reduction in thrips incidence, flonicamid and fipronil significantly reduced the leaf hoppers (94.4 and 75.2% reduction respectively); and whiteflies were reduced by 67.9% with flonicamid followed by diafenthiuron (67.2%), spiromesifen (66.9%) and acetamiprid (64.8%). Maximum yield was obtained with diafenthiuron (1569 kg ha^{-1}) followed by flonicamid (1557 kg ha^{-1}), fipronil (1543 kg ha^{-1}) and acetamiprid (1517 kg ha^{-1}) with benefit cost ratio of 2.02, 2.04, 2.05 and 2.04 respectively against a yield of 1157 kg ha^{-1} and benefit cost ratio of 1.62 in untreated control.
	Year of conclusion	:	2019
	Developed by	:	Department of Entomology, RARS, Nandyal
	Status of the Technology	:	Research paper published. Refer Annexure I, S. No. 84

6.	Name of the Technology	:	**Evaluation of New Chemical Molecules against Viral Diseases of Sunflower.**
	Description of the Technology	:	Seed treatment with Imidacloprid 600 FS @ 5 ml kg^{-1} seed+ foliar spray with Diafenthiuron 50 wp @1.25 g lit^{-1} at 30, 45 and 60 DAS and Seed treatment with Imidacloprid 600 FS @ 5 ml kg^{-1} seed + foliar spray with Flonicamide 50 WG (Ulala) @ 0.25g L^{-1} at 30, 45 and 60 DAS recorded disease incidence of 23.71 and 24.29% with yield of 1591 and 1573 kg $ha^{-1}$and BC ratios of 1.79 and 1.8, respectively. Both the treatments have shown 42.82% and 39.29% of disease reduction and recorded higher yields of 17.53% and 16.05% over control which

recorded disease incidence of 41.9% with yield of 1268 kg ha^{-1} and BC ratio of 1.69.

Year of conclusion : 2019

Developed by : Department of Plant Pathology, RARS, Nandyal

Status of the Technology : OFT was given to KVK, Kalyandurg and Banavasi.

Research paper published. Refer Annexure I, S. No. 83.

Viral disease of sunflower

7. Name of the Technology : **Planting Method for *Kharif* Sunflower**

Description of the Technology : In *kharif* season cultivation of sunflower in ridge and furrow method at 60 cm x 30 cm with 125 % RDF (75- 75 - 37.5 kg NPK ha^{-1}) recorded 67% higher yield (659 kg ha^{-1}) with profit of Rs.11537/- and BC ratio of 1.6 followed by Broad bed and furrow method with paired row planting at 45 cm x 30 cm and 125 % RDF (yield 606 kg ha^{-1} and profit Rs.7639/-. BC ratio 1.42). Whereas check (flat bed method with 100% RDF) recorded seed yield 405 kg ha^{-1}

Year of conclusion : 2020

Developed by : Department of Agronomy, RARS, Nandyal

Status of the Technology : OFT completed

Broad bed and furrow with paired row planting

Ridge and furrow planting at 60 cm x 30 cm

Check (flat bed method)

8. Name of the Technology : **Management of Sunflower Diseases Using Plant Growth Promoting Rhizobacteria (PGPR).**

Description of the Technology : Seed treatment with *P. fluorescens* @ 10 g kg^{-1} seed + soil application of *P.fluorescens* @ 2.5 kg ha^{-1} fortified with 250 kg FYM + two foliar sprays of *P.fluorescens* @ 45 and 60 DAS recorded *Alternaria* leaf spot (PDI) severity of 43.96 % and

powdery mildew severity (PDI) of 12.4% and yield of 1233 kg ha^{-1} with BC ratio of 1.4 compared to control with *Alternaria* leaf spot PDI of 50.48%, powdery mildew severity (PDI) of 20.64%, yield of 1006 kg ha^{-1} and BC ratio of 1.34.

For powdery mildew disease, significant difference was observed and the above treatment was found best of disease reduction.

Year of conclusion : 2020

Developed by : Department of Plant Pathology, RARS, Nandyal

Status of the Technology : Disseminated through T & V, ZREAC etc.

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9. Name of the Technology : **Evaluation of Plant Defense Inducers for the Management of Important Diseases of Sunflower**

Description of the Technology : Seed treatment with salicylic acid @100 ppm + foliar spray of Salicylic acid (SA) @ 100 ppm at the time of initiation of disease and after 15 days , resulted in 27.98% PDI of Alternaria leaf spot with yield of 1661 kg ha^{-1} and BC ratio of 2.01 compared to control which recorded PDI of 45.9% and yield of 1438 kg ha^{-1} with BC ratio of 1.86. The same treatment recorded low powdery mildew disease (PDI) of 11.64% whereas control has recorded 17.32%.

Year of conclusion : 2020

Developed by : Department of Plant Pathology, RARS, Nandyal

Status of the Technology : On farm validation trial is going on at RARS, Nandyal

30 days

45 days

60 days

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10. Name of the Technology : **Boron Foliar Nutrition in Sunflower**

Description of the Technology : Sunflower seed yield was 24.6% higher (2289 kg ha^{-1}) with boron foliar application at 0.3% concentration twice at V-4 and R--3 stages and on par with application at 0.2% concentration at (2207 kg ha^{-1}) V-4 and R--3 stages whereas control (no boron foliar spray) recorded seed yield of 1837 kg ha^{-1}.

Year of conclusion : 2020

Developed by	:	Department of Agronomy, RARS, Nandyal
Status of the Technology	:	Paper published. Refer Annexure I, S. No. 85

Spraying of boron

11.	Name of the Technology	:	**Agro Techniques for Rice Fallow Sunflower**
	Description of the Technology	:	In *rabi* season, cultivation of sunflower in paddy fallows under Zero tillage method (Herbicide spray (Paraquat @ 5 ml water^{-1} + Pendimethalin @ 5ml L^{-1} water) + seed dibbling with 150% RDF(112.5 -135-45 kg NPK ha^{-1}) recorded 26.8% higher yield (1062 kg ha^{-1}) with BC ratio of 1.46 compared to Conventional tillage (2 plough fb 2 times cultivator and 1 rotavator with 150% RDF with yield of 837 kg ha^{-1} and BC ratio of 1.2.
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	1st year OFT completed

Zero tillage crop **conventional tillage crop**

12.	Name of the Technology	:	**Good Agricultural Practices for Rabi Sunflower**
	Description of the Technology	:	Practice of good agricultural practices i.e. sowing in ridges and furrows, seed treatment with fungicide saff (Carbendagim 12% + mancozeb 63%) at 2 g kg^{-1} seed + insecticide Imidachloprid at 5 ml kg^{-1} seed and bio fertilizers (Azospirellum 5 kg ha^{-1} + PSB 1.0 kg ha^{-1} and use of Pendimethalin 5 ml lit^{-1} of water aspre emergence herbicide for weed control and STCR based fertilizer application etc. has recorded 28% increase in seed yield (2068 $kgha^{-1}$) with net returns of Rs. 85512 ha^{-1} and BC ratio of 3.2 compared to farmers practice where crop was sown in traditional method (flat bed) and use of RDF (75-90-30 kg NPK ha^{-1}) which recorded seed yield of 1669 kg ha^{-1} with net returns of Rs. 83685 and BC ratio of 3.5.
	Year of conclusion	:	2021
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	1st year OFT completed



Ridge and furrow planting **biofertilizer application** **Boron 0.2% spray**

13.	Name of the Technology	:	**Management of Alternaria Leaf Spot Using Combi Products of Fungicides in Sunflower.**
	Description of the Technology	:	Seed treatment with carbendazim 12% + mancozeb 63% wp @ 2 g kg^{-1} seed followed by two foliar sprays with trifloxystrobin 25%+ tebuconazole 50% (Nativo 75WG) @ 0.3 g L^{-1} recorded disease severity (PDI) of 37.5% with yield of 1382 kg $ha^{-1}$and BC ratio of 1.57 followed by seed treatment and two foliar sprays with difenconazole 25% + propiconazole 25% (TASPA 500EC) @ 0.25% ml L^{-1} recorded PDI of 40.95%, with yield of 1363 kg $ha^{-1}$and BC ratio of 1.65 compared to control which recorded disease severity of 53.38% and yield of 1200 kg ha^{-1} and BC ratio of 1.5.
	Year of conclusion	:	2021
	Developed by	:	Department of Plant Pathology, RARS, Nandyal
	Status of the Technology	:	OFT given to KVK, Banavasi and KVK, Kalyanadurgam.

14.	Name of the Technology	:	**Selection of a Suitable Crop and Schedule of Irrigation During Rabi Season in Alfisols of Anantapuramu District**
	Description of the Technology	:	Among three irrigation schedules (IW/CPE ratios 1.0, 0.8 and 0.6 with 50 mm depth of irrigation), higher sunflower equivalent yield was recorded with irrigation at IW/ CPE 1.0. The yield levels were at par with irrigation at 0.6 and 0.8 IW/CPE ratios. Sunflower recorded higher gross returns (Rs. 46160 ha^{-1}), net returns (Rs. 37660 ha^{-1}) and BC ratio of 4.40 followed by Mustard which recorded gross returns of Rs. 32,603 ha^{-1}, net returns (Rs.24103 ha^{-1}) and BC ratio of 2.84. 
	Year of conclusion	:	2021
	Developed by	:	Department of Agronomy, ARS, Reddipalle
	Status of the Technology	:	Included ZREAC recommendations

15.	Name of the Technology	:	**Assessment of Yield Losses by Leaf Curl Disease in Sunflower.**
	Description of the Technology	:	Seed yield losses were observed as 79.61% when the infection takes place in 30 days old crop. Seed yield losses were 58%, 47.94%, 34.7%, 23.26% when the infection takes place on 40, 50, 60 and 70 days old crop. 
	Year of conclusion	:	2022
	Developed by	:	Department of Plant Pathology, RARS, Nandyal
	Status of the Technology	:	-

Safflower

1.	Name of the Technology	:	**Agrotechniques for Safflower in Alkali Soils**
	Description of the Technology	:	Application of gypsum @ 10 t ha^{-1} + FYM @ 10 t ha^{-1} + 25% extra nitrogen 50 kg ha^{-1} than recommended dose (40:25 NP kg ha^{-1}) recorded the highest seed yield (1434 kg ha^{-1}) over farmers practice (477 kg ha^{-1}) in saline soils having EC 

	Year of conclusion	:	2016
	Developed by	:	Department of Agronomy, SWS, Bapatla
	Status of the Technology	:	Paper published. Refer Annexure

Sesamum

1.	Name of the Technology	:	**Management of Powdery Mildew in Sesamum**
	Description of the Technology	:	Spraying of Carbendazim @ 1.0 g L^{-1} results in lowest per cent disease index of 20.6% with yield of 604 kg ha^{-1} & BC ratio of 1.36 compared to control with highest percent disease index (59.6), lowest yield (532 kg ha^{-1}) and BC ratio (0.96).
	Year of conclusion	:	2016
	Developed by	:	Department of Plant Pathology, ARS, Utukur
	Status of the Technology	:	Disseminated through T & V, ZREAC meetings etc.

2.	Name of the Technology	:	**Pre and Post Emergence Weedicides for Effective Control of Weeds in Sesamum.**
	Description of the Technology	:	Pre-emergence application of pretilachlor @ 1.0 litre ha^{-1} controlled the weeds effectively and recorded higher seed yield (223 kg ha^{-1}) (19.8%) compared to no weedicide application which was comparable with hand weeding twice at 20 & 40 DAS (186 kg ha^{-1}).
	Year of conclusion	:	2017
	Developed by	:	Department of Agronomy, RARS, Anakapalle
	Status of the Technology	:	OFT conducted. Presented in National seminar and Abstract published. Refer Annexure II, S. No.7

3.	Name of the Technology	:	**Effect of Sowing Date and Plant Protection on The Incidence of Vector Leaf Hopper and Sesame Phyllody.**
	Description of the Technology	:	The highest seed yield (299.5 kg ha^{-1}), lowest disease incidence (0.05%) and leaf hopper population (0.17 per plant) were observed in early sowing (15th December) and spraying with imidacloprid 17.8 SL @ 0.3 ml L^{-1} applied twice at 30 and 50 days after sowing which are comparable to 31st December sowing. Data indicated that early infestation by leaf hopper in late sown crop was the most damaging and resulted in the highest phyllody and yield reduction (193.2 kg ha^{-1}).  
	Year of conclusion	:	2017
	Developed by	:	Department of Entomology, ARS, Darsi
	Status of the Technology	:	Paper published. Refer Annexure I, S. No.87, 88

4.	Name of the Technology	:	**Standardization of Sowing Dates of Sesamum During *Rabi* / Summer Season for Alfisols of Anantapuramu District**
	Description of the Technology	:	A significantly higher seed yield of sesame was recorded with October 1st (401 kg ha^{-1}) sowing which was at par with seed yield of January 1st (390 kg ha^{-1}) sowing. Statistically significant higher gross returns (Rs.33920 ha^{-1}) and net returns (Rs. 25135 ha^{-1}) were recorded with the January 1st date of sowing. 
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, ARS, Reddipalle
	Status of the Technology	:	Research highlights were brought out in the form of a booklet & distributed to farmers

5.	Name of the Technology	:	**Intercropping for Management of Sucking Pests in Sesame**
	Description of the Technology	:	Intercropping with green gram and finger millet reduced the sucking pest load (2.77-5.23 per plant) in sesame compared to sole sesame (4.54-8.57 per plant). Intercropping registered more number of coccinellids (1.01 &1.11) and spiders (1.02 &1.03) per plant compared to check (0.13 coccinnellids and 0.14 spiders per plant). Higher BC ratio was recorded with sesame + green gram (1.58) followed by sesame + finger millet (1.56) compared to sole sesame (1.27).
	Year of conclusion	:	2021
	Developed by	:	Department of Agronomy , RARS, Anakapalle
	Status of the Technology	:	OFT conducted in 2021-22. Paper published. Refer Annexure I, S. No.89

Intercropping in sesame with finger millet and greengram

6.	Name of the Technology	:	**Insecticidal Management of Sucking Pests in Sesame**
	Description of the Technology	:	Seed treatment with Imidacloprid 70WS (7.5 g kg^{-1} seed) followed by foliar spray of imidacloprid 17.8 SL (0.25 ml L^{-1}) at 30 and 60 DAS was effective in reducing the incidence of sucking pests (0.43 to 1.62 per plant) compared to check (1.23 to 7.36 per plant). It has registered BC ratio of 2.71 compared to check (foliar spray of monocrotophos 36SL (1.6ml L^{-1}) at 30 and 60 DAS) (1.88).
	Year of conclusion	:	2021
	Developed by	:	Department of Entomology, RARS, Anakapalle
	Status of the Technology	:	OFT conducted in 2021-22. Paper published. Refer Annexure I, S. No.90

7.	Name of the Technology	:	**Sowing Window for sesame during Early *Kharif***
	Description of the Technology	:	Sowing of sesamum during May II F.N gives significantly highest seed yield (1008 kg ha^{-1}) and 91.2 % higher yield over June II F.N (527 kg ha^{-1}) with highest BC ratio of 3.36 as against 1.64 in June II F.N.
	Year of conclusion	:	2021
	Developed by	:	Department of Agronomy, ARS, Nellore
	Status of the Technology	:	Disseminated through T & V, ZREAC etc.

