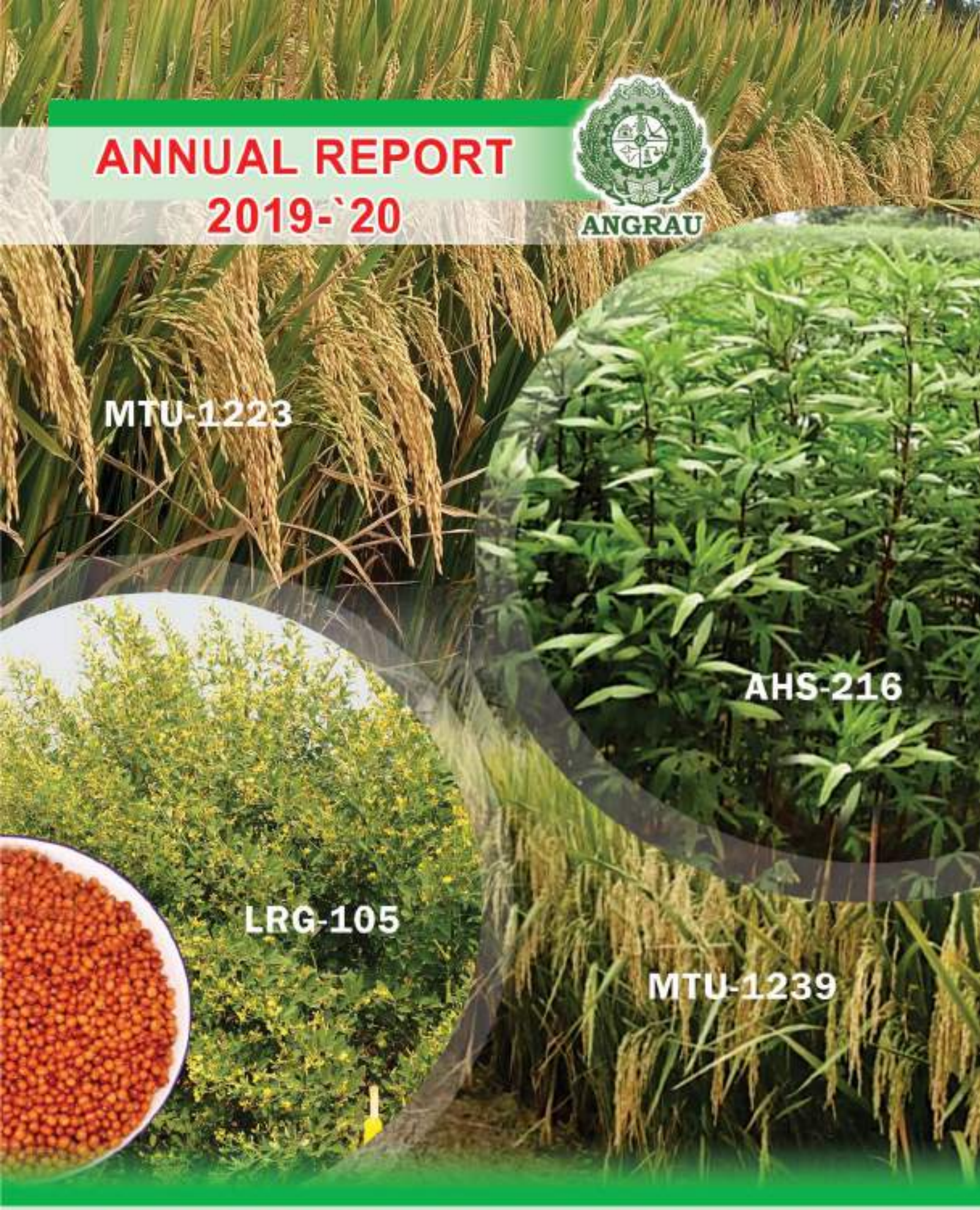
ANNUAL REPORT
2019-`20

ANGRAU



ACHARYA N. G. RANGA AGRICULTURAL UNIVERSITY

LAM, GUNTUR, ANDHRA PRADESH, INDIA

Blood Donation Camp Organized at
Dr. NTR College of Food Science & Technology, Bapatla

Annual Post Graduate Students` National Conference (APGSNC) - 2020 organised at Agricultural College, Bapatla during 30-31 January, 2020.

Fifty Sixth Annual Report

2019-`20

13th Rank among Agricultural Universities by ICAR in 2019

ANGRAU

Acharya N.G. Ranga Agricultural University

Lam, Guntur-522 034, Andhra Pradesh, India

ANGRAU

Annual Report 2019-2020

Compiled by

Planning and Monitoring Cell

Acharya N G Ranga Agricultural University

Lam, Guntur - 522 034

Director (Planning and Monitoring Cell)	:	**Dr. Y. Radha** (up to 03.05.2021) **Dr. Ch. Sreenivasa Rao** (from 21.05.2021)
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First Page:

Crop Varieties:

Rice (MTU-1223, MTU-1239)

Mesta (AHS-216)

Redgram (LRG-105)

Printed at

ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY

Guntur-522 034, Andhra Pradesh, India

A. Vishnuvardhan Reddy
Vice-Chancellor

ANGRAU

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

FOREWORD

It is indeed with a great pleasure that I present the 56th Annual Report of Acharya N. G. Ranga Agricultural University for the year 2019-'20. We have been making rapid strides in all the fronts of Teaching, Research and Extension and emerging as a talisman for farming community in solving their farm problems and socio-economic upliftment. The University is in the upper echelons among national agricultural universities of late, and is ranked 13th by ICAR for the year 2019.

On the academic front, a total of 1682 students, comprising of 1344 in Agriculture; 241 in Agricultural Engineering & Technology; and 97 in Community Science were passed out during 2019-'20. A total of 5563 students in Undergraduate, Post Graduate, Doctoral and Diploma programmes were on roll during 2019-'20. Students of our University have made a commendable effort in competitive examinations and about 105 students from various colleges under three faculties were qualified in ICAR- JRF/ SRF and GATE examinations during 2019-'20. About 55 UG students from our five accredited colleges were deputed to International training programme for two months at Kansas State University and Oklahoma State University, USA during August, 2019 under Institutional Development Plan financed by NAHEP.

Our University's contribution on the research front is remarkable over the years. In the year 2019, a total of 12 crop varieties in rice, finger millet, mesta and cotton

were released. During 2020, a total of 18 improved varieties in rice, pigeonpea, finger millet, foxtail millet, chickpea, sugarcane, horsegram, groundnut and tobacco were released and notified from ANGRAU. ANGRAU has shown tremendous progress in research frontiers of biotechnology, nanotechnology, geo spatial technology, agricultural engineering etc.

The ANGRAU has a robust ToT in delivering plant production and protection tactics to farming community. During the year 2019-'20, our DAATTCs and KVKs have tested 29 minikit cultures of eight crops both during kharif and rabi. Further, 290 technologies covering field crops, horticultural crops, animal husbandry/fisheries and community science were assessed. Apart from these, nine ODLC (Open Distance Learning Centre) courses were offered by the KVKs and a total of 299 candidates have obtained certificates.

In addition, ANGRAU is in collaboration with various national and international institutes in Education, Research and Extension activities for mutual benefit in frontier areas.

I congratulate the Planning and Monitoring Cell team on their strenuous efforts in compiling and bringing out the 56th Annual Report of ANGRAU.

(A. VISHNUVARDHAN REDDY)

CONTENTS

V EXTENSION

List of Tables

List of Figures

Annexures

EXECUTIVE SUMMARY

The University is executing its academic, research and extension functions efficiently for the benefit and welfare of all stake holders, thus improving the farm income, livelihoods of that dependant on Agriculture directly or indirectly, through imparting skill development, development of improved crop varieties / plant health management techniques / crop improvement technologies, and wider reach of transfer of technologies from lab to land through various innovative extension programmes and publications.

The Indian Council of Agricultural Research, based on the assessment and competency, has awarded 13th rank at National level to Acharya N. G. Ranga Agricultural University for the year 2019-20.

The academic activities of University are implemented through three faculties *viz*., *faculty of Agriculture* in five agricultural colleges, one advanced post graduate centre, 17 polytechnics (15 agricultural, one in organic farming, one in seed technology); faculty of Agricultural Engineering & Technology in two colleges each of Agricultural Engineering, food science & technology and Agricultural Engineering Polytechnics, and faculty of Community Science in one college of Community Science.

The need based and demand driven research programmes for developing or validating or advocating new varieties / methods / techniques / technologies are being conducted by Regional Agricultural Research Stations (RARS) spread over six agro-climatic zones of the state through 32 Agricultural Research Stations (ARS).

The key and vital activity in spreading / popularizing the various methods / practices for crop management is the extension activity, and in this regard, University has been systematically organizing capacity building training / mass communication programs through 13 Krishi Vigyan Kendras (KVKs), 13 District Agricultural Advisory and Transfer of Technology Centres (DAATTCs), Agricultural Information and Communication Centre (AI&CC), Electronic Wing (EW), Farmers Calls Centre (FCC), besides extension units in different RARSs.

Administration

His Excellency, the Governor of Andhra Pradesh is the Chancellor of the University. The Board of Management (BoM) with 21 Members is the governing body of the University with Vice-Chancellor as the Chairman. The BoM meeting was convened only once during 2019-'20 and decisions were taken on various issues and aspects. The Vice-Chancellor acts as the Chief Executive Officer of the University with the assistance of Dean of Agriculture, Dean of Agricultural Engineering & Technology, Dean of Community Science, Dean of Post Graduate Studies, and Dean of Student Affairs, Director of Experimental Stations, Director of Extension, Registrar, Comptroller, Estate Officer, University Librarian and Controller of Examinations.

The activities of the University in the areas of education, research and extension carried out during the period of June 2019 to May 2020 have been summarized and placed below.

Teaching

- A total of 1839 students were admitted in the University. Out of them, 1066 were admitted in undergraduate courses, 152 in

masters, 53 in doctoral programmes and 568 in diploma courses.

- A total number of 1484 students were admitted into the Faculty of Agriculture, comprising of 779 in undergraduate programmes, 134 in postgraduate programmes, 46 in doctoral programmes and 525 in diploma programmes.
- A total number of 268 students were admitted into the Faculty of Agricultural Engineering & Technology, comprising of 209 in undergraduate courses, 10 in postgraduate programmes, 06 in doctoral programmes and 43 in diploma programmes.
- In Community Science, a total of 87 students were admitted, comprising of 78 in undergraduate programmes, 08 in post graduate programmes, and 01 in doctoral programme.
- A total number of 5563 students were on rolls of the University in different Undergraduate, Postgraduate, Doctoral and Diploma programmes. Out of them, 2240 were boys and 3323 were girls.
- A total number of 1682 students comprising of 1344 in Agriculture, 241 in Agricultural Engineering & Technology and 97 in Community Science faculties have passed out from the University during the academic year 2019-'20.
- A total of 105 students of different colleges of ANGRAU qualified in ICAR- JRF/ SRF and GATE examinations, while 27 students obtained different fellowships, awards and medals.
- As many as 15 students of the ANGRAU obtained 'C' certificates and 35 students got 'B' certificate's in NCC.
- The NSS volunteers of various colleges actively participated in NSS activities and Special Camps during the year.
- First Phase of Intercollegiate Sports, Games, Cultural & Literary Meet of ANGRAU-2019-'20 was held at S.B.V.R. Agricultural College, Badvel from 30.09.2019 to 04.10.2019, while the Second Phase was held at Agricultural College, Bapatla from 14.10.2019 to 18.10.2019.
- Agricultural College, Bapatla bagged University Overall Champion (Boys), Individual Champion (Girls), Overall Champion for Literary & Cultural Events, Overall Champion for Games (Girls) in the Inter Collegiate Sports, Games and Cultural and Literary Meet concluded at Agricultural College, Bapatla.
- Inter-zonal teaching sports meet of ANGRAU-2020 was held at Agricultural College, Mahanandi from 22.01.2020 to 24.01.2020.
- Students of different constituent colleges of ANGRAU participated in XX All India Inter Agricultural University Sports Meet-2020 held at S.V.Veterinary University, Tirupati from 01.03.2020 to 05.03.2020.
- Students of Agricultural College, Naira have participated in YUVA 2020 at GBPUAT, Pantnagar, Uttaranchal from 20.02.2020 to 23.02.2020 and bagged one "Best Poster Presentation Award".
- Twenty two Students from ANGRAU participated in AGRIUNIFEST- 2020 held at Indira Gandhi Krishi Viswa Vidyalaya, Raipur, Chattisgarh from 8.2.2020 to 12.2.2020.

- A total of 194 students secured employment in different public and private sectors through the Students' Counseling and Placement Cells that are functioning in all the Colleges and Polytechnics of the University.
- The University Library has rich collection of both print and non-print documents. All the library e-Resources are made available through EZProxy remote access to various colleges, Research stations, Polytechnics, DAATT centers and KVKs of ANGRAU. A total of 3793 books and 448 theses have been added to the library collection.
- Under Institutional Development Plan (IDP) of National Agricultural Higher Education Programme (NAHEP), 55 students have participated in International Programmes such as Twinning Arrangements, Skill Oriented Courses, at Oklahoma State University (OSU), USA and Internship Programmes at Kansas State University (KSU), USA.

Research

- During 2019, a total of 12 crop varieties (six varieties each at the state and national level) were released. These include seven in rice (MTU 1224-Maruteru Sambha, MTU 1262-Maruteru Mashuri, MTU 1210-Sujatha, BPT 2595-Teja, NLR 3354-Nellore Dhanyarasi, MTU 1223-Varsha and MTU 1239-Sravani), two each in Fingermillet (VR 988-Suvarnamukhi and VR 929-Vegavathi) and Mesta (AMV 8 and AMV9) and one in Cotton (LDHP 1).
- During 2020, a total of 12 varieties at the state level and 6 at national level *viz.*, four in rice (BPT 2782, BPT 2411, NLR 4001 and NLR 40054), three in pigeonpea (LRG 105, TRG 59 and LRG 133-33), two each in finger millet (PR 1045 and CFMV 1), foxtail millet (SiA 3222 and SiA 3223), chickpea (NBeG 452 and NBeG 810), sugarcane (2009A 107 and 2009A 252) and one (1) each in horsegram (ATPHG-11), groundnut (TCGS-894) and tobacco (ABD 132) were released and notified from ANGRAU.
- A quantity of 9501.2 quintals of Breeder seed in various crops was produced during 2019-20. In addition, 7131.7 and 2564.5 quintals of foundation and certified seed were produced in different crops during the year 2019-20.
- Different field trials such as Initial Varietal Trials, Advanced Varietal Trials, Preliminary Yield Trials, Observational Yield Trials, Advanced Yield Trials, Multi-location Trials, Initial Evaluation Trials, Screening trials, Initial Hybrid Trials, etc., were conducted in both during kharif & rabi (as the case may be) in different crops.
- Studies on Bio-fortification of annual cereal fodder crops with zinc and iron revealed that significantly highest green fodder yield of 50,825 kg ha^{-1} were realized with African tall maize variety (net returns: Rs. 74,689 ha^{-1} and B:C of 0.96) compared to fodder sorghum SSV-74 with the grain yield of 44,486 kg ha^{-1} (net returns Rs. ha^{-1} 46,673 and B:C ratio of 0.54).
- Significantly highest green fodder yield of 49,269 kg ha^{-1} with net returns of Rs 65,892/ ha was recorded with application of 10 kg $FeSO_4$ ha^{-1} as basal + 1% $FeSO_4$ foliar spray at 45 DAS, however comparable with 10 kg $ZnSO_4$ ha^{-1} as basal + 1% $ZnSO_4$ foliar spray

at 45 DAS, 20 kg $ZnSO_4$ ha^{-1} as basal + 1% $ZnSO_4$ foliar spray at 45 DAS, 20 kg $FeSO_4$ /ha as basal + 1% $FeSO_4$ foliar spray at 45 DAS.

- Evaluation of rice-based cropping systems for higher productivity with non-traditional crops in HAT zone revealed that groundnut (59.2 q ha^{-1}), maize (51.9 q ha^{-1}) and wheat (48.2 q ha^{-1}) crops recorded more system productivity than the remaining crops.
- Studies on Carbon crediting and Green House Gas (GHG) emission in Integrated Farming System (IFS) model revealed that, net GHG emission was -5042 CO_2e, indicating that the established IFS model at RARS, Maruteru is more suited for environmental sustainability.
- In a trial on organic rice (at ARS, Ragolu), grain yields of 6259 kg ha^{-1} were recorded with application of NPK @ 120-60-50 kg ha^{-1} + $ZnSO_4$@ 50 kg ha^{-1} with the variety Srikurma (RGL 2332) whereas organic production practices gave 5490 kg ha^{-1}.
- At RARS, Anakapalle, among three methods of sugarcane cultivation, higher tiller population, stalk population, yield attributes and yield were higher with ICM (88.5 t ha^{-1}) followed by Organic Farming and Natural Farming (74.9 t ha^{-1}) while the lowest cane yield (60.5 t ha^{-1}) was recorded with Palekars Zero Budget Natural Farming.
- Studies on Integrated Weed Management in horsegram at RARS, Lam indicated that pre emergence (PE) application of pendimethalin + imazethapyr @ 750 + 50 g ha^{-1} (Vellore 32®) alone or the combination of pendimethalin @ 750 g ha^{-1} followed by one hand weeding recorded on par seed yield with two hand weedings.
- Studies at Saline Water Scheme, Bapatla indicated that among different plantations, *Casuarina* was found tolerant to high soil salinity (15.0 dS m^{-1}). Subabul exhibited tolerance in alkaline soils (pH 9.0).
- Biotechnological research at RARS, Tirupati on redgram proved that two viruses, pigeonpea sterility mosaic virus 1 (PPSMV I) and PPSMV 2 are associated with Sterility mosaic diseases of pigeonpea (cv. LRG41) in Andhra Pradesh. A Real Time Polymerised Chain Reaction (RT-PCR) method was developed for detecting viruses.
- Under NICRA project, 17 Back cross inbred lines were developed in the genetic background of Swarnasub with introgression of *SCM2* for lodging tolerance, *Saltol1* for seedling stage salinity tolerance and *qAG3.1* for anaerobic germination.
- The Nanoscale materials were effective in promoting germination per cent, plant growth and yield in groundnut. Concentration of GA3 significantly increased with the application of nanoscale zinc oxide (2466 µg/g). Further, the protocols for synthesis of nanoscale chitosan encapsulated mancozeb and imidacloprid; and nanoscale silicon dioxide were standardized at Nanotechnology wing of RARS, Tirupati.
- Soil fertility maps of East Godavari district were prepared using the analytical data generated by Department of Agriculture, Govt. of AP at Geospatial Technology, RARS, Lam, Guntur.

- Drones mounted with multispectral cameras were used for estimating pest and disease incidence in groundnut growing regions of Ananthapuramu and YSR Kadapa districts. It was estimated that approximately 14 – 28 per cent of the area was affected in the study area that resulted in corresponding yield reduction.
- A total of 47.36 MTs of powdered form of biofertilizers & 7.27 MTs of liquid fertilizers were produced during the period under report at various research centres of ANGRAU.
- Two releases of *Trichogramma pretiosum* from one week after seedling emergence and three sprays of *Bacillus thuringiensis* (NBAIR Bt G4) @ 2.0 g L^{-1} from 25 DAS was found effective against Fall Army Worm in maize with higher cob yield (55.45 Q ha^{-1}) and C: B ratio (13.24).
- Research on AINP on Vertebrate Pest Management at RARS, Maruteru indicated that Bromadiolone 0.005% applied in 10% jaggery liquid recorded 83.4% control success with 61.75 % consumption as against 25.3% control success with 15.5 % consumption in regular broken rice based bait. Consumption of De-hulled maize cob bait was relatively higher (52.5%) over the regular broken rice bait (16.75%) and it was found very promising for effective delivery of rodenticides at much lower bait costs.
- At ARS, Vijayarai, a study on artificial domiciliation of non-Apis Pollinators revealed that Pollinator insects constructed their nests in *Saccharum sp* sticks (8.73 %) and *Megachile sp* preferred 1.00-1.5 cm diameter *Saccharum* stick for their nest construction.
- At Post Harvest Technology Centre, Bapatla, the treatments of groundnut oil, sesame oil and neem oil @ 5 mL per kg of pulse seeds *i.e*., black gram, green gram and pigeonpea could effectively prevent bruchid infestation. However, there was a decline in germination per cent of the oil treated pulse seed upon storage beyond three months.
- At ARS, Anantapuramu, agro meteorological studies on the effect of wind mills on micro climate, growth and yield of groundnut inferred that lower yield was observed in the vicinity 20 m from wind mill (1323 kg ha^{-1}) when compared to the 60 m away from wind mill (1727 kg ha^{-1}). With respective to yield and no of pods/plant (1592 kg ha^{-1}) the highest was observed in crop sown in north direction and the lowest (1252 kg ha^{-1}) in crop sown in west direction.
- In Crop Weather Relationship studies of groundnut during *kharif* 2019 at RARS, Tirupati, Groundnut varieties (Narayani, Dharani, K6, K9, TCGS-1694, TCGS-1157 and TCGS-1416) sown during second fortnight of July (4261 kg ha^{-1}) gave highest pod yield compared to the crop sown during second fortnight of June (2903 kg ha^{-1}) and first fortnight of July (3168 kg ha^{-1}).
- Research on Market Intelligence indicated that the seasonal index of paddy price was high during October to December months because of low arrivals to the market yards. The maize prices were high during months of April and May, Chilli index of price was low during the month of January to April and June to November because of increased export demand, Cotton seasonal index of price

was found higher during the crop production season because of scanty arrivals of produce, Blackgram, greengram, and bengalgram seasonal index of prices were found high during the rainy season and scarcily decreased as the arrivals increased during January to March where as Onion seasonal index of price shows an abrupt increase between April to December 2019.

- In sugarcane, the total cost of cultivation under irrigated conditions on plant crop was Rs. 1,08,952/-, of which, the operating costs were Rs. 81,876/-. The B:C ratio for operating costs was 0.94, as against 0.71 on total costs. On ratoon crop, the total cost of cultivation was Rs. 80,469/-, of which, the operating costs were Rs. 57,7733/-. The B:C ratio for operating costs in ratoon crop was 1.27 as against 0.85 on total costs at RARS, Anakapalle.
- At RARS, Anakapalle, for rainfed sugarcane, the total cost of cultivation in plant crop was Rs. 77,027/- of which, the operating costs were 57,332/-. The B:C ratio for operating costs was 0.96 as against 0.71 on total costs. On ratoon crop, the total cost of cultivation was Rs. 53,891/- , of which Rs. 37,455/- were operating costs. The B: C ratio for operating costs was 1.25 as against 0.87 on total cost.
- The Post Harvest Engineering and Technology at RARS, Anakapalle, a) a manual operated hand compression machine for moulding of food packaging material from sugarcane bagasse was developed, b) the process of making food packaging material from dry sugarcane bagasse (90%), paper waste (5%), Starch (1%), Glycerol (2%) in 1% Poly vinyl alcohol using hand compression moulding machine was standardized, c) a Centrifugal Clarifier for clarification of sugarcane juice was developed, and d) The process technology for preparation of sugarcane juice powder using spray drying technology was standardized. .
- At PHTC, Bapatla, studies indicated that addition of ghee to rice at a ratio of 1:10 was effective in lowering the Glycemic Index of rice to 10%, whereas addition of pigeonpea at the same ratio lowered up to 8%.
- AICRP on Farm Implements and Machinery Scheme, Bapatla, tested that the Minimum power required for the Tractor operated cotton plant shredder was is 45 hp, Stalk cutting efficiency is 99% and Fuel consumption was 4.5-5 lit/h with field efficiency of 72.21 to 88.50%. The Cost of operation was Rs. 3000 ha^{-1}.
- At RARS, Chintapalle, during *rabi*, 2019-'20, solar system capacity of 4800 wp with 16 pieces of solar panels with capacity of 300 wp each were installed to supply the required power to 5 hp surface mounted Monoblock pump. Micro irrigation and automation was installed for yearlong irrigation to the fields.
- Under empowering rural families and field level functionaries through Mobile app- "AALAMBANA" e-Content was developed in selected areas. The content was developed in telugu language in APK format. The AALAMBANA App will be available in the Google play store for the open access after field testing.

Extension

- During 2019-'20, the performance of 29 minikits and 290 techonologies were

evaluated at field level by KVKs and DAATTCs.

- A total of 205 Frontline Demonstrations (FLDs) by KVKs and 58 FLDs by DAATTCs were organized during the year.
- A total of 1943 diagnostic surveys were undertaken in different districts of AP.
- A total of 2786 Capacity Building Programmes viz., trainings, skill teachings, vocational trainings, group discussions, field days and rythu sadassus" were conducted regularly to different stakeholders.
- About 112 Training & Visit meetings were organized by ANGRAU and solutions were offered to farm problems.
- Nine Open and Distance Learning Centre (ODLC) courses were offered by seven KVKs (Utukur, Rastakuntubai, Nellore, Kalikiri, Banavasi, Reddipalli, Undi) and a total of 299 candidates have participated in ODLC of which 147 candidates in Organic Farming, 79 candidates in Terrace Gardening, 19 candidates in Bee Keeping and 54 candidates in Mushroom production.
- Under DAESI (Diploma in Agriculture Extension Services for Input Dealers) programme, 120 input dealers were trained and transformed as Para-Extension professionals. One DAESI programme each with a capacity of 40 members was organized by KVK, Darsi, KVK, Banavasi and ARS, Utukur during 2019-'20.
- Vyavasaya Patasala programmes were broadcasted every Monday at 7.15 PM in All India Radio (AIR) and a total of 48 programmes were conducted during 2019-'20.
- The AI & CC has brought out publications such as a) Vyavasaya Panchangam 2019-'20 & 2020-'21, Journal of Research, ANGRAU (Quarterly), e-News Letter, Vyavasayam (Monthly Telugu Farm Magazine), Diaries, Wall Calendars and Table Calendars-2020, and Crop Diagnostic Bulletins on Rice, Cotton, Blackgram, Greengram, Groundnut, and Sugarcane.
- About 78 Weekly advisories were published in Telugu daily newspapers during the period under report.
- During 2019-'20, a total of 16 Kisan Melas and 78 exhibitions were organized.
- During 2019-'20, about 11 centres comprising 5 colleges (Agricultural College, Rajamahendravaram; Dr. NTR College of Food Science & Technology, Bapatla; Agricultural College, Bapatla; Agricultural College, Mahanandi; College of Agricultural Engineering, Madakasira), 2 RARSs (Lam and Tirupati), and 4 ARSs (Seethampeta, Peddapuram, Podalakur and Utukur) conducted 83 diagnostic team visits covering 400 farmers, 14 demonstrations on 230 farm holdings, 26 training programmes benefitting 577 farmers, one animal health camp covering 304 animals in Village Adoption Programme.
- During 2019-'20, all 13 KVKs implemented Cluster Frontline Demonstrations (CFLD) on Pulses and CFLD on Oilseeds during *kharif* and *rabi*.
- The Technology Demonstration Component (TDC) of National Innovations in Climate Resilient Agriculture (NICRA) was implemented in ANGRAU. Demonstrations, capacity building on livestock & fisheries and

institutional interventions were taken up by KVKs.

- A total of 18 On farm Trials (OFTs) (88 beneficiaries); 28 Frontline Demonstrations (FLDs) (231 beneficiaries); 75 Trainings to farmers (2512 beneficiaries); 19 Trainings to rural youth (547 beneficiaries); 16 Trainings to Extension Personnel (504 beneficiaries); 15 Skill Training Programmes (450 beneficiaries); 61 Extension Activities (2656 beneficiaries); 52.4 Q of seed supply (1206 beneficiaries); 1,70,600 number of planting material (2391 beneficiaries); Supply of 2,700 livestock strains (202 beneficiaries); Analysis of 759 soil samples (706 beneficiaries); 1145 Mobile advisories (3456 beneficiaries) were taken up under TSP.
- During 2019-'20, KVK, Utukur established four enterprise units each of Vermicompost, Mushroom cultivation, Nursery under shadenet, Value addition to millets and eight enterprise units each of Mushroom cultivation and Nursery under shadenet were established by KVK, Nellore under ARYA (Attracting and Retaining Youth in Agriculture) programme.
- Three KVKs of ANGRAU in AP under Seed Hub Programme have produced 899.78 q of Certified and Foundation seed of redgram (LRG 52, PRG 176); greengram (WGG 42, IPM 2-14); blackgram (TBG 104, LBG 752, LBG 787); and bengal gram (NBeG 49).
- During 2019-'20, all KVKs of ANGRAU had analyzed 6,066 soil samples and distributed 5,948 Soil Health Cards, benefitting 5,183 farmers from 388 villages.
- Seven District Agro Met Units (DAMUs) were established in ANGRAU and 272 messages relating to weather were sent. Further, a total of 2209 Agromet Advisory Bulletins were issued in 48 blocks.
- Fourteen Skill Training Programmes under Agricultural Skill Council of India (ASCI), coordinated by eight KVKs were organized on various aspects, benefitting 278 trainees during the year 2019-'20.
- Eight KVKs implemented CEREAL SYSTEM INITIATIVE FOR SOUTH ASIA (CSISA) during the year 2019-'20.
- As a part of BIOTECH KISAN HUB-ANGRAU, during the year 2019-'20, a total of 182 demonstrations were conducted across four districts (Kurnool, Ananthapuramu, Visakhapatnam, and Srikakulam) on groundnut, pigeonpea, chickpea, blackgram and greengram covering 39 mandals including four ITDA mandals.
- During 2019-'20, "Reach Every Panchayat" programme was implemented in three districts.
- The extension wing of ANGRAU is involved in partnership activities with reliance foundation, through which about 610 advisories were sent to 1,08,641 farmers covering 1895 villages.
- As a part of the project titled "Collaborative Strategies of ANGRAU – SERP in enhancing the livelihoods of small and marginal farmers & Nutri & Hygiene entrepreneurship promotion in Andhra Pradesh" under Andhra Pradesh Rural Inclusive Growth Project (APRIGP), a total of 160 training programmes were conducted by KVKs/

DAATTCs with a participation of 3700 FPO members. Further, about 114 demonstrations were conducted, benefitting 2423 FPO members.

- Three KVKs (Reddipalli, Undi & Rastakuntubai) have implemented MSSRF programme in advocating the Farming System for Nutrition (FSN) approach.
- Eruvaka Purnima was celebrated on June 9, 2019 and on this occasion all the best management practices (BMPs) were showcased for the benefit of the farmers across state.
- All the scientists of DAATTCs and KVKs have actively participated in the Dr. Y.S.R. *Polambadi*, AMC level interaction meetings and Farmer-Scientist interaction meetings regularly.

Research Publications

- The research and extension activities carried out by the students and teaching staff of Agriculture, Agricultural Engineering & Technology; and Community Science were published in various national and international journals, accounting to a total of 487 publications and 13 books during the period under report.

Awards

- ANGRAU has received ICAR Award 2019 on the eve of securing 2nd position in PG Admissions at National Level under the category of Agricultural Sciences.
- KVK, Banavasi received Appreciation Certificate from DDG, ICAR and the Director, ATARI, Zone X, Hyderabad on July 16 & 17, 2019.
- AICRP on Sugarcane Unit of RARS, Anakapalle received an Award of Excellence on October 15-17, 2019.
- AICRP on Pearl Millet, ARS, Anantha-puramu received Best Centre Award for the year 2019'20.
- ARS, Vizianagaram has received the "Best Performing AICRP Centre Award" for overall performance for the periods 2017-'20.

Other events

Inaugurations

- Liquid Biofertilzer Laboratory & Modern Jaggery Plant were inaugurated by Hon'ble Vice Chancellor, Dr. V. Damodar Naidu on 25.05.2019 at RARS, Anakapalle.
- Dr. V. Damodara Naidu, Hon'ble Vice Chancellor inaugurated Roof Top Solar Power Plant at Agricultural College, Bapatla Campus on 03.10.2019.
- Value Addition Unit Building funded by NABARD at ARS, Vizianagaram was inaugurated by Dr. V. Damodara Naidu, Hon'ble Vice-Chancellor, ANGRAU on 19.10.2019.
- DBT Kisan Hub project dhal mill was inaugurated by Hon. Sri B. Muthyala Naidu, MLA and Chief Whip of Government of Andhra Pradesh at Kothapenta (V) of Devarapalli (M), Visakhapatnam District on 08.01.2020.
- 40 KWP, Solar Panel (CAPEX MODE) at RARS, Maruteru was inaugurated by Dr. V. Damodara Naidu, Hon'ble Vice-Chancellor, ANGRAU on 11.03.2020.

Visitors

- Dr. Pawan Kumar Agarwal, Hon'ble Vice Chancellor, OUAT, Odisha visited Soil Science and Biotechnology laboratories at RARS, Tirupati on 13.06.2019 & 14.06.2019.
- Dr. Y. G. Prasad, Director, ATARI, Hyderabad visited KVK, Kondempudi and inaugurated the development activities for doubling the farmers income at DFI villages on 02.07.2019.
- Dr. Vijaya Gopal Kakani, Sarkeys and Warth Distinguished Professor of Crops, Energy and Climate, Oklahoma State University, USA visited College of Food Science and Technology and interacted with students on the prospects of international education at USA and Oklahoma on 03.08.2019.
- Dr. A. Vishnuvardhan Reddy, Director, ICAR-IIOR, Hyderabad visited RARS, Nandyal and monitored the *kharif* 2019 experiments of AICRP-sunflower scheme on 09.10.2019.
- Sri M. Arvind Kumar, Member Secretary & CEO, National Jute Board, Kolkata visited ARS, Amadalavalasa and inspected the ongoing research project on the performance of Tossa Jute on 11.10.2019.
- Dr. Trilochan Mohapatra, Secretary (DARE) & Director General, ICAR visited S.V. Agricultural College, Tirupati on 28.10.2019.
- Dr. N. Balasubramani, Director, MANAGE, Hyderabad visited the Nodal Training Institute-ARS, Utukur and reviewed the on-going activities of DAESI-II on 30.01.2020.
- Dr. B. Maruti Prasanna, Director, CIMMYT's Global Maize PRogramme, CGIAR Research Programme on Maize, Kenya and Sri S. Selvaraj, Chief General Manager, APRO, NABARD visited Agricultural College, Bapatla and participated in the Annual Post Graduate Student's National Conference (APGSNC-2020) on 30 & 31.01.2020.
- Sri. P. N. Praveen Kumar, General Manager, NABARD, Andhra Pradesh; Sri B. Ramesh Babu, Deputy General Manager and Sri K.R.D. Kartheeik District Development Manager, visited Agricultural College, Bapatla and monitored the construction works of Annexe Building sanctioned under NABARD funds on 12.02.2020.

I. INTRODUCTION

As per the APAU Act, 1963, Acharya N. G. Ranga Agricultural University (ANGRAU) was established on June 12, 1964 as "Andhra Pradesh Agricultural University" (APAU). Later, on November 7, 1996, the APAU was renamed after the noted Parliamentarian and Kisan Leader, Sri Gogineni Ranga Nayakulu (popularly known as N. G. Ranga) as "Acharya N. G. Ranga Agricultural University". Subsequent to bifurcation of United Andhra Pradesh into Andhra Pradesh (AP) and Telangana State (TS) on June 2, 2014, the ANGRAU has been bifurcated on "Order to Serve Basis" into ANGRAU for residual state of Andhra Pradesh and has been shifted from Rajendranagar, Hyderabad to Lam, Guntur during May, 2016. The ANGRAU, a State Agricultural University (SAU), is continuing its services to meet the requirements of the students and the farmers with renewed interest and dedication.