8.	Name of the Technology	:	**Identification of Optimum Sowing Time for Sesame During Rabi in North Coastal Zone of Andhra Pradesh Under Irrigated Conditions.**
	Description of the Technology	:	Sowing of Sesamum during Second F.N of December recorded higher seed yield (897 kg ha^{-1}) and lowest seed yield of 409 kg ha^{-1} was recorded with 1st F.N of February sowing.
	Year of conclusion	:	2022
	Developed by	:	Department of Agronomy, RARS, Anakapalle
	Status of the Technology	:	OFT proposed during 2023-24

9.	Name of the Technology	:	**Integrated Management of Stem and Root Rot in Sesame.**
	Description of the Technology	:	Seed treatment with *T. harzianum* @10 g kg^{-1} + soil application of *T. harzianum* @ 2.5 kg ha^{-1} as basal dose significantly reduced stem and root rot of sesame caused by *Macrophomina phaseolina* with less disease incidence of 3.7% over control (19%) and recorded highest grain yield of 986 kg ha^{-1} with ^{BC} ratio of 3.2 compared to control (495 kg $ha^{-1}$and 1.9).
	Year of conclusion	:	2022
	Developed by	:	Department of Plant Pathology,ARS, Yelamanchili
	Status of the Technology	:	Under first year OFT testing

10.	Name of the Technology	:	**Management of Sesame Phyllody through Vector Control**
	Description of the Technology	:	Seed treatment with Imidacloprid 600 FS@ 5ml kg^{-1} and foliar spray with Imidacloprid @ 0.3 ml L^{-1} at 30 & 45 DAS gave significantly less incidence (2.8%) and highest grain yield of 767 kg ha^{-1} and BC ratio of 3.2 compared to control where maximum incidence (21.3%) of phyllody and minimum grain yield of 459.8 kg ha^{-1} with BC ratio of 1.8 was recorded.
	Year of conclusion	:	2021
	Developed by	:	Department of Plant Pathology, ARS, Yelamanchili
	Status of the Technology	:	Disseminated through T & V, ZREAC etc.

Castor

1. Name of the Technology : **Weed Management in castor**

Description of the Technology : Pre-emergence application of Pendimethalin 5 ml L^{-1} followed by chlorimuron ethyl 10 g ha^{-1} at 40 DAS resulted in 38.2 percent higher seed yield (1054 kg ha^{-1}) over unweeded check (651 kg ha^{-1}) .

Year of conclusion : 2016

Developed by : Department of Agronomy, RARS, Lam

Status of the Technology : Proposed for OFT

Control without weeding

Hand weeding @ 20 & 40 DAS

Pendimethalin fb chlorimuron ethyl at 40 DAS

2. Name of the Technology : **Newer Insecticide Molecules against Major Insect Pests in Castor**

Description of the Technology : Spinosad@0.3 ml L^{-1} and cyantraniliprole@0.3 ml L^{-1} recorded significantly lower population of semilooper (0.28larvae $plant^{-1}$), capsule borer damage (10.1% and 10.7% respectively) compared to untreated control (2.23 larvae $plant^{-1}$). Significant reduction in the incidence of *S. litura* larvae was recorded with cyantraniliprole (0.45 larvae $plant^{-1}$) followed by spinosad (0.78 larvae $plant^{-1}$). Cyantraniliprole registered significantly low incidence of Bihar hairy caterpillar (0.16 larvae $plant^{-1}$). Significantly high seed yield was recorded with spinosad (1004 kg ha^{-1}) which was at par with cyantraniliprole (974 kg ha^{-1}) and recorded higher ICBR of 6.76 and 5.40.

Year of conclusion : 2017

Developed by : Department of Entomology, ARS, Darsi

Status of the Technology : Paper published. Refer Annexure I, S. No.91

Semilooper larva

Spodoptera larva

Damage by capsule borer

Damage on leaves

2.	Name of the Technology	:	**Cow Based Fermented Organic Products for Non-Insecticidal Pest Management in Castor**
	Description of the Technology	:	NSKE 5% recorded least no. of mean larval population of *Achaea janata* (1.06 /plant), *Spodoptera litura* (0.78 plant^{-1}), capsule damage by *Conogethes punctiferalis* (17.0%) and was no way inferior to recommended insecticidal check (0.74, 0.66 larvae plant^{-1} and 11.7%, respectively). NSKE @ 5% and neemastra @ 20% registered significantly least (2.15 and 2.40 hoppers /leaf) population and were on par with the other organics including insecticidal check (2.63 /leaf) but superior to untreated control (3.8/ leaf). NSKE@ 5% recorded higher seed yield of 742 kg ha^{-1} with ICBR of 16.4 followed by agniastra (474 kg ha^{-1}) with ICBR of 3.4 and were next best to insecticidal check (885 kg ha^{-1}) which recorded ICBR of 10.2.
	Year of conclusion	:	2020
	Developed by	:	Department of Entomology , ARS, Darsi
	Status of the Technology	:	Paper published. Refer Annexure I, S. No.92

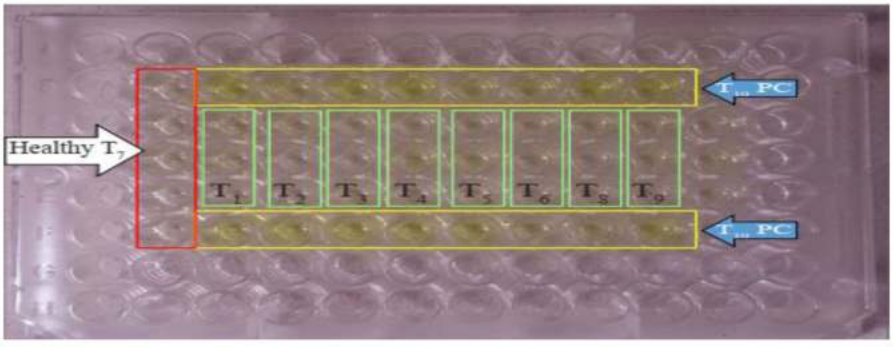
Mustard

1.	Name of the Technology	:	**Identification of Suitable Date of Sowing of Mustard Under Water Scarce Areas of Ananthapuramu District**
	Description of the Technology	:	 Mustard crop recorded highest seed yield when sown on November 16th (1188 kg ha^{-1}) compared to sowing beyond December 1st (516 kg ha^{-1}). Water use efficiency was highest with November I F.N (3.7 kg ha^{-1}mm^{-1}) sowing and lowest with January I F.N (2.1 kg ha^{-1}mm^{-1}). Gross returns (Rs. 50085 ha^{-1}) and net returns (Rs. 40685 ha^{-1}) were higher with November I F.N sowing. The returns were significantly lower with January I F.N sowing. From this study it is clear that sowing of mustard can be taken up from October 16th to November 16th for higher productivity.
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, ARS, Reddipalle
	Status of the Technology	:	Research highlights were brought out in the form of a booklet & distributed to farmers

Sugarcane

1.	Name of the Technology	:	**Planting Methods, Type of Seedlings and Fertigation on Yield and Quality of Sugarcane**
	Description of the Technology	:	Planting of single bud seedling under dual row planting registered a significantly higher cane yield of 103.6 t ha^{-1} (5.8%) as compared to normal planting with three budded setts (97.9 t ha^{-1}) and planting of bud chip seedlings in paired row planting (97.9 t ha^{-1}). Application of 150 percent recommended dose of nitrogen fertilizer (168 kg N ha^{-1}) through drip (20 splits at a weekly interval from 30 DAP) gave a significantly higher cane yield of 104.8 t ha^{-1} (4.4%) as compared to 100 percent (100.4 t ha^{-1}) recommended dose of nitrogen fertilizer (112 kg N ha^{-1}).
	Year of conclusion	:	2016
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Paper presented in International conference and exhibition on sugarcane value chain – Vision 2025 and Abstract published. Refer to Annexure II, S. No. 8 for more information.

2.	Name of the Technology	:	**Impact of Seed disinfectants on Yellow Leaf Disease (YLD) incidence**
	Description of the Technology	:	Sett disinfection with *Trisodium ortho phosphate (TSP) @ 10%* reduced the inoculum load of ScYLV and resulted in 37.8% reduction of YLD incidence in sugarcane compared to NaCl and Ethanol. Healthy canes proved to be the best management option for YLD in sugarcane along with significant yield improvement.
	Year of conclusion	:	2016
	Developed by	:	Department of Plant Pathology, RARS, Anakapalle
	Status of the Technology	:	Published in *International Journal of Bio-resource and Stress Management*,7(4):862-869 DOI: HTTPS://DOI.ORG/10.23910/IJBSM/2016.7.4.1637



DAS-ELISA confirmation of the effect of sett disinfection treatments for the management of yellow leaf disease (YLD) of sugarcane

3.	Name of the Technology	:	**Standardization of serological virus indexing protocol for quick diagnosis of ScYLV in Meristem tip cultured Sugarcane seedlings from stem/leaf sap.**
	Description of the Technology	:	Serological screening with DAS-ELISA was carried out in 20 different sugarcane varieties as well as meristem tip cultured sugarcane seedlings. DAS-ELISA was proven to be effective towards the detection of the virus in plant samples with OD405 values ranging between 0.7 to 1.8 for virus infected samples (symptomatic as well as asymptomatic) compared to negative controls (0.1-0.3). Thus, a small volume of stem/leaf sap can be used for effective indexing of the virus which makes the detection quick and more economical compared to the time and cost-driven leaf extraction.
	Year of conclusion	:	2016
	Developed by	:	Department of Plant Pathology, RARS, Anakapalle
	Status of the Technology	:	Published in Australasian Plant Pathology. 46:433–439 DOI 10.1007/s13313-017-0505-0

Symptomatic representation of YLD grades in Sugarcane.
0- No symptom
1- Mild yellowing of midrib
2 – Prominent yellowing of midrib on all the leaves
3 – Progress of midrib yellowing to laminar region
4 – Drying of laminar region typical bunching of leaves as a tuft,
5 –Stunted growth of the cane combined with drying

4.	Name of the Technology	:	**NCBI cataloguing of ScYLV isolates capsid protein sequence and Phylogenetic Analysis.**
	Description of the Technology	:	YLD infected leaf samples with mixed infection revealed both SMV and ScYLV, with varying levels of similarity with available data base in the source (Acc. No. KX371835). capsid protein sequence obtained from samples with only YLD symptoms having 613 nucleotide length Acc. No. KX260957). Phylogenetic analysis revealed that Indian isolate is a new variant of already existing isolates from India and not much

variation was observed when compared with other countries isolates.

Year of conclusion : 2016

Developed by : Department of Plant Pathology, RARS, Anakapalle

Status of the Technology : Obtained GenBank Accession No. KX371835 and GenBank accession number KX260957 from NCBI.