MANDATE OF THE UNIVERSITY

- Train the manpower in Agriculture, Agricultural Engineering and Technology and Community Science for the development of the state (Teaching)
- Constantly generate and improve technologies for increasing production in Agriculture and for the welfare of rural folk (Research)
- Assist in dissemination of the improved technologies to the farmers of the state through development departments of Government (Extension)

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

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

The ANGRAU has three faculties namely Agriculture, Agricultural Engineering & Technology and Community Science. The University offers degrees in Undergraduate, Post Graduate and Doctoral Programs in various disciplines. The teaching mandates of ANGRAU are being carried out through ten constituent colleges and one Advanced Post Graduate Centre. ANGRAU is the pioneer in introducing few programs like RWEP (Rural Work Experience Programme) during the final year of different undergraduate programmes and starting diploma courses in Agriculture, Organic Farming and Seed

Technology in local dialect (Telugu) and in Agricultural Engineering in English medium with the intention to impart training to grass root level technical workers for developing skilled manpower. Till date, a total of 42,035 students, comprising 31262 graduates and 10773 post graduates including doctoral students have received degrees from ANGRAU.

The research wing of ANGRAU is ramified across the State and has 32 Research Stations including six Regional Agricultural Research Stations (RARS). The University has made outstanding contribution in research with a motto of making agriculture, a sustainable and profitable one. In this direction, ANGRAU has released thus far, 442 improved crop varieties/hybrids. Some of these released varieties are claimed to be first of their kind and have gained global importance by sizable contribution in boosting agricultural production.

The Extension wing of ANGRAU is robust and the University claims first in the country in introducing DAATT Centres (District Agricultural Advisory and Technology Transfer Centres), popularly known as "Eruvaka Kendras" functioning in all the 13 districts of Andhra Pradesh. With the recent merging of DAATTCs into the existing thirteen Krishi Vigyan Kendras (KVKs) of respective districts, the Extension Wing is further strengthened in Lab to Land Program and in delivering Plant Production and Protection Techniques to farming community. A "Farmers' Call Centre" is also being operated successfully at University Head Quarters, which facilitates direct access to farmers to speak to Crop Experts and get ideas/solutions to farm problems instantaneously over wire. All these innovations and excellence could make it possible for the ANGRAU to secure thirteenth rank among all the agricultural institutes under ICAR for the year 2019.

Against this backdrop of ANGRAU, this 56th Annual Report of ANGRAU showcases its worthwhile activities and significant achievements in Education, Research and Extension along with other events and development activities taken place in the University during the period from June 2019 to May 2020.

II. UNIVERSITY ADMINISTRATION

His Excellency, the Governor of Andhra Pradesh, Sri Biswa Bhusan Harichandan is the Chancellor of the University, since he took over charge from Sri E S L Narasimhan, as the Governor of Andhra Pradesh state, on 24th September 2019. The Hon'ble Vice-Chancellor, Dr V Damodara Naidu, acts as the Chief Executive of the Acharya N. G. Ranga Agricultural University.

The administration of ANGRAU is governed by three authoritative bodies:

(i) Board of Management

(ii) Academic Council and the Faculty Boards

(iii) Research and Extension Advisory Council

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

A. AUTHORITATIVE BODIES OF THE UNIVERSITY

1. Board of Management (BoM)

The Board of Management of ANGRAU, which acts as an apex body and is responsible for taking policy decisions, consists of 21 members nominated from different categories as presented hereunder (Table 1). The Vice Chancellor shall be ex-officio member and acts as the Chairman of the BoM. The Registrar acts as the Secretary to the BoM. The term of office of the members of the BoM other than ex-officio members shall be three years. The BoM includes Secretaries to Government from Panchayat Raj (1) and Finance (1) Departments; Directors of the State Department of Agriculture (1) and Animal Husbandry (1) as ex- officio members. The other members of BoM include representatives from State Legislature / Parliament (4); representatives from the Agro-industry (2); the State Chamber of Panchayat Raj (1); Distinguished Agricultural Scientist (1); ICAR representative (1); members of the Academic Council of ANGRAU (3); and Progressive Agriculturalists (4).

2. Academic Council (AC) and Faculty Boards (FBs)

On the academic front, the University has three Faculties *viz.*, Agriculture, Agricultural Engineering & Technology and Community Science. The Academic Council and Faculty Board are vested with the powers to implement and monitor all the academic programmes. Hon'ble Vice-Chancellor is the Chief Executive and the Registrar acts as the Ex-Officio Secretary of Academic Council. The Faculty Deans act as the Chairman of respective Faculty Boards The members of Academic Council include representatives of Other Universities; representatives from BoM, ANGRAU; Commissioner & Director of Agriculture, Govt. of A.P., Deans, Directors, Controller of Examinations, Co-opted members, Associate Deans, University Heads of Departments, Professors, Special invitees and other Nominated Members.

Table 2. Members of the Academic Council during 2019 –'20

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

The members of Faculty Board of Agriculture include Deans, Directors and Controller of Examinations of ANGRAU; Associate Deans, Principal Scientists, Professors and University Heads of Agriculture faculty; College Heads of Agriculture faculty and other Nominated members.

The Faculty Board of Agricultural Engineering and Technology includes Deans, Directors, Controller of Examinations, Associate Deans of faculty of AE&T, Principal Scientists, Professors, University Heads and College Heads of Agricultural Engineering and Technology faculty and other Nominated persons as members.

The members of Faculty Board of Community Science include Deans, Directors, Controller of Examinations, Associate Dean of College of Community Science, Professors, University Heads and College Heads of faculty of Community Science and other Nominated members.

The Faculty Board of Post Graduate Studies includes University Heads of all the faculties, Heads of Departments in colleges where PG courses are offered, Associate Deans of the Colleges, Special Officer - APGC, Lam, Heads of the Department of Colleges offering PG Courses, Heads of Department offering minor courses to P.G. students located at Agricultural College, Naira / Mahanandi, two Eminent Scientists from outside the University to be invited by the Dean of Post Graduate Studies, three representatives from each faculty (2 Assoc. Professors + 1 Asst. Prof.) to be nominated by the Vice-Chancellor and Officers–in-charge of PG Academic activities in the colleges.

1. Research and Extension Advisory Council (REAC)

The research and extension functions are the responsibilities of the Director of Experimental Stations and Director of Extension respectively. Research and Extension Advisory Council (REAC) is an apex body of the University to review the research and extension achievements of previous year and give directions to formulate strategies for the future research and extension activities under the chairmanship of Hon'ble Vice-Chancellor.

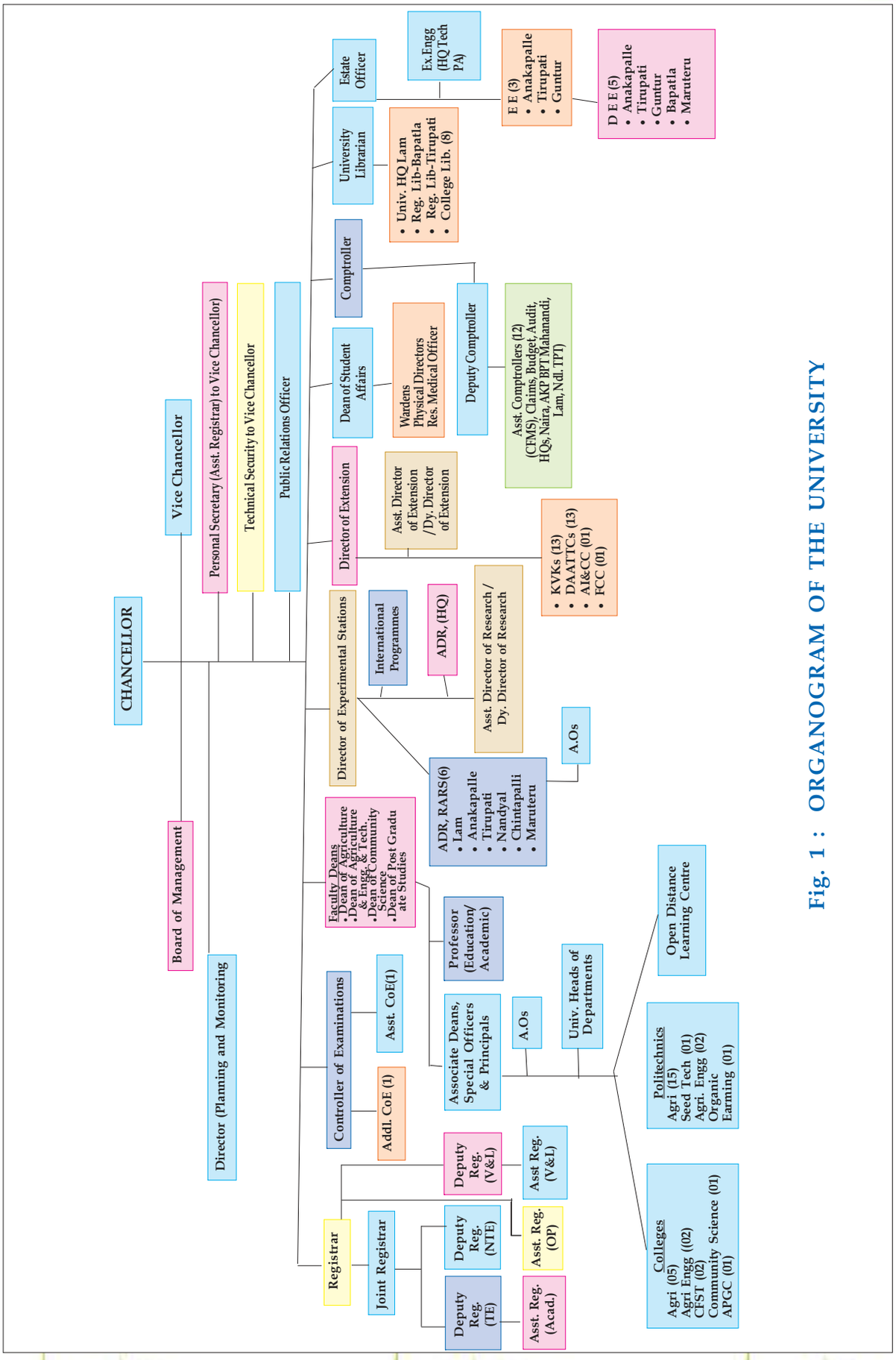


Fig. 1 : ORGANOGRAM OF THE UNIVERSITY

Table 1. Members of the Board of Management, ANGRAU during 2019-'20

Ex-Officio Members (5)	**Dr V Damodara Naidu** Vice-Chancellor, ANGRAU and Chairman
	Sri Gopala Krishna Dwivedi, IAS Principal Secretary to Government, Panchayat Raj Department
	Sri H Arun Kumar, IAS Commissioner of Agriculture
	Dr M Srinivasa Rao Director of Animal Husbandry
	Sri K V V Satyanarayana, IRAS Special Secretary to Government Finance Department
Other Members (16)	
ICAR Nominee (1)	**Dr Ch Srinivasa Rao** Director ICAR – National Academy of Agricultural Research & Management (NAARM), Rajendranagar, Hyderabad
Distinguished Agricultural Scientist (1)	**Dr V Chenga Reddy** Principal Scientist (Retd.), ANGRAU
Three Persons from Academic Council	**Dr V Srinivasa Rao** Professor & University Head (Stat. & Comp. Applications), ANGRAU
	Dr J Lakshmi Professor & Univ. Head (Foods & Nutrition), ANGRAU
	Dr L Vijay Bhaskar Professor (Entomology), ANGRAU
Four Persons from Members of Legislative Assembly / Parliament	**Sri V Balashowry** MP, Machilipatnam
	Sri Alla Ramakrishna Reddy MLA, Mangalagiri
	Sri K Sanjeevaiah MLA, Sullurupeta
	Smt. Viswasarayi Kalavathi MLA, Palakonda

Four Persons from Progressive Agriculturists, of whom one shall be a woman	**Sri T V Muralinadha Reddy** Chittoor Dist.
	Smt. Mukala Kasturi Vizianagaram Dist.
	Sri P Devullu Visakhapatnam Dist.
	Sri Batchu Srinivasa Rao Guntur Dist.
One Person from among the Members of the State Chamber of Panchayat Raj	**Dr P V R M Reddy** Director, IWMP Department of PR & RD
Two Persons from among Agro Industrialists and other Entrepreneurs, including Self Employed Graduates	**Sri C Rammohan Reddy, MD** Sri Nandeeswara Polymers (I) Pvt. Ltd. Kurnool Dist.
	Dr S V S R K Netaji Agri Business Centre of Excellence Srikakulam Dist.
Secretary	**Dr D Bhaskara Rao** Registrar

The REAC is comprised of Director of Experimental Stations as the Convener and Secretary, Director of Extension, Associate Directors of Research, three persons from Innovative Farmers Network, three from Agri Business Consortium, three from KVKs operated by NGOs, Special Invitees and two Eminent Scientists of Agriculture as its members (Annexure II).

B. MEETINGS OF THE AUTHORITATIVE BODIES OF THE UNIVERSITY

1. Meeting of Board of Management

On completion of the term of the other members of the existing Board of Management (nominated vide G.O.MS. No. 30 dt. 04.05.2016 of the Special Chief Secretary to Government (Agriculture), GoAP), the new members were nominated by the Governor of Andhra Pradesh and Chancellor of ANGRAU vide G.O. MS. No. 115 dt. 02.12.2019 of the Special Chief Secretary to Government, Govt. of AP. The new Board of Management met only once (292nd meeting of BoM) on 30th January 2020 during the period under report.

2. Meetings of Academic Council and Faculty Boards

The Academic Council normally meets once in six months. The 102nd and 103rd meetings of the Academic Council were held on 19th June 2019 and 17th December 2019 at Seminar Hall, Advanced Post Graduate Centre, Lam, Guntur. The respective Faculty Boards met before each Academic Council and discussed thoroughly on the agenda items. The agenda items discussed in the meetings of the individual faculty boards were put up to the Academic Council for final discussion and decision thereon.

3. Meeting of Research and Extension Advisory Council

The 49th meeting of REAC was held on 18-19 December, 2019 at RARS, Lam, Guntur under the chairmanship of Hon'ble Vice Chancellor. The achievements of University in research and extension were reviewed and future activities were formulated.

C. OFFICERS OF THE UNIVERSITY

His Excellency, the Governor of Andhra Pradesh is the Chancellor of the University. The Vice Chancellor acts as the Chief Executive Officer of the University with the coordination of four faculty deans comprising of Agriculture, Agricultural Engineering & Technology, Community Science and Post Graduate Studies besides one each of Director of Experimental Stations, Director of Extension, Dean of Student Affairs, Comptroller, Estate Officer, Registrar and Controller of Examinations. The details of the University Officers for the period under report are given below in Table 3.

Table 3. Details of the University Officers of ANGRAU during 2019-'20

S. No.	Name	Designation
1.	His Excellency the Governor of Andhra Pradesh and The Chancellor, ANGRAU	Sri E S L Narasimhan (up to 23.09.2019) Sri Biswabhusan Harichandan (24.09.2019 onwards)
2.	Vice Chancellor	Dr V Damodara Naidu
3.	Registrar	Dr D Bhaskara Rao
4.	Dean of Agriculture (FAC)	Dr S R Koteswara Rao
5.	Dean of Agricultural Engineering & Technology	Dr K Yella Reddy
6.	Dean of Community Science	Dr L Uma Devi
7.	Dean of Post Graduate Studies	Dr D Balaguravaiah
8.	Dean of Student Affairs	Dr S R Koteswara Rao
9.	Director of Experimental Stations	Dr N V Naidu (up to 30.06.2019) Dr A S Rao (01.07.2019 onwards)
10.	Director of Extension	Dr P Rambabu
11.	Comptroller	Dr A S Rao (up to 30.06.2019) Dr N Trimurtulu (01.07.2019 to 06.01.2020) Dr D Balaguravaiah (06.01.2020 to 25.01.2020) Dr B Vijayabhinandana (25.01.2020 onwards)
12.	Estate Officer	Er P V Narasimha Rao
13.	Controller of Examinations	Dr A Siva Sankar

D. FACULTY STRENGTH

The cadre-wise strength of teaching staff of the ANGRAU working in three wings viz., teaching, research and extension along with the administration is shown in Table 4, while details of faculty working in various Colleges, Agricultural Research Stations and other Extension Centres including Administration are given in Annexure III.

Table 4: Faculty Strength in the ANGRAU during 2019-'20

S. No.	Item	Professor		Associate Professor		Assistant Professor		Total	
		S	IP	S	IP	S	IP	S	IP
1	Teaching	39	36	88	51	268	192	395	279
2.	Research	21	23	62	54	175	124	258	201
3	Extension	5	6	15	12	113	79	133	97
4.	Administration	10	18	0	7	5	8	15	33
	Total	**75**	**83**	**165**	**124**	**561**	**403**	**801**	**610**

III. TEACHING

A. EDUCATION

1. Teaching Institutes

The Acharya N G Ranga Agricultural University offers both undergraduate and postgraduate programmes including doctoral programmes in the faculties of Agriculture, Agricultural Engineering & Technology and Community Science. The University has 5 Agricultural Colleges, 1 Advanced Post Graduate Centre, 15 Agricultural Polytechnics, 1 each of Agricultural Polytechnic (organic farming) and Agricultural Polytechnic (Seed Technology) under the Faculty of Agriculture; 2 Colleges of Agricultural Engineering, 2 Colleges of Food Science & Technology and 2 Agricultural Engineering Polytechnics under the Faculty of Agricultural Engineering & Technology; and 1 College of Community Science under the Faculty of Community Science and the Certificate course. The organogram of teaching in the University is depicted in Fig.2. The list of Colleges and Polytechnics with their location, year of establishment and courses offered is given in Table 5.

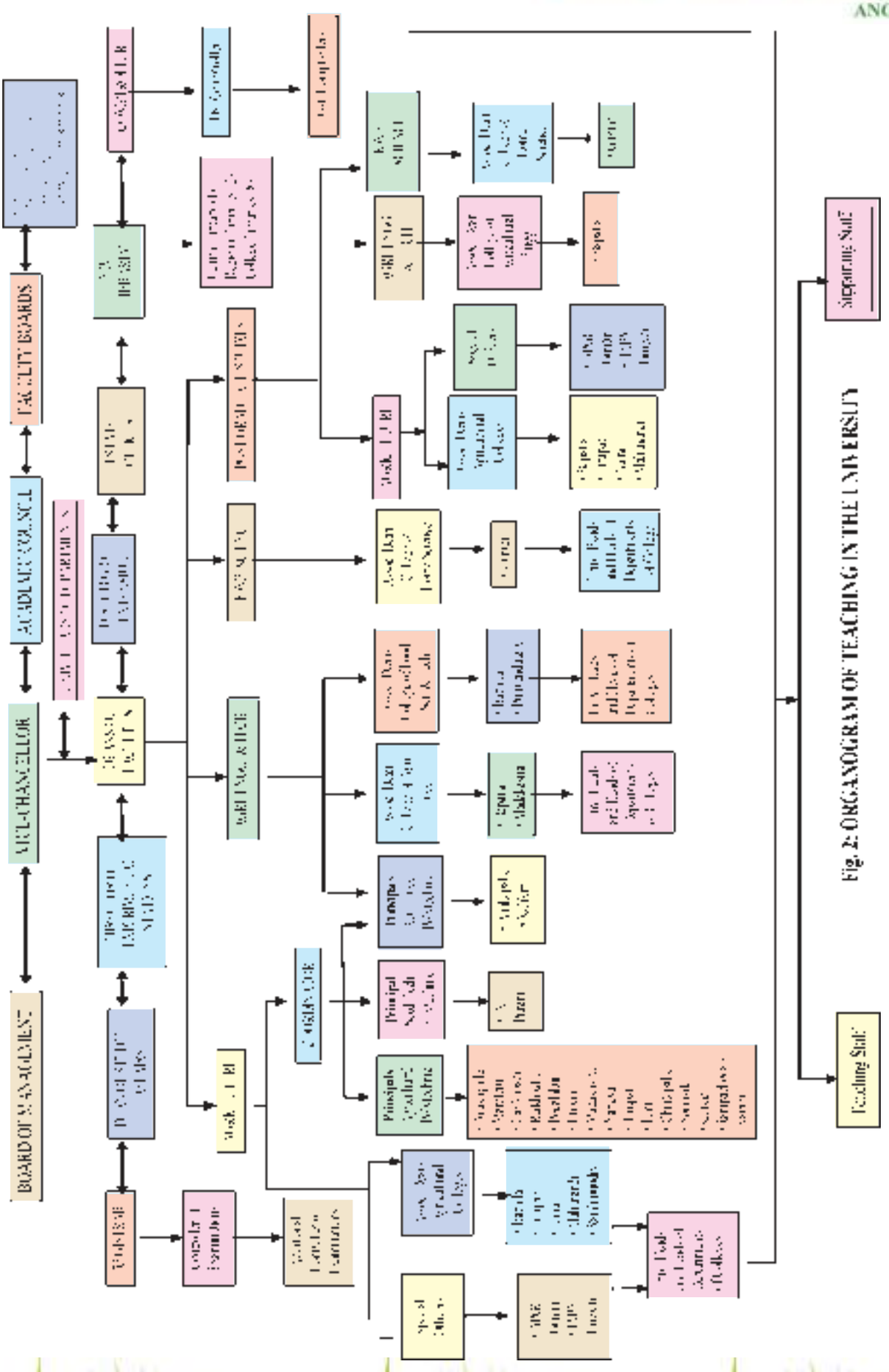


Fig. 2: ORGANOGRAM OF TEACHING IN THE UNIVERSITY

Table 5. Teaching Institutes of the University

S. No.	Teaching Institute with Location	Year of Establishment	Name of the Associate Dean / Principal	Courses Offered
Faculty of Agriculture				
1	Agricultural College Bapatla – 522 101, Guntur Dist.	1945	Dr D Lokanadha Reddy (up to 25.09.2019) Dr P V Krishnayya (from 26.09.2019)	B.Sc. (Hons) Agriculture, M.Sc.(Ag.) Ph.D. (Ag.)
2	S V Agricultural College Tirupati – 517 502 Chittoor Dist.	1961	Dr P Ramesh Babu (up to 12.12.2019) Dr R Sarada Jayalakshmi Devi (from 12.12.2019)	B.Sc. (Hons) Agriculture, M.Sc.(Ag.) Ph.D. (Ag.)
3	Agricultural Collège Naira – 532 185 Srikakulam Dist.	1989	Dr P V Krishnayya (up to 25.09.2019) Dr A V Ramana (from 26.09.2019)	B.Sc. (Hons) Agriculture, M.Sc. (Ag.)
4	Agricultural College Mahanandi- 518 502 Kurnool Dist.	1991	Dr B Narendra (up to 31.08.2019) Dr L Vijay Bhaskar (FAC) (up to 08.09.2019) Dr A Pratap Kumar Reddy (from 09.09.2019)	B.Sc. (Hons) Agriculture, M.Sc. (Ag.)
5	Agricultural College Rajamahendravaram – 533 103 East Godavari Dist.	2008	Dr G V Nageswara Rao (up to 31.07.2019) Dr K Madhavi (FAC) (up to 07.02.2020) Dr D Srinivas (FAC) (up to 10.02.2020) Dr K Madhavi (FAC) (up to 11.05.2020) Dr J Krishna Prasadji (from 12.05.2020)	B.Sc. (Hons) Agriculture
6	Advanced Post-Graduate Centre, Lam, Guntur - 522034 Guntur Dist.	2015	Dr G V Lakshmi (up to 04.02.2020) Dr G Ramachandra Rao (up to 12.06.2020)	M.Sc. (Ag.) M.Sc. (C.Sc.) Ph.D. (Ag.) Ph.D. (C.Sc.)

Agricultural Polytechnics

S. No.	Teaching Institute with Location	Year of Establishment	Name of the Associate Dean / Principal	Courses Offered
1	Agricultural Polytechnic Regional Agricultural Research Station, Maruteru – 534 122 West Godavari Dist.	1999	Dr P Munirathnam (up to 03.10.2019) Dr P V Satyanarayana (from 04.10.2019)	Diploma in Agriculture
2	Agricultural Polytechnic Regional Agricultural Research Station, Anakapalle –531001Visakhapatnam Dist.	1999	Dr P Jamuna (up to 26.06.2020) Dr M Bharatha Lakshmi (from 27.06.2020)	Diploma in Agriculture
3	Agricultural Polytechnic Podalakur– 524345 SPS Nellore Dist.	2005	Dr P Sujathamma	Diploma in Agriculture
4	Agricultural Polytechnic Reddipalli– 515001 Anantapuramu	2005	Dr K Bhargavi	Diploma in Agriculture
5	Agricultural Polytechnic Utukur – 516 003 YSR Kadapa Dist.	2005	Dr M Sreenivasa Chari	Diploma in Agriculture
6	Agricultural Polytechnic Garikapadu – 521175 Krishna Dist.	2007	Dr Y Padma Latha	Diploma in Agriculture
7	Agricultural Polytechnic Madakasira– 515 301 Anantapuramu Dist.	2007	P V K Jagannadha Rao	Diploma in Agriculture
8	Agricultural Polytechnic Regional Agricultural Research Station, Tirupati – 517 502, Chittoor Dist.	2011	Dr P Rajasekhar (up to 26.06.2020)	Diploma in Agriculture
9	Agricultural Polytechnic Regional Agricultural Research Station, Nandyal – 518 502 Kurnool Dist.	2011	Dr M Subba Rao (up to 26.09.2019) Dr D Sampath Kumar (from 26.09.2019)	Diploma in Agriculture
10	Agricultural Polytechnic Somasila, SPS Nellore Dist.	2012	Dr M C Obaiah	Diploma in Agriculture
11	Agricultural Polytechnic Kalikiri- 517234, Chittoor Dist.	2012	Sri A Subramanyam (up to 30.09.2019) Dr K Ankaiah Kumar (from 09.10.2019)	Diploma in Agriculture

S. No.	Teaching Institute with Location	Year of Establishment	Name of the Associate Dean / Principal	Courses Offered
12	Agricultural Polytechnic Rampachodavaram Rajahmundry – 533 103 East Godavari Dist.	2013	Dr T V P Rajendra Prasad	Diploma in Agriculture
13	Agricultural Polytechnic Darsi - 523 247 Prakasam Dist.	2015	Dr G. Subba Rao	Diploma in Agriculture
14	Agricultural Polytechnic Ghantasala (MD), Krishna (Dist.) - 521133	2016	Dr K Srinivasulu (up to 25.09.2019) Dr K Nagendra Rao (from 26.09.2019)	Diploma in Agriculture
15	Agricultural Polytechnic Ramagiri, Ramagiri (Mandal), Anthapuram Dt	2016	Dr Y Narasimhudu (up to 04.12.2019) Dr A Subramanyam (from 05.12.2019)	Diploma in Agriculture
16	Agricultural Polytechnic (Seed Technology) Jangameswarapuram, Gurajala-522415, Guntur Dist.	2011	Dr N Sambasiva Rao	Diploma in Seed Technology
17	Regional Agricultural Research Station, Chintapalle-531 111 Visakhapatnam Dist.	2016	Dr D V Ramana Reddy (up to 18.11.2019) Dr G Rama Rao (from 18.11.2019)	Diploma in Organic Farming
Faculty of Agricultural Engineering & Technology				
1	Dr NTR College of Agricultural Engineering Bapatla – 522 101 Guntur Dist.	1990	Dr A Mani	B.Tech. (Ag. Engg.) M.Tech. (Ag. Engg.) Ph.D.(Ag. Engg.)
2	College of Agricultural Engineering Madakasira - 515 301 Anantapuram Dist.	2008	Dr P V K Jagannadha Rao	B.Tech. (Ag.Engg.)
3	Dr NTR College of Food Science & Technology Bapatla – 522 101 Guntur Dist.	2003	Dr D Vishnu Sankar Rao (up to 31.07.2019) Dr Ch V V Satyanarayana (up to 10.05.2020) Dr Y Radha (from 11.05.2020)	B.Tech. (Food Technology)

S. No.	Teaching Institute with Location	Year of Establishment	Name of the Associate Dean / Principal	Courses Offered
4	College of Food Science & Technology Pulivendula – 516 390 YSR Dist.	2008	Dr D D Smith	B.Tech. (Food Technology)
Agricultural Engineering Polytechnics				
1	Polytechnic of Agricultural Engineering Kalikiri, Chittoor Dist.	2013	Sri A Subramanyam (up to 30.09.2019) Dr K Ankaiah Kumar (from 09.10.2019)	Diploma in Agricultural Engineering
2	Polytechnic of Agricultural Engineering Anakapalle Vishakapatnam Dist.	2013	Dr P Jamuna	Diploma in Agricultural Engineering
Faculty of Community Science				
1	College of Community Science Guntur	2013	Dr L Uma Devi (up to 10.05.2020) Dr M S Chaitanya Kumari (up to 22.06.2020)	B.Sc. (Hons) Community Science

2. *Admission Strength and Out-turn of Students*

During the academic year 2019-'20, a total of 1839 students were admitted in the University. Out of them, 1066 were admitted in undergraduate courses, 152 in masters, 53 in doctoral programmes and 568 in diploma courses. Student enrolment by courses and year-wise is presented in Annexure IV and students strength in various colleges of the ANGRAU is shown in Annexure V.

A total number of 1484 students were admitted in to the Faculty of Agriculture, comprising of 779 in undergraduate programmes, 134 in postgraduate programmes, 46 in doctoral programmes and 525 in diploma programmes. A total number of 268 students were admitted into the Faculty of Agricultural Engineering & Technology, comprising of 209 in undergraduate courses, 10 in postgraduate programmes, 06 in doctoral programmes and 43 in diploma programmes. In Community Science, a total of 87 students were admitted, comprising of 78 in undergraduate programmes, 08 in post graduate programmes, and 01 in doctoral programme.

A total number of 5563 students were on rolls of the University in different Undergraduate, Postgraduate, Doctoral and Diploma programmes. Out of them, 2240 were boys and 3323 were girls. The information pertaining to the number of students admitted, students enrolled and students out-turn during the year 2019-20 is given in Table 6.

A total number of 1682 students comprising of 1344 in Agriculture, 241 in Agricultural Engineering & Technology and 97 in Community Science faculties have passed out of the portals of the University during the academic year 2019-'20.

In the Faculty of Agriculture, 579 undergraduates, 244 postgraduates and 19 at doctoral level have passed. In addition, 464 students in Agriculture; 20 in Organic farming and 18 students in Seed Technology obtained their diploma during the year under report.

One hundred and eighty three (183) undergraduate, 05 postgraduate, 04 doctoral and 49 diploma students passed out in the Faculty of Agricultural Engineering and Technology. A total of 87 undergraduates, 09 postgraduates and one doctoral student obtained their degree in faculty of Community Science.

Table 6. Admission Strength, Students on Rolls and Out-turn of Students under Various Programmes during the Year 2019-'20

Degree	Faculty & Course	Intake Capacity	Students Admitted			Students on Rolls			Students Out-turn		
			Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Faculty of Agriculture											
Diploma	Diploma in Agriculture	510	223	255	478	457	514	971	200	264	464
	Diploma in Seed Technology	25	6	17	23	11	33	44	5	13	18
	Diploma in Organic Farming	25	6	18	24	513	33	46	5	15	20
	Total (Diploma)	**560**	**235**	**290**	**525**	**481**	**580**	**1061**	**210**	**292**	**502**
UG	B.Sc. (Hons) Agriculture	**840**	**268**	**511**	**779**	**1151**	**1696**	**2847**	**253**	**326**	**579**
PG	M.Sc. (Ag.)	156	36	85	121	68	155	223	70	148	218
	M.B.A. (ABM)	17	07	06	13	15	12	27	15	11	26
	Total (PG)	**173**	**43**	**91**	**134**	**83**	**167**	**250**	**85**	**159**	**244**
Doctorate	Ph.D. (Ag.)	**51**	**20**	**26**	**46**	**60**	**75**	**135**	**07**	**12**	**19**
	Sub Total (Agriculture)	**1624**	**566**	**918**	**1484**	**1775**	**2518**	**4293**	**555**	**789**	**1344**

Degree	Faculty & Course	Intake Capacity	Students Admitted			Students on Rolls			Students Out-turn		
			Boys	Girls	Total	Boys	Girls	Total	Boys	Girls	Total
Faculty of Agricultural Engineering & Technology											
Diploma	Diploma in Ag. Engg.	**60**	**17**	**26**	**43**	**55**	**79**	**134**	**19**	**30**	**49**
UG	B. Tech. (Ag. Engg.)	136	50	52	102	245	192	437	59	47	106
	B. Tech. (Food Sci. & Tech.)	115	28	79	107	136	196	332	35	42	77
	Total (UG)	**251**	**78**	**131**	**209**	**381**	**388**	**769**	**94**	**89**	**183**
PG	M. Tech. (Ag. Engg.)	**17**	**05**	**05**	**10**	**12**	**13**	**25**	**03**	**02**	**05**
Doctorate	Ph.D. (Ag. Engg.)	**05**	**03**	**03**	**06**	**10**	**07**	**17**	**03**	**01**	**04**
	Sub Total (Agril. Engg.)	**333**	**103**	**165**	**268**	**458**	**487**	**945**	**119**	**122**	**241**
Faculty of Community Science											
UG	B.Sc. (Hons) Community Science	**91**	**07**	**71**	**78**	**07**	**299**	**306**	**-**	**87**	**87**
PG	M.Sc. (Home Science)	**13**	**-**	**08**	**08**	**-**	**16**	**16**	**-**	**09**	**09**
Doctorate	Ph.D. (Home Science)	**02**	**-**	**01**	**01**	**-**	**03**	**03**	**-**	**01**	**01**
	Sub Total (Community Science)	**106**	**07**	**80**	**87**	**07**	**318**	**325**	**-**	**97**	**97**
	Total (Diploma)	**620**	**252**	**316**	**568**	**536**	**659**	**1195**	**229**	**322**	**551**
	Total (UG)	**1182**	**353**	**713**	**1066**	**1539**	**2383**	**3922**	**347**	**502**	**849**
	Total (PG)	**203**	**48**	**104**	**152**	**95**	**196**	**291**	**88**	**170**	**258**
	Total (Ph.D.)	**58**	**23**	**30**	**53**	**70**	**85**	**155**	**10**	**14**	**24**
	GRAND TOTAL	**2063**	**676**	**1163**	**1839**	**2240**	**3323**	**5563**	**674**	**1008**	**1682**

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

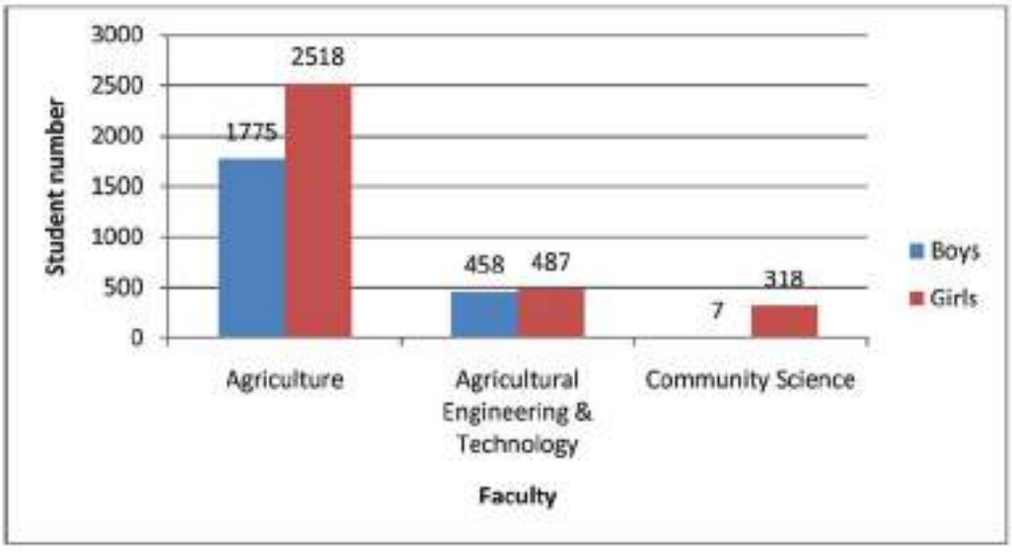


Fig. 3: Faculty-wise Students on Rolls

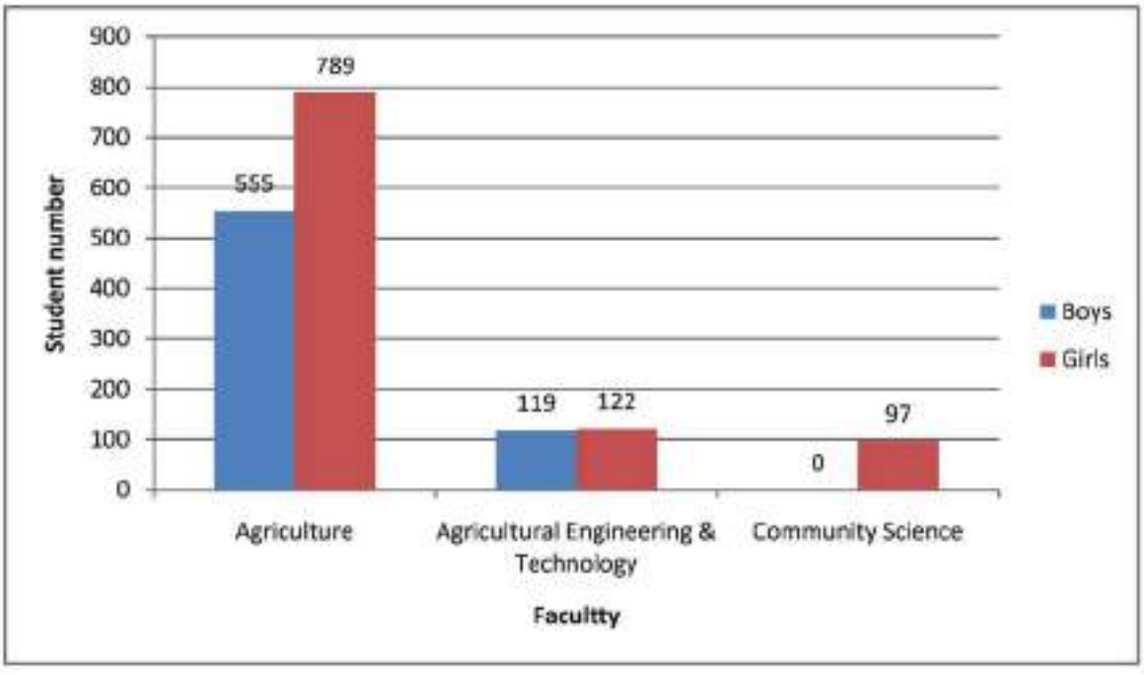


Fig. 4: Faculty-wise Students Out turn

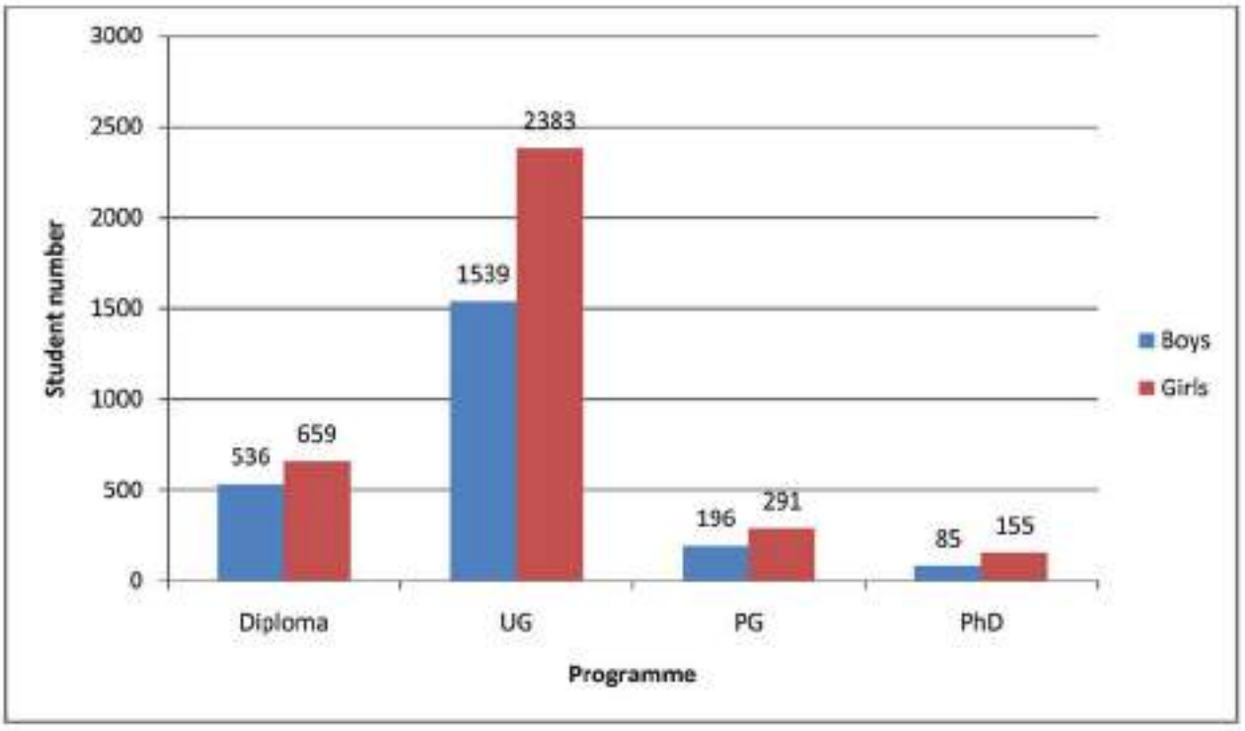


Fig. 5: Programme-wise Students on Rolls

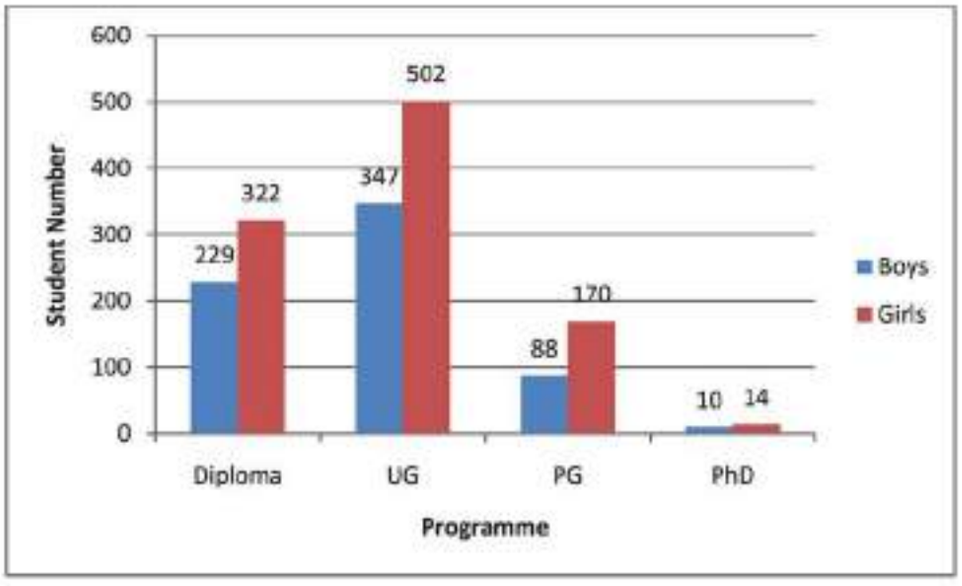


Fig. 6: Programme-wise Students Out turn

3. Academic Excellence

A total of 105 students of different colleges of ANGRAU qualified in ICAR- JRF/ SRF and GATE examinations. While 27 students obtained different fellowships, awards and medals during 2019-'20 as detailed below in Table 7.

Table 7. Details of Ranks Secured by Students of ANGRAU in Different Competitive Examinations during 2019-'20

S.No.	Name of the College	No. of ranks secured				
		ICAR-JRF	ICAR-SRF	GATE	Others	TOTAL
1	Agricultural College, Bapatla	31	01	-	NAT – 14	46
2	S.V. Agril. College, Tirupati	06	-	-	ASRB-ARS - 01 IBPS - 01	08
3	Agril. College, Naira	09	16	-	AIEEA - 11	36
4	Agril. College, Rajamahendravaram	-	-	-	-	-
5	Dr NTR College of Agril. Engg., Bapatla	-	-	16	-	16
6	College of Agril. Engg., Madakasira	05	-	09	-	14
7	Dr NTR College of Food Science and Tech., Bapatla	-	-	02	-	02
8	College of Food Science and Tech., Pulivendula	02	04	03	-	09
9	College of Community Science, Guntur	01	-	-	-	01
	TOTAL	**54**	**21**	**30**	**27**	**132**

4. Academic Initiatives

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

As a part of the regular curriculum, the final year B. Sc. (Hons) Agriculture students were placed in rural areas for one semester during *kharif* season, where each student was attached to

one host farmer for practical learning with regard to crop production, crop protection, rural economics and also the dynamics of rural society.

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

As a part of the regular curriculum, the final year B. Sc. (Hons) Agriculture students, before/ after the completion of RAWEP were placed in different areas of entrepreneurship, for one semester, wherein each student was attached to any one of the experiential learning units. The AELP enables students to gain self confidence in understanding critically the grass root level realities in farming. Further, the students can thoroughly understand the intricacies in starting their own agri-business after their studies.

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

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

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

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

(v). B.Sc. (Hons) Community Science - Rural Awareness Work Experience Programme (RAWEP)

Each student of the final year B.Sc. (Hons) Community Science of College of Community Science, Guntur was attached to 5 households to teach rural women, youth and children in the identified areas of Community Science.

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

In Community Science, the Departments of Foods and Nutrition, Apparel and Textiles and Resource Management and Consumer Sciences, Human development and Family studies and Extension education and communication management have provided in-depth managerial and

entrepreneurial skills to the students in the production, marketing and management through Experiential Learning Program in the areas viz., Tie and dye and Block Printing, Designing and Development of Multimedia products, Institutional canteen, Developmental assessment of children, Development of Teaching and Learning material for early childhood education centres and Interior Design Solutions etc.

The details of number of students, who attended the RAWEP / In-Plant Trainings/ ELP programmes during the year are given in Table 8.

Table 8. Details of RAWE / In-Plant Training / ELP Programmes

Name of the College and Degree Programme	No. of Students Attended	No. of Villages / Plants	No. of Host Farmers
Faculty of Agriculture			
Agricultural College, Bapatla	227	18	227
S.V. Agricultural College, Tirupati	146	10	146
Agricultural College, Mahanandi	94	15	94
Agricultural College, Naira	144	33	144
Agricultural College, Rajahmundry	61	07	61
Faculty of Agricultural Engineering & Technology			
Dr NTR College of Agricultural Engineering, Bapatla	77	11	-
College of Agricultural Engineering, Madakasira	44	07	-
Dr NTR College of Food Science & Technology, Bapatla	34	11	-
College of Food Science & Technology, Pulivendula	16	01	-
Faculty of Communitcience			
College of Community Science	88	08	440

5. Scholarships and Stipends

The students of Acharya N. G. Ranga Agricultural University were provided with large number of scholarships, fellowships and stipends sponsored by various agencies. The details are given in Table 9.

Table 9. Details of Scholarships and Stipends

S. No.	Name of the Scholarship	No. of Students Awarded	Amount in Rs. per Year
1	2	3	4
1	National Merit/ Talent Scholarship	07	2.52
2	Government of India Post- Matric Scholarship to Scheduled Castes	29	4.80
3	Government of India Post-Matric Scholarship to Scheduled Tribes	32	4.18

S. No.	Name of the Scholarship	No. of Students Awarded	Amount in Rs. per Year
4	Government of India Post- Inter Merit Scholarship (Dist. Level) to SCs and STs.	121	22.78
5	Post Matric Scholarship to BC	-	-
6	Post Matric Scholarship to EBC	-	-
7	Minority Post Matric Scholarship	-	-
8	State Scholarship to Denoted Tribes	113	18.98
9	State Scholarship to Listed Backward Class	1464	110.14
10	State Scholarship to Economically Poor Persons	744	69.23
11	Stipend to Post Graduate Students	92	77.23
12	Stipend to Ph. D. Students	09	10.80
13	Stipend to Under Graduate Students from Other States	70	25.20
14	Stipend to Agril. Officers studying M.Sc. (Ag.) Course	-	-
15	Stipend to VEOs studying B.Sc. (Ag.) Course	-	-
16	Stipend to VDOs studying B.Sc.(Ag.) Course	-	-
17	Dress and Book Allowance	517	3.10
18	Others, if any a) Bayer Fellowship (M.Sc. (Ag.)) b) Bayer Fellowship (Ph.D. (Ag.)) c) ANGRAU Stipend	 103 - -	 221.24 - -
19	State Post – Matric Scholarship to BC-E	-	-
20	Inspire Fellowship for Ph.D. Students	-	-
21	Rajiv Gandhi Fellowship for Ph.D. Students	-	-
22	State scholarship to Scheduled castes	-	-
23	State scholarship to scheduled tribes	-	-
24	State scholarship to Backward castes	-	-
25	State scholarship to Minority	-	-
26	State scholarship to Kapu welfare Department	-	-
27	State Scholarship to EBC	-	-
28	ICAR – JRF Scholarship	-	-
29	ICAR – SRF Scholarship	-	-

6. Students Hostels :

The hostel facilities available in the Colleges and the number of students accommodated in different hostels in all the campuses of the University are given in Table 10.

Table 10. Campus-wise Hostel Accommodation

S.No.	Campus	No. of Hostels			No. of Students Accommodated		
		Boys	Girls	Total	Boys	Girls	Total
Faculty of Agriculture							
1	S.V. Agricultural College, Tirupati	04	01	05	337	533	870
2	Agricultural College, Bapatla	05	05	10	370	630	1000
3	Agricultural College, Mahanandi	02	03	05	184	230	414
4	Agricultural College, Naira	03	02	05	234	177	411
5	Agricultural College, Rajamahendravaram	-	-	-	-	-	-
6	Advanced Post Graduate Centre	-	-	-	-	-	-
7	Agricultural Polytechnic, Maruteru	01	01	02	87	44	131
8	Agricultural Polytechnic, Anakapalle	01	01	02	37	64	101
9	Agricultural Polytechnic, Podalakur	-	01	01	-	24	24
10	Agricultural Polytechnic, Reddipalli	01	01	02	15	34	49
11	Agricultural Polytechnic, Utukuru	01	01	02	20	22	42
12	Agricultural Polytechnic, Kalikiri	-	01	01	-	36	36
13	Agricultural Polytechnic, Rampachodavaram	-	-	-	-	-	-
14	Agricultural Polytechnic, J.M.Puram	01	01	02	21	27	48
15	Agricultural Polytechnic, Madakasira	01	01	02	18	29	47
16	Agricultural Polytechnic, Chintapalli	RARS, Staff Quraters			09	22	31
17	Agricultural Polytechnic, Nandyal	RARS. Staff Quraters			19	22	41
18	Agricultural Polytechnic, Somasila	ARS, Staff Quraters			21	24	45
19	Agricultural Polytechnic, Garikapadu	ARS, Staff Quraters			28	41	69
20	Agricultural Polytechnic, Tirupati	Hostels of Ag. college			20	27	47
21	Agricultural Polytechnic, Ghantasala	Tribal Welfare Department Hostels			25	46	71
22	Agricultural Polytechnic, Ramagiri	Boys at Sarvasiksha Abhiyan and girls at Dist. Sports Authority pavilion			23	19	42
23	Agricultural Polytechnic, (SST) J M Puram	Hostels of APT			19	22	41
24	Agricultural Polytechnic, (OF) Chintapalle	RARS Staff quarters			07	16	23

S.No.	Campus	No. of Hostels			No. of Students Accommodated		
		Boys	Girls	Total	Boys	Girls	Total
Faculty of Agricultural Engineering & Technology							
25	Dr NTR College of Agricultural Engineering, Bapatla	01	01	02	154	118	272
26	College of Agricultural Engineering, Madakasira	03	02	05	90	65	155
27	Dr NTR College of Food Science & Tech., Bapatla	01	01	02	66	141	207
28	College of Food Science & Tech., Pulivendula	01	01	02	59	84	143
29	Polytechnic of Agricultural Engg. Kalikiri	-	01	01	-	39	39
30	Polytechnic of Agricultural Engg. Anakapalle	Farmers guest house RARS staff quarters			28	42	70
Faculty of Community Science							
31	College of Community Science, Guntur	-	01	-	-	135	135

B. RESEARCH PROJECTS OPERATED IN THE COLLEGES

1. "ICAR –NASF", Effective delivery of nutrients, insecticides and fungicides using nanoparticulates and its effect on growth and uptake in groundnut and chillies with an outlay of 111.34 lakhs for the year 2018-`20 by Dr P Sudhakar, Professor, Department of Crop Physiology, S V Agricultural College, Tirupati, as Co PI.
2. Causes and consequences of e-National Agriculture Market on the South Indian agriculture, with an outlay of Rs.31,28,694-00 for the period from 01.06.2019 to 31.05.2022 by Dr I Bhavani Devi, Professor, IABM, S V Agricultural College, Tirupati, as PI.

C. STUDENTS' RESEARCH

1. Agricultural College, Bapatla

(i). Department of Agronomy

Nutrient management interventions in Rice-Ragi sequence

- During *kharif*, integration of organic and inorganic sources i.e. FYM @ 10 t ha^{-1} + 50 kg $ZnSO_4$ ha^{-1} as soil application in combination with 50 % RDF recorded maximum growth, yield attributes, yield and nutrient uptake of rice.
- During *rabi* under no-till ragi, 100% RDF (30-30-20 NPK ha^{-1}) recorded maximum growth, yield attributes, nutrient uptake, gross returns, net returns and returns per rupee investment.
- But the integration of 50% RDF + FYM @ 10 t ha^{-1} + zinc sulphate@ 50 kg ha^{-1} to *kharif* rice in combination with 100% RDF to *rabi* ragi was more economical as recorded higher system productivity.

Crop residue and nitrogen management in Pulse-Maize Sequence

- Among pulses, cowpea with residue retention enhanced soil microbial population and also leads to increased levels of available soil N, P_2O_5 and K_2O after maize during both the years.
- Preceding pulses with residue management practices (residue retention, incorporation and removal) could not result in nitrogen economy for succeeding maize, but responded upto 150% RDN.
- Growth and yield of maize was enhanced by legume residue retention and application of 150% RDN in both the years.
- Total stem yield was higher with blackgram-maize and greengram-maize along with residue retention and application of 150% RDN. The higher net returns, BCR and returns per rupee investment were with cowpea-maize sequence with residue retention and nitrogen @ 150% RDN.

Site-specific nutrient management in Rice-Blackgram sequence

- Site specific nutrient management by soil test based fertilizer recommendation with FYM followed by soil test based fertilizer recommendation alone found superior in increasing growth, yield and nutrient uptake of rice.
- Among the target yield fertilizer recommendations, 7.5 t ha^{-1} target yield recommendation along with and without FYM proved superior over other target yield recommendations in increasing growth and yield of rice.
- Soil test based fertilizer recommendation with FYM followed by Soil test based fertilizer recommendation alone and 7.5 t ha^{-1} target

yield recommendation with and without FYM, imposed in rice had significant positive residual effect on increasing growth and yield of succeeding blackgram.

- Though the maximum system productivity and gross returns were realized with STFR application with FYM (T_7), the net returns and return per rupee invested were higher with the application of STFR alone (T_2) in rice-blackgram system as a whole.

Response of Rice Sorghum cropping sequence to prevailing weather and nitrogen levels

- The growth, yield and uptake of nitrogen was significantly more in case of BPT-5204 rice variety compared to NLR-145 and NLR-34449 tested in this investigation under direct seeded rice conditions. This is because the macro and micro weather that prevailed is most congenial for this variety.
- Studies on residual effect of nitrogen levels on sorghum crop grown as a sequence responded well with better growth, yield attributes and yield optimum uptake of nitrogen and thereby higher net returns were obtained significantly with the residual effect of 120 kg N ha^{-1}.
- The rice crop in both the years experienced 27.1^{0}C-32.2^{0}C and 1 to 6 hrs day-1 bright sunshine hours during vegetative stages; 26.6^{0}C-29.8^{0}C and 1 to 6 hrs day-1 bright sunshine hours during reproductive phase and 22.4^{0}C-26.3^{0}C and 4 to 6 hrs day-1 bright sunshine hours during maturity phases. The sorghum crop in both the years experienced 21.8^{0}C-23.7^{0}C and 4 to 7 hrs day-1 bright sunshine hours during vegetative stages, 22.8^{0}C-28.1^{0}C and 6 to 8 hrs day-1 bright sunshine hours during reproductive phase and 27.6^{0}C-29.3^{0}C and 8 to 9 hrs day-1 bright sunshine hours during maturity phases. These are found to be most congenial and optimum for rice-sorghum cropping sequence under the above weather conditions with early date sorghum sowing and 120 kg N ha^{-1} residual nitrogen.
- There was a significant negative correlation between micrometeorological parameters *viz.*, canopy air temperature and soil temperature on grain yield of rice under rice-sorghum cropping sequence.
- The statistical models for weather resilient yield prediction of rice varieties tested through regression equations were found to have significant linear relation with yield. These are:

  $Y = -70894.95+610.29(RH_{13})+358.19(RH_{21})-28.43(RF2)$ for NLR-145

  $Y = -456495.33-8517.20\ (MAT_1)+9233.55\ (RH_{11})+20.87(RF_3)$ for BPT-5204

  $Y = 73989.44-1866.96\ (MAT_1)+1214.78\ (SSH_2)+19.41(RF_3)$ for NLR-3449

System productivity and phosphorus management in Pearl millet-Pulse sequence

- There was a significant increase in growth, yield attributes and yield of pearl millet were recorded with 100% RDP+ seed inoculation with PSB over rest of the treatments except 100% RDP.
- Soil microbial population were increased with increase in fertilizer level and in PSB treated plots when compared to un inoculated PSB plots. Thus, higher fertility level with combination of PSB increased the total microbial counts. It leads to highest solubilisation of available nutrients in the soil which is useful for the raising next season crop.

- Among the different treatments application of 100% RDP+seed inoculation with PSB and 100 RDP were showed the maximum residual effect of nutrients and growth and yield of rabi pulses
- In three cropping sequences, pearl millet-chickpea was profitable sequence followed by pearl millet-greengram with application of 100 RDP+ seed inoculation with PSB or 100% RDP.

(ii). Department of Agricultural Extension

A Study on the Knowledge and Adoption of the Recommended Production Technologies by the Redgram Growers of Prakasam District of Andhra Pradesh

- Nearly two third (65.00 %) of the redgram growers were coming under medium extent of adoption on selected redgram production technology.
- Majority (66.67%) of the redgram growers had medium level of knowledge on redgram production technology.

Impact of ANGRAU Supported Reliance Foundation Information Services (RFIS) in Guntur District of Andhra Pradesh - A Public Private Partnership Initiative

- About 60.84 per cent of the farmers perceived medium effectiveness of RFIS and two third (66.66 %) of the farmers were observed in medium impact category preceded by high (17.50 %) and low (15.84 %) impact category due to RFIS.
- Majority (87.50%) of the farmers perceived „lack of information on address for input availability is the foremost constraint in RFIS.

A Critical Analysis of Pradhan Mantri Fasal Bhima Yojana (PMFBY) in Srikakulam District of Andhra Pradesh

- Most of the insured farmers had medium level knowledge (61.67 %) and medium opinion (69.17 %) on PMFBY in Srikakulam District.
- The PMFBY procedure should be simplified and „Awareness programmes should be organized by the Agriculture department were the major suggestions given by the insured farmers for implementation of PMFBY.

Entrepreneurial Behaviour of Commercial Floriculture Nursery Owners in Kadiyam of Andhra Pradesh

- More than two third (67.50 %) of the nursery owners had medium level of entrepreneurial behaviour in commercial floriculture enterprise.
- In person order (68.01 %) was the major method of sale and “Credit kind of payment (64.51 %)” and “Cash Payment (40.50%)” were the major payment methods by the commercial nursery owners.
- Scarcity of labour (70.80 %) and Unavailability of suitable soil due to legal restrictions (66.25 %) were the major constraints faced by nursery owners of Kadiyam.

A Study on Impact of Water Users Associations in Krishna Delta of Andhra Pradesh **(PhD)**

- Nearly half (47.50%) of the respondents had medium level of direct changes followed by high (39.17%) and low (13.33%) level of direct changes of the respondents of WUAs in Krishna delta area.
- Nearly half (46.67%) of the respondents had highly favorable opinion followed by favourable opinion (43.33 %) and less

favourable opinion (10.00 %) towards Water User Associations.

- Before establishment of WUAs the average income to the respondents was Rs.24000/- and after establishment of WUAs the average income was Rs. 42000/-.
- Before establishment of WUAs everyone followed only the conventional method. But after the establishment of WUAs, nearly two third (63.09 %) of them followed the conventional method followed by direct sown rice (33.33 %) and both conventional and direct sown rice (4.58%).

(iii) Department of Crop Physiology

Source and Sink studies in Blackgram (Vigna mungo (L.)Hepper) influenced by PGRs, Major and Minor Nutrients

- Hoagland s nutrient solution highly increased the branch number, source size, chlorophyll content, root, stem, leaf and pod biomass, protein content in seed and starch content.
- Number of pods in black gram was enhanced by Hoaglands solution and mono ammonium phosphate.
- Foliar application of Hoagland nutrient solution at flowering and pod formation stages showed significantly higher growth attributes with increased seed yield (38.8%) of black gram.

Effect of Paclobutrazol and Salicylic Acid on Amelioration of Water Stress Effects in Maize

- Experiment was conducted in split plot design with three main plot treatments viz., M_1: Control (No water stress); M_2 : Water stress at knee high stage (V_6 stage); M_3 : Water stress at cob development stage (V_T- R_1 stage) and seven sub plot treatments viz., Control (S_1), 50 ppm paclobutrazol (PBZ) spray at V_6 stage (S_2), 0.5 mM salicylic acid (SA) spray at V_6 stage (S_2), 50 ppm PBZ spray at VT-R_1 stage (S_2), 0.5 mM SA spray at V_T-R_1 stage (S_5), 50 ppm PBZ spray at V_6 and VT-R_2 stage (S_6), 0.5 mM SA spray at V_6 and VT-R_2 stage (S_7) in three replications.
- Plants treated with salicylic acid (SA) at V_6 increased the dry matter of leaf (31.8%), stem (11.8%), root (26.0%), reproductive parts (6.5%) and total plant (21.5%).
- The spray of SA at VT-R_1 and V_6 stages increased the dry matter of leaf (17.37 & 19.0%), stem (12.0%), root (34.1 & 32.6%), reproductive parts (10.3 & 11.2%) and total plant (13.5 & 14.2%), respectively.
- Plants treated with SA at V6, VT-R_1, V_6 and VT-R_1 stages enhanced the number of cobs plant^{-1} (17.1, 18.6 & 20.1%), number of rows cob^{-1} (17.5, 18.2 & 19.6%), number of kernels row^{-1} (9.4, 10.4 & 10.5%), cob length (10.9, 11.2 & 11.2%), cob yield (17.5, 20.2 & 21.6%), kernel yield (20.6, 23.2 & 24.6%), test weight (7.3, 7.8 & 7.6%) and shelling percentage (4.2, 5.0 & 4.9 %respectively).

Physiological Response of Sorghum (Sorghum bicolor (L.)Moench) Genotypes to Irrigation in Rice Fallows

- For getting higher biomass and grain yield of sorghum in rice fallows, it should be irrigated thrice each at panicle initiation, booting and at 50 % flowering to soft –dough stages, or it should be irrigated twice, at panicle initiation and booting.

Studies on Leaf Number Index (LNI) in Maize (Zea mays L.) (PhD)

- The maximum number of leaves was attained at 70 DAS with cumulative heat units of about 1028°C.

- For all hybrids under study, the leaf appearance rate was found maximum during the period of 21 to 28 DAS. Similar to the final leaf number, the leaf number index (LNI) of 100 was attained by the maize hybrids at 70 DAS.
- In *rabi* 2016-'17, cob initiation coincided with visible leaf number 10 in DKC 9042 and DKC 9081, 10.75 in DKC 9120 and 900M Gold, 11.50 in DKC 9142 and Pinnacle with

  LNI of 59.29, 59.29, 60.18, 60.84, 63.63 and 63.60 respectively and thermal unit requirement varied from 467 to 498 °C.
- The increasing trend in CGR was found up to 63 DAS, during both the seasons.
- In all hybrids, maximum RGR values were attained at 35 to 42 DAS coinciding with reproductive primordial initiation and development.

***Influence of Potassium and Nickel Nutrition on Water Status, Biomass Production and Yield in Maize under Heat Stress* (PhD)**

- Increased mean maximum and minimum temperatures createed a heat stress for late sown crops, resulting in reduction of plant height (9.6 to 24.6%), leaf area (7.9 to 17.1%), enhanced anthesis silking interval, reduced TDM (6.6 to 18.4%), dry matter partitioning, RWC (4 to 10.8%), photosynthetic rate, stomatal conductance, internal CO_2, transpiration rate, enhanced soil and canopy temperatures, MII, Proline content, SOD and peroxidase activity, reduced CSI, rows per cob, kernel per row and test weight, resulting in yield reduction by 18.0 to 50.2 per cent during 2017-18 and 16.6 to 48.8 per cent during 2018-'19.
- During both the years, nutrient treatments had a positive effect over the studied parameters by enhancing plant height (5.6 to 33.6%), leaf area (7.9 to 17.1%), reduced anthesis silking interval, increased TDM (4.9 to 31.5%), dry matter partitioning, RWC, photosynthetic rate, stomatal conductance, internal CO_2, transpiration rate, reduced soil and canopy temperatures, MII, increased Proline content, SOD and peroxidase activity, enhanced CSI, rows per cob, kernel per row, test weight resulting in an yield increment by 6.6 to 30.0 per cent during 2017-'18 and 6.2 to 28.4 per cent during 2018-'19.

(iv) Department of Soil Science and Agricultural Chemistry

Influence of Potassium Solubilising Bacteria on Potassium Dynamics and Yield of Sweet Corn

- The available nutrient status of soil under sweet corn cultivation showed improvement with level of potassium fertilizer in combination with KSB significantly with N, P, S and Fe but non-significantly with Zn, Cu and Mn.
- The growth parameters (plant height and dry matter accumulation), yield (kernel and stover) and yield attributes (number of kernels per cob and 100 kernel weight) of sweet corn were better with combined application.

Phosphorus and Sulphur Management in Sunflower

- The growth parameters *viz.*, plant height, dry matter accumulation and chlorophyll content were significantly influenced by phosphorus and sulphur levels.
- Application of 90 kg P_2O_5 ha^{-1} and 30 kg S ha^{-1} was significantly superior in plant growth parameters, yield attributes, yield, plant nutrient content, uptake, soil available phosphorus and sulphur in sunflower.

Effect of Biochar on Soil Properties and Performance of Groundnut in Red Sandy Loams of North Coastal Andhra Pradesh

- Significant reduction in soil bulk density, increase in porosity and maximum water holding capacity were observed in the biochar applied treatments.
- The physico-chemical properties like pH, CEC were significantly increased with biochar application. The available N, P_2O_5, K_2O were high in 100% RDF and biochar applied treatments.

Phosphorous Management in Direct Sown Rice in Sandy Clay Soil

- There was a significant improvement in the yield attributes, grain and straw yield of direct sown rice with application of 100% RDP + Vesicular Arbuscular Mycorrhiza.
- Uptake of nutrients like N, P, S, Cu and Mn at tillering, panicle initiation and at harvest was markedly higher.
- Application of phosphorus along with bio fertilizers showed significant influence on microbial population. Fungal population was significantly increased with application of 100% RDP + Vesicular Arbuscular Mycorrhiza (VAM). While the bacterial and actinomycetes population was significantly increased with application of 100% RDP + Phosphorus Solubilising Bacteria (PSB).

Effect of Organic Manures and Inorganic Phosphorus Fertilizers on Soil Health, Growth and Yield of Chickpea

- There was significant influence of treatments on available nitrogen, phosphorus
- Soil biological properties were markedly influenced by the treatments and recorded highest for microbial population and enzymatic activity in treatment which received 100% RDP through BGD + microbial consortium.
- Uptake of Macro and micronutrients, Yield and yield attributes were recorded highest by the treatment 100% RDP through BGD+ microbial consortium followed by 100% RDP through BGD.

***Phosphorus Dynamics in Relation to Nutrient Management in Rice-Blackgram Cropping Sequence* (PhD)**

- Drymatter production, grain yield and straw yield of rice were significantly higher with the application of 100% RDNK in combination with *Dhaincha* @10t ha^{-1}.
- Application of RDNK+green manure along with 60 kg P_2O_5 ha^{-1} to *kharif* rice crop was optimum for rice - blackgram cropping sequence of Krishna Agro climatic zone of Andhra Pradesh.

(v) Department of Agricultural Economics

An Economic Analysis of Farm Mechanization in Rice Cultivation in West Godavari District of Andhra Pradesh State

- The net income was high in complete mechanised farms with Rs.60,551.16 ha^{-1} as compared to partially mechanised farms with Rs. 37,822.09 ha^{-1}.
- One unit increase in the input costs and machine used time, would decrease the labour requirement by 0.06 and 4.34 units in complete mechanised farms and partially mechanised farms respectively.
- Fertilizer energy was found to be the dominant source of energy contributing 19,784 MJ ha^{-1} and 28,425 MJ ha^{-1} under complete and partially mechanised farms respectively.

- The mean technical efficiency was 92.30 per cent and 80.25 per cent respectively in complete and partially mechanized farms.

Impact of Rain Water Harvesting through Farm Ponds in Mizoram State: An Economic Analysis

- The investment in farm-ponds was financially feasible and worthwhile with net present worth of 90857, benefit cost ratio of 1.92, Internal Rate of Return of 34.34 per cent and payback period of 4 years and 1 month.
- The cropping intensity was comparatively higher in WFP (With Farm Pond) (148.68%) than in WoFP (Without Farm Pond) (111.86%).
- The average net income of household from farm was significantly higher in WFP (Rs.79611) compared to WOFP area (Rs.46936). The average employment generated in a year was more in WFP (130 man days) as compared to WOFP (94 man days).