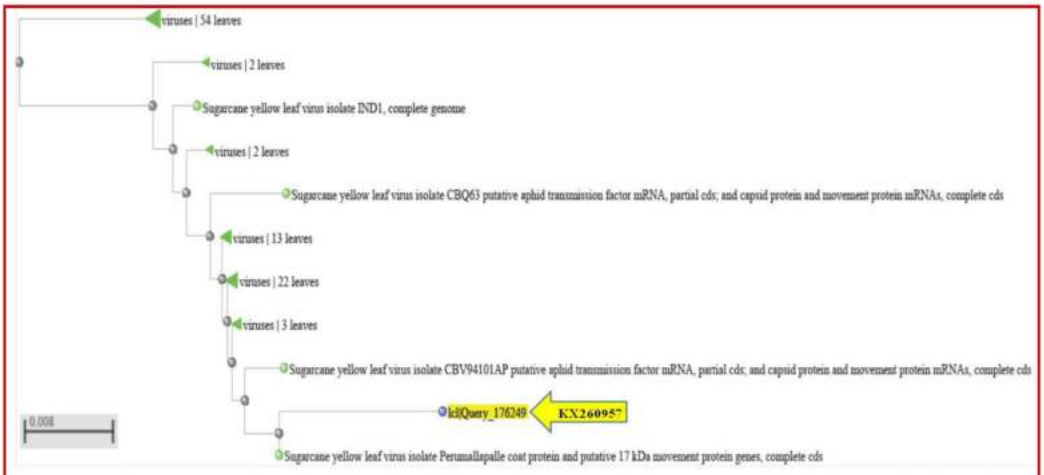


Figure 4.13. Phylogenetic analysis of ScYLV Anakapalle isolate with other available sequences - Fast minimum evaluation method (highlighted in yellow)

5. Name of the Technology : **Performance of Single Node Seedlings of Sugarcane Under Wider and Paired Row Planting at Different Nitrogen Levels (Ratoon Crop).**

Description of the Technology : Planting of single node seedlings in paired rows of 60/120 × 60 cm gave higher ratoon cane yield of 76.8 N ha^{-1} (28.0 %) as compared to wider row planting (150 cm × 45 cm) (60.0 t ha^{-1}). Application of nitrogen at 175% recommended dose recorded higher cane yield of 75.1 t ha^{-1} over 100% recommended dose of nitrogen (65.7 t ha^{-1}).

Year of conclusion : 2017

Developed by : RARS, Anakapalle

Status of the Technology : Widely disseminated through T & V

6. Name of the Technology : **Intercropping in Sugarcane Raised with Single Node Seedlings**

Description of the Technology : Bhendi (1061 kg ha^{-1}) or Guar (1051 kg ha^{-1}) grown as intercrop in sugarcane raised with single node seedlings gave higher yields. Whereas greengram as intercrop gave 334.7 kg ha^{-1}.

Sugarcane + Greengram registered higher sugarcane equivalent yield of 84.8 t ha^{-1} and the next best treatment was Sugarcane + Bhendi with sugarcane equivalent yield of 80.4 t

			ha^{-1}. Sugarcane + Greengram recorded higher B:C ratio of 1.22 closely followed by sole sugarcane (1.21).
	Year of conclusion	:	2016-17
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Widely disseminated to farmers through training programmes

7.	Name of the Technology	:	**Rooting Media Standardization for Raising Sugarcane Seedlings in Protrays**
	Description of the Technology	:	Sugarcane seedlings raised in protrays using rooting media of coir pith + vermicompost (1:1) + sett treatment with 10% lime solution recorded higher seedling vigour index (SVI) of 3824 which is superior over control (1408) that is coir pith + vermicompost.
	Year of conclusion	:	2017
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Paper published. Refer Annexure I, S. No. 93

8.	Name of the Technology	:	**Efficacy of Halosulfuran 75% WG for Management of *Cyperus Species* in Sugarcane under Seedling Transplantation**
	Description of the Technology	:	Post Emergence Application Of Halosulfuran 75% WG @ 80g a.i ha^{-1} At 45-50 DAP Controlled *Cyperus* Weed Effectively And Gave Cane Yield Of 102.3 t ha^{-1}. Unweeded Control Plot Registered Lowest Cane Yield Of 69.9 t ha^{-1}
	Year of conclusion	:	2018
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	OFT conducted. Paper published. Refer Annexure I, S. No. 94

9.	Name of the Technology	:	**Standardised Recommended Dose of Fertilizers (Revised RDF) for Sugarcane**
	Description of the Technology	:	Higher cane & sugar yield (81.90 & 10.40 t ha^{-1}) were recorded with 168-100-120 kg NPK along with 12.5 kg $ZnSO_4$ and 10 tonnes of FYM per ha over existing fertilizer recommendation of 112-100-120 kg NPK + 25 t of FYM per ha (76.90 t ha^{-1} and 9.58 t ha^{-1} of cane and sugar yields).

			An additional cane yield of 5.00 t ha^{-1} with 1.21 BC ratio was recorded in the developed package
	Year of conclusion	:	2018
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	OFTs conducted and new recommendations incorporated in Vyavasaya Panchangam.

10.	Name of the Technology	:	**Scheduling Irrigation with Mulch in Sugarcane**
	Description of the Technology	:	Scheduling irrigation at 1.0 IW/CPE gave higher cane yield of 85.2 t ha^{-1} when compared to IW/CPE of 0.8 and 0.6 (80.2 t ha^{-1} and 75.7 t ha^{-1}, respectively) with 6.1% and 12.5 % increase, respectively. Furrow irrigation with sunnhemp mulch gave higher cane yield of 84.2 t ha^{-1} (7.5%) whereas alternate furrow irrigation without mulch gave lower cane yield of 78.3 t ha^{-1}.
	Year of conclusion	:	2019
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Disseminated to extension personnel and farmers through trainings

11.	Name of the Technology	:	**Management of Sugarcane White Grub with Entomopathogenic Nematode**
	Description of the Technology	:	Field application of **entomopathogenic** nematode, *Heterorhabditis indica* (ICAR-NBAII H38*)* @12 kg ha^{-1} in 150 kg moist sand per ha two times at monthly interval at onset of mansoon rains recorded 85.5% reduction in white grub damage and 85.0% reduction in white grub population compared to untreated control. Cane yield in biocontrol was 79.4 t ha^{-1} whereas in over untreated control (32.0 t ha^{-1}). The benefit of biocontrol compared to untreated control was Rs. 1,20,326 ha^{-1}, with an investment of Rs.4,800 ha^{-1} for biocontrol agents. BC ratio was high in Biocontrol (1.51) compared to untreated control (0.88).
	Year of conclusion	:	2019
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	OFT & Large scale Demonstrations were conducted. The recommendation is included in the POP. Paper published. Refer Annexure I, S. No. 95

12.	Name of the Technology	:	**Management of sugarcane white grub with Entomopathogenic Fungi**
	Description of the Technology	:	Soil application of entomopathogenic fungus, *Metarhizium anisopliae* (NBAIR Ma 4) @ 2.5 kg ha^{-1} enriched in 250 kg FYM per hectare two times at one month interval or at onset of mansoon rains (June/ July months) effectively reduced the grub population (85-86%) and plant damage (91-92%) resulted in increased cane yield of 90.7 t ha^{-1} over untreated control (34.2 t ha^{-1}). Cost-benefit ratio was high in *Metarhizium anisopliae* (2.02) vs. untreated control (0.78).
	Year of conclusion	:	2019
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	OFT & Large scale Demonstrations were conducted. Recommendation included in POP. Paper published. Refer Annexure I, S. No. 96, 97

13.	Name of the Technology	:	**Bioefficacy of Entomopathogenic Fungi and Entomopathogenic Nematode in Suppression of Termite Incidence in Rainfed Sugarcane**
	Description of the Technology	:	Soil application of entomopathogenic **nematode,** NBAII H38 @ 20 kg ha^{-1} in 150 kg mixed with moist sand at planting or onset of mansoon rains is effective in reducing bud damage (24.68%), seedling mortality (54.16%) and higher seed cane yield (69.53 t ha^{-1}) with 57.63 % yield increase compared to untreated control and was on par with entomopathogenic fungi, *Metarhizium anisopliae* (NBAIR Ma4) @ 2.5 kg ha^{-1} mixed with 250 kg FYM at planting or onset of mansoon rains recorded 24.59 % reduction in bud damage, 35.3% reduction in seedling mortality with 44.18% increased cane yield over untreated control. Benefit cost ratio was high in biocontrol – NBAIR Ma 4 (2.1); NBAII H38 (1.72) vs. untreated control (0.69).
	Year of conclusion	:	2019
	Developed by	:	AICRP on Biological Control, RARS, Anakapalle
	Status of the Technology	:	OFT conducted. The recommendation included in POP. Paper published. Refer Annexure I, S. No. 98

14.	Name of the Technology	:	**Management of Early Shoot Borer in Sugarcane Using New Insecticides**
	Description of the Technology	:	Soil application of chlorantraniliprole 0.4 G @ 22.5 kg ha^{-1} at the time of planting of three budded setts followed by spraying of chlorantraniliprole 18.5 SC @ 375 ml ha^{-1} at 60 DAP effectively reduced the incidence of early shoot borer (9.55%) compared to check(35.49%). Highest cane yield was recorded in chlorantraniliprole 0.4G (85.6 t ha^{-1}) followed by

			chlorantraniliprole 18.5 SC @ 375 ml ha^{-1} (84.17 t ha^{-1}) as compared to untreated control (67.67 t ha^{-1}). The BC ratio was 1.21 & 1.19 in these treatments when compared to untreated control (0.98).
	Year of conclusion	:	2019
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	OFT conducted in 2019-20. The recommendation is included in POP of AICRP-Sugarcane. Paper presented in International conference and Abstract published. Refer to Annexure II, S. No. 9 for more information.

15.	Name of the Technology	:	**Nutrient Management in Sugarcane with Additional Doses of N, P, K, Zn, B than 100% RDF**
	Description of the Technology	:	Application of 125% RDN, 125% RDP, 125% RD Zn, RDB and 100% RDK (225:100:120 N NPK kg ha^{-1}) gives 15.3% higher cane yield (143 t ha^{-1}) and BC ratio (1.46) than 100% RDF with 124 t ha^{-1} of cane yield and BC ratio of 1.27.
	Year of conclusion	:	2019
	Developed by	:	Department of Soil Science, ARS, Perumallapalle
	Status of the Technology	:	OFT 2nd year

16.	Name of the Technology	:	**Efficacy of Micronutrient Mixture along with 100% RDF**
	Description of the Technology	:	Foliar spray of micronutrient mixture developed at RARS, Tirupati @ 2% along with 100% RDF(225:100:120 N NPK kg ha^{-1}) enhances cane yield by 8.3% (118 t ha^{-1}) and BC ratio of 1.25 than 100% RDF with 109 t ha^{-1} of cane yield and BC ratio of 1.1.
	Year of conclusion	:	2019
	Developed by	:	Department of Soil Science, ARS, Perumallapalle
	Status of the Technology	:	OFT 2nd year

17.	Name of the Technology	:	**Response of Sugarcane to Micronutrient Application through Drip Fertigation.**
	Description of the Technology	:	Application of FeSo4 @ 25 kg ha^{-1} through drip (96.2 t ha^{-1}) or application of micro nutrient mixture – Formula 4 @ 2kg ha^{-1} through drip (95.6 t ha^{-1}) gave higher cane yield in Sugarcane.
	Year of conclusion	:	2020
	Developed by	:	RARS, Anakapalle

Status of the Technology : Paper published. Refer Annexure I, S. No. 99

18. Name of the Technology : **Identification of Drought Tolerance Efficient Sugarcane Clones for January / February Planting.**

Description of the Technology : Sugarcane clones 2009A 107, 2009A 252 and 2011A 252 were identified with higher drought tolerance efficiency percent of 95.37%, 86.39 % and 84.92% with cane yields of 80.32, 76.42, and 71.48 t ha^{-1} respectively over controls 87A 298 (85.38% & 61.22 t ha^{-1}) and 83V 15 (84.53% & 58.13 t ha^{-1}).

Year of conclusion : 2019-20

Developed by : RARS, Anakapalle

Status of the Technology : Paper published. Refer Annexure I, S. No. 100

2011A 252 **2009A 107** **2009A 252**

19. Name of the Technology : **Management of sugarcane shoot borers using *Trichogramma chilonis***

Description of the Technology : Field Release of *Trichogramma chilonis* (normal strain or temperature tolerant strain) @ 50,000 ha^{-1} at weekly interval, 8 times from 30 days after planting/ ratooning against early shoot borer and 4 times at node formation against internode borer in sugarcane reduced the early shoot borer and internode borer incidence by 66.6% and 27.9% compared to chemical control. Cane yield increased in biocontrol (66.19 t ha^{-1}) over chemical control (57.54 t ha^{-1}) was 14.8% (8.6 t ha^{-1}). Additional yield resulted in additional returns of Rs. 24,220 ha^{-1}.The saving in cost of plant protection was 77% (Rs. 5000 ha^{-1}) in biocontrol. ICBR was high with Biocontrol (56.77) compared to chemical control (10.29).

Year of conclusion	:	2020
Developed by	:	RARS, Anakapalle
Status of the Technology	:	OFT & Large scale Demonstrations conducted. The recommendation is included in POP. Paper published. Refer Annexure I, S. No. 101,102


20. Name of the Technology : **Formulation and Validation of IPM Module**

Description of the Technology : **IPM Module:**

- Dipping of the setts in the solution of imidacloprid 600 FS @ 1ml L^{-1} of water for 2 minutes
- Soil application of fipronil 0.3G@ 25 kg ha^{-1} or chlorantraniliprole 0.4 G @ 22.5 kg ha^{-1} in furrows at planting
- Trash mulching at 3 days after planting, frequent irrigations at weekly interval.
- Installation of pheromone traps at 20 days after planting for mass trapping (25 traps ha^{-1}) of sugarcane borer moths (ESB & INB).
- Field release of *Trichogramma chilonis* @ 50,000 ha^{-1} commencing from 30 days after planting for 4 times at 7-10 days interval and two times after 120 days.
- Spray of chlorantraniliprole 18.5 SC @ 375 ml ha^{-1} at 60 DAP
- Detrashing of dried older leaves & removal of water shoots at 120-150 DAP
- Spray of clothianidin 50 WDG @ 250 g ha^{-1} after detrashing lower leaves for the control of sucking pests.