An Economic Analysis of Energy Use in Zero Budget Natural Farming, Organic Farming and Conventional Farming in Rice Production in Visakhapatnam District of Andhra Pradesh State

- The per hectare energy consumption was highest in conventional farming (23055.60 MJ ha^{-1}) followed by ZBNF (14260.50 MJ ha^{-1}) and organic farming (13978.84 MJ ha^{-1}).
- Human energy is the costliest source of energy which accounts to 81.87, 35.01 and 63.02 per cent of the total energy consumption in ZBNF, organic and conventional farming respectively.
- The energy use efficiency was highest in organic farming (5.42) followed by ZBNF (4.83) and conventional farming (2.80). The energy productivity was highest in organic farming (0.38 kg MJ^{-1}) followed by ZBNF (0.31 kg MJ^{-1}) and conventional farming (0.17 kg MJ^{-1}).

Impact of Backward Integration of Agribusiness Firms in Chilli Farming in Prakasam District of Andhra Pradesh State

- The integrated technology component was contributing 3.7 per cent to the total increase in output.
- Backward integration technology increases output and quality of the produce so it should be expanded by an assured alternative agency (Government or co-operative) for increase in quantity and value of export of chilli.

Impact of Climate Change on Pulse Crops in Andhra Pradesh: An Economic Analysis **(PhD)**

- The highest instability in area was recorded in redgram and lowest instability in bengalgram. The highest instability in production was recorded in red gram whereas for yield it was highest in bengalgram.The lowest instability in production and yield was recorded in blackgram.
- Anantapur district continued to be in very highly vulnerable group in all the periods under study Educational attainment, farming experience, farm income and knowledge on climate adaptation of the farmer increased the probability of adapting to climate change.
- Majority of the farmers opined that reduction in yield was the major impact of climate change. Lack of knowledge and lack of sufficient credit facilities were identified as the major constraints for adaptation of strategies against climate change.

Trade Competitiveness and Export Performance of Shrimps in India with Special Reference to Andhra Pradesh **(PhD)**

- The average unit price for Indian shrimps in USA market was higher than Japan, South East Asia, EU markets and Middle East. The share of shrimp exports during 2009-`10 to 2017-`18 was 7.8 per cent of the total world shrimp exports.
- European Union and other pooled countries were found to be highly loyal markets for Indian shrimp.
- The Indian shrimp has relatively better comparative advantage in South East Asia and Middle East markets. The shrimp exports from Andhra Pradesh had a significant comparative advantage in India.
- The attributes that influence the shrimp exports in Andhra Pradesh are the raw (frozen) form, certification and labeling. Price attribute has a strong influence on exports if the quality of shrimp increases. The exporters are highly preferable for exporting large sized shrimps. In case branding, foreign buyers brand had major influence on exports than own branding.
- Years of experience in shrimp processing, BAP star rating and quantity of exports from A.P. were positively significant on revenue of shrimp industry in Andhra Pradesh.

Dynamics of Farming Systems(FS): A Study on Income Maximization in North Coastal Andhra Pradesh **(PhD)**

- The FS-III (Crop + Poultry) was the most profitable farming system noticed in Srikakulam district with a profitability ratio of 1.27. In Vizianagaram and Visakhapatnam districts, the farming system with sheep & goat (FS-IV & FS-VI) as allied activity recorded high profit ratios.
- Majority of farms in all major farming systems were operating at IRS (Increasing returns to scale).
- The Simpsons Diversification Index (SID) of farming systems was less when crops were combined with allied activities like poultry and sheep & goat.
- The Market Dependency Ratio (MDR) was lowest when ruminants were the part of farming systems along with the cropping. The higher MDR was observed in FS-III when poultry was an allied activity as it was completely dependent on markets for inputs.
- The higher area under paddy and sugarcane crops decreased the total net returns from crop components of major farming systems. Maize, blackgram and greengram among the seasonal crops, betel leaf among perennial crops and sheep & goat component among non-crop enterprises recorded higher net returns.

(vi) Department of Genetics and Plant Breeding

Study of Genetic Diversity in Elite Inbred Lines of Maize (Zea mays L.)

- The traits, days to 50 per cent tasseling, days to 50 per cent silking, days to maturity, plant height and ear placement height recorded a slight difference between Phenotypic Coefficient of Variation (PCV) and Genotypic Coefficient of Variation (GCV) indicating less influence of environment on these characters.
- High heritability coupled with high genetic advance as per cent of mean was observed

for ear placement height implying additive gene action.

- Cob yield plant^{-1} showed true relationship with grain yield plant^{-1} by establishing significant positive association and positive direct effect.

Character Association and Selection Indices in Foxtail Millet [Setariaitalica (L.) Beauv.]

- Test weight, productive tillers per plant, panicle length, carbohydrate and plant height could serve as important traits in any selection programme for selecting high yielding genotypes in foxtail millet.

Molecular Characterization of Elite Genotypes for Salinity Tolerance in Rice (Oryza sativa L.)

- Phenotyping of the genotypes for reproductive and seedling salinity tolerance revealed the superiority of Nonabokra and Pokkali.
- Pokkali and Nonabokra genotypes can be used as donor for varietal improvement or for introgression of salinity tolerance into a susceptible variety.

Identification of Genomic Regions Linked to Dormancy Related Traits in Rice (Oryza sativa L.)

- The identified recombinant inbred lines which showed high dormancy also exhibited similar banding pattern as that of dormant parent MTU 1001 with four markers viz.,RM346, RM22565, RM7051 and RM10793 on chromosome 7, 8, 4 and 1 respectively indicating that these chromosomal regions may be harboring the genes/QTLs responsible for the strong dormancy in the above lines.
- The marker RM22565 ($P<0.0001$) on chromosome 8 reported significant association with germination (%) at 5 days after harvesting at a mapping position of 5,796,298-5,796,574bp (5cM).

Characterization of Rice Genotypes for Distinctiveness, Uniformity and Stability and Nutritional Parameters

- Out of 26 DUS descriptors studied, only one character was found to be monomorphic and 12 characters were dimorphic and remaining were polymorphic.
- The crosses between Mappillai samba x Kalabhatt with inter cluster distance 134.845 and Mappillaisamba x Kulakar with inter cluster distance 134.845 may be considered for obtaining superior transgressive segregants with respect to yield and nutritional parameters as these genotypes exhibited superior performance and also belonged to the divergent clusters III and IV respectively.

Validation of Identified QTLs in Recombinant Inbred Lines for Stagnant Flooding Tolerance in Rice

- Selection of plants with higher plant survival %, moderate plant height and elongation, high tillering ability having wider and strong culms with longer panicles would be useful for varietal improvement under stagnant flooding.
- Out of 17 QTLs, qSE10.1 for stem elongation at 30 DAT, qLOD10.1 for per cent of lodging, qNG10.1 for number of grains panicle-1 and qGY10.1 for grain yield plant-1 with higher values of phenotypic variation can be exploited for yield improvement apart from validated QTL qSF10.1 for plant survival under stagnant flooding.

Study of Genetic Divergence for Fibre Yield and Yield Components in Roselle

- High variability coupled with high genetic advance as per cent of mean was observed

for traits green fresh weight per plant, dry stick weight per plant and fibre yield per plant.

- The genotypes RIN-018, RIN-020, RIN-026 and RIN-050 were found to be highly diverse and may serve as potential parents for future hybridization programmes.

Identification of Novel QTLs for BPH Tolerance in Rice (Oryza sativa L.) using Resistant Donor BM 71 (MTU ITJ 206-7-4-1)

- Composite interval mapping and interval mapping has identified three QTLs for BPH tolerance viz., qmbph2.1, qmbph4.1 and qmbph12.1on chromosomes 2, 4 and 12 respectively.

Mapping of QTL for Anaerobic Germination using the Donor Ac39416a in the Genetic Background of Swarna Sub-1 (Oryza sativa L.)

- The polymorphism percentage was reported to be highest in chromosome 2 (27.59%) while lowest (7.58%) in case of chromosome 9.
- The QTL qAG12-1 can be introgressed into popular rice varieties for development of varieties tolerant to submergence during germination in direct seeding fields and paddy nurseries.

Studies on Association of Physiological Traits with Yield and Yield Component Characters in Rice Fallow Black gram (Vigna mungo (L.) Hepper)

- The number of pods per plant could be considered as most efficient selection criteria for yield improvement in rice fallow blackgram.

Genetic Analysis of Amylose Content in Rice (Oryza sativa L.) **(PhD)**

- The presence of a few individuals having higher or lower levels of amylose content as compared to parents indicated the role of polygenes or modifiers.
- Three QTLs on chromosome 6 viz., qAC-6-1 qAC-6-2 and qAC-6-3 in the marker interval of JGT6_18.1 - RM190, RM190 - RM587 and RM587-RM204 were identified for amylose content and three QTLs viz., qGC-6-1, qGC-6-2 and qGC-6-3 were identified in the same location for gel consistency.
- The markers which are linked to the QTLs have stronger LOD score and phenotypic variance can be used for marker assisted selection to develop the rice varieties with desirable amylose content and gel consistency.

Genetic Studies and Identification of QTLs Associated with High Iron and Zinc Content in Rice Kernels (PhD)

- The results revealed wide genetic variation for Fe and Zn among the tested rice genotypes. The values were ranged from 6.45ppm (MTU 1061) to 14.30ppm (FR13A) for iron and 14.7ppm (MTU1156) to 26.7ppm (Chittimutyalu) for zinc in brown rice. In polished rice the iron and zinc content values were ranged from 0.8 (MTU 1075) to 4.4ppm (Azucena) and 6.90 (PLA1100) to 20.6 ppm (Chittimutyalu) respectively.
- The genetic relationship revealed that varieties, MTU 1075, MTU 1156, and KMP 105 were highly diverse from the genotype Chittimutyalu indicating that they can be used for future breeding programme for generating the transgressive segregants.
- The highest phenotypic variance was explained by QTL for Fe on chromosome 12 (5.68%) and for Zn on chromosome 2 (4.35%). On chromosomes 2, 3, 7 and 12 co-

localization of both the iron and zinc QTLs were observed.

- Two QTLs (qKL-3-1 and qKL-3-2) on chromosome 3 and one QTL (qKL-7-1) on chromosome 7 were identified for kernel length. Among the twelve QTLs, L/B ratio (qKL-3) accounted for the largest phenotypic variance i.e., 23.47 %, followed by kernel length (qKL-3-1. qKL-3-2) with 18.7% phenotypic variance.

(vii) Department of Plant Pathology

Studies on Seed Borne Nature and Management of Alternaria Leaf Spot in Blackgram

- The test pathogen *A. alternate* was found to be both externally and internally seed borne. Among the externally seed borne mycoflora detected, *A. alternate* and *Aspergillus* spp. were higher in association with blackgram seeds, ranged from 13 to 26% (mean 19.62%) and 17-29% (mean 23.62%) respectively. In case of internally seed borne association, *A. alternate* was ranged from 5-16% (mean 10.12%).
- Maximum reduction of disease was recorded with combination treatment *i.e.*, seed treatment (ST) with Mancozeb @ 0.25% followed by two sprays (FS) of Trifloxystrobin + Tebuconazole @ 0.05% (25.51) with 61.65% disease reduction over unsprayed check.
- The highest yield (12.06 q ha^{-1} in *kharif* and 12.75 q ha^{-1} in *rabi*) and B:C ratio of (2.73 in *kharif* and 2.77 in *rabi*) were obtained with combination treatment *i.e.*, Mancozeb (ST) @ 0.25% and Trifloxystrobin + Tebuconazole (FS) @ 0.05%.

Characterization of Sorghum Turcicum Leaf Blight Pathogen and its Management

- The highest PIC (Polymorphic Information Content) value was recorded with OPA-03 primer, followed by OPH-18 (0.41). The similarity coefficient varied between 0.45 and 1.00.
- The benefit cost ratio (BCR) of the different treatments varied from 0.70 to 1.56 with the highest BCR being recorded with fungicidal spray of 0.25% mancozeb (1.56).
- Among non chemical treatments best BCR was obtained in T_4 (*Trichoderma* (ST+ FS) + Henna @ 15% FS) with 1.48 followed by the treatment *Trichoderma* (ST+ FS) + Panchagavya @15% (ST+FS) with a BCR of 1.40 treatments which represents a potential alternative to fungicide treatments.

Studies on Antagonistic Potential of Methylotrophic Bacteria against Sclerotium rolfsii in Groundnut (Arachis hypogaea L.)

- Combined application of methylotrophic bacteria through seed treatment and soil application was found better in controlling stem rot.
- Seed treatment with bacteria (PPFM 3) + tebuconazole seed treatment + soil application of bacteria was found better in inhibiting stem rot with 86.12 per cent reduction over control.

Studies on Urd bean Leaf Crinkle Disease on Urd bean [Vigna mungo (L.) Hepper]

- Seeds when treated with water (50^0C for ten min) significantly lowered the incidence (10%) of *urd bean* leaf crinkle disease (ULCD).
- Among the micronutrients tested, spraying of MgSO4 @ 0.2% + $ZnSO_4$ @ 0.2% recorded significantly lowest AUDPC value (466.97)

of ULCD followed by $ZnSO_4$ @ 0.2% (567.84) as against unsprayed control (955.92).

Epidemiology and Management of Fungal Foliar Diseases in Cotton under High Density Planting System

- Significant positive correlation between Alternaria PDI and minimum temperature, morning relative humidity, sunshine hours, rainy days and evaporation was observed in HDPS.
- In Corynospora leaf spot under HDPS, there was a significant positive correlation between PDI and maximum temperature.
- In case of grey mildew, under HDPS, it was observed that morning relative humidity, rainfall and evaporation showed significant positive correlation.
- With respect to rust under HDPS, there was a significantly positive correlation between PDI and minimum temperature, morning relative humidity.
- The highest yield (3613.3 kg ha^{-1}) and B:C ratio (3.06) were obtained with hexaconazole @ 0.2% over unsprayed check.

***Epidemiology and Management of Field Bean Anthracnose Incited by Colletotrichum Spp* (Ph D)**

- PCR-RFLP with four restriction enzymes produced the different size bands. High degree of genetic diversity among the *Colletotrichum* isolates was noticed with *Hinf1,* while high similarity (polymorphism) was noticed with *Taq1*.
- Cross pathogenicity of *Colletotrichum* isolates on different beans revealed that isolates C 8 from horsegram and C 4 from cowpea were most virulent, produced characteristic anthracnose symptoms in all the test hosts, except pole type beans like yard longbean, wingedbean, swordbean and clusterbean.

(viii) Department of Entomology

***Evaluation of Ecofriendly Techniques for the Management of Stem Borers, Chilo partellus (Swine hoe) and Sesamia inferens (Walker) in Maize* (PhD)**

- The results of benefit to cost ratio inferred NSKE (5%) as the best treatment in reducing the *C. partellus* infestation and increasing of yields with 3.89 in *kharif* and 2.99 in *rabi*. It was followed by carbofuran 3G @ 12.5 kg ha^{-1} with 2.53 in *kharif* and 2.35 in *rabi*. All other botanicals and organics tested proved to be ineffective and showed very low benefit to cost ratios.
- The pooled data (four seasons) pertaining to effect of botanicals and organics on natural enemies showed highest number of spiders in UTC (1.15), NSKE (5%) (1.10) and cow urine (10%) (1.06) and lowest number of spiders found in carbofuran 3G @ 12.5 kg ha^{-1} (0.38) and panchagavya (3%) (0.51). Similarly, highest number of coccinellids were recorded in UTC (1.38), NSKE (5%) (1.34) and cow urine (10%)(1.25) and lowest in carbofuran 3G@ 12.5 kg ha-1 (0.49) and panchagavya (3%) (0.61).

***Effect of Elevated CO_2 and Temperature on the Toxicity of Certain Insecticides Against Spodoptera Litura (Fab.) on Sunflower* (PhD)**

- The efficacy of spinosad and fenvalerate decreased with increase in temperature under both aCo_2 and eCo_2 and exhibited negative temperature coefficient.

- Spinosad suppressed the larval weights of *S. litura* after allowed to feed on foliage treated *w*ith *viz.*, LC10 (24.57 and 22.36 %) and LC_{30} (30.60 and 29.71 %). Similar trend was reflected in the larva exposed to sublethal concentrations of fenvalerate. Contrastingly the larval weights of test insect increased significantly at higher temperatures on exposure to sublethal concentration of emamectin benzoate (LC10 - 10.22 and 5.17 %; LC30 - 12.50 and 8.62 %) compared to ambient both aCO_2 and eCO_2.
- The pupal weights decreased both with increase in temperature and sublethal concentrations of test insecticides. The per cent adult emergence was decreased at higher temperatures compared to lower temperatures at both aCO_2 and eCO_2.
- The per cent adult emergence of *T. chilonis* was decreased with increase in temperatures under both aCo_2 and eCo_2 and was more evident at eCo_2, indicating the general susceptibility of egg parasitoid to increased temperatures.

Inseticide Induced Resurgence of Rice Brown Plant Hopper, Nilaparvata lugens (Stal) (Hemiptera: Delphacidae) and Management with Certain Insecticides **(PhD)**

- Insecticide induced resurgence in the population of brown plant hopper is due to combination of factors such as selective destruction of natural enemies, direct stimulatory effect on the reproductive potential of the insect and indirect effect through favourable changes in the nutritional quality of rice plant.
- Insecticide rotation namely fipronil (1000 ml ha^{-1}) followed by pymetrozine (300 g ha^{-1}) was the best treatment and recorded 74.90 per cent mean reduction in BPH population over untreated control.

Molecular and Biochemical Variability of Certain Brinjal Genotypes against Shoot and Fruit Borer Leucinodes orbonalis (Guenee) (Lepidoptera: Pyralidae) **(Ph D)**

- A positive correlation was observed with shoot thickness (r = 0.9403) and negative correlation with trichomes on leaf and shoot.
- Physicomorphic characters of fruit and fruit infestation showed positive correlation with fruit length (r = 0.9403) and pedicel length, negative correlation with fruit diameter (r = -0.9755) and calyx length.
- Minimum shoot infestation (11.76%), fruit infestation on number basis (15.05%) and weight basis (14.30 %) was recorded with Moderately resistant genotype.

Impact of Elevated CO_2 and Temperature on Tritrophic Interactions of Zea mays (L.), Rhopalosi phummaidis (F.) and Menochilus sexmaculatus (Fab.) **(PhD)**

- Elevated CO_2 and temperature significantly extended the duration of reproductive time (19.96-23.32 days) with highest fecundity (83.20-87.68 nymphs per female), whereas the development time (6.60-7.16 days) and total life cycle (26.96-29.92 days) were declined compared to that at aCO_2 and temperatures in *R. maidis* across the three generations.
- The first instar nymphal weight was significantly increased with temperature in the range of 20^0C to 27^0C (3.67-3.85 ˜g day-1) but significantly declined at 30^0C to 35^0C (1.87-2.78 ˜g day-1) under eCO_2 compared to aCo_2 conditions across the three generations.

- Mean relative growth rate of *R. maidis* was significantly increased with temperature in the range of 20^0C to 35^0C (0.269 to 0.464 ˜g ˜g-1 day-1) under eCO_2 compared to that of aCO_2 conditions across the three generations.
- Intrinsic rate of increase (rm), finite rate of increase (˜), net reproductive rate (Ro), gross reproductive rate (GRR) and mean generation time (T) of *R. maidis* were found to have non-linear relationship with temperature.
- Increased tannins and total polyphenols in maize foliage showed antifeedance and indigestibility to *R. maidis* grown under eCO_2 and temperatures.

Management of Spotted Stem Borer, Chilopartellus (Swinhoe) through Ecological Engineering in Maize (PhD)

- Among the leguminous intercrops evaluated, maize-cowpea intercropping system supported with higher number of coccinellid beetles (0.93 plant^{-1}) and spiders (1.02 plant^{-1}) than maize sole crop, which recorded 0.53 coccinellid beetles and 0.71 spiders plant^{-1}.
- Maize trap cropped with napier grass treatment recorded with least foliage damage (9.62%), dead hearts (1.99%) and larval density (0.35larave plant^{-1}).
- Significantly higher number of egg batches (4.5/plant) and total number of eggs (354.6/ plant) were laid on napier grass than maize (2.3 egg batches/plant and 148 eggs). Larval survival and development studies indicated the greater mortality of *C. partellus* larvae occurred within five days on napier grass.

Relative Abundance of Stem Borer species Infesting Rice and Management of Rice Yellow Stem Borer, Scirpophaga incertulas (Walker) (Crambidae: Lepidoptera)**(PhD)**

- Among all the stem borers infesting rice, the yellow stem borer was the predominant species with peak infestation at grain filling stage of the crop.
- Stem borer species distribution was aggregate while the predatory fauna in rice ecosystem exhibited random distribution pattern.

Seasonal Incidence and Management of Helicoverpa armigera (Hubner) and Maruca vitrata (Geyer) in Pigeon pea (Cajanus cajan.L)

- Adult and larval population of *H.armigera* and *M.vitrata* were found significantly correlated with maximum temperature and evaporation.
- Among different eco-friendly products evaluated against *H. armigera* and *M. vitrata*, spinosad 45 % SC @ 73 g a.i/ha, followed by NSKE @ 5 % were found effective.

Estimation of Yield Loss Due to Pectinophora gossypiella on Transgenic Cotton and it's Management

- The seed cotton yield of 39.10 and 35.16 q ha^{-1} was recorded in protected conditions of Jaadoo and US 7067.
- Chlorantraniliprole + lambda cyhalothrin (Ampligo 14.6 % ZC) was effective in control of pink bollworm which recorded per cent reduction of 86.05, 85.18 and 69.48 over control in terms of larval population for 20 bolls, per cent green boll and locule damage respectively followed by cypermethrin (82.81, 80.88 and 61.56).
- Among the treatments chlorantraniliprole +

lambda cyhalothrin recorded highest seed cotton yield (kg ha^{-1}) of 3786 with an increase of 64.32 per cent over control and cost benefit ratio of 1.04.

Studies on Mealybug Complex in Cotton and Management of Phenacoccuss olenopsis, Tinsley

- The order of relative toxicity of insecticides against *P. solenopsis* crawlers was, sulfoxaflor > thiamethoxam > flonicamid > profenophos > buprofezin > dinotefuran at LC50, while in adults the order was sulfoxaflor > thiamethoxam > profenophos > flonicamid > dinotefuran > buprofezin.
- Evaluation of combinations revealed that the treatment neem oil + profenophos was most effective against the *P. solenopsis* crawlers and adults as it has recorded high mean per cent mortality of 92.86 per cent and 85.96 per cent, respectively.

Seasonal Incidence and Monitoring of Resistance Development in Pectinophora gosspiella (Saunders) (Lepidoptera: Gelechiidae) on Bollguard II

- Growth and development of surviving pink bollworm larvae on Cry toxins under laboratory conditions revealed that larval period, larval weight, pupal weight, pupal period, per cent pupation and per cent adult emergence of pink bollworm showed that the effect of both toxins *i.e.*, Cry1Ac and Cry2Ab at higher conc.(10 ppm in Cry1Ac and 5 ppm in Cry2Ab), lower conc. (0.01 ppm in both toxins) and untreated populations of respective districts were found narrow with marginal difference due to probable development of resistance to Cry toxins which was reflected in the field condition with huge population levels at flag end of the crop.

Isolation and Characterization of Native Isolates of Bacillus Thuringiensis (Berliner) from Cotton Cultivated Soils of Guntur District, A.P.

- The vegetative insecticidal protein, *vip* 3 gene was detected in MKV_2S_3. SDS-PAGE of crude spore - crystal protein samples of native *B. thuringiensis* isolates had shown that the protein polypeptides ranging from 29 to 97.2 kDa and above.
- The reference strain, HD1 recorded with LD_{50} of 7.26×10^7 CFU ml^{-1} and LT_{50} of 106.76 hpi.

Monitoring of Predators/Parasitoids of Rice Plant hopper Complex

- Field population of BPH showed a non-significant and positive correlation with maximum temperature (r = 0.529), minimum temperature (r = 0.114) and sunshine hours (r = 0.417).
- The light trap catches of BPH population had a significant and positive correlation with maximum temperature (r = 0.580), and non-significant positive correlation with minimum temperature (r = 0.031) and sunshine hours (r = 0.0313).
- The light trap catches of WBPH had a significant and positive correlation with maximum temperature (r = 0.593).
- BPH and WBPH showed a significant positive correlation with spiders, mirids, rove beetle, and damselfly population.

Seasonal occurrence of Major Insect Pests of Groundnut and their Management

- Thiamethoxam 25 % WG was found effective against thrips and leafhoppers with 65.07 and 60.25 per cent reduction of thrips

and leafhoppers respectively over control. Thiacloprid 480 SC was found effective in reduction of aphids with 57.09 per cent reduction over control.

- Spinosad 45 SC was found to be effective in the reduction of leaf miner larval population and its per cent damage by 66.78 and 38.24 per cent reduction over control respectively.
- Emamectin benzoate 5 SG was found effective in reducing the larval population of *S. litura* and its per cent damage by 66.95 and 33.98 per cent reduction over control respectively. Emamectin benzoate 5 SG was found effective in reduction of the larval population of bud borer and its damage by 69.85 and 35.85 per cent reduction over control respectively.
- Chlorantraniliprole, cyantraniliprole and flubendiamide resulted in highest per cent reduction of 37.58, 37.27, 34.66 per cent reduction of coccinellids over control and these found harmful to coccinellids.
- Cyantraniliprole, flubendiamide and chlorantraniliprole resulted in highest per cent reduction of spiders 34.45, 32.14 and 31.93 per cent over control and found harmful to the spiders.

Screening of Rice Entries against Rice Leaf Folder, Cnaphalocrocis medinalis (Guenee) and its Management with Ecofriendly Products

- In controlled condition, W-1263 (6.31%) and BPT-3034 (10.30%) recorded lowest and BPT-3059 (48.63%) recorded highest mean per cent leaf damage respectively.
- In natural condition, W-1263 (6.58%) and BPT-3034 (9.39%) recorded lowest and BPT 3036 (25.88%)recorded highest mean per cent leaf folder damage respectively
- Flubendiamide 480 SC @ 0.2 ml. l^{-1} was found to be the effective by recording the lowest mean per cent leaf damage (6.30%) with 54.40 per cent reduction over control.
- Among the ecofriendly products the treatment with NSKE (5%) recorded higher yield (4259 Kg ha^{-1}) with 54.58 per cent increased yield over control.

Field Screening of Groundnut Genotypes against Leaf Miner, Aproaerema modicella Deventer and its Management with Insecticides

- The influence of weather parameters on the larval population of *A. modicella* during *kharif* 2017-'18 recorded that maximum and minimum temperatures showed a positive correlation.
- The efficacy of Spirotetramat+imidacloprid 150 OD @ 1 ml. l^{-1} (75.53%), cyantra-niliprole 10 OD @ 0.3 ml^{-1} (66.55%) and flubendiamide 480 SC @ 0.2 ml. l^{-1} (66.45%) were found most effective over other treatments.
- The insecticidal treatment, spirotetramat+ imidacloprid 150 OD @ 1 ml. l^{-1} recorded high incremental cost benefit ratio (ICBR) values (1.89 and 2.14) in both *kharif* & *rabi*).

2. S V Agricultural College, Tirupati

(i) Department of Crop Physiology

***Influence of Canopy and Growth Attributes on Yield of Rainfed Groundnut* (Ph D)**

- The ideal plant type attributes for groundnut during *kharif* rainfed were: Medium plant height (35 – 40 cm), wider primary branch angle with main stem (80° to 86°), higher number of secondary branches (5 – 6), maximum critical leaf area index at peg to pod formation stage (4.5 to 5), moderate SLA

(180-200 cm2 g^{-1}) and high SCMR (45 – 50) for high WUE, high reproductive efficiency in terms of high peg to pod ratio (> 50), higher drymatter partitioning to pods (> 50%) at pod filling stage and crop duration of 100-110 days.

Effect of Calcium and Boron on Growth, Drymatter Partitioning and Yield of Groundnut

- The influence of thermal indices were more pronounced in crop phenological stages.
- The maturity of the crop was found advanced with every delay sowing.
- The highest accumulation of photothermal units (31980.69^{0}C day hr), growing degree days (2728.74^{0}C day) and heliothermal units (12524.14^{0}C day hr) from sowing to harvest were recorded in 1st fortnight of June sowing followed by 1st fortnight of July and 1st fortnight of August sowings.

Effect of Silicon and Salicylic Acid on Growth and Yield of Groundnut under Simulated Moisture Stress Conditions

- Foliar spray treatments RDF + K_2SiO_3 @ 0.4%, RDF + K2SiO3 @ 0.2 %, and RDF + SA @ 100 ppm were superior in terms of drought tolerance, physiological efficiency, heat tolerance, yield and yield components.
- Foliar application of salicylic acid and silicon could be recommended to groundnut crop prone to moisture stress condition to sustain plant growth and final yields.

(ii) Department of Agronomy

Direct and Residual Effect of Organic and Inorganic Sources of Nutrients on Cowpea – Little Millet Cropping Sequence **(Ph D)**

- Application of poultry manure @ 2 t ha^{-1} and 40kg P_2O_5 ha^{-1} recorded higher green pod yield as well as maximum economic returns of cowpea.
- Organic manures and phosphorus applied to the preceding cowpea had a residual effect on succeeding little millet for its optimum performance, besides enhancing the soil health and sustainability.

Real Time Nitrogen Management in Rabi Maize Using Leaf Colour Chart under Different Plant Population **(PhD)**

- Higher kernal yield and economic returns of maize were obtained when crop was sown at planting density of 1,11,111 plants ha-1 along with dose of 40kg ha^{-1} of nitrogen application each time, based on LCC threshold value of 5.

Productivity and Water Use Efficiency of Rice (Oryza sativa L.) Cultivars under Different Irrigation Regimes and Systems of Cultivation **(PhD)**

- Either DRR Dhan 43 (Long and bold grain type) or NLR-34449 (fine grain type) cultivars of rice could be grown under SRI or drum seeding method of sowing with alternative wetting and drying irrigation system for higher yield and economic returns.

Sequentiial Application of Herbicides for Weed Management in Rainfed Lowland Rice

- Pre-emergence application of pendimethalin 1000 g ha^{-1} applied at 20 DAS considered as best chemical weed management practice for increasing the productivity and profitability of rainfed lowland rice, besides effective control of all categories of weeds associated with rainfed lowland rice.

Performance of Sesame (Sesamum indicum L.) Varieties under Varied Levels of Sulphur

- The sesame variety YLM-66 in combination with 40 kg S ha^{-1} was the best option for obtaining higher productivity, profitability and quality of sesame for southeren agro-climatic zone of Andhra Pradesh.

Response of Fodder Cowpea to Time of Sowing and Graded Levels of Phosphorus

- In conclusion, the present investigation indicated that fodder cowpea gave optimum green fodder yield with high nutritional quality if sown during I FN of January with 60 kg P_2O_5 ha^{-1}.
- If sowing is limited by any of the factors it can also be extended to II fortnight of January without significant reduction in yield and quality.

Performance of High Efficiency Herbicides in Rabi Groundnut

- The highest pod yield and monetary returns, besides broad - spectrum weed control in *rabi* groundnut was obtained with pre-emergence application of diclosulam 20 g ha^{-1} supplemented with hand weeding at 40 DAS, which was comparable with pre-emergence of diclosulam 20 g ha^{-1}.

Evaluation of Bio-Fertilizers for Phosphorous Economy in Sweet Corn (Zea Mays L.)

- Combined application of 100% RDP+AM @ 12.5 Kg ha^{-1} + PSB @ 5 kg ha^{-1} to sweet corn was the most efficient integrated phosphorous management practice for better growth, yield, economics and soil fertility status.
- Among the reduced phosphorous doses, application of 75% RDP with AM @ 12.5 kg ha^{-1} and PSB @ 5 kg ha^{-1} was found to be economically feasible and ecologically sustainable practice for sweet corn.

Effect of Moisture Stress and Foliar Nutrition on Growth and Yield of Summer Blackgram (Vigna Mungo L.)

- The study revealed that without stress and foliar application of 0.5% KNO_3 twice at flowering and pod formation stages was found to be better in increasing the growth, yield attributing characters and yield of summer blackgram.

Response of Greengram to Nutrients and Bio Stimulants

- The investigation revealed that foliar application of 19:19:19 @ 0.5% + seaweed extract @ 2% spray at 30 and 45 DAS proved to be promising nutrient management practice for obtaining higher yield, quality and economic returns of green gram.

Productivity and Quality of Green Gram as Influenced by Potassium and Zinc Nutrition

- It was concluded that higher seed yield, protein and zinc content in the seed and monetary returns would be obtained with application of 20 Kg N, 50Kg P_2O_5 along with foliar application of 1% KNO_3 + 0.2% $ZNSO_4$ at flower bud initiation stage in green gram on sandy loam soils during *kharif*.
- Foliar application of potassium and zinc was an effective approach, which not only enhances the yield but also achieves nutritional quality and better monetary returns in green gram.

(iii). Department of Agricultural Extension

Instructional Technological Needs of Teachers of ANGRAU to Meet the Modern Pedagogical Approaches

- More than three fourth of teachers reported

inadequate funding was the major constraint in instructional technology utilization followed by crowded class, lack of time of teachers to master the emerging technologies, etc.

Awareness and Perception of Famers towards Soil Health Card Scheme in Rayalaseema Region of Andhra Pradesh

- The study revealed that majority (67.92%) of the SHC holders had possessed medium level of awareness about soil health card scheme and 79.58 per cent expressed medium level of perception about soil health card scheme.

Input Utilization Pattern of Rice Farmers in Nellore District of Andhra Pradesh

- Nearly two third (65.83%) of the rice farmers had medium knowledge level.
- Herbicides were found to be having high extent of precision with 65.12 per cent, followed by seeds with 63.12 per cent.
- Majority of the rice farmers felt the „High cost of inputs as one of the major constraints.

Impact of National Initiative on Climate Resilient Agricultural Project in Ananthapur District of Andhra Pradesh

- Regarding socio personal constraints expressed by the respondents inability to accept new practices was ranked first, followed by more interested to follow conventional practices and others.
- The financial constraints expressed by the respondents in the rank order were lack of credit/capital, high cost of inputs, higher investment cost on farm implements, etc.
- The technological constraints opined by the farmers in rank order were lack of knowledge on adaptation method, lack of access to irrigation water, lack of effective advisory system on climate change, etc.

Marketing Behaviour of Women Agripreneurs in Kadapa District of Andhra Pradesh

- Majority of the women had medium level of involvement in agrpreneurial activities.
- Indifferent attitude of the society was perceived as major sociopersonal constraint.
- Financial constraints faced by women entrepreneurs were lack of own funds and resources, limited working capital, shortage of capital in starting the business, lack of government assistance, etc.

A Study on Performance of Custom Hiring Centres in Chittoor District of Andhra Pradesh

- The most important constraints in the utilization of services of custom hiring centres as indicated by farmers were non availability of farm machinery during peak season; lack of timely availability of farm machinery; etc.
- The most important suggestion for efficient utilization of services of custom hiring centres were expansion of custom hiring centres where ever necessary so that small and marginal farmers can access the services of custom hiring centres.

Farming Performance of Wheat farmers in Khas Kunar District of Kunar Province in Afghanistan

- Majority of the farmers engaged in wheat cultivation were middle aged illiterate, small farmers, with medium farming experience, low mass media exposure, low extension contact, medium social participation, high scientific orientation, high economic motivation, high innovativeness, medium achievement motivation and low deferred gratification.
- Farming experience, mass media exposure,

social participation, scientific orientation, economic motivation and deferred gratification were positively and significantly contributed to the most of the variation in farming performance of wheat farmers.

(iv). Department of Plant Pathology

Characterization of Xanthomonas axonopodis Pv. Punicae, (Hingorani and Singh) Vauterin et.al. Incitant of Bacterial Blight of Pomegranate and its Management

- The disease incidence on fruits was found to be higher than the disease incidence on leaves irrespective of location, variety and season.
- Molecular variability studies of pathogen isolates using ISSR markers revealed that there was no correlation between virulence of isolates and banding pattern.
- For control of bacterial blight using antibiotics *in vitro*, highest inhibition zone was obtained with sulphamethoxazole + trimethoprim @ 750 ppm concentration. The combination of tetracycline and COC @ 500 ppm +1500 ppm was found to be highly effective.

Molecular Characterization and Development of DNA Based Screening Methods for Yellow Mosaic Virus Infecting Black gram in Andhra Pradesh

- Seventeen black gram genotypes were identified resistant to both species of begomo viruses *i.e.,* MYMV and MYMIV.

Studies on Fruit Rot of Chilli Caused by Colletotrichum capsici (Syd.) Butler and Bisby and its Management

- In AP, over all mean fruit rot incidence was 40.84, with highest (50.84 %) in Guntur district and lowest (33.01 %) in Chittoor district. Seed mycoflora studies revealed that *C. capsici* is the most predominant cause of fruit rot of chilli.
- Disease Management experiment revealed that the Integrated Module (T_3), is more effective compared to (Biological (T_1), Chemical (T_2), Control (T_4) modules.
- Studies on fungicide residues revealed that tebuconazole and carbendazim were most commonly detected in dry chillies.

Studies on Antagonistic Potential of Trichoderma sp.against Groundnut Soil Borne Pathogenic Fungi

- Highest root rot incidence was noticed in Ananthapur, stem rot incidence in Nellore and Chittoor, collar rot incidence in Kadapa districts.
- *In vitro* efficacy of five fungicides *viz*., thiram, mancozeb, carbendazim, tebuconazole and thiram+vitavax revealed that all the five fungicides were effective at all the concentrations tested.
- Seed treatment+soil application (basal)+soil drenching of mutant *Trichoderma*+mancozeb seed treatment recorded highest germination percentage (91.67), lowest collar rot (3.09%), stem rot (2.74%), root rot incidence (5.49%), highest pod yield (1961.50 kg ha^{-1}) and haulm yield (2573.50 kg ha^{-1}).

Development of Actinomycetes Based Bioformulation Against Groundnut Stem Rot Pathogen, Sclerotium rolfsii, Sacc

- Among twenty isolates of actinomycetes, five isolates namely Ggd (73.72%), Kdr (71.44%), Kyd (70.61%), Lrp (61.33) and Mkc (52.06) showed maximum inhibition of *S. rolfsii*.

Talc based formulations were superior in maintaining the longer shelf life of the actinomycetes.

- In glasshouse studies, among different treatments, (T_{13}) seed treatment with Ggd isolate @ 5 g kg^{-1} seed + soil application @ 5 g / 5 kg soil at 30 DAS was found to be superior in reducing the stem rot incidence showing lowest per cent disease incidence.

Studies on Collar Rot Disease in Groundnut (Arachis hypogaea L.) Caused by Aspergillus Spp. and its Management

- Seed treatment with effective fungicide at half recommended dose i.e., 1.25 g kg^{-1} seed + potential isolate of *Trichoderma* spp. was found to be superior which recorded highest germination per cent (*A. niger*-92.42 %, *A. flavus*-92.42 % and *A. terreus*-91.66 %), least per cent disease incidence at 7 DAS.

Characterization of Viruses Associated with Leaf Curl and Stem Necrosis Diseases of Blackgram in Andhra Pradesh

- Disease incidence was high in Guntur district (6.26).
- The amplicon of cDNA with TSV-CP gene primer gave negative results.

Studies on Collar Rot of Chickpea Caused by Sclerotium Rolfsii Sacc.

- The influence of three different dates of sowing employing three chickpea varieties showed that NBeG 49 sown at 19th November showed highest germination. NBeG-49 sown at 15th October showed highest disease incidence. Highest soil moisture was recorded with NBeG-49 sown at 15th October. Highest inoculum load was observed with NBeG-49 sown at 15th October.
- Among the eight fungicides tested under *in vitro* conditions, combination of strobilurin and triazole fungicides was highly effective and completely inhibited the mycelial growth of the pathogen at all concentrations.

Studies on Suppression of Bacterial Leaf Blight and Plant Growth Promotion by Rice Endophytic Bacteria

- Among the 12 endophytic bacterial isolates evaluated for the antagonistic efficacy against BLB pathogen, *Xanthomonas oryzae* pv. *oryzae* by Agar well Diffusion method, EMP-5 showed maximum inhibition zone of 16.8 mm.
- With regard to Plant growth promoting (PGP) traits, EMP-5 showed positive for Phosphate solubilization, Siderophore production, HCN production, Ammonia Production, Amylase activity and Protease production.
- Seed bacterization with EMP-5 @ 109 cells / ml + foliar application of EMP-5 @109 cells / ml recorded reduction in per cent disease index (4.92 %), increased plant growth promoting ability with plant height of 80.8 cm, increase in the no. of effective tillers (97.4 %), grain yield (5340 kg ha^{-1}) and straw yield (6013.5 kg ha^{-1}) over the untreated control.

Studies on Diversity of Sclerotium oryzae, Catt and Magement of Stem Rot of Rice

- The isolates of *Pseudomonas fluorescens* were screened against mycelial growth of *Sclerotium oryzae* with dual culture and significantly highest percentage of inhibition was noticed in SOA-10 with 97.44 %.
- Difenconazole showed 100 per cent highest inhibition on mycelial growth and sclerotial viability.

- There is good compatability between effective fungicide (difenconazole) and potential antagonist (SOA-10) at lowest concentration (500 ppm).

(v). Department of Agricultural Economics

Study on Sustainable Livelihood Security in Andhra Pradesh

- Srikakulam, Vizianagaram and Vishakapatanam remained as less sustainable districts throughout the study period. East Godavari, West Godavari, Krishna, Guntur and Prakasam districts maintained their status of high sustainability during the entire study period.
- In 2006, the first five ranks of Ecological Security Index were occupied by East Godavari, West Godavari, Srikakulam, Guntur and Vizianagaram districts. The first five ranks of Economic Efficiency Index were occupied by Guntur, Kurnool, Anantapur, Prakasam and Krishna districts. In case of Social Equity Index the districts Chittoor, West Godavari, S.P.S. Nellore, Y.S.R. Kadapa and Prakasam positioned in first five ranks.
- In 2017, regarding Ecological Security Index, the first five ranks were given to districts East Godavari, West Godavari, Srikakulam, Vizianagaram and Guntur. In case of Economic Efficiency Index, the first five ranks were occupied by Kurnool, Guntur, Prakasam, Krishna and Anantapur districts. Regarding Social Equity Index the districts West Godavari, Krishna, Chittoor, East Godavari and S.P.S. Nellore positioned in first five ranks.
- The results pertaining to Sustainable Livelihood Security Indices values of different districts of Andhra Pradesh before and after implementation of National Rural Livelihood Mission revealed that there were no major differences in the indices values.

Crop Insurance: Perception, Adoption and Effectiveness in Anantapur District of A.P.

- Maximum insured farmers have taken insurance due to bank compulsion (68.33 per cent).
- The factors like family size, accessibility to credit, farm income, access to information, awareness about insurance policy and extent of irrigation are the significant factors influencing willingness to take insurance by the farmers.
- Diversification index was slightly higher for non-insured farmers than insured farmers as the farmers are practicing it as risk coping mechanism.
- Major constraint observed was government was not paying compensation amount in time.
- Awareness building programmes should be initiated in collaboration with local banks and local administration.

An Economic Analysis of Crop Shifts in Rayalaseema Region of Andhra Pradesh

- In Rayalaseema region, crops like bengalgram, redgram, maize and cotton were found associated with positive significant growth of area.
- In Chittoor district other crops were the most stable as revealed by their retention share of 0.9520 followed by groundnut with retention probability of 0.6243. In Y.S.R Kadapa district cotton had highest retention probability of 0.8050 followed by groundnut with retention probability of 0.7624. Groundnut was the most stable crop with high retention probability in Anantapuram district. The crops from which

groundnut gained were bengalgram, redgram, jowar, chillies and sunflower but with varying transfer probabilities. In Kurnool district, sunflower and maize were the most stable crops.

- Area under paddy, groundnut and sugarcane were significantly influenced by rainfall in Rayalaseema region. Positive and significant influence of rainfall was observed on crops like paddy, groundnut and sugarcane.
- Crop shifts exhibited positive and significant influence in the economy of Rayalaseema

Financial Inclusion among Rural Households in Chittoor District of Andhra Pradesh

- The results revealed that 84 per cent of the respondents were mainly depending on agriculture and average land possessed by agricultural households was 1.58 ha.
- The annual income of the agricultural households was Rs. 194810.71 and for the non-agricultural households it was Rs. 214950.
- The consumption expenditure for non-agricultural households was higher (Rs.1555637.50) as compared to that of agricultural households (Rs.109213.57).
- The study observed that agricultural households (41.66%) and non-agricultural households (43.75%) were assessed to be having sound financial knowledge.

(vi). Department of Genetics and Plant Breeding

Genetic Analysis for Seed Yield and Quality Attributes in Blackgram (Vigna mungo (L.) Hepper (PhD)

- The genotypes *viz.*, TU 94-2, LBG 752, LBG 787 and TBG 104 were found to be superior for yield and yield attributes, while the genotypes KU 1006 and MBG 1045were desirable for quality traits.
- The crosses *viz.* TU 94-2 × LBG 752, LBG 787 × LBG 752, LBG 787 × TU 94-2 and TU 94-2 × KU 1006 were found superior based on *per se* performance, *sca* effects and heterosis.
- Generation mean analysis revealed the predominant role of non-additive gene action in the inheritance of most of the traits and were under the influence of duplicate epistasis besides additive type of gene effects .

Molecular Mapping of QTLs for Yield and its Component Traits in Rice (Oryza sativa L.) (Ph D)

- The SSR markers, RM3572 and RM6953 were significantly associated with grain weight trait (*qGW8*) and grain number per panicle (*qGN12*), respectively, in F2, F2:3 and BC1F2 populations. These markers can be used for foreground selection in varietal improvement through Marker Assisted Selection in rice.
- *qGW8* and *qGN12* are the novel QTLs for grain weight and number of grains per panicle, respectively in rice.
- In the *qGW8* QTL region, five genes were considered as candidate genes controlling grain weight, while seven genes in *qGN12* were the probable candidate genes controlling grain number in rice, based on previous literature.
- ***Genetic Analysis of Yield, Yield Attributes and Water Use Efficiency Related Traits in Mung bean (Vigna radiata (L.) Wilczek) (Ph D)***
- Based on *per se* performance and *gca*, the parents *viz.*, MGG 390, AKM 9904, LM 95,

ML 267 and EC 362096 were adjudged as the best parents and the cross combinations *viz*., MGG-390 × LM-95, LM 95 × EC 362096 and ML 267 × LGG 528 recorded high *per se* performance, *sca* and heterosis for yield, WUE and heat stress tolerance related attributes.

- Results on generation mean analysis of three superior crosses *viz*., ML 267 × LGG 528, MGG 390 × LM 95 and LM 95 × EC 362096 indicated the predominant role of non-additive gene action in the inheritance of most of the traits of all the three crosses.
- Improvement in seed yield coupled with drought and heat stress tolerance could be brought through component characters like number of pods per plant, number of clusters per plant, number of pods per cluster, plant height, branches per plant, SLA, SCMR, SLW and relative injury.
- Direct effect of number of pods per plant was high and positive in all the three F2 populations indicating its major contribution to seed yield.

Genetic Variability for Yield, Yield Attributing Traits, Physiological and Quality Traits in Groundnut (Arachis hypogaea L.)

- The D2 analysis revealed the presence of considerable diversity among 30 advanced breeding lines of groundnut.
- Character association and path analysis indicated that kernel yield per plant, dry haulms yield per plant, harvest index, 100-pod weight, 100-kernel weight, number of mature pods per plant, number of primary branches per plant and number of secondary branches had high magnitude of positive direct effect on pod yield per plant.
- The genotypes TCGS-2174, TCGS-1901, TCGS-1845, TCGS-1839, TCGS-2153, TCGS-1884, TCGS-2160 and TCGS-1904 were found promising for physiological, yield and quality characte

Identification of Differentially Expressed Genes under Heat Stress Conditions in Rice (Oryza sativa L.)

- FR 13A and Pusa 1121 were identified as contrasting genotypes and were thus used for molecular analysis for identification of differentially expressed genes *viz*., Hsps/Hsfs, WRKY, kinases etc.
- Five genes showed differential expression between the two genotypes.
- Genotype FR13A, an „indica genotype, could be utilized in heat tolerance breeding programmes as donor parent.
- The HSPs, TT1 and OsGSK1 that proved with differential expression might be used to develop functional markers to use in the marker assisted based introgression breeding to develop heat tolerant varieties.

Genotype by Trait Biplot Analysis for Yield, Physiological and Nutritional Traits in Pearl Millet (Pennisetum glaucum (L.) R. Br.)

- High to moderate GCV estimates and high heritability coupled with high genetic advance as per cent of mean were observed for the characters plant height, number of productive tillers plant-1, panicle length, panicle girth, 1000 grain weight, grain yield plant-1, grain yield plot-1, green fodder yield plant-1, green fodder yield plot-1, LAI, LAD, harvest index, iron content, zinc content and protein content indicating the preponderance of additive gene action and the direct selection may be rewarding for these traits.

- The genotype ATP-15 was identified as ideal cultivar and most desirable, as it combines several good traits in its genetic composition.
- Based on the divergence analysis, the crosses viz., ATP-2 x ATP-8 (cluster III x cluster VII), ICHiFe-3 x ATP-4 (cluster III x cluster V), ATP- 2 x ICHiFe-20 (cluster III x cluster VI) for high yield and nutritional traits could be considered for obtaining a wide spectrum of variation among the segregants.

Studies on Genetic Variability for Seed Yield and Tolerance to Yellow Mosaic Virus in Greengram [Vigna radiata (L.) Wilczek]

- The genotypes VGG-05-009 and COGG-13-19 NRI Sakthi, CO-6 and LGG-544 exhibited high mean performance for seed yield per plant which can be utilized for *rabi* cultivation.
- Identification of resistant sources to YMV is a reliable option for controlling the viral disease.
- Character association studies revealed that plant height, days to maturity, number of primary branches per plant, number of clusters per plant, pod length, number of seeds per pod, number of pods per plant and 100 seed weight showed significant and positive correlation with seed yield per plant indicating that selection based on these characters would bring about simultaneous improvement in the seed yield.
- Path analysis revealed that direct selection of number of pods per plant, pod length, 100 seed weight, plant height, number of primary branches per plant, days to maturity and number of clusters per plant and number of seeds per pod would be effective due to positive direct effect on the seed yield.
- Leaf hairiness, protein content, amino acid content and phenol content had negative direct effect on the YMV disease score and also recorded negative significant association with it, hence selection on these characters will be effective in imparting resistance against YMV.

Genetic Studies on Early and Mid Late Clones of Sugarcane (Saccharum officinarum L.)

- High heritability coupled with high genetic advance as per cent of mean was observed for tillers at 120 DAP, shoots at 240, NMC, SCW, fibre % and CCS yield in early trial.
- In mid late high heritability coupled with high genetic advance as per cent of mean was observed for tillers at 120 DAP, shoots at 240 DAP, cane length, NMC, SCW, cane yield and CCS yield. This indicates that these characters were controlled by additive gene and selection for genetic improvement will be worthwhile for improving respective characters.
- The correlation studies in both early and mid late clones revealed that tillers at 120 DAP, shoots at 240 DAP, NMC, SCW, cane length, cane girth and CCS yield showed positive and significant association with cane yield and also among them. This indicates that simultaneous selection for these characters would result in the improvement of cane yield in sugarcane.
- Path analysis revealed that the characters viz., shoots at 240 DAP, cane length and NMC exhibited high positive direct effects on cane yield in early and also in midlate trial.

Genetic Analysis of Grain Yield and Physiological Attributes in F3 Generation of Blackgram [Vigna mungo (L.) Hepper]

- High estimates of heritability and genetic advance as per cent of mean for plant height,

number of clusters per plant, number of pods per cluster and seed yield per plant was found in two crosses LBG-787 x LBG-752 and TU-94-02 x KU-1006.

- Among all the three crosses studied, cross TU-94-02 x KU-1006 can be utilized for breeding of high yielding varieties.

Genetic Divergence Studies in Pearl millet (Pennisetum glaucum (L) R. Br

- Moderate to high GCV, PCV, heritability and genetic advance as per cent of mean was recorded for number of productive tillers per plant, ear head length, leaf area index at 45 DAS, SPAD chlorophyll meter reading at 45 DAS, fodder yield per plant and grain yield per plant. Hence, simple selection of these traits would be effective as they were governed by additive gene action.
- The correlation studies revealed strong significant positive association of dry fodder yield per plant followed by ear head length, harvest index, leaf area index at 45 DAS, ear head diameter, plant height, 1000 seed weight, number of productive tillers per plant and SPAD chlorophyll meter reading at 45 DAS.
- Path coefficient analysis revealed that high positive direct effect on grain yield per plant was exerted by harvest index followed by fodder yield per plant and ear head length.

Genetic Divergence Studies in Little Millet (Panicum sumatrense)

- Higher GCV, PCV, heritability and genetic advance as per cent mean were recorded for leaf area index at panicle and 15 days after panicle initiation.
- Based on the divergence, the crosses *viz.*, BL-8 × IIMRLM-7012 (cluster IV and VII) for early maturity, high yield and drought tolerance, BL-8 × TNPsu-183 (cluster IV and VI) for short duration, high yield and drought tolerance and TNPsu-183 × TNPsu-186 (cluster V and VI) for high yield and drought tolerance could be suggested for the exploitation of transgressive segregants for yield and yield attributing traits in little millet.

(vii). Department of Entomology

***Studies on Insecticide Residues in Paddy Grown in Southern Agro Climatic Zone of Andhra Pradesh* (PhD)**

- More residues of organophosphates followed by anthranilic diamides and eonicotinoids were observed in milky paddy grains.
- Chlorantraniliprole 18.5 SC proved as the most effective insecticide with the lowest Dead Hearts (9.50%), White Ear Heads (4.22%) and leaf folder (4.95 %)
- The highest yield was recorded in the chlorantraniliprole 18.5 SC (58.19 q ha^{-1}) treated plots and the lowest was recorded in cartap hydrochloride 50 SP (47.33 q ha^{-1}) treated plots.
- The carbofuran and cartap hydrochloride 4G insecticide residues increased in paddy leaves from zero to one day after second insecticidal application and later dissipated following pseudo-first order kinetics and reached to BDL after 21 days.
- The insecticidal residues *viz*., acephate, cartap hydrochloride, chlorantraniliprole, chlorpyrifos, dichlorvos, flubendiamide, monocrotophos and profenofos followed the first order kinetics in their dissipation behaviour and individually reached to BDL at 14, 7, 14, 14, 10, 10, 45 and 30 days after second insecticidal application.

***Identification of Resistant Sources for BPH, Nilaparvata lugens (Stål) and Molecular Characterization of Different BPH Populations* (PhD)**

- The studies on probing marks revealed that resistant entries, IC 464944 and IC 377527 were least preferred by BPH nymphs for settling.
- Significantly highest phenolic content (45.37 mg g^{-1} tissue) was observed in infested IC 300202 compared to all test cultures including resistant check Ptb 33.
- Molecular profiling by using 17 SSR markers for detecting 9 Bph genes revealed the presence of *Bph6* gene in IC 300167 and *Bph18* gene in IC 301181, IC 319799, IC 450041 IC 343392, IC 343457 and IC 449821.
- When both genotypic and phenotypic grouping is compared Nalgonda & Nellore populations, Raipur & Bargarh populations, Gangavathi & Glasshouse populations were found to be similar.

***Influence of Nanomaterials on Production, Multiplication and Bioefficacy of Bacillus thuringiensis (Berliner), Nomuraea rileyi (Farlow) Samson and Beauveria bassiana (Balsamo) against Spodoptera litura (Fabricius)* (PhD)**

- *S. litura* treated with CaO nano enriched *Bt* affected the highest cumulative per cent mortality (96.67) which was on par with MgO (96.67). The highest mortality (93.33%) was recorded with CaO 20 ppm.
- Cumulative mortality with nano enriched *B.bassiana* ranged between 16.67 and 90.00 per cent in different treatments, the highest (90.00) was recorded with MgO at 50 ppm.
- *Bt* grown on barley flour and with CaO NPs was found as effective treatment with the highest pod and haulm yield of 1993 kg ha^{-1} and 3899 kg ha^{-1} respectively on groundnut.

Studies on Pollinator Fauna of Coriander with Special Reference to European Honeybee, Apis mellifera Linnaeus

- Insect pollinator foraging activity on coriander began from 07.00 h. The peak activities of *A. cerana indica* were observed during 09.30-11.05 h and 15.30-17.05 h, whereas, the activity of *A. florea* reached peak during 12.30-14.05 h of the day. In case of *T. iridipennis*, the foraging activity reached peak 09.30-13.30 h .
- Malathion and imidacloprid were found to be highly toxic.

Taxonomic Studies on Planthopper Fauna Assoicated with Graminaceous Crop Ecosystems in Southern and Scarce Rainfall Zones of Andhra Pradesh

- *Cemus balajii* sp. nov., *Sardia tirupatiensis* sp. nov. were described as new species. *Cixius clitellus* (Ball) and *Cixius* (*Orinocixius*) sp. were described as new records for the first time from India.
- *Opiconsiva* sp., *Stenocranus* sp., *Toya bridwelli* (Distant) and *Tropidocephala serendiba* (Stal) were reported for the first time from Andhra Pradesh.

Isolation, Identification and Molecular Characterization of Beauveria bassiana (BALSAMO) Vuillemin Strains Effective Against Spodoptera litura (Fabricius)

- Among the 16 strains, AT recorded 93.33, 83.33, 70.00 and 56.67 per cent larval mortality at 1×10^{12}, 1×10^{10}, 1×10^{8}, 1×10^{6}

spores ml^{-1} after 120 h of treatment, whereas at 1×10^4 spores ml^{-1} MB recorded highest mortality of 50.00 per cent at 144 h after treatment.

- Among the eighteen random primers screened for variability studies in the native strains of *B. bassiana*, five primers (OPA-13, OPA-15, OPB-10, OPC-11 and OPE-18) produced polymorphic bands and 100 per cent polymorphism was observed among the strains in the present collection.

Effect of Castor Genotypes with Different Blooms on Growth and Development of Castor Semilooper, Parallelia algira (Linnaeus)

- Lowest values of adult longevity and oviposition period of *P. algira* were observed when larva was fed on GCH-4 (triple bloom) compared to DPC-9 (zero bloom) and 48-1 (double bloom) indicating GCH-4 as least preferred host for growth and development of *P. algira*

Seasonal Incidence and Management of Pod Bugs in Cowpea

- The peak incidence of pod bug was recorded in early sown cowpea for shorter duration at pod filling stage inflicting comparatively lesser pod damage than the mid and late sown crop.
- Incidence of *Clavigralla gibbosa* Spinola exhibited a significant positive correlation with minimum temperature.
- Two genotypes *viz.*, GC-1603 and TPTC-29-1 were found to be highly resistant to pod bugs and recorded higher yields.
- NSKE 5 per cent recorded significantly low pod and seed damage by pod bugs and significantly higher grain yield and 100 grain weight than the other treatments, indicating the superiority of NSKE 5 per cent in managing the pod bugs in cowpea.

Studies on Seasonal Incidence of Thrips and Whitefly on Blackgram (Vigna mungo Hepper) and their Management

- Weather parameters *viz.*, maximum temperature, evaporation and sun shine hours were positively correlated while relative humidity and rainfall negatively correlated with whitefly population.
- The genotypes PU-31and GBG-1 recorded lowest incidence of leaf curl with 1 scale rating.
- In case of whiteflies 11 genotypes *viz.*, PU-31, TBG-130, GBG-1, NDUK-15-222, LBG-787, LBG-623, IPU-2-43, Tuti Minumu, KPU-12-213, LBG-752 and TBG-129 with (1-10 per cent) were the resistant entries (1 scale rate) for YMV incidence.
- Acetamiprid 20 SP and thiacloprid 240 SC were found highly effective against thrips and whiteflies.

Taxonomic Studies on Predatory Coccinellid Fauna and Estimation of Predatory Potential

- Ten species of Coccinellids *viz., Cheliomenes sexmaculata, Coccinella transversalis, Coccinella septumpunctata, Illeis cincta, Harmonia octomaculata, Brumoides suturalis, Micraspis discolor, Scymnus nubulis,Jauravia dorsalis* and *Pseudospidimerus trinotatus* were reported from pulse crop ecosystem.
- The two most abundant species from both pulse and groundnut crop ecosystems were found to be *C. sexmaculata* and *C. transversalis*.

Studies on Seasonal Incidence, Mechanisms of

Host Plant Resistance in Sesamum Against Leafhopper (Orosius albicinctus) and it's Management

- Both the phyllody and leafhopper population were higher when the crop was sown in the month of June compared to July.
- The leafhopper population decreased with delay in sowing.
- Pymetrozine @ 0.4 g L^{-1} showed highest per cent reduction of nymphal population (91.5 %) followed by imidacloprid (40 %) + ethiprole (40%) @ 0.3 g L^{-1} (73.7%), acephate @ 1.5 g L^{-1} (73.1%), dinotefuron @ 0.3 g L^{-1} (72.1%), diafenthiuron @ 1.3 g L^{-1} (70.6%).

(viii). Department of Soil Science and Agricultural Chemistry

Impact of Power Loom Dyes Effluent Water on the Properties of Soil, Plant and Water in Nagiri Division of Chittoor District

- The EC of textile effluent irrigated soil was mostly non saline in reaction. The organic carbon status of 56, 33 and 11 per cent of soil samples were low, medium and high respectively. The available nitrogen in waste water irrigated soil was low to medium.
- The mean concentration of heavy metals in the textile effluent irrigated soils were in the order of Pb > Ni > Cr > Cd.
- The textile effluent samples were medium to high in nitrogen, low in phosphorus, medium to high in potassium. The Ca and Mg in textile effluent samples were found to be low to medium in content.
- The heavy metals such as cadmium, chromium and nickel were above the standard limits in water samples collected from different location. The majority of soil samples were found to be within the permissible limits of copper.
- The heavy metals such as Cr, Ni and Pb were found to be within the allowable limits except Cd, which exceeded the permissible limits in leaves of sugarcane crop. The micronutrients such as Mn and Zn were found to be within the permissible limits except Fe, which exceeded the permissible limits in leaves of sugarcane crop.

Size Dependenet Effects of Nano-Scale Zinc Oxide on Productivity of Groundnut in Alfsisols

- Nano ZnO particles were prepared using a modified oxalate decomposition method. treatment n- ZnO particles of size 20 nm @ 150 ppm.
- The nano ZnO particles have significant effect on the growth, development and yield enhancement of agricultural crops, especially in groundnut.

Influence of Long Term Application of Fertilizers and Manures on Soil Properties and Productivity of Rainfed Groundnut (Arachis hypogaea L.)

- Long-term use of manure and fertilizers over a period of 38 years to groundnut crop brought about slight decrease in PH and increase in organic carbon content.
- The soil available phosphorus was depleted at both depths over a period of 38 years except in only P (T4) and NPK+lime (T10) at surface (0-15 cm) in which a little increase in available P was observed.
- Long- term application of fertilizers and manure over 38 years significantly increased the soil exchangeable Ca, Mg and available

sulphur.

- The highest uptake of N, P and K was noticed with the application of NPK + gypsum + $ZnSO_4$ as compared to other treatments. The higher 100 pod weight was observed in NPK+lime whereas the higher 100 kernel weight was observed in NPK. However, highest shelling percentage was observed in only gypsum.
- It is clear that nutrients application is essential for higher yields in groundnut crop grown under rainfed conditions on Alfisols and FYM application on long-term is needed to sustain the yields.

Generation of Spatial Fertilizer Recommendation Maps of Nethakuppam Watershed Using RS and GIS

- The larger CV depicts that within a watershed there is much variation in the micronutrient status, proving that soil fertility is not homogeneous.
- The application of N, P, and K as per the recommendation in different spatial zones arrived revealed that there was a significant reduction in fertilizer application when compared to the general recommendations.
- Further, the results provide actual estimates of fertilizer requirement for the study area for the important crops grown, thereby saving budget on nutrients at both planning and farmers level

Effect of Phosphatic Fertilizers and Biofertilizers on Yield and Quality of Finger Millet (Eleusine coracana L.)

- The dry matter production and nutrient uptake by plant were significantly improved with conjunctive use of P fertilizer and biofertilizers
- Combined application of 75 % RDP + PSB @ 750 ml ha-1 + VAM @ 12.5 kg ha-1 (T9) recorded significantly the highest P content and uptake by plant at flowering and at harvest stages of crop growth.
- Higher Benefit - cost ratio was noticed with 100 % RDP + PSB @ 750 ml ha^{-1} + VAM @ 12.5 kg ha^{-1} (T6).
- Combined application of 100 % RDP + PSB @ 750 ml ha^{-1} + VAM @ 12.5 kg ha^{-1} is proposed to be an economically feasible and ecologically sustainable phosphorus management practice for the finger millet in southern agro-climatic zone of Andhra Pradesh.

Dynamics of Soil Potassium Under Different Cropping Systems in Southern Zone of Andhra Pradesh

- In Chittoor district, available K of surface soils was highly and significantly correlated with water soluble K (r = 0.779**), exchangeable K (r = 0.963**) and non-exchangeable K (r = 0.837**). In sub-surface soils available K was highly and significantly correlated with water soluble K (r = 0.541**) and exchangeable K (r = 0.963**).
- In Y.S.R Kadapa district, available K of surface soils was highly and significantly correlated with exchangeable K (r = 0.987**) and non-exchangeable K (r = 0.791**). In sub-surface soils available K was highly and significantly correlated with exchangeable K (r = 0.766**) and non-exchangeable K (r = 0.943**).
- In S.P.S.R Nellore district, available K of surface soils was highly and significantly correlated with exchangeable K (r = 0.990**) and non-exchangeable K (r = 0.875**). In

sub-surface soils available K was highly and significantly correlated with exchangeable K (r = 0.982**).

Studies of Soil Phosphorus Status and Phosphorus Fractions Under Different Cropping Systems in Southern Zone of A.P.

- Available P_2O_5 showed positive and significant correlation with saloid-P (r= 0.456*), Al-P (r= 0.765**) and Fe-P (r= 0.559**).
- Saloid-P showed significant and positive correlation with total-P (r= 0.477*) and other forms of P (r= 0.510**).
- Al-P showed positive and significant correlation with Fe-P (r= 0.885**).
- Ca-P showed positive and significant correlation with total-P (r= 0.418*).

***Detailed Soil Survey of Tatrakallu Village of Anantapuramu District of Andhra Pradesh Using Air Borne Hyper Spectral Remote Sensing* (PhD)**

- Based on the morphological, physical, physico-chemical, mineralogical and meteorological data, the soils in Tatrakallu village were classified into Entisol, Inceptisol, Alfisol and Vertisol orders and these soils were classified into Lithic Ustorthent, Typic Haplustept, Typic Haplustalf, Lithic Haplustept, Typic Ustifluvent, Fluventic Haplustept, Lithic Haplustalf, Sodic Haplustert, Sodic Calciustert, Typic Haplustert and Leptic Haplustert.
- The hyperspectral data revealed that kaolinite, smectite and illite were the dominant clay minerals in Tatrakallu village which were in accordance with XRD analysis.
- Kaolinite mineral in the study area was identified by strong absorption band at 1400 nm along with a weak band at 1900 nm whereas smectite clay mineral in study area was identified by stronger absorption band at 1900 nm which was caused by bound water molecules in this hydrous clay.
- However, illite clay mineral was identified by two diagnostic absorption peaks at 1400 nm and 2200 nm regions.
- Soil reaction, organic carbon, available N, P_2O_5 and K_2O showed positive and significant correlation at visible region (400 - 750 nm) with good fit for organic carbon (R_2 = 0.607) and poor
- The coefficient of improvement (Ci) varied from 1.42 to 2.85 indicating the implementation of judicious soil and water management practices to sustain soil productivity.

***Identifiation of Soil Related Constraints of Bengal Gram (Cicer Arietinum L.) Growing Areas in Koilkuntla Division of Kurnool District Using Remote Sensing and Geographical Information System* (PhD)**

- The available N, Zn and Fe were the major nutrient constraints in bengalgram growing soils of Koilkuntla Agriculture division.
- Organic carbon showed decreasing trend with depth.
- Available N, P, and K showed decreasing trend with in majority of the pedons, while sulphur showed irregular trend with depth. All micronutrients showed decreasing trend with depth in majority of the pedons.
- Correlation studies of soil properties in the study area revealed that available S, Fe, Zn were positively and significantly correlated with pH, organic carbon and Cu was

significantly and positively correlated with EC. Available N, K, Cu and Mn were significantly and positively correlated with organic carbon. P was positively and significantly correlated with Zn, sulphur was positively and significantly correlated with Fe and Zn, available Ca and Mg were positively and significantly correlated with each other. Cu was positive and significantly correlated with K, Mn, Zn, and Fe where as Mn and Fe were positively and significantly correlated with each other.

Spatial Variability in Soil Nutrient Status and Soil Fertility Mapping Using Geospatial Techniques in Kurnool Division of Andhra Pradesh **(PhD)**

- The spatial variability was high with phosphorus followed by sulphur, zinc, iron, nitrogen, potassium and copper.
- A significant and positive correlation was observed between NDVI and available nitrogen only during 2017-`18 whereas both organic carbon and available nitrogen had significant and positive correlation with NDVI during 2016-`17 in bengalgram.
- A significant and positive correlation was observed between the NDVI and organic carbon and available nitrogen in cotton crop during 2016-`17.

(ix). Institute of Agri Business Management

Evaluation of Non-Tomato Based Product Lines for Efficient Capacity Utilization of Farmer Owned Tomato Processing Unit in Chittoor District of Andhra Pradesh

- In the economics of processing, for the given unit which dealt with mango, papaya, tomato, banana, guava, pineapple, and chillies, the revenue obtained from mango is likely to Rs. 50 crore, where total working costs would be Rs.39.96 crore with a fixed cost of Rs.8.04 crore and net income of Rs.2 crore.
- In papaya processing, Rs. 2 crore of gross income could be obtained with total costs of Rs.1.896 crore deriving a net eturn of about Rs.0.104 crore.
- Pineapple processing would bring a gross income of Rs.1 crore with total costs of Rs.0.9399 crore with a net profit of Rs.0.0601 crore.
- In respect of guava, gross revenue of Rs.1 crore is going to be attained. The total costs that would be Rs.0.9546 crore helping the entrepreneur to gain a net income of Rs.0.0454 crore.