New IPM module was found effective by recording high percent germination (76.74%), less incidence of early shoot borer (11.22 % DH), internode borer (40.41% DH) and scale insect (6.27 % incidence) compared to untreated control (61.60%; 52.41% & 46.34 %). In existing IPM recommendation the per cent germination was 71.20, with 23.66% DH incidence of early shoot borer; 63.61% incidence of internode borer with 6.24% intensity and 10% incidence of scale insect with 2,01% intensity were recorded. More number of millable canes (69,390 ha^{-1}) and superior cane yield were recorded in IPM module with a benefit cost ratio of 1.64

compared to untreated control (53,340 NMC ha^{-1}; 55.08 t ha^{-1}; 1.42) where as in zonal recommendation 59,390 NMC ha^{-1} and 63.68 t ha^{-1} of cane yield were recorded with a benefit cost ratio of 1.52

Year of conclusion : 2020

Developed by : RARS, Anakapalle

Status of the Technology : Recommendation included in ZREAC recommendations.

21. Name of the Technology : **Management of whip smut in Sugarcane**

Description of the Technology :

In ratoon crop, spray of tebuconazole 12.5% EW (0.1%) immediately after ratooning followed by second spray at 30-35 days after ratooning is proved effective to control whip smut. It has recorded disease incidence of 4.06% only and the yield was 77 t ha^{-1} as compared to inoculated control where disease incidence of 29.83% was recorded and the yield was 53 t ha^{-1}. Tebuconazole 12.5% EW (0.1%) has recorded the highest BC ratio of 1.88.

Year of conclusion : 2020

Developed by : RARS, Anakapalle

Status of the Technology : Paper Published. Refer Annexure I, S. No. 103

22. Name of the Technology : **Organic Farming Package**

Description of the Technology :

- Application of FYM @ 25 t ha^{-1}as basal dose +Incorporation of *insitu* green manuring between the lines
- Application of cane trash vermicompost @ 3 t ha^{-1} in three equal splits at 60, 90 and 120 days after planting
- Application of biofertilizers (*Azospirillum* @ 5 kg ha^{-1} and PSB and KRB @10 kg ha^{-1} mixed with 100 kg FYM and applied to soil as basal for every alternate year)
- Sprayings of vermiwash (10 ml L^{-1}) at critical stages of crop at cessation of monsoon,
- Application of trash compost@ 5 t ha^{-1}
- Treat the setts with *Pseudomonas* @ 5g L^{-1}.
- Basal application of *Trichoderma viridi* @ 5 kg ha^{-1}.
- Early Shoot Borer management by using *Trichogramma chilonis* parasitoid @ 50,000 ha^{-1} release, 4-6 releases from

30 days after planting at 7-10 days interval and 2 releases from node formation.

- Need based application of neem formulations.

Cane and sugar yields stabilized in organic farming (OF) after five years of experimentation and recorded comparable yields as that of inorganic farming (IF) from 6th year onwards (72.90 & 72.0 t ha^{-1} in OF & IF, respectively). While, during eleventh year (2021), additional cane and sugar yields to the extent of 6.23 and 1.23 t ha^{-1}, respectively were obtained in organic farming with superior juice quality over inorganic farming. Soil organic carbon status showed a gradual increase and organic farming recorded significantly higher soil organic carbon (0.81%) than inorganic farming (0.70 %) from its initial value of 0.57 % at RARS, Anakapalle.

OF package gives cane yield (102 t ha^{-1}) which is at par with 100% NPK (224-112-112 kg N-P_2O_5-K_2O ha^{-1}) (108 t $ha^{-1}$of cane yield). Organic farming practice results in BC ratio of 1.38 whereas 1.57 in 100% NPK at ARS, Perumallapalle.

Year of conclusion : 2020
Developed by : RARS Anakapalle and ARS, Perumallapalle
Status of the Technology : Conducting OFT. Published in University level booklet on "Organic Farming research in ANGRAU".

Published. Refer Annexure I, S. No. 104

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23. Name of the Technology : **Planting Time**

Description of the Technology : Planting early sugarcane varieties in February first fortnight increases cane yield (109.8 t ha^{-1}) by 14% along with benefit cost ratio of 1.59 over November planting (95.8 t ha^{-1}, 1.35). Where as for mid late sugarcane varieties, January first fortnight planting increases cane yield (117.8 t ha^{-1}) by 19.5% with benefit cost ratio of 1.65 over November planting (95.2 t ha^{-1} cane yield, BC of 1.45).

Year of conclusion : 2020
Developed by : Department of Agronomy, ARS, Perumallapalle
Status of the Technology : Paper published. Refer Annexure I, S. No. 105

24.	Name of the Technology	:	**Drip Fertigation in Sugarcane**
	Description of the Technology	:	 Application of 125% RDN and K in 12 equal splits through drip fertigation commencing from 30-150 days increase sugarcane yield (114.7 t ha^{-1}) by 11.7% with benefit cost ratio of 1.96 over 100% recommended nitrogen (224 kg N ha^{-1}) in two equal splits applied at 45 and 90 DAP and entire P_2O_5 and K_2O (112 kg P_2O_5 and 112 kg K_2O ha^{-1}) at planting (102 t ha^{-1} and BC of 1.38).
	Year of conclusion	:	2020
	Developed by	:	Department of Agronomy, ARS, Perumallapalle
	Status of the Technology	:	OFT 1st year & Paper published. Refer Annexure I, S. No. 106
25.	Name of the Technology	:	**Identification of Resistant Lines**
	Description of the Technology	:	Identified two sugarcane somaclones showing resistance to Sugarcane yellow leaf disease; 2016T7 and 2016T37.
	Year of conclusion	:	2020
	Developed by	:	Department of Plant Pathology, ARS, Perumallapalle
	Status of the Technology	:	Paper published. Refer Annexure I, S. No. 107
26.	Name of the Technology	:	**Carbon Sequestration Potential of Sugarcane Based Cropping Systems in Soils of North Coastal Zone of Andhra Pradesh**
	Description of the Technology	:	Highest carbon was sequestrated (3.03 Mg C ha^{-1} $year^{-1}$) in Sugarcane-oilseed-rice system with more labile and active carbon pools, followed by sugarcane-sugarcane (2.80 Mg C ha^{-1} $year^{-1}$) compared to Rice-Pulse-Fallow system(2.052 Mg C ha^{-1} $year^{-1}$)
	Year of conclusion	:	2020
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Paper accepted for publication. Refer Annexure I, S. No. 108
27.	Name of the Technology	:	**Identification of Early Maturing Sugarcane Genotypes Suitable for Delayed Harvesting.**
	Description of the Technology	:	Harvesting of new early maturing sugarcane genotypes *viz.*, 2009A 107, 2010A 229, 2006A 102 at 10 months age (81.9 t ha^{-1}) or 11 months age (83.4 t ha^{-1}) gave significantly higher cane yield. With delay in harvesting of these genotypes upto 13 months age, the cane yield decreased to 71.9 t ha^{-1}
	Year of conclusion	:	2021

	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Disseminating to sugarcane farmers through awareness programmes and trainings in sugar factory area.

28.	Name of the Technology	:	**Bio-Intensive Pest Management against Sugarcane Borers**
	Description of the Technology	:	Field release of *Trichogramma chilonis* @ 50000 ha^{-1} from 30 DAP to 240 DAP at an interval of 10 days in combination with installation of Delta traps @ 25 ha^{-1} from 20 DAP to 120 DAP for early shoot borer and from 120 DAP to 240 DAP for internode borer had registered highest percent reduction of sugarcane early shoot borer and internode borer incidence with 78.88 and 80.87 percent, over control, respectively. BIPM recorded 72.5 t ha^{-1}over control (48.6 t ha^{-1}) with BC ratio of 1.26. Control plot recorded a BC ratio of 0.84.
			
	Year of conclusion	:	2021
	Developed by	:	SRS, Vuyyuru
	Status of the Technology	:	Research paper published

29.	Name of the Technology	:	**Studies on Management of Late Initiated Ratoons.**
	Description of the Technology	:	Working with trash shredder + spraying of Gibberellic acid @ 100 ppm at one week after ratooning gave significantly higher ratoon cane yield of 71.4 t ha^{-1} (23.1%) closely followed by working with trash shredder alone at one week after ratooning (69.6 t ha^{-1}) (20.0%) when compared to control (58.0 t ha^{-1}).
			
	Year of conclusion	:	2021
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Demonstrated the technology to the sugar factory extension personnel.

30.	Name of the Technology	:	**Management of Scale Insect**
	Description of the Technology	:	Without destrashing application of imidacloprid 17.8 SL @ 0.25 ml L^{-1} found effective with 82.8 & 58.0 percent reduction of incidence and infestation of scale insect over control, respectively. The treatment recorded 73.6 t $ha^{-1}$with a BC ratio of 1.28 over control (48.1 t $ha^{-1}$and BC ratio of 0.67)
	Year of conclusion	:	2021
	Developed by	:	SRS, Vuyyuru
	Status of the Technology	:	OFT is conducted during 2022. Submitted the paper and review is in progress.

31.	Name of the Technology	:	**Standardized and Developed Recommended Dose of Fertilizer Schedules for Sugarcane Short Crop**
	Description of the Technology	:	Application of fertilizers at the rate of 112:100:120 kg NPK ha^{-1} (P as basal and N&K in three splits at 30, 45 & 60 after planting) recorded higher seed cane yield of 55.75 t ha^{-1} with 1.18 BC ratio followed by 112:100:120 kg NPK ha^{-1} (P as basal and N&K in two splits at 30 & 60 DAP) with 46.5 t ha^{-1} seed cane yield with 1.15.
	Year of conclusion	:	2021
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	--

32.	Name of the Technology	:	**Effect of Preceding Green Manure Crop and Type of Sugarcane Seed Material on the Productivity of Rainfed Sugarcane**
	Description of the Technology	:	Higher sugarcane yield of 50.7 t ha^{-1} obtained with dhaincha grown as preceding green manure or pillipesara (50.6 t ha^{-1}) or sunnhemp (49.5 t ha^{-1}). Lowest cane yield of 43.5 t ha^{-1} was obtained in control plot (no green manure).
	Year of conclusion	:	2022
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Proposing for OFT during 2023-24

30.	Name of the Technology	:	**Consumer Preferred Sugarcane Clone Suitable for Quality Cane Juice Used for Beverages.**
	Description of the Technology	:	Sugarcane clone 2015 A 230 was identified as a suitable clone for light green coloured juice with 1.96% color intensity and rich in percent sucrose (17.65 %) and less in reducing sugars (0.26 %). The control sugarcane variety 87A298 recorded a sucrose percent of 16.86%, reducing sugars of 0.24% and color intensity of 2.20% (green colour).
	Year of conclusion	:	2022
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Paper published. Refer Annexure I, S. No. 109

Cotton

1.	Name of the Technology	:	**Weed Management**
	Description of the Technology	:	Pre-emergence application of pendimethalin 30% EC @ 5 ml L^{-1} followed by post emergence application of quizalofopethyl 5% EC @ 2 ml L^{-1} + pyrithiobac sodium 10% EC @ 1.25 ml L^{-1} at 2-4 leaf stage with one inter-cultivation increased the seed cotton yield by 58.1% (3582 kg ha^{-1}) over weedy check (2266 kg ha^{-1}) and comparable with weed free check (4411 kg ha^{-1}).
	Year of conclusion	:	2015
	Developed by	:	RARS, Lam
	Status of the Technology	:	Included in Vyavasaya panchangam

2.	Name of the Technology	:	**Management of *Alternaria* Leaf Spot**
	Description of the Technology	:	Seed treatment with combination product of carboxin 37.5% +thiram 37.5% DS @4.5g kg^{-1} controlled *Alternaria* leaf spot by 73% compared to no treatment.
	Year of conclusion	:	2015
	Developed by	:	RARS, Lam
	Status of the Technology	:	Included in Vyavasaya Panchangam

3.	Name of the Technology	:	**Cotton Geometry**
	Description of the Technology	:	Significantly superior seed cotton yield (2566 kg ha^{-1}) was recorded in NH-615 variety at 60 cm x 30 cm spacing over 45 cm x 30 cm (2437 kg ha^{-1}) and 45 cm x 20 cm (2415 kg ha^{-1}) under rain fed conditions.
	Year of conclusion	:	2016
	Developed by	:	Department of Crop Physiology, RARS, Nandyal
	Status of the Technology	:	Paper published. Refer Annexure I, S. No. 110

4.	Name of the Technology	:	**High Density Planting With Straight Variety**
	Description of the Technology	:	In high density planting system, higher yields were obtained with 45 cm x 10 cm spacing + 125% (90:45:45 NPK kg ha^{-1}) over 60 cm x 10 cm spacing and 75 cm x 10 cm spacing in straight cotton varieties namely, SCS-1206 (3854, 3384 and 3355 kg ha^{-1}, respectively) and ANGC-1452 (3543, 2954 and 2243 kg ha^{-1} respectively).
	Year of conclusion	:	2018
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	Paper published. Refer Annexure I, S. No. 111