  Banana processing brought an income of Rs.0.4 crore. Total costs would be Rs.0.378 crore and the net income is expected to be Rs.0.0278 crore.
- The gross revenue derived from tomato products will be Rs. 6 crore while total working capital and total fixed costs will be of the order of Rs.4.793 crore and Rs.0.913 crore respectively with a net return of Rs.0.294 crore.
- In red chilli, sale proceeds would be Rs. 3 crore with a total cost of Rs.2.8686 crore and the net returns would be Rs.0.1313 crore, whereas in green chilli paste production, gross income and net income would be Rs.0.3 crore and Rs.0.017 crore respectively.

Economic Analysis of Shrivellage in Selected Vegetables and Fruits in Organized and Unorganized Retail Outlets in S.P.S. Nellore District, Andhra Pradesh

- Among all the vegetables studied, the percentage loss due to shrivelling was highest for cauliflower in both organized and unorganized bazars.
- The maximum loss regarding fruits was found in respect of banana in unorganized stores. Delayed sales, over ripening and poor customer handling were the three top ranked factors affecting shrivellage losses of vegetables and fruits in organized stores, while the same for unorganized stores were high temperatures, customer handling and the delayed sales.

Impact of e NAM on Enhancement of Farm Income in Andhra Pradesh - An Analytical Study

- With regard to arrivals, no significant change was observed in arrivals of turmeric before and after eNAM and prices of turmeric changed significantly after eNAM.
- Change in income of farmers in all the selected markets after introduction of eNAM was positive.

Evaluation of Commodity Procurement Services Utilized by Agribusiness Companies in Guntur District of Andhra Pradesh

- The respondent companies from Guntur district have procured their commodities from the TPP service provider called National Collateral Management Service Limited (NCML).
- Most of the selected companies were associated with the TPP service providers from one to three years. Peak season for spinning mills procurement was November to March.
- Strategic goals adopted by firms in procurement were procuring good quality commodities, provision of reasonable prices for their commodities, to maintain long term cooperation with suppliers, on time delivery of commodities and to reduce the overall cost of procurement.

Assessment and Formulation of Communication Strategies for Penetration of e-NAM among Farmers in Andhra Pradesh

- Among different problems faced by the traders in trading through e-NAM, 33 per cent had a feeling that it was a long process, 20 per cent felt that bidding results were late, 20 per cent opined that there was no problem in trading through e-NAM.
- As e-NAM is in its infancy all possible measures should be undertaken by all government agencies involved in the production, marketing and extension apart from involving other agencies with a sole motto of bringing the awareness of e-NAM and its benefits at large to the farming community.

Performance of Indian Tobacco in Domestic and International Markets

- The overall tobacco area and production from 1950-`51 to 2016-`17 had shown a positive trend as indicated by positive growth rates of 0.09 per cent and 1.59 per cent.
- Indian FCV tobacco in the year 2017-`18 was export competitive to Belgium, Germany, Yemen and South Africa as their NPC values were less than unity *i.e.* 0.83, 0.72, 0.73 and 0.85 respectively. For Indian unmanufactured tobacco during 2009-`10 to 2017-`18, South and South East Asia was the loyal market and Africa was the unstable market.
- With respect to FCV tobacco, Australia followed by South and South East Asia were

the stable importers and Africa was the unstable market destination.

- For non-FCV tobacco Africa was the stable market and South and South East Asia and East Europe were unstable markets.

A Feasible Study on Dairy Services Offered in Chittoor District of Andhra Pradesh

- Dairy need index (DNI) was high for vaccination (97.50 %), followed by high milk yielding feed (96.50% DNI). The present dairy services offered are medical treatment, market information (100%), followed by vaccination (96%) and supply of groundnut straw (94%).
- From the gap analysis it can be seen that there was a high percentage of gap in availability of hand outs & literatures (83.90 %) and health certificates (83.52 %), etc.
- The constraints faced by farmer development centers were lack of qualified veterinarians, high feed and machinery cost which made the farmers reluctant to approach the farmer development centers.

Warehouse Receipts Financing of Chillies in Guntur District of Andhra Pradesh–An Empirical Study

- Among the farmers and traders reasons for storing the produce in warehouse was profit motive which was ranked first by both of them.
- The criteria preferred by the stakeholders for selecting the warehouse for storage was well maintained cold storage units which was ranked first by both.
- According to the farmers the finance obtained through warehouse receipts were used for payment of wages to labour was the top ranked. On the other hand traders utilized the funds to undertake purchase of the produce which they were handling.
- Among the farmers the factors which influence the selection of financial institution were identified as suggestion made by the manager of warehouse was one of the top most factors. Among traders interest rate was top notch factor.

Product Portfolio Evaluation for Proposed Farmer Owned Tomato Processing Plant in Chittoor District of Andhra Pradesh

- Most of the respondents who showed the preference towards tomato sauce were (98.75%), followed by tomato ketchup (86.25%), tomato juice (30.00%), and tomato paste (25.00%) and least used was tomato puree (7.50%).
- Majority of consumers purchase tomato products once in week with preferred quantity of 250 to 500g. The taste was most preferred attribute of processed tomato products with a mean value of (78.11) followed by price (72.21) and aroma (69.92).

Study on Scouting of Business Opportunities for Farmer Producer Organisations (FPOs) in Anantapur District of Andhra Pradesh

- After joining the FPOs, the level of social recognition among the respondents increased the most.
- Regarding scouting new business opportunities, majority of the farmers of Tanakallu mandal desired grower s collective marketing center to be established through FPO, while members in Lepakshi felt the need for establishment of the sericulture units. Most of the respondents in NP Kuntla mandal favored dairy and goat and sheep rearing was

the most desired business opportunity in Parigi and Rolla.

Study of Marketing of Pomegranates and Grapes in Arghandab District, Kandahar Province, Afghanistan

- The highest percentage of sales took place through channel I in pomegranates and grapes i.e., Producer- wholesaler- retailer-consumer.
- About 70 per cent of the pomegranate farmers expressed that spot payment and proximity were both influencing factors that prompted to prefer these channels.
- About 40.00 per cent of the wholesalers for both crops considered colour, size, taste and durability as the important indicators to judge quality of the fruit.
- Crate charges was the major item accounting for 64.10 per cent of total marketing costs of pomegranates. The price spread analysis of grapes showed that the producers share in consumers rupee was higher in channel IV, when the fruits were sold directly to consumers.
- Regarding pomegranates, Pakistan had high retention probability to the extent of 0.739 and relatively lower transfer probability 0.227 to India. In respect of grapes, Pakistan had the highest retention probability of 0.988 and least transfer probability of 0.011 and 0.000088 to India and UAE respectively.

Exploring the Scope of Village Associate Business Model to Strengthen the Farmer Development Centers (FDCs) in Andhra Pradesh State

- At selected FDCs seed business sales accounted for about 10.78 per cent in the total business turn over.
- The majority of sample farmers expressed the high quality of agricultural information received from input dealers, research station, mobiles, field days, television, farmer meeting and quality of information obtained from agricultural extension officers and fellow farmers was insufficient**.**
- Significant difference between farming experience and information needs of the sample farmers with respect to input availability, weather related and farm machinery services existed.
- Around 35 per cent of sample respondents were ordering inputs through mobiles.

3. Agricultural College, Naira

(i). Department of Agronomy

Effect of Foliar Nutrition on Yield and Economics of Sweet Corn

- Maximum cob yield (with and without husk) and stover yield was recorded with foliar application of 1% 19-19-19 one week before tasseling fb 1% KNO_3 one week after silking, while harvest index was maximum with T4 (0.2% Formula 4 one week before tasseling and one week after silking).
- The productivity and profitability of *rabi* sweet corn could be improved significantly by foliar feeding with major nutrients alone or in combination with vermiwash in addition to recommended dose of fertilizers (180:75:60 kg N, P_2O_5, K_2O ha^{-1}) through soil application.

Studies on Fertilizer Requirement of Rice Fallow Finger Millet for North Coastal A.P.

- Application of N @ 120 kg ha^{-1} and foliar feeding of 1% 19-19-19 at tillering *fb* 1% KNO_3 at panicle initiation is required for

realizing the higher yield and profits in rice fallow finger millet in North Coastal Zone of Andhra Pradesh.

Green Seeker Based Nitrogen Management in Rice

- N application through green seeker at NDVI value of 0.8 (M_3) and application of 120 kg N ha^{-1} were found to be suitable for *kharif* transplanted rice as it registered the highest productivity and profitability for North Coastal Zone of Andhra Pradesh.

(ii). Department of Entomology

Incidence of South American Tomato Leaf Miner, Tuta absoluta (Meyrick) in North Coastal Districts and its Insecticidal Management

- The occurrence of *T. absoluta* and *Nesidiocoris tenuis* was observed during 51st-52nd standard week (23rd-27th Dec) and the leaf miner population reached its peak at 8th, 9th and 11th standard weeks.
- The multiple regression analysis indicated that all the weather parameters together can cause variation to the extent of 79.4 per cent (R_2 = 0.794) in larval incidence of *T. absoluta*, 78.3% (R_2 = 0.783) in leaf infestation, 92.1% (R_2 = 0.921) in fruit infestation, 88.7% (R_2 = 0.887) in percentage damaged fruits of *Tuta absoluta* and 80.7% (R_2 = 0.807) in population level of *Nesidiocoris tenuis.*
- Higher yield of 20,250 kg ha^{-1} (40.50 kg plot-1) with low fruit damage (19.61%) and a maximum of 188.87 per cent increased yield over untreated check were recorded in spinetoram 11.7 SC @ 1.0 ml l^{-1} treated plot.

Taxonomy Studies on certain genera of Typhlocybinae (Cicadellidae : Hemiptera) leaf hopper fauna in North Coastal districts of Andhra Pradesh

- The leafhoppers like *Amrasca biguttula biguttula* (Ishida) and *Amrasca bilobata,* Mathew and Ramakrishnan are widely distributed in crops like brinjal, bhendi, cotton, cowpea and sunflower in all the three districts of North Coastal districts of Andhra Pradesh and causing considerable economic losses.
- The species under the sub genus *Empoasca (Distantasca)*and *Empoasca (Empoasca)* were observed in large populations, causing considerable economic losses in pulses and oilseeds.

4. Agricultural College, Mahanandi

(i). Department of Agronomy

Cultivar and Sowing Date Effect on Productivity of Redgram

- The Cultivar ICPL-8719 resulted in higher yield over LRG-52 & PRG-176.
- July Ist FN sowing was the best for sowing redgram in achieving higher yields.

5. Dr NTR College of Agricultural Engineering

(i) Department of Soil and Water Engineering

Drip Fertigation for Enhancing Water and Fertilizer Use Efficiency of Onion Crop in Red Loamy Soils of Anantapuramu

- The Crop Water requirement for onion crop was determined by using CROPWAT 8.0 model.
- Calculation of fertilizer requirement of onion crop based on soil test results.
- Preparation of drip fertigation scheduling throughout the crop period of onion.

Estimation of Soil Erosion of Guravajipeta

Watershed in Prakasam District Using RS and GIS

- Potential soil erosion of Guravajipetta watershed for 2010 and 2015 were mapped and quantified using USLE.
- The average annual soil loss was sensitive to rainfall factor, slope and type of land use.
- Breaking the slope with appropriate conservation measures coupled with water harvesting strategies is essential for resource conservation.
- The recommended soil and water conservation measures were waste weir and graded bunds.

Impact of Climate Change on Spatial Water Footprint in Maddileru Basin

- The blue water foot print was high for paddy (793.29 m3/ton) for the period 1990 to 2018.
- Groundnut contributed almost 53.55% to the total green-water footprint. Sorghum, maize, paddy and redgram contributed 21.45%, 9.11%, 8.82% and 7.04%. Paddy contributed 100% to BWF.
- Green water use will be high for paddy, groundnut, maize, redgram and sorghum.
- The blue water footprint for paddy will be very high during 2050 compared to the average BWF.
- The GWF is expected to increase upto 95% by 2050 for paddy. The Grey water footprint will be expected to increase by 17%, 17%, 24% and >100% for groundnut, maize, sorghum and redgram respectively.

Studies on Low Cost and Low Head Porous Pipe Irrigation System in Tomato

- Plant growth parameters like plant height (cm), root length (cm), dry matter production (g), number of branches per plant (No.), yield parameters like number of fruits per plant (No.), average weight of fruit per plant (g), yield per plant (kg), yield per plot (kg), yield (t ha^{-1}) and yield attributes of tomato were observed to be highest in porous pipe irrigation system compared to drip irrigation system and surface irrigation system at different growth stages.
- Higher water productivity of tomato was realized in porous pipe irrigation system followed by drip and surface irrigation systems for different irrigation levels.

(ii) Department of Processing and Food Engineering

Development of a Novel Table Salt with Low Sodium Content

- Yield of spray dried salt powder increased from 66.8% to 90.3% with an increase in temperatures from 150 to 170 ºC and with decrease in feed flow rate from 600 to 350 mL/h.
- Increase in drying air temperature from 150 to 170 ºC decreased the moisture content of the spray dried salt powder from 5% to 2.5% (w.b).
- High feed flow rate resulted in high moisture content of the spray dried salt powder.
- Bulk density, tapped density and particle density of salt powder ranged from 23.53 to 78.43, 31.25 to 100 and 61.5 to 138.1 kg/m^3, respectively, and they were negatively affected by the drying air temperature and increased with feed flow rate.
- Spray drying of salt solution at optimized

conditions of dying air temperature (T_x), feed flow rate (F_x), and air flow rate (A_x) maltodextrin concentration (M_x) gave the salt powder yield and moisture content of 90.32% and 2.7%, respectively.

Clarification of Sugarcane Juice with Organic Clarificants and Fortification in Jaggery Production

- Maximum non-reducing sugars of 87.88% was observed for jaggery prepared with honey 0.5 ppm as a clarificant and the minimum non-reducing sugars of 76.51% was observed for jaggery prepared with aloe vera juice 2 ppm concentration as a clarificant.
- Minimum reducing sugars of 10.39% was observed for jaggery prepared with honey 0.5 ppm as a clarificant and the minimum non-reducing sugars of 76.51% was observed for jaggery prepared with Aloe vera juice 2 ppm concentration as a clarificant
- Maximum hardness of 2.43 N was observed for jaggery prepared with honey 1.5 ppm as a clarificant and the minimum hardness of 1.03 N was observed for control sample
- The per cent decrease of non-reducing sugars was minimum in 3-layer metalized polyester (0.30%) followed by 2.5-layer metalized polyester (0.28%) and LDPE packaging material (0.55%) as compared to aluminium foil (0.70%).
- Increase in reducing sugars was minimum in 3-layer metalized polyester (0.50%) followed by 2.5-layer metalized polyester(0.70%) and LDPE packaging material (0.90%) as compared to aluminum foil packaging material (1.0%).

Design and Development of Weight Based Grader for Sweet Orange

- The engineering properties of sweet oranges like axial dimensions, equivalent diameter, sphericity, individual fruit weight, volume of the fruit, bulk density, true density, coefficient of friction and firmness relevant to the grader design were determined.
- Precise calibration of load cell was done and linearity (R_2=1) of a 1 kg load cell confirmed the suitability to use it in the present weight grading system.
- The highest grader capacity was obtained at a grader speed of 6 rpm and the lowest capacity was observed at 3 rpm.
- Highest grading efficiency of 90% was observed for grade IV sweet orange fruits at 3 rpm.
- There was no damage for sweet orange fruits during the weight grading operation.

Design and Development of Continuous Infrared Rice Bran Stabilizer

- At constant power density and moisture, the capacity increased with increase in thickness of rice bran bed and speed of the conveyor. At constant power density and time, FFA increased with increase in thickness and moisture. At constant thickness and moisture, the FFA decreased with increase in power density
- At constant thickness and moisture, the energy demand increased with increase in power density and time, whereas the energy demand decreased with increase in infrared exposure time. At constant power density and time, efficiency decreased with increase in thickness and moisture.
- Optimum conditions of continuous rice bran

stabilizer are 600W, 12%mc, 0.5cm thickness and 3 min and at these optimum conditions, capacity, efficiency, energy demand and FFA were 17.85 kg/h, 20.12%, 0.006kW-h/kg, 5.01% respectively.

(iii) Department of Farm Machinery and Power Engineering

Design and Development of A Chilli Planter for Direct Sowing of Seeds

- The planter was found to function effectively under field conditions by placing the seeds at a mean seed spacing of 27 cm with a missing index of 6.05 to 15.15 per cent
- The draft of the planter was found to vary from 50 to 159 kg and wheel slippage of the tractor was found to be 4.38 to 7.31 per cent as depth of operation varied from 2.3 to 5.4 cm at varying speed of operation from 1.5 to 2.5 km/h.
- Average values of theoretical and actual field capacities were reported as 0.27 and 0.18 ha/h and field efficiency of 65-71 per cent was recorded.
- The total cost of operation of the developed chilli planter was found to be Rs. 287.78/h.

Development of Manual Operated Women Friendly Paddy Transplanter

- The mean hill spacing in a row at forward speeds of 0.75, 1.00 and 1.25 km h^{-1} was 25.60, 25.07 and 24.40 cm with 2 to 3 seedlings per hill at transplanting depth of 3.53, 4.57 and 5.35 cm respectively.
- Effective field capacity at selected forward speeds were recorded as 0.249, 0.313 and 0.373 ha/day with field efficiencies of 82.92, 78.24 and 74.53% respectively.
- Pulling force for operating transplanter was observed as 93.15 N at forward speed of 1.25 km h-1 followed by 75.50 N at 1.00 km h^{-1} and 65.70 N at 0.75 km h^{-1}.
- Overall discomfort rating (ODR) and total body part discomfort score (BPDS) at forward speeds of 0.75, 1.00 and 1.25 km h^{-1} of manual operated paddy transplanter and conventional transplanting was 4.50, 5.33, 7.17 and 7.33 and 38.17, 46.83, 61.67 and 74.5 respectively.
- Maximum body pain was observed by subjects in upper back followed by upper arm, shoulder, waist, thighs and legs in mechanical paddy transplanter.

Development of Active-Passive and Passive – Passive Combination of Tillage Implements for Mini Tractor

- The combination tillage implement such as cultivator- disc harrow(C-DH), cultivator with clod crusher(C-CC) and rotavator with tines (R-T) was developed. The developed tillage implements were evaluated under actual field condition at different operating conditions.
- The power requirement of combination tillage implement was observed as, 5.32, 9.866, 18.48 and 2.42, 6.3, 7.7 and 0.46, 1.7, 3.5 kW at forward speed of 1.5, 2.5 and 3.5 km h^{-1} respectively.
- The average field capacity of developed C-DH implement was found to be varied from 0.306 and 0.612 ha h^{-1} as the speed of operation changes from 1.5 and 3.5 km h^{-1}.
- Field efficiencies of developed tillage implements were found to be varied from 81.5% to 90.7% as speed of operation changes from 1.5 to 3.5 km h^{-1}.
- The combination of tines with rotavator gives

better field efficiency (ranges 86.83% to 90.07%) compared to other developed combination implements due to less non productive time demand of tines with rotavator compared to other two combinations.

6. Advanced Post Graduate Centre

(i) Department of Agricultural Microbiology

Isolation and Molecular Characterization of Paenibacillus Spp. and their Effect on Growth and Yield of Sorghum (Sorghum bicolor L.)

- Combined application of *Paenibacillus* consortia (PB1 + PB2 + PB3) and inorganic fertilizers (75 % RDN) significantly improved the microbial population, available NPK in soil, soil enzyme activities and growth and yield of sorghum crop.
- Hence these isolates can be developed into effective biofertilizers either singly or in combination with other efficient biofertilizers as these are cost effective and eco-friendly.

Selection of an Efficient AM Fungi and Standardizing the Method of Application for Rice

- Among the different methods of AMF inoculation, application of AMF at nursery was found better and further plant growth and yield of rice enhanced with the application of N, P and K biofertilizers at the time of transplanting.

Development of efficient microbial low alcoholic beverage from tomato

- Yeast and acetic acid bacteria combination has proved to produce a functional beverage from tomato which has low alcohol content and with good organoleptic score.

Influence of Pink Pigmented Facultative Methylotrophic (PPFM) Bacteria and Pseudomonas flourescens on Blackgram (Vigna mungo L.) under Drought Conditions

- Inoculation of blackgram with drought tolerant KNPP isolate containing ACC deaminase activity, EPS producing activity and with highest OD at 20 % PEG 6000 concentration significantly decreased the stress on growth and increased the blackgram yield compared to control.

Development of Plant Growth Promoting Microbial Consortia and their Effect on Growth and Yield of Sorghum Crop in Vertisols

- Combined inoculation of PGPR increased the growth and yields of sorghum.
- The increase in yield due to microbial inoculants may not be solely due to N fixation or phosphate solubilization etc., but because of several other factors such as release of growth promoting substances, control of plant pathogen, and proliferation of beneficial organisms like Azospirillum, Azotobacter, PSB, KRB, ZnSB and PGPR isolate.
- 25% reduction in the dose of chemical fertilizers with addition of microbial consortia and FYM increased the yield of Sorghum.

(ii) Department of Molecular Biology and Agricultural Biotechnology

Molecular Diversity Studies in Sesame (Sesamum indicum L.)

- The molecular characterization with 50 SSR primer pairs revealed the use of 45 primer pairs for characterization as they produced clear banding pattern.
- The number of alleles per locus was varied from 2 to 6 with an average of 3.57 alleles per locus.

- The size of the scoring bands ranged from 120 to 300 bp. PIC values of primers ranged from 0.28 to 0.80 with an average value of 0.47. These allele diversity values indicated the high level of informativeness of these markers in the present material.
- The dendrogram prepared from the UPGMA grouped the genotypes into 4 clusters and a clade at similarity coefficient value of 0.85.
- The similarity values were minimum between the genotypes of the clusters II and IV indicating their exploitation.
- This study also reported the potentiality of SSR markers for studying the genetic relatedness among the genotypes of sesame.

Marker Assisted Improvement of Bacterial Blight Resistance of the Elite Rice CV NLR 34449 (Nellore Mahsuri)

- Developed Bacterial Leaf Blight resistant lines of NLR34449 through marker assisted backcrossing using Improved Samba Mahsuri as donor (Xa21, xa13 and xa5 genes) (in collaboration with ICAR-IIRR).
- Best NIL which performed very well in station trials is jointly nominated by ANGRAU and ICAR-IIRR for the forthcoming AICRIP trials 2020 under AVT1-NIL (Bacterial blight and blast resistance) trial.

Studies on the Transferability and Efficiency of Different DNA Marker Systems from Other Vigna Species of Mungbean (Vigna radiate L. Wilczek)

- The range of transferability from *Vigna* species to mung bean of SSR, RAPD and ISSR markers was 67- 100% , 100% and 50-100% respectively.
- CEDG103, CEDG022 and CaGM01514 markers were mostly monomorphic among all the mung bean genotypes under study. Most markers were polymorphic which was less than 5 *i.e.* least informative.
- Similarity coefficient ranged for SSR markers from 0.61 to 0.88. Jaccard s similarity coefficient for RAPD ranged from 0.6 - 1. RAPD and ISSR were multi locus marker systems expected to produce higher EMR and MI values were efficient than single locus (SSR) marker systems.

(iii) Department of Environmental Science

Effect of Industrial Dairy Effluents on Soil, Water and Certain Crops in Guntur District of Andhra Pradesh

- Effect of Industrial Dairy Effluents has no significant effect on the properties of soil, water and microbial load (fungi and bacteria population) in Guntur District.
- BOD and COD of effluent samples ranged from 135 to 213 and 278 to 361 mg l^{-1} respectively.
- Micronutrients and heavy metals in the plant samples followed decreasing trend with increase in distance from the Dairy plant.

Studies on the Effect of Aquaculture on Soil and Ground Water Quality in Guntur District of Andhra Pradesh, India

- HCO_3-,Cl and S were very much higher than the permissible limit in soils.
- Mean concentration of Ca, Mg, Na, K, RSC, SAR, BOD and COD of water samples were all in excess of permissible limits.
- Zn, Mn, Cu, Cr, Pb and Cd were within permissible limits.

Effect of Sewage Water Irrigation on Soil Ground Water and Vegetable Crops in Peri

Urban Areas of Guntur District

- The concentrations of micronutrients (zinc, iron, copper and manganese) and heavy metals (cadmium, chromium, nickel and lead) were higher in the sewage irrigated soils during post- monsoon season.
- Total nitrogen, phosphorus, potassium, calcium, magnesium, micronutrients and heavy metals were observed to be higher in the sewage irrigated vegetable samples.

Characterization of Urban Compost and its Suitability to Different Crops

- The composts were very rich in nutrients and neutral in nature with more organic carbon content.
- All the trace elements were present in the composts but all were within the limits of USEPA, 1997.

(iv) Department of Seed Science and Technology

Seed Treatment and Polymer Coating Effect on Germination, Seedling Vigour, Field Performance and Yield of Hybrid Maize

- Polymer coating of the seed of maize hybrid, DHM 117, could not improve the germination but enhanced the seedling dry matter production.
- Seed treatment with Imidacloprid @ 5 g kg^{-1} seed either alone or in combination with Thiram @ 3 g kg^{-1} seed improved the seedling growth and vigour.
- Seed treated with Thiram @ 3 g kg^{-1} seed but without polymer coating showed high germination, while seed treated with either Imidacloprid @ 5 g or Thiram @ 3 g + Imidacloprid @ 5 g kg^{-1} seed without polymer coating resulted in better seedling performance.
- Seed treatment with a combination of fungicide, insecticide and polymer resulted in significant improvement in yield contributing parameters of maize hybrid compared to control.
- Seed treated with Thiram @ 3 g and coated with polymer @ 4 g kg^{-1} of seed reduced the duration of 50% tasseling, 50% silking and maturity.

Studies on Seed Borne Fungi in Groundnut

- Among the five seed health testing methods, Agar plate method with PDA, was found to be efficient in recording maximum incidence of mycoflora from all the test samples.
- Samples collected from Guduru village of Nellore district recorded highest incidence of seed mycoflora while those from Yazili village of Guntur district recorded the lowest incidence.
- Significant differences in seed quality (germination and seedling quality parameters) and biochemical characters (crude protein content, total soluble sugar content, total phenol content and total oil content) were observed in the groundnut seed samples after artificial inoculation with *Aspergillus spp.*
- Relatively more changes in quality and biochemical characters were observed in seed inoculated with *A. niger* in comparison to *A. flavus*.
- Among the four fungicides tested *viz.*, mancozeb, carbendazim, tebuconazole and carboxin+thiram, tebuconazole recorded highest germination and maximum per cent disease control.

Genotypic Variation for Biochemical Characters

and Seed Quality Parameters under Drought Stress Conditions in Chickpea

- Nitrogen, protein and esterase activity decreased with increase in drought stress while proline, soluble sugars, peroxidase activity, MDA content and acid phosphatase activity increased with increase in drought stress.
- JG 11 and NBeG 3 showed better tolerance among the chickpea genotypes under study with high germination, seedling growth, vigour, protein, proline, soluble sugars, peroxidase, acid phosphatase and esterase activities along with low MDA content in the seedlings.
- Protein, proline, soluble sugars, MDA content and peroxidases can be used as potential biochemical indicators to identify the chickpea genotypes tolerant to drought stress.

Influence of Seed Treatment on Field Performance and Storability of Accelerated Aged Seed of Sorghum

- The duration of accelerated ageing showed a significant progressive reduction in all the seed quality parameters.
- Seed quality reduced gradually with increase in period of storage and such a decline was found to be more with the seed sample having lesser initial seed quality.
- Significant enhancement in seed quality was possible through the invigoration of accelerated aged seed with different chemicals *viz*., GA3@ 50ppm, 2% KH_2PO_4, 2% $CaCl_2$ and 2% KNO_3.
- Seed treatment with 2% KH_2PO_4 and 2% $CaCl_2$ improved the seed quality and field performance of accelerated aged seeds of sorghum.

(v) Department of Agronomy (Water Management)

Sorghum (Sorghum bicolor L.) Response to Irrigation and Sowing Time during Rabi Season

- Among different sowing dates tested first fortnight of October sown crop recorded the highest growth parameters, yield attributes, grain yield and nutrient uptake.
- The interaction effect of irrigation schedules and sowing dates on water use Efficiency of sorghum was found to be significant.
- Higher gross returns, net returns and returns per rupee invested were recorded when irrigations were scheduled at 0.7 IW/ CPE ratio and in first fortnight of October sown crop.

Maize (*Zea mays* L.) response to drip irrigation and fertigation levels

- Irrigation at 3 days interval with 120% Etc produced significantly higher plant height and dry matter accumulation over alternate irrigation at 3 days interval with 100% ETc and 50% Etc and 120% Etc and 60% Etc.
- Kernel yield of maize was significantly higher with irrigation scheduled at 3 days interval with 120% Etc.
- Fertigation through 100% RDF recorded significantly higher growth and yield parameters compared to 75% RDF and 50% RDF. Also recorded significantly higher IWP and total water productivity (TWP).
- Alternate irrigation with 100% Etc and 50% Etc recorded higher irrigation water productivity (IWP)

(vi) Department of Food and Nutrition

To Study the Physicochemical Properties of Selected Rice Varieties and to Develop Value

Added Products using Extrusion and Flaking Technologies

- There exists a significant difference in physicochemical properties between the both varieties (MTU 3626 and MTU1001) analyzed.
- The extrusion process showed increase in fat, protein, calcium, energy, and iron in both varieties MTU 3626 and MTU 1001 which was mainly because of the addition of corn along with rice during the process of extrusion.
- The flaking process resulted in increase in protein, fat, fiber, calcium and iron in both varieties MTU 3626 and MTU 1001.
- It was found that the all the three recipes - rings, poha and pulihora had high acceptability.

To Study the Physicochemical Properties of Selected Rice Varieties and to Develop Value Added Products using Parboiling and Puffing Technologie

- Parboiling characteristics were measured for selected rice varieties 1001 and 3626 and were compared with normal variety 7029 and were found almost on par with the normal rice variety.
- A significant difference existed among rice varieties in properties such as hulling, milling head rice recovery, kernel lengths, kernel diameter, grain elongation ratio, alkaline spread value, gel consistency, bulk density, water absorption capacity and swelling capacity when compared to normal rice variety.
- The alkaline spread value, head rice recovery and the percentage broken grains of the two varieties of rice tested were significantly different when compared to normal rice variety.
- The total milling recovery of bold varieties was on par with normal variety.

Utilization and Evaluation of Foxtail millet (Setaria italica) and Moringa Leaves as Functional Food Ingredients in Biscuit Preparation

- Different levels of ingredients viz., 90:10:0, 70:20:10, 60:20:20, 50:20:30, 40:20:40 and 30:20:50 of *Foxtail Millet*, whole wheat flour and Moringa leaves respectively were used to prepare biscuits. The formula 2 with (70:20:10) gained highest acceptability.
- The results of proximate composition of the most accepted biscuits showed that they contain 343 kcal of energy, 59g of carbohydrate, 7.5 g of total protein, 4.8g of fat, 21.4g of total dietary fibre, 2.2% of ash content and 8.4% of moisture content per 100g, in addition to 72.4 mg of calcium, 68.3 mg of zinc, 7.22 mg of iron, 252 mg of magnesium and 452 mg of potassium.
- It was estimated that 100g of the biscuits cost approximately Rs. 30.00.
- The moisture contents of 11.9, 13.38 and 16.7 per cent were found to be critical (curdles and mould growth were observed) for biscuits.
- The product retained its original free-flowing property and normal colour up to a moisture level 4.5 % on dry basis.
- Nylon 11 (ralsin) of 2 mil (0.002 inch) thickness would be the best packaging material for storing 100g of *Moringa* leaves incorporated biscuits at 25°C and 65% Relative Humidity.

Consumption Pattern of Green Leafy Vegetables among Different Income Groups in Guntur

Town, Andhra Pradesh

- Majority of the respondents (92%) were consuming GLVs twice in a week followed by Alternate days (42%).
- Among all the GLV powders, curry leaf powder consumption was found to be high.
- Amaranth, Spinach and Gogu are the GLVs consumed by most of the respondents. The processing/cooking methods used for the GLVs resulted in good retention of the nutrients except for Ascorbic acid.

A Study on Physio-Chemical Cooking Properties and Development of Yeast Leavened Products From Selected Varieties of Little Millet (Panicum sumantrense)

- It was observed that all the varieties of Little millet, namely, JK-8, Pedasamalu/ PS, OLM-203 and OLM-206 examined had better cooking properties.
- It was found that variety PS had significantly higher protein and zinc content and variety OLM-206 had significantly higher crude fibre content.
- Little millet is a good source of protein, fibre, iron and zinc. It is suitable for preparation of doughnuts and bread and can be consumed to fulfill the nutritional needs of people.

(vii) Department of Family Resource Management

Ergonomic Evaluation and Refinement of Manually Operated Tender Coconut Punching Tools

- Punching tender coconut with tender coconut opener was found comfortable and the vender exerted relatively less pressure.
- The newly designed and developed tool can reduce the drudgery involved in punching the tender coconut.

Performance and Ergonomic Evaluation of Manually Operated Weeders Developed in ANGRAU

- The anthropometric measurements considered for designing the manually operated weeders are (i) acromial height, (ii) Elbow bredth, (iii) Grip diameter, (iv) Middle finger palm grip diameter, (v) Push force by both hands (Standing) and (vi) Pull force by both hands (Standing).
- The weeder was designed with single wheel and two wheels. Single wheel diameter is 36cms and two wheel diameter is 16.5 cms.
- Irrespective of the weeder, the RULA score indicated that the posture adopted b y arm wrist, trunk and leg suggested immediate investigation and change of posture.

(viii) Department of Human Development and Family Studies

A Study on Relationship between School Environment and Academic Achievement of Ashram School Students in Tribal Areas of Visakhapatnam

- Majority of the tribal adolescents exhibited high levels of creative stimulation, cognitive encouragement, acceptance, permissiveness, rejection and control.
- There was a significant difference between boys and girls in all the dimensions of school environment.
- There was a significant difference among the academic attainment of boys and girls where girls performed better than boys in all the subjects.

A Study on Relationship between Family

Environment, Emotional Maturity and Mental Health Status of Tribal Adolescents

- Majority of the adolescents selected for the study were extremely emotionally immature and had good mental health status.
- All the dimensions of family environment had positively correlated with all the dimensions of mental health. Cohesion and active recreational orientation was highly correlated with intelligence. Emotional stability and independence dimensions of emotional maturity were negatively correlated with overall adjustment with the dimension of mental health. Overall mental health status exhibited negative correlation with independence dimension of emotional maturity.

(ix) Department of Apparel and Textiles

Contemporising Sculptural Designs from Tadipatri Temple on Textiles through Techniques of Weaving and Painting

- When the overall preference of developed products was considered, it was found that as per parameters of colours combination, quality and trend, woven sarees were considered while parameters price and trend are considered, painted products were favoured by the consumers.
- All the consumers agreed that all products developed were trendy.
- The collected source of designs helped in adding new set of designs besides preserving culture and traditional designs from temples and was well appreciated by the consumers.

D. STUDENTS' ACTIVITIES

1. National Cadet Corps (NCC)

As many as 15 students of the ANGRAU obtained "C" certificates and 35 students got "B" certificate in NCC during the year 2019-'20. The NCC Camps attended by the students during the year are detailed in the Table 11.