5.	Name of the Technology	:	**Soil Test Crop Response Equation in Cotton**
	Description of the Technology	:	F N = 8.15 T – 0.57 SN – 0.39 VC N F P_2O_5 = 2.95 T – 2.80 SP – 1.28 VC P F K_2O = 5.92 T – 0.66 SK – 0.77 VC K FN, F P_2O_5 and F K_2O are nutrients to be applied T refers to yield target SN, SP and SK refers to available nutrients (NPK) in the soil VC N, VC P and VC K refers to nutrients(NPK) supplied Regression equations were developed in cotton, which facilitates precise quantitative adjustment of fertilizer dosages to achieve desired yield targets by planned soil test based fertilizer schedule.
	Year of conclusion	:	2017
	Developed by	:	AICRP on STCR, ARS, Utukur
	Status of the Technology	:	Publication in progress

6.	Name of the Technology	:	**Weed Management**
	Description of the Technology	:	Highest weed control efficiency (62.5%), seed cotton yield (3480kg/ha, BC ratio (3.35) were recorded in cotton was achieved with pre-emergence application of pendimethalin 30% EC @ 5 ml L^{-1} + post-emergence application of glyphosate 41% SL @ 10 g L^{-1} at 25 DAS + one intercultivation at 50 DAS where as in weedy check weed control efficiency (0%), seed cotton yield (1645 kg ha^{-1} BC ratio 1.75) were recorded.
	Year of conclusion	:	2017
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	Paper published. Refer Annexure I, S. No. 112

7.	Name of the Technology	:	**Management of Pink Bollworm in Cotton**
	Description of the Technology	:	 Erection of pheromone traps @ 10-15 ha^{-1} at 45 DAS and spraying of neem oil 1500 ppm @ 5ml, chlorantraniliprole 18.5% SC @ 0.3ml followed by spray of bifenthrin 10 % EC @ 1ml $L^{-1}$of water at weekly intervals after pink bollworm crossing ETL recorded the lowest green boll damage (24.56%), open boll damage (13.18%) and lowest pink bollworm larvae per twenty green

bolls (4.7) with highest seed cotton yield (2635 kg ha $^{-1}$) at RARS, Nandyal.

Year of conclusion : 2018

Developed by : RARS, Nandyal and Lam

Status of the Technology : Paper published. Refer Annexure I, S. No. 113



8. Name of the Technology : **Management of Sucking Pests in Cotton**

Description of the Technology : 
Spinetoram 10% + sulfoxaflor 30% WG @ 0.7 ml L^{-1} of water (3.2/3 leaves), spinetoram 10% +sulfoxaflor 30% WG @ 0.6 ml L^{-1} of water (3.83/3 leaves), spinetoram @ 0.6 ml L^{-1} of water (5.03/3 leaves) and sulfoxaflor 21.8 SC @ 0.6 ml L^{-1} of water (3.8/3 leaves) were effective in reducing the leafhopper population in cotton. Whereas, spinetoram 10% + sulfoxaflor 30% WG @ 0.7 ml L^{-1} of water (17.22%), pyriproxyfen10 EC @ 0.7 ml L^{-1}(28.11%) and sulfoxaflor 21.8 SC@ 0.6 ml L^{-1} of water (19.5%)were found effective in reducing the pink bollworm damage in green bolls, besides realizing the highest seed cotton yield (5985 kg ha^{-1}).

Year of conclusion : 2018

Developed by : Department of Entomology, RARS, Nandyal

Status of the Technology : Paper published. Refer Annexure I, S. No. 114

9. Name of the Technology : **Crop Residue Management**

Description of the Technology : Cotton crop residue incorporation @ 5 t ha^{-1} + application of 75% RDF (150-60-60 kg N-P_2O_5-K_2O ha^{-1}) + decomposing mycorrhiza @ 2 kg ha^{-1} recorded comparable yield (4070 kg ha^{-1}) with 100% RDF (4506 kg ha^{-1}) and improved soil microbial population and soil organic carbon content.

Year of conclusion : 2018

Developed by : RARS, Lam

Status of the Technology : Paper published



10. Name of the Technology : **Refined IPM Package for Pink Bollworm on *Bt* Cotton.**

Description of the Technology :
- Recommended time of sowing in shortest window.
- Installation of pheromone traps @ 10-15 ha^{-1} for monitoring and 25-40 for mass trapping at 45 DAS.
- Spraying of 5% NSKE
- Release of *Trichogramma bactrae* @ 1,50,000 ha^{-1} (thrice at weekly interval) starting from 50 DAS.
- ETL (10 % fruiting body damage) based application of recommended insecticides.
- Timely termination of crop

Year of conclusion : 2020

Developed by : RARS, Lam

Status of the Technology : Included in Vyavasaya Panchangam

11. Name of the Technology : **Refined IPM Package for Sucking Pests on *Bt* Cotton**

Description of the Technology :
- Use of yellow ~~sticky~~ and blue sticky traps at 30 DAS @ 25 ha^{-1}
- Stem application of monocrotophos 36 SL @ 1:4 dilution at 30 and 45 DAS and imidacloprid 17.8 SL @ 1:20 dilution at 60 DAS.
- Restrict the use of neonicotinoids during first 60 days.
- ETL based spray of flonicamid 50 WG @ 0.3 g L^{-1} and diafenthiuron 50% WP @ 1.25 g L^{-1} of water.
- Do not use same insecticide twice.

Year of conclusion : 2020

	Developed by	:	RARS, Lam
	Status of the Technology	:	Included in Vyavasaya Panchangam

12.	Name of the Technology	:	**Insecticide Resistance Management (IRM) in Cotton**
	Description of the Technology	:	Demonstration of IPM package for pink bollworm in 5 villages showed mean reduction in green boll damage to a tune of 54.28 % and reduction in number of sprays by 31.50 % with higest yield (3300 kg ha and BC ratio 1.9) over farmers practice (2712 kg ha^{-1}).
	Year of conclusion	:	2020
	Developed by	:	Department of Entomology, RARS, Nandyal
	Status of the Technology	:	Paper published. Refer Annexure I, S. No. 116

13.	Name of the Technology	:	**Drought Management**
	Description of the Technology	:	Application of 2% potassium nitrate 4 times at weekly interval against drought improved the drought tolerance indices and seed cotton yield (2009 kg ha^{-1}) over control (1748 kg ha^{-1}).
	Year of conclusion	:	2021
	Developed by	:	RARS, Lam
	Status of the Technology	:	Included in Vyavasaya panchangam

14.	Name of the Technology	:	**Recycling of Crop Residues**
	Description of the Technology	:	Application of biochar (@ 2 t ha^{-1}) prepared from cotton residues through pyrolysis when integrated with RDF (150-60-60 kg N-P_2O_5-K_2O ha^{-1}) and microbial consortium resulted in a significantly higher seed cotton (Kapas) yield of 2838 kg ha^{-1} and B-C ratio of 1.59 against RDF with kapas yield of 1423 kg ha^{-1} and B-C ratio of 1.20. It showed a positive influence on soil health parameters *viz.*, organic carbon (0.51%), phosphatase activity (76.5 & 182 µg PNP g^{-1} soil h^{-1} respectively for acid and alkaline phosphatase), bacteria and fungi populations in the rhizosphere (12 x 10^8 and 14 x 10^5 CFU g^{-1} soil).
	Year of conclusion	:	2021
	Developed by	:	RARS, Lam
	Status of the Technology	:	Publication is in progress

15.	Name of the Technology	:	**Integrated Nutrient Management**
	Description of the Technology	:	The mean seed cotton yield over 31 years was 2026 kg ha^{-1} with integrated application of recommended dose of N- P_2O_5-K_2O (150-60-60 kg ha^{-1}) fertilizers along with FYM @ 10 t ha^{-1} which was 19% more over 100 % RDF, 13 % over 150 % RDF and 16 % over 200 % RDF.

	Year of conclusion	:	Long-term experiment since 1991
	Developed by	:	RARS, Lam
	Status of the Technology	:	28 years of data compiled and published

Mesta/ Jute

1.	Name of the Technology	:	**Management of Foot and Stem Rot in Mesta**
	Description of the Technology	:	Seed treatment with metalaxyl MZ (2.5 g kg^{-1}) followed by spraying of metalaxyl (2.5 g L^{-1}) at 30 DAS and 45 DAS resulted in less disease incidence (10.56%) at the time of harvest with 61% higher fibre yield (2630 kg ha^{-1}) compared to no application of metalaxyl which recorded 33.11% disease incidence & fibre yield of 1630 kg ha^{-1}

	Year of conclusion	:	2017
	Developed by	:	ARS, Amadalavalasa
	Status of the Technology	:	Paper published. Refer Annexure I, S. No. 117

2.	Name of the Technology	:	**Remunerative Mesta Based Inter Cropping System**
	Description of the Technology	:	Inter cropping of maize or groundnut in Mesta were found more remunerative with higher B:C ratio of 3.7 and 2.7 per rupee invested respectively.

Mesta + Maize (2:1)

Mesta + Groundnut (3:4)

	Year of conclusion	:	2021
	Developed by	:	ARS, Amadalavalasa
	Status of the Technology	:	Proposed for OFT

3.	Name of the Technology	:	**Integrated weed management in mesta**
	Description of the Technology	:	In mesta + greengram intercropping, post emergence application of quizalofop ethyl 10 % EC @ 0.76 ml L^{-1} of water + hand weeding at 30 DAS (1828 kg ha^{-1}); pre-emergence application of ipfencarbazone 22.8% EC @ 0.8 ml L^{-1} of water + hand weeding at 15 DAS (1706 kg ha^{-1}) and mulching with paddy straw @ 7.5 t ha^{-1} + hand weeding at 15-21 DAS (1656 kg ha^{-1}) recorded on par fibre equivalent yield with two hand weedings (1844 kg ha^{-1}), with lower weed index (9.5-20.9%) and higher weed control efficiency at 45 DAS and harvest (72-81%).
	Year of conclusion	:	2022
	Developed by	:	ARS, Amadalavalasa
	Status of the Technology	:	Paper accepted in Indian Journal of Weed Science. Refer Annexure I, S. No. 118

Tobacco

1.	Name of the Technology	:	**Planting Methods and Foliar Spray**
	Description of the Technology	:	Cultivation of tobacco in ridges and furrow method recorded significantly higher cured leaf of 1550 kg ha^{-1} compared with flatbed method (1359 kg ha^{-1}). Foliar application of potassium nitrate (KNO_3) @ 2.5% twice at 45 DAS and 60 DAS recorded significantly higher cured leaf of tobacco (1713 kg ha^{-1})
	Year of conclusion	:	2017
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	Paper published. Refer Annexure I, S. No. 119

2.	Name of the Technology	:	**Topping in Bidi Tobacco on Growth, Yield and Quality**
	Description of the Technology	:	Topping in tobacco at 15 leaf - early flowering stage recorded 1938 kg ha^{-1} cured leaf yield with good quality.
	Year of conclusion	:	2019
	Developed by	:	Department of Agronomy, RARS, Nandyal
	Status of the Technology	:	Paper published. Refer Annexure I, S. No. 120

Cropping Systems and Farming Systems

1.	Name of the Technology	:	**System Productivity in Rice Based Cropping System Suitable for North Coastal Zone.**
	Description of the Technology	:	Highest rice equivalent yield (REY) of 16621 kg ha^{-1} with BC ratio of 3.7 was recorded with sweet corn sown after rice, followed by ragi (6038 kg ha^{-1}) with BC ratio of 1.52.
	Year of conclusion	:	2019
	Developed by	:	ARS, Ragolu
	Status of the Technology	:	Paper published. Refer Annexure I, S. No. 122
2.	Name of the Technology	:	**Suitable Cropping Sequence for Prakasam District Compared to Sole Redgram**
	Description of the Technology	:	Higher redgram equivalent yield was recorded with foxtail millet- greengram (2057 kg ha^{-1}) followed by bajra-cowpea (1876 kg ha^{-1}) cropping systems compared to sole redgram (796 kg ha^{-1}).
	Year of conclusion	:	2020
	Developed by	:	ARS, Darsi
	Status of the Technology	:	Published an abstract in International Conference

3.	Name of the Technology	:	**Rice-Fallow Pulses & Oil Seeds**
	Description of the Technology	:	Greengram is found best for rice fallows in Nellore region of Andhra Pradesh with BC ratio of 1.48
	Year of conclusion	:	2021
	Developed by	:	Department of Agronomy, ARS, Nellore
	Status of the Technology	:	Abstract Published. Refer Annexure II, S. No. 10.

4.	Name of the Technology	:	**Duplex Poultry Units for Secure Rearing of Backyard Poultry under Integrated Farming System**
	Description of the Technology	:	Duplex Poultry Unit fabricated with Zinc material for secure rearing of backyard poultry birds of size 8x4x5½ ft with unit cost of Rs. 20,000/- is sufficient for rearing of 15-20 poultry birds. Rearing of backyard poultry birds in duplex poultry unit reduced 46.67% loss due to taken away by jackals, dogs and thefts. Rearing of 15 backyard poultry (10 Female + 5 Male) birds in this duplex unit has increased the egg production by 54.45% (1247 eggs/annum) when compared to openly reared birds(568 eggs/annum) and also 57.34% (52.50 kg/annum) additional meat advantage over open rearing (22.40 kg/ annum).
	Year of conclusion	:	2021
	Developed by	:	AICRP-IFS, ARS, Vizianagaram
	Status of the Technology	:	Recommended at National Level in Annual workshop conducted during December, 2021. Presented a Poster in 5th International Agronomy Congress Paper Published. Refer Annexure I, S. No. 123 and Annexure II, S. No. 11

Duplex Poultry Units Interacting with Farmers on Use of Duplex Poultry Unit for rearing of Duplex Poultry Units by Dr.A.Vishnu Vardhan Reddy Garu, Honourable Vice Chancellor, ANGRAU

5.	Name of the Technology	:	**Diversification of the Existing Farming System under Marginal Household Conditions**
	Description of the Technology	:	Diversification was popularized with green manuring/ greengram-short duration paddy-zero tillage maize cropping system along with improved cultivation of cashew garden, scientific rearing of backyard poultry and livestock in place of the existing system i.e., long duration paddy-fallow in cropping system along with neglected management of cashew garden, backyard poultry rearing and livestock management. In addition to diversification introduced nutritional kitchen garden and vermi composting as additional components. Due to this diversification, the Net benefit has increased from Rs.5413 in 2017-18 to Rs.10,371/- in 2020-21 with additional employment generation of 54 man days per household. Out of 24 OFR farmers about 75-80% of the farmers are still practicing the interventions and realized its impact on their income and livelihood.
	Year of conclusion	:	2021
	Developed by	:	AICRP-IFS, ARS, Vizianagaram
	Status of the Technology	:	Recommended at National Level in Annual on AICRP-IFS Published. Refer Annexure II, S. No. 12

Pre Kharif-Greengram

Zero tillage maize

Vegetable Nutri Garden

Vermicomposting

6.	Name of the Technology	:	**Rainbow Cropping / Mechanized Strip Cropping - Diversified Food Basket and Assured Income**
	Description of the Technology	:	In a rainbow cropping/ mechanized strip cropping, seven crops such as oil seeds, millets and pulses are sown in strips based on their hierarchal manner to get the assured income to the farmers under extreme dry spells. Rainbow cropping /mechanized strip cropping system recorded higher seed yield (1773 kg ha^{-1}) compared to the Navadhanya system traditional old poly cropping (1160 kg ha^{-1}) and monocropping of groundnut (1325 kg ha^{-1}). BC ratio of Rainbow cropping system is higher (1.62) over traditional navandhya cropping system (1.17)
	Year of conclusion	:	2021
	Developed by	:	AICRP in Dryland Agriculture, ARS, Ananthapuramu
	Status of the Technology	:	The recommendation included in vyavasaya panchamgam

Navadhanya system

Rainbow cropping system

7.	Name of the Technology	:	**On-Farm Crop Response to Plant Nutrients in Rice-Maize Cropping System**
	Description of the Technology	:	Application of recommended doses of NPK and Zinc i.e., 80:60:50:50 NPK Zn kg ha^{-1} for Paddy 200:80:80 NPK kg ha^{-1} for Maize recorded 24.22% and 16.94% higher yields (6129 kg ha^{-1} & 7072 kg ha^{-1} respectively) over farmers practice (5241 kg ha^{-1} & 5693 kg ha^{-1} respectively). NPK + Zn recorded higher system productivity (13466 kg ha^{-1}) over Farmers practice (11147 kg ha^{-1}). The System Agronomic efficiency is 4.95 for N, 2.01 for P, 1.58 for K and 7.46 for Zinc.
	Year of conclusion	:	2022
	Developed by	:	AICRP-IFS, ARS, Vizianagaram
	Status of the Technology	:	Paper Published. Refer Annexure I, S. No. 124, 125.

8.	Name of the Technology	:	**Identification of Best Cropping Systems Module for Rice Based Farming Systems**
	Description of the Technology	:	Under income enhancement module, highest system productivity (18.5 t ha^{-1}) and BC ratio (6.79) was realized with rice-sweet corn cropping system and the next best module is Rice- Marigold cropping system (11.54 t $ha^{-1}$and 4.46) when compared to Rice-Rice cropping system (6.46 t ha^{-1} and 1.87 BC ratio). Under soil health improvement module, Rice-Black gram system found better with system yield of 9.2 t $ha^{-1}$and BC ratio of 4.68 when compared to rice-rice cropping system (6.46 t ha^{-1} and 1.87).

Best Cropping Systems Module for Rice Based Farming Systems

Year of conclusion	:	2022
Developed by	:	AICRP on IFS, Dept. of Agronomy, RARS, Maruteru
Status of the Technology	:	Paper Published and proposed for OFT during 2022
		For more information refer Annexure-I, S. No. 126, 127, 128

9.	Name of the Technology	:	**Development of Wet Land Integrated Farming Systems (IFS) Model Suitable for Delta Alluvial Soils**
	Description of the Technology	:	Wet land IFS with 1.5 Acre model, Highest average net returns (Rs. 23,298/-) was realised from crop component involving Rice-Maize-Pulses system followed by value addition of produce as brown rice with an income of Rs. 18,192/-. Among various IFS components, fishery component (0.20 acres area with 550 Nos of Rohu, Katla and Grass carp species) recorded highest average net returns of Rs. 16,706/- with BC Ratio 4.48 followed by horticulture component (0.40 acres area with Banana based vegetable cropping system) recorded Rs. 11, 383/- and BC ratio 3.17. Even the area allocated for Poultry is

0.01 acres (Aseel breed with 30 Nos) also found remunerative with net returns of Rs. 4,915/- and BC ratio of 3.52.

Wet Land Integrated Farming Systems (IFS) Model

Year of conclusion	:	2022
Developed by	:	AICRP on IFS, Dept. of Agronomy, RARS, Maruteru
Status of the Technology	:	Booklets published and OFT will be proposed during 2023

Alternate Crops & Contingent Crops

1.	Name of the Technology	:	**Remunerative Alternate Crop (Castor) in Place of Groundnut in Rainfed Alfisols**
	Description of the Technology	:	Castor was found as a better alternate crop to groundnut due to less cost of cultivation and remunerative prices in alfisols of Ananthapuram district. Groundnut recorded pod yield of 852 kg ha^{-1} with a BC ratio of 1.97. While, Castor recorded 1176 kg ha^{-1} with a BC ratio of 2.50
	Year of conclusion	:	2016
	Developed by	:	AICRP on Dryland Agriculture, ARS, Ananthapuramu
	Status of the Technology	:	OFT completed and published. Refer Annexure-I, S. No. 129

2.	Name of the Technology	:	**Contingent Crops**
	Description of the Technology	:	Under delayed onset of monsoons, Redgram (1810 kg ha^{-1} and net returns of Rs. 69,120/- ha^{-1}), castor (2300 kg ha^{-1} and Rs. 62,400 ha^{-1}) and cowpea (514 kg $ha^{-1}$and Rs. 53,410/- ha^{-1}) are the better contingent crops to sow in place of groundnut from August II F.N to September II F.N.
	Year of conclusion	:	2017
	Developed by	:	ARS, Utukur
	Status of the Technology	:	---

3.	Name of the Technology	:	**Suitable Alternate Rainfed *Rabi* Crops to Tobacco in Prakasam District**
	Description of the Technology	:	Bengalgram was found as a suitable alternate crop to tobacco in terms of tobacco (550 kg ha^{-1}) equivalent yield (1371kgha^{-1}) followed by cowpea (874 kg ha^{-1}).
	Year of conclusion	:	2018
	Developed by	:	ARS, Darsi
	Status of the Technology	:	Published an Abstract in National Conference

4.	Name of the Technology	:	**Recommendation of Profitable Contingent Crops to Delayed Sowing Situation.**
	Description of the Technology	:	Higher groundnut pod equivalent yield was recorded with cluster bean when sown during 2nd FN of August followed by greengram, pigeonpea and horsegram. While, considering the cost of cultivation, higher net returns were obtained with greengram (Rs. 43,227 ha^{-1}) followed by pigeonpea (Rs. 31,562 ha^{-1}) and cluster bean (Rs.25, 508 ha^{-1}).
	Year of conclusion	:	2019
	Developed by	:	Department of Agronomy, ARS, Kadiri
	Status of the Technology	:	Paper Published. Refer Annexure-I, S. No. 130

5.	Name of the Technology	:	**Alternate Cropping Sequence to Sugarcane**
	Description of the Technology	:	Groundnut – Vegetable Cowpea – Sweet corn cropping sequence was found better alternative to sugarcane with higher BC ratio (2.02), sugarcane crop equivalent yield of 127 t ha^{-1} and 7 per cent yield increase over sole sugarcane crop (118.7 t ha^{-1}).
	Year of conclusion	:	2021
	Developed by	:	Department of Agronomy, ARS, Perumallapalle
	Status of the Technology	:	Proposed for OFT & Paper published. Refer Annexure-I, S. No. 131.

Fodder Crops

1.	Name of the Technology	:	**Nutrient Management in Fodder Jowar**
	Description of the Technology	:	Application of zinc as a foliar spray @ 2.0 g L^{-1} at 30 and 45 DAS recorded highest green fodder yield of jowar (22.3 t ha^{-1}) which is 26.2 per cent higher over no spray and also resulted in Rs.6,953 ha^{-1} additional net returns over control (no spray).
	Year of conclusion	:	2019
	Developed by	:	Department of Agronomy, RARS, Tirupati
	Status of the Technology	:	Included in ZREAC recommendations

2.	Name of the Technology	:	**Intercropping Systems**
	Description of the Technology	:	Fodder maize intercropped with fodder cowpea either in 2:2 and 1:2 ratios recorded highest green fodder yield of 50 t ha^{-1} and 45.5 t ha^{-1} with additional returns of Rs 13,820/- and 10,235/- respectively when compared to other intercrops like horsegram, rice bean and sunhemp.
	Year of conclusion	:	2019
	Developed by	:	Department of Agronomy, RARS, Tirupati
	Status of the Technology	:	Included in ZREAC recommendations

3.	Name of the Technology	:	**Sowing Window for Fodder Sorghum**
	Description of the Technology	:	Under optimization of sowing window for summer fodder sorghum, II FN of January to II FN of February was found optimum and CSV-32F and CSV-30F varieties were found suitable for southern agroclimatic region with highest green and dry fodder yields.
	Year of conclusion	:	2020
	Developed by	:	Department of Agrometeorology, RARS, Tirupati
	Status of the Technology	:	Papers published. Refer Annexure-I, S. No. 132 & 133.

Agro Forestry

1.	Name of the Technology	:	**Agro Techniques for Casuarina**
	Description of the Technology	:	The tallest plants of Casuarina are at a spacing of 1.5 m x 1.5 m and highest girth of the plant (19.60 cm) is at spacing of 2.0 m X 1.5 m.
	Year of conclusion	:	2018
	Developed by	:	Department of Agronomy, ARS, Kavali
	Status of the Technology	:	Paper publication in progress

2.	Name of the Technology	:	**Agro Techniques for Eucalyptus**
	Description of the Technology	:	Spacing of 3.0 m X 1.5 m in Eucalyptus gave higher girth of 28.7 cm and application of 300 g N $plant^{-1}$ results in higher girth of 29.2 cm.
	Year of conclusion	:	2018
	Developed by	:	Department of Agronomy, ARS, Kavali
	Status of the Technology	:	Paper publication in progress

Dryland Technologies

1.	Name of the Technology	:	**Water Harvesting through Farm Pond and Supplemental Irrigation of 20mm to Rainfed Groundnut / Redgram During Critical Stages**
	Description of the Technology	:	A farm pond of 250 m^3 (size of 10 m X 10 m with 2.5 m depth) capacity with side slopes of 1.5:1 is recommended for catchment area of 1 ha. Soil + cement lining in 6:1 ratio around the farm pond is done for reducing seepage losses. Application of harvested rainwater @ 20 mm during pod development stage in groundnut and flowering in redgram was found to increase groundnut pod yield by 25 - 30% and seed yield of redgram by 30 - 40 % compared to rainfed crops.
	Year of conclusion	:	2017
	Developed by	:	AICRP on Dryland Agriculture, ARS, Ananthapuramu
	Status of the Technology	:	OFT completed and published. Refer Annexure-I, S. No. 134


Rainfed crop



Supplemental irrigation

2.	Name of the Technology	:	**Sub soil chiselling at one interval once in two years (Deep ploughing)**
	Description of the Technology	:	Deep tillage (up to 60 cm) using chisel plough found to break the hard pans in red soils and increase the depth of soil to store more rainwater *in-situ* and to curtail surface runoff compared to cultivating the land with 9 – tyne (spring) cultivator. Six years of mean data revealed 23% increase in yield due to sub soil chiselling over no sub soiling in rainfed crops *viz*., groundnut/ redgram/ castor. The BC ratios were 1.83 with sub soiling and 1.56 in no sub soiling
	Year of conclusion	:	2021
	Developed by	:	AICRP on Dryland Agriculture, ARS, Ananthapuramu
	Status of the Technology	:	OFT completed


Subsoiling with chisel plough


Tractor drawn 9 - tyne (spring) cultivator

3.	Name of the Technology	:	**Conservation Furrows for Higher Groundnut / Castor/ Redgram Productivity**
	Description of the Technology	:	Opening of conservation furrows by bullock drawn *metla guntaka* or tractor drawn intercultural implement in groundnut/ castor/ redgram coupled with sowing across the slope not only conserves moisture but also increases the yield to the tune of 10 to 35 percent. Five years of mean data revealed that *in-situ* moisture conservation practices in groundnut + pigeonpea (8:1) cropping system coupled with formation of conservation furrow at every row with a tractor drawn intercultural implement recorded 35 per cent higher groundnut equivalent yield with a BC ratio of 2.08 compared to 1.7 with control.
	Year of conclusion	:	2021
	Developed by	:	AICRP on Dryland Agriculture, ARS, Ananthapuramu
	Status of the Technology	:	OFT completed and published. Refer Annexure-I, S. No. 135

Farmers practice **Formation of conservation furrows with small tractor**

4.	Name of the Technology	:	***In-Situ* and *Ex-Situ* Moisture Conservation Measures in Redgram and Castor**
	Description of the Technology	:	Among different in-situ and ex-situ moisture conservation practices in redgram and castor, higher redgram equivalent yield was recorded with supplemental irrigation (1569 kg ha^{-1}). Subsoiling either at 1.8 m and 2.7 m distance recorded similar redgram equivalent yield (1311 kg ha^{-1}) but, superior to formation of conservation furrows at 3.6 m interval (1073 kg ha^{-1}).
	Year of conclusion	:	2021
	Developed by	:	ARS, Darsi
	Status of the Technology	:	Published an Abstract in National Symposium.