Table 11. Details of NCC Camps Attended by the Students during 2019-'20

Name of the College	Camp	Venue	Date	No. of Cadets
Agricultural College, Bapatla	-	-	-	-
S. V. Agricultural College, Tirupati	CATC-VI	NCC Nagar, Tirupati	17.07.2019 to 26.07.2019	11
	Army Trekking Camp (ATC) – XI	Secunderabad	16.11.2019 to 25.11.2019	03
	CATC-XIII	Kadapa	15.12.2019 to 24.12.2019	01
	CATC-XIV	Kadapa	12.02.2019 to 21.02.2019	20

2. National Service Scheme (NSS)

The NSS volunteers of various colleges actively participated in NSS Camps during the year. The NSS activities included planting of ornamental and tree plants, sanitation programmes, awareness programmes on Health & Hygiene and AIDS, blood donation camps, vaccination to animals, rodent control, parthenium eradication in public places and Clean & green programmes, etc. The NSS special camps of about seven days duration were organized for the students of all the final year Undergraduate and Diploma programmes. The details of the NSS special camps conducted by the students during the year 2019-'20 are shown in Table 12.

Table 12. NSS Camps Attended by the Students during 2019-'20.

Name of the College	Camp	Venue	Duration of Special Camp		No. of Students Attended
			From	To	
Faculty of Agriculture					
Agricultural College, Bapatla	NSS Special Camp	G N Palem & NM Varipalem	30.10.2019	05.11.2019	200
S. V. Agricultural College, Tirupati	Special Camp	Kothasanam-batla Village, Chandragiri, Chittoor	16.11.2019	22.11.2019	73
Agricultural College, Naira	NSS Special Camp	Thandyamvalasa	16.11.2019	22.11.2019	53
Agricultural College, Naira	NSS Special Camp	GITAM University, Visakhapatnam	24.02.2020	25.02.2020	16
Agricultural College, Mahanandi	NSS Special Camp	Nandipalli	12.11.2019	18.11.2019	50
Agricultural College, Rajahmahendra-varam	NSS Special Camp	Kirlampudi, East Godavari Dist.	11.11.2019	17.11.2019	50
Faculty of Agricultural Engineering & Technology					
Dr. NTR College of Agril. Engg., Bapatla	NSS Special Camp	Poondla, Bapatla	18.02.2020	24.02.2020	65
College of Agricultural Engineering, Madakasira	NSS Special Camp	Zilladakunta	19.02.2020	25.02.2020	42
Dr. NTR College of Food Science and Technology, Bapatla	NSS Special Camp	Perali, Karlapalem	26.02.2020	03.03.2020	55

Name of the College	Camp	Venue	Duration of Special Camp		No. of Students Attended
			From	To	
College of Food Science and Technology, Pulivendula	NSS Special Camp	Akkulugaripalle	30.12.2019	05.01.2020	16
College of Community, Guntur	NSS Special	Jonnalagadda, Camp	19.06.2019 Tadikonda	25.06.2019	88

3. Sports, Games, Cultural and Other Activities

i) Events

- New events viz., mimicry for the students and 4X100 m relay race and mixed doubles in shuttle for staff sports were included in the sports and cultural meets of ANGRAU.
- First Phase of Intercollegiate Sports, Games, Cultural & Literary Meet of ANGRAU-2019-'20 was held at S.B.V.R. Agricultural College, Badvel from 30.9.2019 to 4.10.2019.
- Students of Agricultural College, Rajamahendravaram have secured 1st Prize in Chess and Cartoon making; 2nd Prize in Folk Dance (Solo) and 3rd Prize in Extempore (English) and Discus. Throw at the I phase Sports, Games, Cultural & Literary Meet of ANGRAU-2019-`20.
- A total of 12 prizes were bagged by the students of Dr. N.T.R. College of Agricultural Engineering, Bapatla in Sports, Games, Cultural & Literary Meet of ANGRAU-2019-`20.
- Second Phase of Intercollegiate Sports, Games, Cultural & Literary Meet of ANGRAU-2019-`20 was held at Agricultural College, Bapatla from 14.10.2019 to 18.10.2019.
- Inter-zonal sports meet for teaching staff of ANGRAU-2020 was held at Agricultural College, Mahanandi from 22.01.2020 to 24.01.2020.
- 20th All India Inter Agricultural Universities Sports and Games Meet (ICAR) was held from 01.03.2020 to 05.03.2020, at Tirupati
- AGRIUNIFEST- 2020: The 20th All India Inter Agricultural Universities Youth Festival was held at Indira Gandhi Krishi Vishvavidyalaya, Raipur from 08.02.2020 to 12.02.2020

ii) Nominations / Selections / Participation / Prizes / Tours

- Students of Agricultural College, Mahanandi won prizes as a) Runner-Up in Cricket (Boys); and b) Winners in Ball Badminton and Table Tennis (Boys).
- Three students from Agricultural College, Mahanandi were selected for ANGRAU contingent to participate in XX All India Inter Agricultural University Sports Meet-2020.
- Students of Agricultural College, Naira have participated in YUVA 2020 at GBPUAT,

Pantnagar, Uttaranchal from 20.02.2020 to 23.02.2020 and bagged one "Best Poster Presentation Award".

- A total of 84 students of Agricultural College, Naira have participated in Educational Tour to South India from 15.08.2019 to 26.08.2019 and visited various ICAR, CSIR and SAU establishments in Karnataka, Tamil Nadu and Kerala.
- Eight students from Agricultural College Naira, have participated in district level Intercollegiate Debate Competitions under Garimella Foundation, Srikakulam on 22.12.2019 and received 1st Prize in Telugu debate, elocution and poetry.
- Two students of Agricultural College, Rajamahendravaram were nominated by the University to participate in the 20th All India Inter Agricultural Universities Sports & Games meet 2019-`20.
- Students of Dr. N.T.R. College of Food Science & Technology, Bapatla won a) 1st Prize in Debate, Telugu Elocution, Carroms, Table Tennis and b) 2nd Prize in Shuttle and Tennicoit.
- Students of College of Community Science, Guntur bagged a) 1st Prize in On the Spot Painting, Solo dance, Mono Action; b) 2nd Prize in High Jump, Group Singing; and c) 3rd Prize in Relay and Essay Writing.
- First year student of College of Community Science, Guntur won second prize in painting competition held at state level NSS Youth festival on 24th – 25th February, 2020 at GITAM University, Visakhapatnam.
- Students of College of Community Science, Guntur have participated in the JKC State Level Competitions at Guntur on 13.09.2019 and won 1st Prize in Group Dance; Special Prize in on the spot painting.
- Students of College of Community Science, Guntur participated in the Intercollegiate Competitions conducted by Ramakrishna Sarada Mission, Guntur from 14.12.2019 to 15.12.2019 and won prize in Essay Writing competitions.
- Eight students from the Agricultural college, Bapatla participated in the the 20th All India Inter Agricultural Universities Sports & Games Meet 2019-`20.
- Students of Agricultural College, Bapatla were winners in a) Foot Ball (Boys); b) Cricket (Boys); c) Table Tennis (Girls); d) Chess; 400M running (Girls); e) Javelin Throw (Girls); Long Jump (Girls); 4 * 100 m relay (Girls) and runners in a) Ball Badminton (Girls); b) Volley Ball; c) 200 m run (Girls). The college students bagged a) 1st Place in Solo song; Group Song; One act play; Mime and b) 2nd place in Skit and Group Dance in the cultural competitions in the Inter Collegiate Sports, Games Cultural and Literary Meet 2019-'20.
- Agricultural College, Bapatla was awarded with a) ANGRAU Individual Champion (Girls); ANGRAU Overall Champion for Literary & Cultural Events; ANGRAU Overall Champion for Games (Girls) in the Inter Collegiate Sports, Games and Cultural and Literary Meet.

- Agricultural College, Bapatla bagged with ANGRAU Overall Champion (Boys) for the Year 2019-`20 in Inter Collegiate Sports, Games and Cultural and Literary Meet.
- College of Agricultural Engineering, Madakasira students were winners in Volley Ball and Ball Badminton, Second place in high jump and Telugu debate, First place in Solo Instrumental and Group dance at Inter Collegiate Sports, Games Cultural and Literary Meet 2019-`20
- Girl students of College of Agricultural Engineering, Madakasira have participated in the 20th All India Inter Agricultural Universities Youth Festival Meet.
- Three students of College of Agricultural Engineering, Madakasira participated in XX All India Inter Agricultural Universities Meet.
- Twenty two Students from ANGRAU participated in AGRIUNIFEST-2020. The ANGRAU contingent participated in inaugural ceremony and cultural procession, quiz preliminary round, patriotic song, on spot painting, group song, skit, debate, folk dance, collage, light vocal song, mime, extempore, poster making, cartooning, one act play, monoaction, elocution, clay modeling, rangoli competitions

4. Student Counseling and Placement Cells

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

During this year, the campus interviews were held by several organizations and a total of 194 students got placed in different public and private organizations. The list of firms in which the 194 students got placement is shown in Table 13.

Table 13. Details of Students' Placements during 2019-`20

Name of the Organization	Name of the Post	Number of students placed
Agricultural College, Bapatla		
Bayer Crop Sciences Ltd.	Marketing Officers	11
Dashratha Prasad Fertilizers Ltd.	Marketing Executives	04
Shefa Agricare Technologies, Chennai	Sales Executives	06
Godfrey Phillips India Ltd.	Leaf Supervisors	02
Gram Sachivalaya (Govt. of AP)	Agril. Assistant	25
Department of Agriculture, GoAP	Agricultural Officer	01
ITC	Marketing Executives	05
Gram Sachivalaya, GoAP	Agril. Assistant	20

Name of the Organization	Name of the Post	Number of students placed
S.V. Agricultural College, Tirupati		
ITC	Deputy Manager	02
Tata Rallis ltd	MarketingExecutive	02
Bank of India	A.O.	01
Shreeja Dairy	Marketing Manager	06
Agriculture department	VAA.	02
Agricultural College, Naira		
Govt. of A.P.	VAA	77
ANGRAU	TA/RA	07
IBPS	RDO	02
Federal Bank	Manager	01
Dr NTR College of Agricultural Engineering, Bapatla		
Mahindra & Mahindra Tractors, Hyd.	Work Engineer	02
Dr NTR College of Food Science & Technology, Bapatla		
ITC , Guntur	Quality Executive	03
Galla Foods Pvt,Ltd, Chittoor	Production Manager	01
Foods and Inns Ltd., Chittoor	Quality Manager	01
College of Food Science & Technology, Pulivendula		
Ravi foods	QA executive	04
College of Community Science, Guntur		
WD & CW	Extension Officer Grade I	02
Grama Sachivalayam	Women Protection Secretary	03
Zero Budget Natural Farming Project	Natural Farming Fellow	04

5. Equipment Purchased

The details of equipment purchased by different colleges which costs more than Rupees One lakh per item are furnished in Table 14.

Table 14. Major Equipment (>Rs. 1.00 lakh) Purchased in different Colleges during 2019-`20

S.No.	Institution	Equipment	Cost (Rs.)
1	Agricultural College, Bapatla	Automatic Absorption Spectrophotometer	16,74,750
2		UV-Spectrophotometer	3,91,250
3		Nano drop Spectrophotometer	5,37,600
4		Tissue Culture Racks	7,13,439
5		Trinocular Stereo Micro Scope with Camera	6,72,000
6		Mini Spin	2,18,043
7		Refrigerated Micro Centrifuge	2,47,620
8		Double Distillation Apparatus	3,29,700
9		-200 C Freezer	1,74,300
10		Automatic Absorption Spectrophotometer	16,74,750
11		UV-Spectrophotometer	3,91,250
12		Nano drop Spectrophotometer	5,37,600
13		Tissue Culture Racks	7,13,439
14		Trinocular Stereo Micro Scope with Camera	6,72,000
15		Mini Spin	2,18,043
16		Refrigerated Micro Centrifuge	2,47,620
17		Double Distillation Apparatus	3,29,700

E. UNIVERSITY LIBRARY

1. ANGRAU Library System and Management

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

The ANGRAU Libraries function under the overall supervision of the University Librarian. The Regional Libraries and other College Libraries are run by the Assistant Professors (LIS) under the administrative control of the respective Associate Deans. The University Library has rich collection both print and non-print documents viz. of books, e-books, e-journals, databases such as J-Gate Agriculture and Biological Sciences (CeRA), KrishiKosh, DELNET, EPRF Agricultural database, Indiastat.com etc. All the library e-Resources are made available through EZProxy remote access to various colleges, Research stations, Polytechnics, DAATT centers and KVKs of ANGRAU.

The ANGRAU Library system consists of the following centers.

University Library	:	Lam, Guntur
Regional Libraries	:	1. Agricultural College, Bapatla
		2. S.V. Agricultural College, Tirupati
College Libraries	:	1. Agricultural College, Naira
		2. Agricultural College, Mahanandi
		3. Agricultural College, Rajahmundry
		4. Dr. NTR College of Agricultural Engineering, Bapatla
		5. College of Agricultural Engineering, Madakasira
		6. Dr. NTR College of Food Science & Technology, Bapatla
		7. College of Food Science & Technology, Pulivendula
		8. College of Community Science, Guntur

In addition, every Polytechnic is provided with Library facilities.

2. Objectives of ANGRAU Library System

- To collect, maintain and make accessible all books and journals of Agriculture and allied subjects to the Scientific and Students community.
- To procure, consolidate and make accessible all types of documents in the principal areas of Agriculture and associated subjects of importance to the University.
- To maintain resource house of information on the continuing research and development in Agriculture and allied areas in the University.

- To interact with the associated institutes in the country for effective e-resource sharing and document delivery service.
- To participate in Agricultural Library and Information Networking at the Regional, National and International levels.

3. Components of the Library

Books and Periodicals: During 2019-'20, a total of 3793 books and 448 theses have been added to the library collection. Further, all the libraries receive over 372 Indian and 50 foreign periodicals continuously in agriculture and allied sciences. A separate reference book collection (dictionaries, enclyopaedias, almanacs, etc) is available in all the libraries.

Book Bank Scheme: This scheme is available for SC, ST and BC students and all the libraries provide important books to the students under this scheme. Special text-book collection has been built up at each campus for this purpose.

Reference Section: This section is meant to provide quick access to information on any particular topic. Copies of books recommended by teachers to students will be kept for reference purpose only and are not circulated.

Competitive Examination Cell: This section provides material for students aspiring to take ICAR examinations, Agricultural Scientists Recruitment Board (ASRB), ICAR-JRF/NET, UPSC, APPSC, GMAT, TOEFL, IELTS, GRE, BSRB etc.

Newspaper Section: The University library subscribes eight daily national and regional newspapers in Telugu and English versions. Further, college libraries also subscribe daily newspapers in different languages.

Visitors: During 2019-'20, a total of 1,18, 771 visitors utilized library services in all the campuses of ANGRAU. The regular members (students and staff) of libraries are about 5,690.

4. Library Services

Reprographic Services: During 2019-'20, about 2,32,818 photocopies were provided to the library users and generated Rs. 3,21,870/- from all the library units of ANGRAU.

Exchange of University Publications: During 2019-'20, ANGRAU distributed 50 copies of "Journal of Research ANGRAU" to various national and international institutes and in turn received several publications.

Library In-House Publications: ANGRAU has in house publications of a) "Theses Abstracts" that are published yearly in both hard and soft copies and b) Library Bulletin that is published half yearly as soft copy.

Digital Library Service : The digital library infrastructure facilities viz., interactive digital board, computers with the latest configuration, internet facility, etc., are fully strengthened in existing libraries, besides establishing digital libraries in new Colleges to utilize the electronic information i.e. CeRA, Indian journals.com with full text journals, KrishiKosh, Indiastat, CABI e-Books, Elsevier e-Books, ASAP e-Books, etc. for the improvement of academic and research programmes. All the ANGRAU libraries are equipped with sufficient number of computers with latest configuration and U.P.S. facility, printers, etc. to access the e-Resources and also to browse the Internet. The Internet facility is available in all the ANGRAU libraries.

Resources / Online Resources : The ANGRAU University Library has subscribed e-Resources / Online Resources to provide the latest

information to the teachers, scientists, extension specialists and students, etc., to meet their research and educational information needs.

- **Consortium for e-Resources in Agriculture (CeRA):** The ICAR has provided consortium online e-Resources service called CeRA (Consortium for e-Resources in Agriculture) under NAIP project from 2008 onwards. It is providing access to nearly 4800 journals in Agriculture and allied disciplines. The user ID and Passwords have been circulated to all the colleges of the University, Research Stations and also to all the patrons of the University to utilize the e-Resources effectively.
- **IndiaStat - Statistical Database:** Indiastat.com is an authentic storehouse for socio-economic statistics about India. It provides statistical data, current happenings with a statistical approach and articles from scholars on subjects of social and economic importance, etc.
- **e-Books Taylor and Francis:** The University Library has purchased more than 210 CRC Net Base e-Books on Agriculture and allied sciences, which can be accessed through I.P. and on User ID and Password basis.
- **e-Books CABI:** The University Library has purchased CAB e-Books on perpetual basis, which has unlimited access from the year 2000 and provided access to all the ANGRAU Colleges via I.P. range and on User ID and Password basis. The user ID and Password are circulated to all the Colleges and Research Stations in the University.
- **Arts and Science Publication e-Books:** About 810e-Books on Agricultural Science provide the comprehensive and reliable content that researchers need, the accessibility and searchability that researchers want, which alone cannot be available in print sources. All the ANGRAU Colleges can access via I.P. range and on User ID and Password basis.
- **J-Gate Agriculture and Biological Sciences:** It provides access to 1985 online e-Journals Portal called J-Gate Agriculture and Biological Sciences (which covers data from 2001 to 2018).
- **AgriCat:** AgriCat is the Union Catalogue of the holdings of 12 major libraries of the ICAR Institutes, Deemed Universities and SAUs. It has been created with the partnership of OCLC WorldCat. The ANGRAU University Library is also a member library in AgriCat / WorldCat and contributed nearly 35,000 bibliographical records.
- **KrishiKosh:** KrishiKosh is an Institutional Repository under National Agricultural Research System (NARS). The repository of knowledge in agriculture and allied sciences, having collection of old and valuable theses, books, records and various documents spread all over the country in different libraries of Research Institutions and State Agricultural Universities (SAUs). ICAR Open Access Policy has been implemented in ANGRAU and 960 M.Sc. and Ph.D. theses were uploaded in the KrishiKosh Repository after embargo period of one year from 2014 onwards.
- **DELNET:** Developing Library Network (DELNET) provides access to more than 1.75 crore bibliographic records of books, journals, articles, etc. The main objectives of DELNET are to promote resource sharing

among the Member-Libraries by collecting, storing and disseminating information by offering networking services to users.

- **EzProxy Remote Login Server:** The ANGRAU University Library has implemented EzProxy middleware software to provide remote access to web-based licensed resources offered by the library. The EzProxy server authenticates library users against local authentication authorization. It enables to access all the Library subscribed online resources in a single platform and to download full text articles through EzProxy server without any IP Address.

5. Academic Activities

PGS-501 Library Services Course: This non-credit library and information services course is offered to PG and Ph.D students with an objective to educate the users on accessing library resources, search strategies, online educational resources etc.

Orientation Programme: Regular orientation programmes are conducted to the newly admitted U.G., P.G. and Ph.D students on aspects of library system, rules, regulations, access to library facilities and services etc.

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

The details of library facilities and services at different constituent colleges of ANGRAU (Table 15) and annual statement of library for the year 2019-'20 (Table 16) are presented hereunder.

Table 15. Library Facilities and Services for the Year 2019-2020

S. No.	Name of the Library	Books		e-Resources		Theses		Periodicals Subscribed		Membership		Books Issued	No. of Readers Visited	No. of Internet Users	No. Of Xerox Copies Exposed	Income Generation (Rs.)
		No. added during the Year	Total	e-Journals	e-Books	No. added during the year	Total	Indian	Foreign	No. added during the year	Total					
1.	University Library, Lam	248	27961	81	901	37	990	23	-	27	38	231	1325	1803	21938	2469
2.	Regional Library, Bapatla	315	21378	-	-	79	2110	29	16	236	1213	12154	21412	1287	8682	26889
3.	Regional Library, Tirupati	716	22373	-	-	80	4243	128	24	244	842	8203	31258	1261	23,782	107473
4.	Agricultural College Library, Naira	285	10794	-	-	08	56	27	-	147	543	5858	18143	2906	22942	45135
5.	Agricultural College Library, Mahanandi	891	13103	-	-	07	56	54	-	94	438	2369	12558	17	12675	22673
6.	Agricultural College Repository Dr. NTR Agricultural Engineering College Library, Bapatla	118 136	3170 11725	- -	- -	- 10	- 124	- 17	- 09	22 102	343 1455	3166 7302	3817 2765	166 220	- 53008	- 37778
7. 8.	Agricultural Engineering College Madanapalle Dr. NTR College of Food Science & Technology Library, Bapatla	2691 32	5468 8197	- -	- -	52 06	63 114	27 12	17 -	59 08	179 158	1941 7422	15828 1541	115 1161	14752 9905	19947 7158
9.	College of Food Science & Technology, Pulivendula	105	2874	-	-	-	-	27	-	45	142	2246	6986	272	37129	47709
10.	College of Community Science, Tirupati	137	1102	-	-	-	-	-	-	29	207	132	3248	-	7831	6848
	TOTAL	3793	104591	81	901	448	7706	327	80	1122	5698	44044	118771	9217	232,810	321870

Table 16. Statement of Library Services during 2019-'20

S.No	Name	Added	Total
1	Books	3793	1,04,591
2	Foreign Periodicals	-	50
3	Indian Periodicals	-	327
4	Theses	448	7706
5	Membership	1122	5690
6	No. of Users Visited	-	1,18,771
7	Issue of Books	-	44,044
8	Xerox Copies Exposed	-	2,32,818
9	Internet Users	-	9,217
11	Total Collection of Amount	-	3,21,870

F. Institutional Development Plan (IDP)

Institutional Development Plan has been granted to ANGRAU by the National Agricultural Higher Education Project of ICAR (World Bank funded) with a budget outlay of Rs. 2910.01 Lakhs (Rs. 2410.01 Lakhs – NAHEP share & Rs. 500 Lakhs – ANGRAU share) for three financial years 2018-'19, 2019-'20 and 2020-'21 at five accredited colleges of ANGRAU, Agricultural College, Naira; Agricultural College, Mahanandi; S.V. Agricultural College, Tirupati; Agricultural College, Bapatla, and Dr NTR College of Agricultural Engineering, Bapatla. The Project works with the following key objectives.

Key objectives

- Leverage ICT services to facilitate teaching & learning outcomes
- Designing course curricula duly involving client specific problems
- Hone entrepreneurial skills of students
- Enhance competitive abilities of staff & students and inculcate the habit of lifelong learning and ethical behavior in practicing agriculture
- Going global with student exchange/ sandwich/twinning programs and faculty up gradation

IDP has given a unique opportunity to undergraduate students to attain National and International exposure at various National and International institutions. It is instrumental in development of advance equipment of Central Instrumentation cells, Smart and Virtual classrooms, strengthening of libraries for having better teaching, learning and research experience for undergraduate students. During 2019-'20, the following are the activities under IDP.

1. A Sensitization Workshop on "NAHEP Component 2 Activities & Implementation of Academics Management System (AMS)" with all IDP units in collaboration with Dr. R. C. Goyal, PI and two IT Consultants, ICAR-IASRI at ANGRAU, Lam, Guntur was organized on 11-12 December, 2019 for implementation of AMS in the University.
2. The following National Training Programmes were organized for students.

- "Managerial Skills" organized by MANAGE, Hyderabad from 10.12.2019 to 30.12.2019. A total of 45 students have participated and an amount of Rs. 11,25,000/- was utilized.
- "Sustainable Integrated Farming Systems for Coastal Eco-regions of India" organized by Central Island Agricultural Research Institute (CIARI), ICAR from 23.09.2019 to 14.10.2019. A total of 30 students have participated and an amount of Rs. 15,00,000/- was utilized.

3. The following Skill Development Programmes were organized to the students.

- "Agro based Entrepreneurship" organized by Ni-MSME, Hyderabad from 16.09.2019 to 04.10.2019. A total of 30 students have participated and an amount of Rs. 10,62,000/- was utilized.
- "Requisites of Seed Production, Processing and Quality Assurance" organized by IISS, Mau from 23.01.2020 to 12.02.2020. A total of 28 students have participated and an amount of Rs. 8,90,500/- was utilized.
- "Farm Mechanization for Post-Harvest Operations" organized by CIPHET, Ludhiana, from 01.02.2020 to 28.02.2020. A total of 25 students have participated and an amount of Rs. 9,00,925/- was utilized.
- "Effective Water Management" organized by IISWC, Dehradun from 03.03.2020 to 24.03.2020. A total of 25 students have participated and an amount of Rs. 9,38,563/- was utilized.

4. The following International Programmes were organized to the students.

- A total of 55 students have attended International Programmes at Oklahoma State University (OSU) and Kansas State University (KSU), USA.
- At OSU, Twinning Arrangements (10 students for 8 weeks) from June 1 to July 28, 2019, Skill Oriented Courses (7 students for 4 weeks) &Students trainings at International Level (8 students for 4 weeks) from June 1 to 28, 2019.
- At KSU, Internship Programmes (30 students for 8 weeks) from June 19 to August 15, 2019.

G. INTERNATIONAL PROGRAMMES

The ANGRAU established a centre to facilitate International Programmes (IP) under the control of the Director, International Programmes in 2005. The Centre serves as an internal and external liaison for the University, providing a source of assistance to faculty, administrators and students and enhancing their ability to pursue and develop international activities and initiatives. The ANGRAU promotes the process of actively

partnering with the International Universities and Organizations to effectively utilize and apply the knowledge, resources and expertise to mutually address the needs and problems facing global society today.

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

- Stimulated the Faculty and Students to apply for various International Fellowships
- Coordinated the participation of Faculty in overseas programmes
- Coordinated the visits of foreign delegations

The details of participation of ANGRAU Faculty in various overseas programmes and the visits of foreign delegations to the University during the period under report are given in detail in Tables 17 and 18.

Table 17. Participation of ANGRAU Faculty in Overseas Programmes

S. No.	Name of the Faculty	Programmes attended	Period	Place
1	Dr K Yella Reddy Dean of Agril. Engg. & Technology, ANGRAU, Administrative Office, Lam, Guntur	Participated and presented the paper entitled "Rainfall distribution analysis to assist crop selection and irrigation planning" in 3rd World Irrigation Forum (WIF3) and 70th IEC meeting of ICID at Bali, Indonesia.	1st to 7th September, 2019	Indonesia
2	Dr S Joseph Reddy Principal Scientist (Agril. Engg.), RARS, Nandyal	Participated in 126th Canton Fair-2019, Phase-I, Advanced agricultural machinery and equipments at Guangzhou, South China as on-duty. Post fair tour by the manufacturing factory units on personal leave	15th to 19th October, 2019 20th to 26th October, 2019	South China
3	Dr G M V Prasada Rao Programme Coordinator, KVK, Darsi	Participated and presented a paper on "Insect Resistance to Bt cotton and management recommendations in India" at the 8th meeting of the ICAC – Asian Cotton Research and Development Network (ACRDN) held at the International hotel, Tashkent, Uzbekistan.	9th to 11th Septem-ber, 2019	Uzbekistan
4	Dr N Chamundeswari Senior Scientist (Pl.Br), RARS, Maruteru &	Participated in the Training Workshop for IRRI Colleagues and NARES Partners Based in South Asia involved in the "Breeding Program Modernization" at IRRI Headquarters, Los Banos, Laguna, Philippines on the SOP for field management of breeding trials, data collection, management and analysis tools.	02-13 December, 2019	Philippines
5	Dr M Girija Rani Senior Scientist (Pl.Br.) & Head, ARS, Machilipatnam			

Table 18. MoU signed with National and International Institutions/Universities

S. No.	MoU with	Date of MoU	Areas of understanding
1	Indian Institute of Oilseeds Research, Hyderabad	04.12.2019	To facilitate the PG & Ph.D. research collaborations for students
2	Indira Gandhi Krishi Vishwavidya-laya, Raipur	13.01.2020	Exchange of students for academic, research and training programmes.
3	Indian Institute of Millets Research Institute, Hyderabad	18.02.2020	To facilitate the PG & Ph.D. research collaborations
4	New Mexico State University, USA	23.06.2020	To promote cooperation for: a) Exchange of scientists, technologists and students; b) Exchange of germplasm and breeding material; c) Exchange of scientific literature, information and methodology; d) Exchange of scientific equipment as available and required in programme of common interest as may be mutually agreed upon. e) Development and implementation of collaborative research projects

IV. RESEARCH

Research is by far the largest component of the functions of the University both in terms of manpower engaged and funds raised through several projects including those sponsored by ICAR, RKVY, NABARD, DBT, DST and other national and international agencies. The University continues its research efforts in agriculture, agricultural engineering & technology, community science and allied fields with commitment for improving the production, nutrition and economic status of the farmers of the state.

Thirty-two Agricultural Research Stations spread over in six agro-climatic zones of the State are conducting location specific and need based research on various crops grown to meet the mandate of working towards the welfare of rural folk. The organogram of research in the University is depicted in Fig.7. The Agro-climatic zone-wise list of research stations of ANGRAU and their functions, the list of ICAR Coordinated research projects operated in Research Stations of ANGRAU and the List of projects under *Rashtriya Krishi Vikas Yojana* during 2019-`20 are given in Annexures VI, VII and VIII, respectively.

The research activities of the University mainly focus on crop improvement, crop production, crop protection, climate resilient agriculture, post-harvest management and farm mechanization aspects for adoption by the farming community for overall increase in agricultural production and reducing cost of cultivation besides solving location specific problems. Research is being undertaken in rice, millets, pulses, oilseeds, sugarcane, cotton, mesta, bio-fuel and fodder crops with the objective of developing varieties / hybrids for higher productivity, resistance / tolerance to biotic and abiotic stresses, improvement of quality and wider adoptability to different situations. Research is also being undertaken on development and standardization of low cost production and protection technologies in all the above crops. Research programmes on biotechnology, nanotechnology, post-harvest technology and farm machinery are intensified. Research is also carried out in basic sciences, which is supportive to applied research. On-farm research is conducted for evaluation and refinement of newly developed technologies under farmers field conditions.

A. SEASONAL CONDITIONS AND CROP PERFORMANCE

A rainfall of 532.9 mm was received in the State of A.P. during the South West Monsoon period of 2019-`20 as against the normal rainfall of 556.0 mm with a deficit of 4%. There was a deficit of 17% in the North East monsoon period as only 245.8 mm rainfall was received as against the normal rainfall of 296.0 mm during the reporting period. Winter period recorded 21.1 mm rainfall as against the normal rainfall of 15.7 mm. Rainfall recorded during summer period was 74.7 mm as against normal rainfall of 98.3 mm.

During the Year from 1st June, 2019 to 31st May, 2020, the total rainfall received in the state was 874.5 mm, as against the normal rainfall of 966.0 mm, deficit being 9.5 per cent, whereas the rainfall during the same period of previous year was 635.0 mm, deficit being 34.3 per cent. The Rainfall was normal (- 19% to +19%) in all districts. Out of 670 mandals, one mandal has received scanty rainfall, 212 mandals have received deficient rainfall, 388 mandals have received normal rainfall and 69 mandals have received excess rainfall.

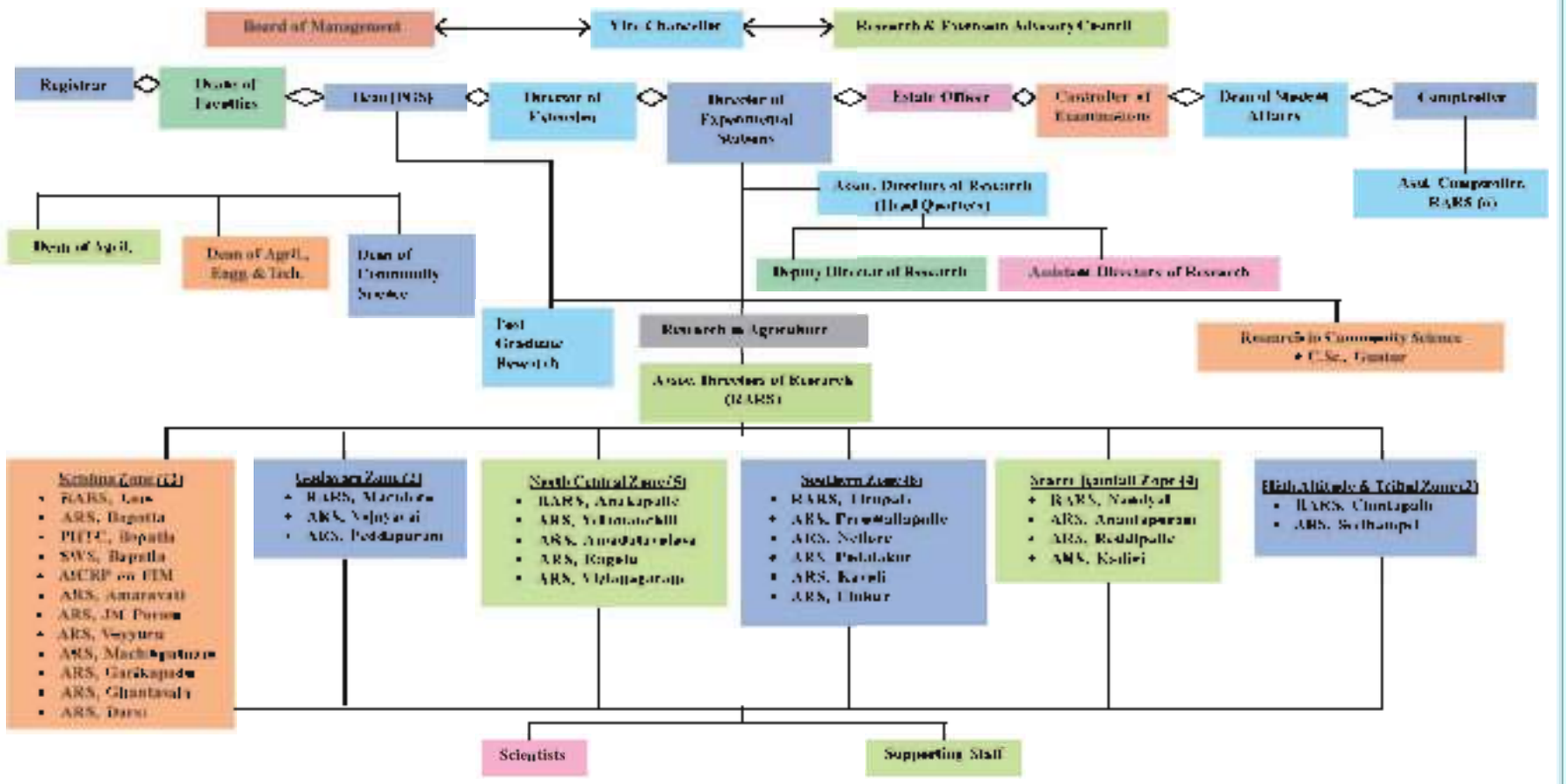


Fig.II7 . Organogram of Research in the University

Season wise normal and actual rainfall received in Andhra Pradesh for the year 2019-'20 is given in Table 19. The estimated area, production and yield of major crops in Andhra Pradesh for the year 2019-`20 are presented in Table 20.