Other Technologies in Field Crops

1.	Name of the Technology	:	**Standardization of Measures to Overcome the Ill Effects of Water Logging Stress Conditions for Cotton, Maize and Sunflower Crops of Vertisols**
	Description of the Technology	:	Four days water logging decreased the kapas yield by 43.22 percent and two days water logging decreased the kapas yield by 34.81 percent over control at vegetative and boll development stages. However, under water logged stress conditions, higher yields of maize (4260 kg ha^{-1}), sunflower (652 kg ha^{-1}) and cotton (835 kg ha^{-1}) were recorded under ridge and furrow method with nutritional management practices like the application of urea @ 50 kg ha^{-1} along with spraying of liquid fertilizers like multi K (13-0-45) & urea solution @ 2% and gypsum application @ 500 kg ha^{-1} at critical stages of crop. Measures to ameliorate the ill effects of water logging stress conditions will lead to enhancement of productivity of rainfed crops besides relieving distress among farmers when high rainfall situations occur.
	Year of conclusion	:	2017
	Developed by	:	NARP – Soil Science, RARS, Nandyal
	Status of the Technology	:	Published. Refer Annexure-I, S. No. 136 & 137

Products

1.	Name of the Technology	:	**Potash Releasing Bacteria (KRB) Biofertilizer**
	Description of the Technology	:	Unavailable form of potassium in the soil can be made available by mixing either powder formulation of Potassium Releasing Bacteria @ 5 kg ha^{-1} or liquid formulation @ 1250 ml ha^{-1} with 500 kg of FYM / compost / vermicompost applying to one hectare at the time of sowing or transplanting. Thus, the usage of potassic fertilizers can be reduced by 25%.
	Year of conclusion	:	2015
	Developed by	:	ARS, Amaravathi
	Status of the Technology	:	Quantity produced and supplied

Powder: 22732 kg

Liquid: 12610 liters

Area covered: 36586 acres

2.	Name of the Technology	:	**Decomposition of agricultural waste material using ANGRAU Agricultural Waste Decomposers**
	Description of the Technology	:	Decompo-A: consortium of 5 types of decomposing fungi Decompo-B: consortium of 4 types of bacteria Decomposition/composting will be completed by 45-50 days Dosage: For composting of 1 ton of agricultural waste material, 1 kg each of Decompo-A and Decompo-B are to be used. For Insitu decomposition of agricultural waste material, 1 kg each of Decompo-A and Decompo-B per acre are to be used.
	Year of conclusion	:	2019
	Developed by	:	ARS, Amaravathi
	Status of the Technology	:	Quantity produced and supplied: 500 kg each of Decompo. A and B

Diagnostic Protocols and Processes

1.	Name of the Technology	:	**Protocol for *In Vitro* Meristem Tip Culture**
	Description of the Technology	:	*In vitro* meristem tip culture protocol for 2009A 107 and 2006A 223 was developed in MS media fortified with 34 g L^{-1} sugar + 0.89 mg L^{-1} BAP + 0.46 mg L^{-1} kinetin and seedlings were produced.
	Year of conclusion	:	2016
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Paper Published. Refer Annexure I, S.No. 144

2.	Name of the Technology	:	**P Efficiency Diagnosis**
	Description of the Technology	:	Developed protocols for identification of P efficiency in groundnut using leaf acid phosphatase activity as an indicator.
	Year of conclusion	:	2017
	Developed by	:	Department of Soil Science, RARS, Tirupati
	Status of the Technology	:	Presented in Inter drought international symposium & awarded as best work. Published. Refer Annexure I, S.No. 145

3.	Name of the Technology	:	**Mole Drainage**
	Description of the Technology	:	It is a subsurface method of draining in clay soils that experience regular water logging from high rainfall. Mole drains are unlined circular soil channels that function like pipe drains. Mole drains are formed with a mole plow that acts as a subsoiler with a chaisel blade facing down to break the hard pan under the surface. This will improve soil conditions and drainage. A major advantage is a low cost and hence can be installed economically at very close spacing. The drains laid at 3m spacing with 0.4 m & 0.5 m depths were found to perform better when compared to other spacings. The temporarily waterlogged soils can be reclaimed with low cost mole drainage the systems and addition of soil oxygenation agents (placement of Calcium peroxide granular powder @ 2 g $plant^{-1}$ at 15 cm deep and 15 cm away from the plant) during monsoon season will ensure good aeration. The combined effect of mole drainage and soil oxygenation resulted in 25-38% increase in the sugarcane yields of Co 86032 variety.
	Year of conclusion	:	2017
	Developed by	:	SWS, Bapatla
	Status of the Technology	:	Widely disseminated to the farming community





Formation of mole drains | Before mole drainage | After mole drainage

4.	Name of the Technology	:	**Chickpea Plant Growth Regulator**
	Description of the Technology	:	Among the various plant growth regulator combinations, the best shoot regeneration response was obtained in MS medium supplemented with BAP 6.0 mg L^{-1} + NAA 3.0 mg L^{-1}.
	Year of conclusion	:	2018
	Developed by	:	Department of Crop Physiology, RARS, Nandyal
	Status of the Technology	:	Paper published. Refer Annexure I, S.No. 146

5.	Name of the Technology	:	**Quality Traits**
	Description of the Technology	:	Quality traits in kernels *viz*., sucrose, total carbohydrates, total free amino acids, protein and oil percent were standardized using a UV-VIS spectrophotometer.
	Year of conclusion	:	2019
	Developed by	:	Department of Crop Physiology, RARS, Tirupati
	Status of the Technology	:	Published Book. Refer Annexure III, S.No. 2

6.	Name of the Technology	:	**Quantification by HPLC**
	Description of the Technology	:	Quantification of aflatoxins in field crops, carotenoids (lutein and β carotene) in leafy vegetables and resveratrol in groundnut seeds were standardized using Reverse phase HPLC.
	Year of conclusion	:	2019
	Developed by	:	Department of Crop Physiology, RARS, Tirupati
	Status of the Technology	:	Published Book. Refer Annexure III, S.No. 2

7.	Name of the Technology	:	**Developed Process Technology to Prepare Briquettes from Sugarcane Bagasse/ Agricultural Waste**
	Description of the Technology	:	Bagasse briquettes are an alternative to wood fuel. The cylindrical briquettes of 4 cm diameter and 25 cm length could be prepared with sugarcane bagasse without using any binder. Bagasse briquettes facilitate easy handling and cost reduction in transportation. The calorific value of bagasse briquettes is 4452 k cal kg^{-1} and could be well utilized as a fuel in food processing industries. Briquettes from sugarcane bagasse can reduce the volume of biomass by 88-92%. The cost of production of briquettes per ton is Rs.3,500/-
	Year of conclusion	:	2019
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Research paper was accepted for publication in "Pollution research" journal

Sugarcane bagasse

Briquetting machine

Prepared briquettes

Charcoal Briquetting machines at RARS, Chintapalle **Charcoal Briquettes**

8.	Name of the Technology	:	**Development of Jack Fruit Value Added Products**
	Description of the Technology	:	The jack fruit chips made at a frying temperature of 160^0C and frying time of 7 minutes was found best. Jam prepared a with 3:1 ratio of pulp and sugar was found best. Forward

			integration involving income increase by 50%.
	Year of conclusion	:	2019
	Developed by	:	Department of Agricultural Engineering, RARS, Chintapalle
	Status of the Technology	:	Included in annual reports and REAC highlights.

9.	Name of the Technology	:	**Developed Process Technology to Prepare Instant Sugarcane Juice Powder**
	Description of the Technology	:	Developed process technology to prepare instant sugarcane juice powder using a spray dryer. Sugarcane juice powder of 80 g can be obtained from 1L of sugarcane juice with maltodextrin (MD) concentration of 19.46%, inlet drying air temperature of 158.5 °C, feed flow rate of 11.02 mL min^{-1} and an atomization pressure of 0.28 MPa. The reconstituted sugarcane juice powder showed similar color and chemical properties as that of fresh juice. Optimized lemon and ginger concentrations to get flavored sugarcane juice powder were 1.12 ml and 4.4 g, respectively. The sugarcane juice powder can be stored for 12 weeks in HDPE, 8 weeks in flexible laminated packaging and 5 weeks in LDPE without altering its physico-chemical and sensory properties at a temperature of 38±2 °C and RH- 93±2%. The cost of production of sugarcane juice powder per kg is Rs.1800/-.

	Year of conclusion	:	2021
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Included in annual reports and REAC highlights 2021-22.

10.	Name of the Technology	:	**Jaggery Coated Peanut**
	Description of the Technology	:	Technology for jaggery coated peanut on individual nut basis was developed.

	Year of conclusion	:	2021
	Developed by	:	Dept. of Engineering, PHETC, RARS, Tirupati
	Status of the Technology	:	Commercialised. Yet to be patented

11.	Name of the Technology	:	**Peanut Butter**
	Description of the Technology	:	Technology for peanut butter making was developed and standardized.
	Year of conclusion	:	2021
	Developed by	:	Dept. of Engineering, PHETC, RARS, Tirupati
	Status of the Technology	:	Commercialized. Preparation charges Rs.75/- per kg of kernel.

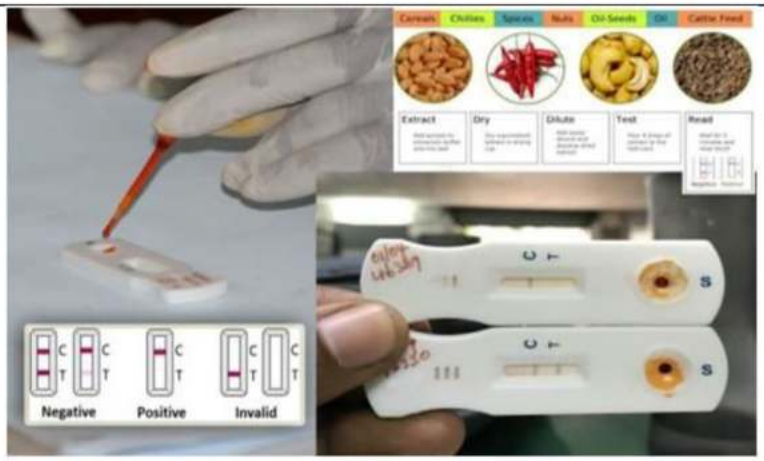
12.	Name of the Technology	:	**Sugarcane Yellow Leaf Virus Disease Diagnosis**
	Description of the Technology	:	Developed polyclonal antibodies for serological detection of sugarcane yellow leaf virus through ELISA for rapid and bulk screening of test samples.
	Year of conclusion	:	2021
	Developed by	:	Department of Plant Pathology, ARS, Perumallapalle
	Status of the Technology	:	The publication is in process.

13.	Name of the Technology	:	**Storage of Pulses, Groundnut & Flours**
	Description of the Technology	:	The total number of microorganisms and bruchids are 25 to 35% less in triple-layer packaging (Poly propylene with three layers of 300 gauge HDPE) compared to farmers and traditional practices without loss of germination and weight loss with regard to pulses, groundnut pods, and cereal flours.
	Year of conclusion	:	2021
	Developed by	:	Department of Microbiology, RARS, Tirupati
	Status of the Technology	:	The publication is in progress.

14.	Name of the Technology	:	**Protocols to Synthesize Nano Products**
	Description of the Technology	:	Developed protocols to synthesize nanoscale oxide materials of zinc, calcium, iron, manganese, copper, magnesium, nanoscale biochar, nanoscale biochar based nitrogen, nanoscale biochar based potassium, nanoscale silica and slow releasing nanoparticle encapsulated azadirachtin formulations and nanoscale silver.
	Year of conclusion	:	2021
	Developed by	:	Department of Nanotechnology, RARS, Tirupati
	Status of the Technology	:	Papers published. Refer Annexure I, S. No. 148 to 153 and two patents filed 1. A method for preparation of nanosilica formulation and its application in agriculture. application: 202241049273 (24-08-2022) - T.N.V.K.V. Prasad, G.C. Satisha 2. A method for preparing nano biochar and its application. Application Number: 202141017623 (04-03-2021) - T.N.V.K.V. Prasad, Vikas Abrol

15.	Name of the Technology	:	**Pesticide Residue Analysis**
	Description of the Technology	:	Standardized multi-residue method for analyzing 41 pesticides
	Year of conclusion	:	2022
	Developed by	:	RARS, Tirupati
	Status of the Technology	:	Protocols are being utilized for sample analysis on a cost basis & Manuscript preparation in progress

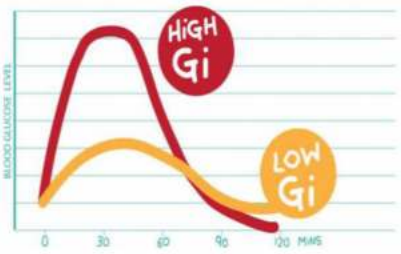
16.	Name of the Technology	:	**Rapid Testing Kit for Detection of Aflatoxin in Agricultural Produce**
	Description of the Technology	:	Rapid testing (Lateral flow immunoassay (LFIA) for detection of aflatoxin B1 in agricultural produce. The extraction takes about 20 minutes and the test can be conducted within 10 minutes. The result can be interpreted by visual observation. The limit of detection was set to be 10 ppb, which is crucial for the export of produce to most of countries.
	Year of conclusion	:	2022
	Developed by	:	PHTC, Bapatla
	Status of the Technology	:	Patent for process technology is under process



Kit for detection of Aflatoxin in agricultural produce

17.	Name of the Technology	:	**Process Technology to Prepare Reconstitutable Sugarcane Juice Concentrate using Rotary Vacuum Evaporator**
	Description of the Technology	:	The reconstituted sugarcane juice concentrate was similar to fresh sugarcane juice with respect to physicochemical properties such as colour, sucrose, reducing sugars, polyphenols, flavonoids and sensory acceptance. It can be stored up to 3 months in glass bottles, aluminium pouches or multi layer packaging material under the refrigerated condition without altering physicochemical properties. Sugarcane juice concentrate of 220 ml can be obtained from 1000 ml of sugarcane juice. The cost of production of sugarcane juice concentrate per liter is Rs. 1000/-
	Year of conclusion	:	2022
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Included in annual reports and REAC highlights 2021-22.

18.	Name of the Technology	:	**An *In-Vitro* Method for Determination of Glycemic Index and Kit**
	Description of the Technology	:	Developed protocols to determine the glycemic index of various agricultural products.
	Year of conclusion	:	2022
	Developed by	:	PHETC, Bapatla
	Status of the Technology	:	A patent on "An *in-vitro* method for determination of glycemic index and kit thereof" has been filed and allotted **Application # 202141030841** by the Patent Office, Chennai.



19.	Name of the Technology	:	**Process Technology for the Preparation of Various Value Added Products of Jaggery**
	Description of the Technology	:	Developed process technology for the preparation of various value-added products of jaggery i.e Jaggery chocolates, Jowar jaggery biscuits, multi millet instant dosa mix, Multi millet nutribar, Sugarcane juice jellies, ragi-jaggery muffins, oats-jaggery biscuits etc. The cost of preparation of jaggery chocolate is Rs. 4.50 per piece, jowar/oats jaggery biscuits is Rs. 3.00 per piece, ragi jaggery muffins is Rs. 6.50 per piece, dosa mix per kg is Rs.180, sugarcane juice jelly per piece Rs.9, multi millet nutribar per 100g is Rs.45.
	Year of conclusion	:	2022
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Paper published. Refer Annexure I, S. No. 154 Published Abstracts. Refer Annexure II, S. No. 14, 15

Establishment of Pilot Plants

1.	Name of the Technology	:	**Developed a Mechanized System for the Production of Solid and Granular Forms of Jaggery**
	Description of the Technology	:	Mechanized plant with a crushing capacity of 10 tonnes per day for the production of 1 tonne of solid or 800 kg of a granular form of jaggery per day. No. of persons required per day to harvest the cane and operate the plant is 45. The cost of a mechanized jaggery plant is Rs. 80,00,000/-
	Year of conclusion	:	2020
	Developed by	:	RARS, Anakapalle
	Status of the Technology	:	Got two patents. One for mechanized jaggery granulator for preparing jaggery granules (Patent No. 361025, Dt: 12.03.2021) and another for Machinery & Process of Manufacturing of Cane Jaggery in Crystal Form (Patent No. 382165, Dt: Nov., 2021)

2.	Name of the Technology	:	**Value Chain Intervention through Cold Pressed Oil Extraction Unit**
	Description of the Technology	:	Forward integration involving income increase by 50%.
	Year of conclusion	:	2022
	Developed by	:	Department of Agricultural Engineering, RARS, Chintapalle
	Status of the Technology	:	Under editorial review of Journal of Economics and Development



3.	Name of the Technology	:	**Preparation of Valuable By-Products from Mango Waste**
	Description of the Technology	:	A pilot plant has been set up for oil extraction with mango nut in the solvent method. Found to be more stable than many other vegetable oils rich in unsaturated fatty acids.

	Year of conclusion	:	2022
	Developed by	:	PHETC, Bapatla
	Status of the Technology	:	

Annexure – I

Research Papers published based on concluded Technologies from 2015-16 to 2021-22

1. Srinivasa Rao, N and Nanda Kishore, M. 2013. Baiting through PVC pipe bait stations – A low-cost baiting technique for rodent control in rice. Annals of Plant Protection Sciences. 21 (1): 167-171.
2. Upendra Rao, A., Visalakshmi, V., Madhu Kumar, K and Rao, NGV. 2016. Evaluation of establishment methods and N management in rice. 4th International Agronomy congress, New Delhi, pp. 1188-1189
3. Upendra Rao, A., Ramana Murty, K.V., Madhu Kumar, K., Visalakashmi, V., Hari Satya narayana N and Gobinda Rao, S. 2020. Alternate Crop Establishment Methods for Water-saving and High Rice Productivity in North Coastal Andhra Pradesh. Current Agriculture Research Journal. 8 (3): 1-6
4. Srinivas Manukonda, Satyanarayana, P.V., Raju, R.A., Upendra Rao, A. and Reddy, C.V. 2017. A long-term trial to develop organic farming package for rice-based cropping system in Godavari delta region of Andhra Pradesh. In: Proceedings of Rural Development Conference 2017 held at Bangkok, Thailand. 6-13.
5. Reddy, C.V., Srinivas, M., Rajendra Prasad, T.V.P., Satyanarayana, P.V and Sudhir Kumar, I. 2017. Integrated nutrient management studies in rice-rice crop sequence. In: Proceedings of National Seminar on "Agronomic Approaches for Climate Resilience in Agriculture held at RARS, Nandyal, AP on 2 May, 2017. Page No: 18.
6. Srinivas, M., Shyam Sundar, K., Kumari, MBGS., Srinivas, Ch and Satyanarayana, PV. 2015. Studies on Integrated nutrient management system in rice-rice crop sequence. In: Proceedings of International Rice Symposium 2015 held at Hyderabad, Telangana. Compendium of Abstracts, Page No: 485.
7. Srinivas, M., Anusha, B and Satyanarayana, PV. 2019. Organic Farming Package for Rice based Cropping System in Godavari Delta Region of Andhra Pradesh. Journal of Rice Research – An International Journal. 7 (202): 241-245.
8. Srinivas Manukonda, Anusha, B., Venkata Reddy, C and Munirathnam, P. 2018. Evaluation of organic farming packages for Kharif Rice in Andhra Pradesh. In: Proceedings of Extended summaries of 3rd ARRW International Symposium-2018 "Frontiers of Rice Research for improving productivity, profitability and climate resilience" held at NRRI, Cuttack, Odisha during 6-9, Feb 2018. Page No: 219-220.
9. Srinivas Manukonda. 2017. Development of organic farming package for Godavari delta region of Andhra Pradesh. In: Proceedings of Invited lecture in 104th Indian Science Congress held at Sri. Venkateswara University during 3-7 Jan, 2017. Page No: 125-126.
10. SWS
11. Satish Kumar, Y.S., Jaffar Basha, S., Narayana Rao, E.S.V., Venkatesh babu, D and Mohan Vishnu Vardhan, K. 2021. Effect of plant Sensor based real time Nitrogen management on growth, yield and economics of rice (Oryza sativa L.) crop. Annals of Plant and Soil Research 23 (4):415-418.

12. Satish Kumar, YS., Venkatesh Babu, D., Mohan Vishnu Vardhan, K and Narayana Rao, E.S.V. 2020. Rescheduling of fertilisers and fertilisation strategies for rice crop. Journal of Pharmacognosy and Phytochemistry 9(6): 2313-2316.
13. Upendra Rao, A., Madhu kumar, K., Visalakashmi, V., Gobinda Rao S and Hari Satyanarayana, N. Bio efficacy testing of sequential application of pendimethalin followed by florpyrauxifen - benzyl in aerobic rice. International Journal of Chemical Studies. 8(6):517-519.
14. Upendra Rao, A., Madhu Kumar, K., Visalakashmi, V and Govinda Rao, S. 2021. Influence of Post Emergence Application of Herbicides on Growth, Yield and Economics of Dry Direct Sown Rice International Journal of Environment and Climate Change, 11(12): 158-164.
15. Bhuvaneswari, V., Raju, S.K., Prasadji, J.K., Satyanarayana, P.V and Muniratnam, P. 2017. Efficacy of new combination fungicide azoxystrobin 11% + tebuconazole 18.3% SC against rice sheath blight pathogen. Journal of Rice Research 10 (2): 85-88.
16. Paramasiva, I., Vineetha, U., Sreelakshmi, Ch and Rajasekhar, P. 2021. Evaluation of different botanicals against yellow stem borer Scirpophagaincertulas (Walker) and leaf folder Cnaphalocrocismedinalis (Guenee) of rice. Biological forum - An International journal. 13(3b):173-175.
17. Srinivasa Rao, N., Anusha, B., Narsimha Rao, Ch. V and Tripathi, R.S. 2019. Evaluation of Flocoumafen and Difenacoum against lesser bandicoot rat, Bandicota bengalensis (Gray) in rice. Journal of Entomology and Zoology studies. 7(3): 907-910.
18. Aruna, E., Karunasagar, G and Prathap Kumar Reddy, A. 2019. Productivity of rice groundnut cropping system under integrated nutrient management. Journal of Research ANGRAU. 47(4): 38-46.
19. Aruna, E and Prathap Kumar Reddy, A. 2019. Productivity of rice varieties under varied nitrogen levels. Green farming. 11(4): 324-327.
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Annexure – II

Papers presented in conferences based on concluded Technologies from 2015-16 to 2021-22 and Abstracts published

1. Mallikharjuna Rao, N., Phanikumar, K., Anand Kumar, A.D.V.S.L.P., Satyanarayana, P.V and Muniratnam, P. 2018. Bio efficacy of new chemistry insecticides against stemborer and brown planthopper on rice. In: Proceedings of 105th Indian Science Congress. Pp. 178.
2. Nanda Kishore, M., Mallikharjuna Rao, N and Anand Kumar, A.D.V.S.L.P. 2020. Compatibility of New insecticides, Fungicides against major Insect pests and diseases of rice. In: Proceedings of 1st Indian Rice Congress, ICAR-NRRI, Cuttack held on December 8-9, 2020, Pp: 731-732.
3. Bhuvaneswari, V., Krishnam Raju, K., Vijay Krishna Kumar, D., Vijay Kumar Naik and Jogi Naidu, G. 2020. Efficacy of new combination fungicide Azoxystrobin 5.6% + Tebuconazole 10% + prochloraz 20% EC against rice sheath blight. In: Proceedings of 1st Indian Rice Congress, ICAR-NRRI, Cuttack held on December 8-9, 2020, Pp. 674-676.
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11. Srinivasa Rao, M.M.V., Patro, T.S.S.K., Tejeswar Rao, K., Ravisankar, N and Panwar, A.S. 2021. Duplex poultry unit for secure rearing of backyard poultry birds in tribal hilly tracts of Andhra Pradesh. In: Proceedings of Extended Summaries: 5th International Agronomy Congress, November 23-27. India.
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15. Jagannadha Rao, P.V.K., Sreedevi, P., Navaneetha, Y., Kiranmayi, K and Bharathalakshmi, M. 2022. Physico-chemical and organoleptic evaluation of ragi (finger millet) based chocolates. Published abstract in International Conference-Emerging technologies in food processing (ETFP-2022).

Annexure – III

Books/ book chapters/ technical bulletins published based on concluded Technologies from 2015-16 to 2021-22

1. Triveni, U., Sukanya, T.S., Patro, T.S.S.K., Anuradha, N., Rani, Y.S., Rao, M.M.V.S., Praveen, B., Kumar, M.H., Kiranmai, M.J., Bharathalakshmi, M., Ganapathy, K.N., Bhat, P and Tonapi, V.A. 2021. Guli/Guni/Netti method: A boon to finger millet farmers in virgin fertile soils. Agricultural Research Station, Vizianagaram, Acharya N.G. Ranga Agricultural University, Andhra Pradesh.pp.1-20.
2. Sudhakar, P., Latha, P and Reddy, P.V. 2016. Phenotyping crop plants for physiological and biochemical traits: Kernel Quality Traits. Elsevier publishers, Academic press, London. pp. 172.

RELEASE OF VYAVASAYA PANCHANGAM - 2021

Visit to Farm Machinery workshop at RARS, Tirupati

Field visit and farmers interaction at Tumuluru, Guntur dt.

Field visit of redgram breeder seed plots at ARS, J.M. Puram












Research & Training achievements of ANGRAU on Drone applications in Agriculture