Rice which is predominantly irrigated crop was grown in an area of 23.56 lakh ha (15.26 lakh ha in *kharif* and 8.30 lakh ha in *rabi*) during 2019-'20. During *kharif* 2019, rice crop recorded 80.13 lakh MTs production with a productivity of 5250 kg ha^{-1}. Increase in *rabi* productivity (6868 kg ha^{-1}) resulted in high rice production in the state (137.10 lakh MTs) during 2019-`20. Significant increase in the production of Rice during *rabi* season together with productivity improvement in some of the crops was through adoption of best management practices.

Maize grown in 3.01 lakh ha (2.05 lakh ha in *rabi*, 2019) recorded an average productivity of 7055 kg ha^{-1}. Total production during *kharif* and *rabi* seasons of 2019-`20 put together was 21.21 lakh metric tons.

Redgram, an important *kharif* pulse crop, was grown in an area of 2.43 lakh ha. Total production in the state was 1.19 lakh MTs. During *rabi* 2019, bengalgram, blackgram and greengram were grown in 4.59, 2.88, 0.94 lakh ha, respectively, with decrease in area sown under these crops durng 2019-20 as against the previous year The total pulse production during the year 2019-`20 was 11.67 lakh MT.

Groundnut crop was sown in an area of 5.68 lakh ha during *kharif*, 2019. Seasonal conditions prevailed in major groundnut growing areas resulted in low pod yields in *kharif* (1095 kg ha^{-1}). The *rabi*, 2019-`20 yields were improved to the tune of 2439 kg $ha^{-1}$ with a total production of 8.50 lakh MTs. The total area and production of oilseed crops were 8.53 lakh ha and 31.65 lakh MTs during the year 2019-`20.

Cotton, an important commercial crop of the state was sown in an area of 6.57 lakh ha and 25.1 lakh bales of lint were produced in the state.

The final estimates by the Directorate of Economics and Statistics, Govt. of Andhra Pradesh showed that the gross cropped area during 2019-`20 was 59.78 lakh hectares.

The highlights of research in agriculture and allied disciplines are presented subject-wise and crop-wise here under.

B. AGRICULTURE

1. *Crop Improvement*

Crop improvement is one of the major mandates of the University for development of superior varieties/ hybrids with high yielding ability, resistant to biotic and abiotic stresses in tune with the changing needs of the framers/ millers/ consumers and also to develop climate resilient varieties and varieties with export orientation.

i) Crop Varieties Released During 2019-'20

Sustained efforts of the University scientists resulted in the development and release of varieties (six varieties each at the state and national level) in different crops during 2019. These include seven in rice (MTU 1224-Maruteru Sambha, MTU 1262-Maruteru Mashuri, MTU 1210 - Sujatha, BPT 2595-Teja, NLR 3354-Nellore Dhanyarasi, MTU 1223-Varsha and MTU 1239-Sravani), two each in Fingermillet (VR 988 - Suvarnamukhi and VR 929-Vegavathi) and Mesta (AMV 8 and AMV9) and one in Cotton (LDHP 1).

During 2020, a total of 18 improved varieties in different field crops (12 varieties at the state level and 6 at national level) *viz.*, four in rice (BPT 2782, BPT 2411, NLR 4001 and NLR 40054), three in pigeonpea (LRG 105, TRG 59 and LRG 133-33), two each in finger millet (PR 1045 and CFMV 1), foxtail millet (SiA 3222 and SiA 3223), chickpea (NBeG 452 and NBeG 810), sugarcane (2009A 107 and 2009A 252) and one (1) each in horsegram (ATPHG-11), groundnut (TCGS-894) and tobacco (ABD 132) were released and notified from ANGRAU.

Table 19. District wise and Monsoon wise Rainfall Received in Andhra Pradesh during 2019-'20

S. No.	District	South–West Monsoon(mm) (June – September, 2019)			North – East Monsoon (mm) (October – December, 2019)			Winter period (mm) (Jan. and Feb. 2020)			Summer period (mm) (March to May 2020)			Total rainfall (mm) (June 2019 to May 2020)		
		Normal	Actual	%Dev	Normal	Actual	%Dev	Normal	Actual	%Dev	Normal	Actual	%Dev	Normal	Actual	%Dev
1.	Srikakulam	705.7	728.3	3.2	276.0	308.2	11.7	25.9	39.1	51.0	154.0	160.7	4.4	1161.6	1236.3	6.4
2.	Vizianagaram	692.7	702.2	1.4	245.8	322.3	31.1	25.5	41.0	60.8	166.7	163.9	-1.7	1130.7	1229.4	8.7
3.	Vishakapatnam	712.5	780.5	9.5	297.2	289.6	-2.6	22.3	27.1	21.5	170.2	176.2	3.5	1202.3	1273.4	5.9
4.	East Godavari	768.1	712.7	-7.2	305.4	265.0	-13.2	19.7	14.5	-26.4	124.5	82.8	-33.5	1217.6	1075.0	-11.7
5.	West Godavari	791.9	705.3	-10.9	239.4	186.0	-22.3	17.7	16.3	-7.9	104.0	42.3	-59.3	1153.0	949.9	-17.6
6.	Krishna	685.1	594.7	-13.2	393.4	178.4	-28.5	15.8	21.2	34.2	83.2	37.4	-55.0	1033.5	831.7	-19.5
7.	Guntur	525.8	506.1	-3.7	228.9	161.3	-29.5	18.4	34.2	85.9	79.9	24.6	-69.2	853.0	726.2	-14.9
8.	Prakasam	388.3	378.9	-2.4	393.7	274.5	-30.3	16.3	35.7	119.0	73.2	50.6	-30.9	871.5	739.7	-15.1
9.	SPSR Nellore	331.4	310.6	-6.2	661.4	513.4	-22.4	19.9	52.4	163.3	67.8	51.9	-23.5	1080.4	928.3	-14.1
10.	Chittoor	439.4	509.1	15.9	395.4	283.6	-28.3	12.1	9.2	-24.0	87.0	78.7	-9.5	933.9	880.6	-5.7
11.	YSR Kadapa	393.6	362.4	-7.9	251.0	194.0	-22.7	3.4	5.1	50.0	51.6	52.7	2.1	699.6	614.2	-12.2
12.	Anantapuramu	338.4	332.8	-1.7	155.3	182.9	17.8	2.9	0.6	-79.3	55.7	56.9	2.2	552.3	573.2	3.8
13.	Kurnool	455.1	468.2	2.9	149.6	119.6	-20.1	4.6	1.0	-78.3	61.2	64.2	4.9	670.5	653.0	-2.6
	Andhra Pradesh (Avg.)	**556.0**	**532.9**	**-4.2**	**296.0**	**245.8**	**-17.0**	**15.7**	**21.1**	**34.4**	**98.3**	**74.7**	**-24.0**	**966.0**	**874.5**	**-9.5**

Table 20. Estimates of Area, Production and Productivity of Major Crops in Andhra Pradesh during 2019-`20

S. No.	Crop	Kharif, 2019			Rabi, 2019-`20			Total		
		Area ('000' ha)	Production ('000' tons)	Productivity (Kg ha^{-1})	Area (000' ha)	Production ('000' tons)	Productivity (Kg ha^{-1})	Area ('000' ha)	Production ('000' tons)	Productivity (Kg ha^{-1})
1	**Paddy**	1526	8013	5250	830	5697	6868	2356	13710	5819
2	**Wheat**	0.00	0.00	0.00	0	0	0	0.00	0.00	0.00
3	**Jowar**	37	39	1051	118	350	2968	155	389	2510
4	**Bajra**	20	47	2297	5	12	2465	25	59	2328
5	**Maize**	96	451	4717	205	1670	8144	301	2121	7055
6	**Ragi**	26	32	1244	8	12	1569	34	44	1320
7	**Korra**	14	16	1100	1	2	1258	15	18	1118
8	**Sama**	5	2	449	—	—	—	5	2	449
9	**Variga**	—	—	—	2	2	800	2	2	800
10	**Bengalgram**	—	N	—	459	559	1218	459	559	1218
11	**Redgram**	238	115	482	5	4	631	243	119	486
12	**Greengram**	13	5	382	94	81	867	107	86	622
13	**Blackgram**	15	14	935	288	315	1094	303	329	1010
14	**Horsegram**	84	39	472	30	17	556	114	56	
15	**Cowpea**	6	3	449	7	3	520	13	6	
16	**Other Pulses**	2	1	426	11	11	1036	13	12	
17	**Groundnut**	568	622	1095	93	228	2439	661	850	1284
18	**Castor**	37	25	686	1	1	603	38	26	684
19	**Niger**	—	—	—	4	2	331	4	2	331
20	**Sesame**	6	1	212	33	12	368	39	13	343
21	**Sunflower**	2	1	698	7	7	1012	9	8	931
22	**Soybean**	1	2	1748	N	N	1709	1	2	1747
23	**Other Oilseeds**	98	2263	23155	—	—	—	98	2263	23155
24	**Cotton (lint*)**	654	2497	649	3	11	542	657	2508	648
25	**Mesta (#)**	2	18	1918	—	—	—	2	18	1918
26	**Chillies**	136	725	5327	17	80	4713	153	805	5259
27	**Tobacco**	7	19	2816	78	166	2121	85	185	2177
28	**Sugarcane**	86	6717	78186	—	—	—	86	6717	78159

Mesta production in „000 bales of 180 kgs, *Cotton lint production in „000 bales of 170 kgs each bale
Source: Directorate of Economics & Statistics, Government of Andhra Pradesh N - Negligible

Crop varieties released from ANGRAU at National Level during 2019

RICE

Variety : **MTU 1239**
Popular name : **Sravani**
Parentage : MTU 1075 / BM71
Duration : 140 days
Season : *Rabi* and Early *Kharif*
Reaction to biotic/ abiotic stresses : Moderately tolerant to BLB and BPH
Average yield : 6.4-6.5 t ha^{-1}
Developed by : RARS, Maruteru

Salient features: Released for the states of Andhra Pradesh, Tamilnadu and Maharashtra. Strong culm with non-lodging nature. Medium slender grain with test weight of 20.5 g.

RICE

Variety : **MTU 1223**
Popular name : **Varsha**
Parentage : MTU1081/MTU1064
Duration : 145-150 days
Season : *Kharif*
Reaction to biotic/ abiotic stresses :
Moderate resistance to BLB, blast and stem-borer
Average yield : 5.8-6.0 t ha^{-1}
Developed by : RARS, Maruteru

Salient features: Identified for the rainfed shallow low land areas in the states of Odisha and Bihar. Strong culm with non-lodging nature. Medium slender grain.

MESTA

Variety : **AMV 8 (AHS-216)**
Parentage : AR 121 / AMV 4
Duration : 140-150 days for fiber 180-190 days for seed maturity
Season : *Kharif*
Reaction to biotic/ abiotic stresses : Tolerant to aphids, white flies, leaf hoppers and mealy bugs and is moderately tolerant to foot and stem rot.
Average yield : 26.59 q ha^{-1}
Developed by : ARS, Amadalavalasa

Salient features: Tall growing, high fibre yielding, suitable for medium to light soils under rainfed agro-ecosystem of Andhra Pradesh, Odisha, Maharashtra, West Bengal and Bihar. It has better fibre quality parameters like strong fibre with comparable fineness (3.08 g/ tex).

FINGERMILLET

Variety : **VR 929**
Popular name : **Vegavathi**
Parentage : GE 3076 × VR 854
Duration : 115-120
Season : *Kharif* and *Rabi*
Reaction to biotic/ abiotic stresses : Resistant to brown spot, banded blight, foot rot, cercospora leaf spot, leaf, finger and neck blast.
Average yield : 35-40 q ha^{-1}
Developed by : ARS, Vizianagaram
Salient features: Yield superiority and it is fertilizer responsive even upto 90 kg N/ha. Higher Zn, Fe, Ca, protein, dietary fibre content and has low tannin content.

MESTA

Variety : **AMV 9 (AHS-230)**
Popular name : **Aditya**
Parentage : AR 121 / AMV 4
Duration : 140-150 days for fiber
180-190 days for seed
Season : *Kharif*
Reaction to biotic/ abiotic stresses : Tolerant to aphids, whiteflies and mealybug and foot and stem rot
Average yield : 27.43 q ha^{-1}
Developed by : ARS, Amadalavalasa
Salient features : Suitable for rising in Mid-May to Mid-June sowing. Mainly suitable for medium to light soils under rainfed agro-ecosystem of Andhra Pradesh, Odisha, West Bengal, Bihar and North-Eastern states. Better fibre quality parameters like strong fibre with comparable fineness (3.05g/tex).

COTTON

Variety : **LHDP 1 (LamHDP1)**
Parentage : L 762 / G Cot16
Duration : 145 – 155 days
Season : *Kharif*
Reaction to biotic/ abiotic stresses : Resistant to BLB and grey mildew and moderately resistant to rust. Moderately tolerant to jassids.
Average yield : 25 - 28 q ha^{-1}
Developed by : RARS, Lam
Salient features: Drought tolerant, high yielding variety, suitable for high density planting with medium tolerance to jassids released for South Zone of India.

Crop Varieties Released from ANGRAU at State Level during 2019

RICE

Variety : **BPT 2595**
Popular name : **TEJA**
Duration : **150 days**
Season : *kharif*
Average yield : 6.5 to 7.0 tons ha^{-1}
Station associated in development of the variety : ARS, Bapatla

Salient features: Non-lodging, non-shattering, fertilizer responsive up to 120 kg N/ha, medium slender translucent grain with excellent cooking quality, possess intermediate amylase and alkali spreading value which is desirable for good cooking quality and high antioxidant activity.

RICE

Variety : MTU 1262
Popular name : MARUTERU MAHSURI
Parentage : [(BPT 5204 / NLR 34449)/ MTU 1075)]
Duration : 150-155 days
Season : *kharif*
Reaction to biotic/ abiotic stresses : Moderately resistant to leaf blast and BPH
Average yield : 65 - 66 q ha^{-1}
Station associated in development of variety : RARS, Maruteru

Salient features: MTU 1262 is a high yielding, non-lodging, semi-dwarf, long duration rice variety. Good plant type with heavy tillering ability, possessing densely packed straw, glume medium, slender grains on its panicle. It has got 2 weeks dormancy with low grain shattering. **Excellent cooking and chemical quality** as it is exhibited by intermediate and desired values of ASV, gel consistency and amylose content. Very high head rice recovery (65%) with translucent grains which is very much desired for marketing. Suitable for both transplanted and direct seeded conditions

RICE

Variety : **MTU 1224**
Popular name **MARUTERU SAMBA**
Duration : 135 days
Season : *Kharif*
Reaction to biotic/ abiotic stresses :
Resistant to leaf blast and BPH
Average yield : 64 - 65 q ha^{-1}
Station associated in development of variety
: RARS, Maruteru

Salient features: Non-lodging, high yielding, nitrogen responsive, semi-tall with green foliage, two weeks seed dormancy, low shattering with completely exerted panicles bearing high grain number. Excellent cooking & chemical quality (intermediate and desired values of ASV, gel consistency and amylase content. Possess high head rice recovery (66%) with translucent grains which is highly desirable for marketing. Suitable for both transplanted and direct seeded conditions.

RICE

Variety : **MTU 1210**
Popular name : SUJATHA
Parentage : MTU 1001 / KMP 150
Duration : 125 days (*rabi*) & 135 days (*kharif*)
Season : *Kharif & rabi*
Reaction to biotic/ abiotic stresses : Resistant to leaf blast & BPH
Average yield : 64-65 Q ha^{-1} (*kharif*) & 89-90 Q ha^{-1} (*rabi*)
Station associated in development of the variety : RARS, Maruteru

Salient features: Strong culm with non-lodging nature, high yielding, semi-tall with green foliage, grains are straw glumed, medium slender, translucent grain, 2 weeks seed dormancy, low shattering with high grain number per panicle. **Excellent cooking and chemical quality** as it is exhibited by intermediate and desired values of ASV, gel consistency and amylose content. It also possesses very high head rice recovery (65%) with translucent grains which is very much desired for marketing. Suitable for both transplanted and direct seeded conditions.

RICE

Variety : **NLR 3354**
Popular name : **NELLORE DHANYARASI**
Parentage : NLR 34242 X NLR 34303
Duration : 130-125 days
Season : *rabi, early kharif*
Reaction to biotic/ abiotic stresses : Tolerant to leaf blast & neck blast, moderately tolerant to BLB
Average yield : 7.0 – 7.5 t ha^{-1}
Developed by : ARS, Nellore
Salient features : Dwarf, less than 1 m height, non-lodging, fine grain, very much suitable to early *kharif* season.

RAGI

Variety : **VR-988**
Popular name : **SUVARNAMUKHI**
Parentage : GE 3076 X VR 855
Duration : 105 days
Season : *Kharif & rabi*
Reaction to biotic/ abiotic stresses : Resistant to leaf blast, finger blast, neck blast and banded blight
Average yield : 32-35 q ha^{-1}
Developed by : ARS, Vizianagaram
Salient features : Resistant to blast, banded blight, defoliators and ear-head caterpillars. Grain is bold in size with copper brown color.

Crop Varieties Released from ANGRAU at State Level during 2020

RICE

Variety : **BPT 2411**
Popular name : **Sasya**
Duration : 140 days
Season : *kharif*
Reaction to biotic/ abiotic stresses : Resistant to BPH and tolerant to Neck blast, brown spot, sheath blight, stem rot and BLB
Average yield : 7.0-7.5 t ha^{-1}
Station associated in development of the variety : Agricultural Research Station, Bapatla
Salient features: Non-lodging, possess two weeks seed dormancy, high tillering ability and suitable for late transplanting with aged seedlings.

RICE

Variety : **BPT 2782**
Popular name : **Bhavati**
Duration : 140 -145 days
Season : *Kharif*
Reaction to biotic/ abiotic stresses : Resistant to blast and BPH. Tolerant to water stress and salinity
Average yield : 7.0-7.5 t ha^{-1}
Station associated in development of variety : Agricultural Research Station, Bapatla
Salient features: Non-lodging, possesses two weeks seed dormancy.

RICE

Variety : **NLR 40054**
Popular name : **Nellore Sugandha**
Parentage : MTU7029 x RNR 19994
Duration : Early *kharif*: 135 days and *Rabi: 130 days*
Season : Early *Kharif* and *Rabi*
Reaction to biotic/ abiotic stresses :
Tolerant to gall midge and Blast
Average yield : 6.5 - 7.0 t ha^{-1}
Station associated in development of the variety
Agricultural Research Station, Nellore
Salient features: Aromatic rice with fine grain. Pleasant aroma persists even in hot summer months *i.e* in early *kharif* season

RICE

Variety : **NLR 4001**
Popular name : **Nellore Siri**
Parentage : NLR 145 x MTU 5249
Duration : *Kharif*: 140-145 days & *Rabi: 140 days*
Season : *Kharif* and *Rabi*
Reaction to biotic/ abiotic stresses : Tolerant to BPH and neck Blast
Average yield : 7.0 t ha^{-1}
Station associated in development of variety : Agricultural Research Station, Nellore
Salient features: Non-lodging, fine grain, high yielding, nitrogen efficient, dwarf with medium green foliage, low shattering and complete exertion of panicle

FOXTAIL MILLET (KORRA)

Variety : **SiA 3222**
Popular name : **Garuda**
Parentage : SiA 3075 x SiA 326
Duration : 60-62 days
Season : *Kharif* and Summer
Reaction to biotic/ abiotic stresses :
Tolerant to downy mildew, escapes terminal drought due to short life cycle
Average yield : 1.5-1.75 t ha^{-1} under rainfed 1.8-1.98 t ha^{-1} under irrigated
Developed by : RARS, Nandyal
Salient features: Extra early duration variety which can fit in cropping system before bengalgram or summer rice fallows. Having monoculm, it is suitable for machine harvest. Closer spacing achieves higher yields.

FINGERMILLET

Variety : **PR 1045**
Popular name : **Gowthami**
Parentage : GPU28 X GE4931
Duration : 115-120 days
Season : *Kharif* and *Rabi*
Reaction to biotic/ abiotic stresses :
Moderately resistant to leaf blight, banded blight and leaf and neck blast diseases
Average yield : 3.2 t ha^{-1}
Station associated in development of the variety :
Agricultural Research Station, Peddapuram
Salient features: Tolerant to lodging. Synchronized maturity. Reddish brown semi compact ear heads with top curved fingers.

FOXTAIL MILLET (KORRA)

Variety : **SiA 3223**
Popular name : **Renadu**
Parentage : Selection from GS 96
Duration : 86-90 days
Season : *Kharif* and *Summer*
Reaction to biotic/ abiotic stresses :
Tolerant to blast and downy mildew.
Average yield : 2.5-2.8 t ha^{-1} under rainfed 2.8-3.2 t ha^{-1} under irrigated
Developed by : Regional Agricultural Research Station, Nandyal
Salient features: Medium duration & dual-purpose variety for grain and fodder. Suitable for intense foxtail millet farming and high potential yields.

REDGRAM

Variety : **LRG 105**
Popular name : **Krishna**
Parentage : ICPL 7414 X ICPL 87119
Duration : 160-180 days
Season : *Kharif*
Reaction to biotic/ abiotic stresses :
Resistant to wilt and SMD
Average yield : 2.0 - 2.2 t ha^{-1}
Station associated in development of the variety :
Regional Agricultural Research Station, Lam
Salient features: Medium duration, Indeterminate with semi spreading, shiny brown seed, oval shape with uniform color pattern.

BENGALGRAM

Variety : **NBeG 452**
Popular name : **Nandyal Gram-452**
Parentage : ICCV 37 X ICC 12451
Duration : 90-105 days
Season : *Rabi*
Reaction to biotic/ abiotic stresses :
Tolerant to wilt
Average yield : 1.75-2.0 t ha^{-1} under rainfed 2.0-2.5 t ha^{-1} with one/ two irrigations
Developed by : Regional Agricultural Research Station, Nandyal
Salient features: Semi spreading plant type Attractive seeds with 100 seed weight of 23-25g. Better alternative to JG11 and other popular *desi* varieties

REDGRAM

Variety : **TRG 59**
Popular name : **Tirupati Kandi**
Parentage : ICP 7035XICP 8863
Duration : 160-170 days
Season : *Kharif* / early *Rabi*
Reaction to biotic/ abiotic stresses :
Tolerant to wilt and SMD
Average yield : 1.6 t ha^{-1}
Station associated in development of the variety : Regional Agricultural Research Station, Tirupati
Salient features: Medium duration. Brownish orange colored medium bold seed. Suitable to sole and intercropping systems.

SUGARCANE

Variety : **2009A107 (Co A 14321)**
Popular name : **Vasista**
Parentage : 87A298GC
Duration : 10 months (300 days)
Season : *Rabi*
Reaction to biotic/ abiotic stresses :
Resistant to red rot, tolerant to wilt and YLD and moderately resistant to smut
Average yield : 131 t ha^{-1}
Developed by : RARS, Anakapalle
Salient features : Suitable for rainfed, limited irrigated, late planted, assured irrigated and saline soils. Suitable for mechanical harvesting due to its erect stem and non lodging nature.

RSUGARCANE

Variety : **2009A 252 (CoA 14323)**
Popular name : **Naveen**
Parentage : CoV92102GC
Duration : 11-12 months (330-360 days)
Season : *Rabi*
Reaction to biotic/ abiotic stresses :
Resistant to red rot, tolerant to wilt and YLD. Moderately tolerant to early shoot borer and scale insect pests
Average yield : 124 t ha^{-1}
Developed by : RARS, Anakapalle
Salient features: Suitable for rainfed, limited irrigated, late planted, assured irrigated and saline soils. Suitable for mechanical harvesting due to its erectness and non lodging nature

Crop Varieties Released from ANGRAU at National Level during 2020

FINGER MILLET

Variety : **CFMV 1**
Popular name : **Indravathi**
Parentage : VL 330 × GE 532
Duration : 105-110 days
Season : *Kharif* and *Rabi*
Reaction to biotic/ abiotic stresses : Resistant to finger blast, neck blast, foot rot and banded blight
Average yield : 3200-3400 kg ha^{-1}
Developed by : Agricultural Research Station, Vizianagaram
Salient features: Non-lodging and fertilizer responsive. Purple pigmented at nodes and leaf sheath junctions. Glumes are also highly purple pigmented. It is rich in Ca (4280 ppm), Fe (58 ppm) and Zn (44.5 ppm).

REDGRAM

Variety : **LRG 133-33**
Popular name : **Sowbhagya**
Parentage : LRG 30 X ICP 8863
Duration : 165-175 days
Season : *Kharif*
Reaction to biotic/ abiotic stresses : Resistant to wilt
Average yield : 2300-2400 kg ha^{-1}
Developed by : Regional Agricultural Research Station, Lam
Salient features: Branching habit is spreading. Flower colour is yellow with sparse streaks. Pods are green with brown streaks and formed in clusters with long peduncle. 10-11g test weight.

BENGALGRAM

Variety : **NBeG 810**
Popular name : **Nandyal Gram- 810**
Parentage : ICCV 95311 × ICCV 95333
Duration : 110-115 days in West Central Zone & 145-150 days in North West Plain Zone
Season : *Rabi*
Average yield : 18-20 q ha^{-1} under rainfed
20-22 q ha^{-1} under irrigated
Developed by : RARS, Nandyal
Salient features: High yielding, extra large seeded (>40 g/100 seed) *kabuli* chickpea variety with wide adaptability. Recommended for cultivation in North West Plain Zone comprising of Punjab, Haryana, western UP, Delhi, North Rajasthan, Jammu and Kashmir and plains of Uttarakhand and West Central Zone comprising of Gujarat, Maharashtra, western Madhya Pradesh and Budelkhand region of Uttar Pradesh.

HORSEGRAM

Variety : **ATPHG-11**
Popular name : **Ananta vulava 1**
Parentage : Selection from ATP-1 Local
Duration : 110-120 days
Season : Late *kharif*
Reaction to biotic/ abiotic stresses :
Highly resistant to dry root rot and moderately tolerant to yellow mosaic virus
Average yield : 800-1100 kg ha^{-1}
Developed by : Agricultural Research Station, Anantapuramu
Salient features: Light grayish brown seed with 100 seed weight of 3.6-4.2 g.

GROUNDNUT

Variety : **TCGS 894**
Popular name : **Pragati**
Parentage : TIR 46 × K 134
Duration : 105 days
Season : *Kharif* and *Rabi*
Pod yield : 33-35 q ha^{-1} in Kharif
40-45 q ha^{-1} in Rabi
Developed by : RARS, Tirupati
Salient features: Short statured, early and high water use efficient variety with rose testa and attractive kernals.

TOBACCO

Variety : **ABD 132**
Popular name : **Nandyal Pogaku 2(NP 2)**
Duration : 195- 210 days
Season : *Kharif*
Reaction to biotic/ abiotic stresses :
Moderately tolerant to *Spodoptera litura*, aphid, mealy bugs, Black shank and TMV. Tolerant to drought
Cured leaf yield : 3146 kg ha^{-1}
Developed by : RARS, Nandyal
Salient features: It is a stay green entry. High seed oil percentage of 31.15%. It has less smoke toxicants like smoke nicotine (1.84 to 3.55 %), carbon monoxide (16.75 to 19.42 %) and tar content (32.95 to 34.09 %). Having permissible chemical quality and trade acceptance.

ii) **Minikits**

The minikit trials were conducted in different crops during the year 2019-'20 for obtaining response of the crop varieties. The following (Table 21) are

Minikit trials conducted in different crops along with the details on specific chartacteristics, yields and per cent increase over check.

Table 21. Particulars of Minikits in Different Crops during 2019-'20

S. No.	Minikit entry & Parentage	Year of testing/ Season	Mean minikit entry yield (Kg ha^{-1})	Mean check yield (Kg ha^{-1})	Per cent increase over check	Specific characters
CEREALS & MILLETS						
Rice						
RARS, Maruteru						
1	**MTU 1211** (MTU 1001/ KMP 105) Vs MTU 1001	III *rabi*	8640	7963	8.49	Medium bold variety and given as an alternate to MTU 1001 (Vijetha). Non-lodging, high yielding variety with 125 days duration in *Rabi* and moderately resistant to BPH and Blast
2	**MTU 1217** (MTU 1001/CR 2081-14-3-1) Vs MTU 1001 or MTU 3626	III *rabi*	9033	8129	11.1	Short bold grains with very occasional chalkiness and has given as an alternate to MTU 3626. Strong culm with non lodging nature, tolerant to Blast and BPH
3	**MTU 1232** (MTU 1075*3 Swarnasub1) Vs PLA 1100 / MTU 1064/ MTU 1075	II *kharif*	6030	5604	7.6	Sub1 introgressed line of MTU 1075 (Pushyami) which is non lodging and which can survive under flash floods as well as stagnant flooding
4	**MTU 1290 (MTU1010/ FL478* 3MTU1010)** Vs MTU 1010	II *rabi*	7624	6651	14.62	A high yielding *Saltol* introgressed line of MTU 1010 with 115-120 days duration, non-lodging, long slender grain similar to MTU1010, tolerant to salinity, moderately tolerant to BPH and BLB
5	**MTU 1238** (MTU 5249 / IR 72) Vs MTU 1001	I *kharif*	6174	5540	11.44	Fine grain (L/B – 2.91), straw glume, medium slender grain type, high yielding than MTU 1001, non lodging, BPH and BLB tolerant, with good milling percentage (70%) and head rice recovery (65%).

S. No.	Minikit entry & Parentage	Year of testing/ Season	Mean minikit entry yield (Kg ha^{-1})	Mean check yield (Kg ha^{-1})	Per cent increase over check	Specific characters
6	**MTU 1253** (BPT5204/ OR2309-19) Vs MTU 7029 or MTU 1061	I *kharif*	6313	5832	8.24	Strong culm, non lodging, two weeks dormancy which is highly desirable for cultivation in coastal delta areas. Semi erect plant with straw glume medium slender grain type. Kernels are highly translucent with high head rice recovery (60-65%). Moderately tolerant to BPH and BLB.
7	**MTU 1271** (MTU 1075 / MTU 1081) Vs BPT 5204	I *kharif*	6695	5976	12	Fine grain (L/B – 3.23), straw glume, medium slender grain type, high yielding than BPT 5204, non lodging, BPH tolerant, with good milling percentage (67%) and head rice recovery (62%)
8	**MTU 1282** (MTU 1001 / KMP 150) Vs NLR 34449	*I rabi*	6549	5381	23.1	Fine grain with medium slender grain quality with kernel L/B ratio of 2.9. Kernels are highly translucent with high head rice recovery (65%). Chemical quality traits belong to intermediate group with good cooking quality. Resistant to BPH and Blast. Higher yielding potential than the fine grain popular variety NLR 34449
9	**MTU 1311** [(MTU 2077/ NLR 3042)/ MTU 1081)] Vs NLR 34449	I *rabi*	6655	5461	24.5	Non lodging, semi erect plant type with two weeks dormancy. Fine grain with medium slender grain quality with kernel L/B ratio of 2.87. Kernels are highly translucent with >60% head rice recovery Resistant to BPH and Blast Higher yielding potential than the fine grain popular variety NLR 34449

S. No.	Minikit entry & Parentage	Year of testing/ Season	Mean minikit entry yield (Kg ha^{-1})	Mean check yield (Kg ha^{-1})	Per cent increase over check	Specific characters
ARS, Nellore						
1	NLR 3186 33892 Check: NLR (Parthiva)	*kharif* . 2019 (Third year of testing)	6373	5950	6.92	Long duration rice culture matures in 150-155 days with medium slender molakolukulu grain having resistance to blast disease with quality. Suitable for good cooking *kharif* season
2	NLR 3238 Check: NLR 34449/MTU 1010	2019-20 (First year of testing)	7128	6668	7.15	Short duration rice culture (120-125 days) having zinc of 19 ppm, 4.4 ppm of iron and 8.43 % of protein in polished rice. Blast tolerant, non-lodging culture with medium slender grain and good cooking quality. Suitable for both *rabi* and early *kharif.*
ARS, Bapatla						
1	BPT 2776 BPT 5204 (Check)	III year of testing during *kharif*, 2019	6923	6178	10.8	Tolerant to blast and BPH, non lodging, straw glume and fine grain quality. 150-155 days duration, suitable to single cropped areas.
ARS, Machilipatnam						
1	MCM 109 Check - MCM 100	*2019 kharif* (1st year)	5564	5959	7.10	Salinity tolerant, medium duration rice culture (130 days during *kharif* and 120 days during *rabi*) with BPH, blast tolerance, having one week seed dormancy. Medium slender fine grain, straw glume grain type and low grain shattering, non-Lodging.
Finger Millet (*Ragi*)						
ARS, Vizianagaram						
1	VR 1099 Sri Chaitanya (C)	2019,	2818 *kharif*	2424	16.2	It is highly finger and neck blast resistant with semi compact ears

S. No.	Minikit entry & Parentage	Year of testing/ Season	Mean minikit entry yield (Kg ha^{-1})	Mean check yield (Kg ha^{-1})	Per cent increase over check	Specific characters
PULSES						
Redgram						
RARS, Lam						
1	LRG 223 LGG 52 (Check)	II yr *kharif*	1841	1616	13.2	Wilt resistant, Bold seeded
Greengram						
RARS, Lam						
1	LGG 607 LGG 460 (Check)	III yr	1176	989	15.9	Resistant to MYMV
2	LGG 630 LGG 460 (Check)	II yr	1353	1188	12.2	Resistant to MYMV and Bud blight
Blackgram						
ARS, Ghantasala (*rabi*)						
1.	GBG 45 LBG -752 (check)	*rabi* 2019-20	1581	1441	10.92	Tall, erect plant with sympodial bearing habit, high yielding, non lodging variety and YMV resistant. Suitable for mechanical harvesting in rice fallow situations.
RARS, Tirupati (*rabi*)						
1.	Minikit entry: TBG-129 Check: LBG-752/PU-31/ TBG-104.	*rabi*, 2019-20	1702	1492	14.1	High yielding, matures in 85-90 days, YMV resistant, shiny and bold seed.
Bengalgram						
RARS, Nandyal (*rabi*)						
1	NBeG 776	2nd year	1547	1373	12.6	High yielding *Desi* line and tolerant to wilt, suitable for mechanical harvesting
2	NBeG 779	2nd year	1548	1341	15.4	A high yielding *Desi* chickpea line; suitable for mechanical harvesting
3	NBeG 440	1st year	1347	1187	13.4	A high yielding bold seeded *Kabuli* chickpea line
4	NBeG 833	1st year	1654	1476	12.0	A high yielding extra large seeded *Kabuli* line

S. No.	Minikit entry & Parentage	Year of testing/ Season	Mean minikit entry yield (Kg ha^{-1})	Mean check yield (Kg ha^{-1})	Per cent increase over check	Specific characters
OILSEEDS						
Groundnut						
ARS, Kadiri (*kharif* 2019)						
1	K 1735 (Minikit entry) Kadiri 6 (C)	Ist year	1133	1025	10.5	Tolerant to jassids, foliar diseases, drought tolerant and confectionary purpose
RARS, Tirupati						
1	TCGS 1694 & K6 (C)	IInd & *kharif*, 2019	2850	2150	33	Short statured, WUE, LLS and rust tolerant, drought tolerant, pink testa
		IInd & *rabi*, 2019-20	3073	2544	21	
2	TCGS 1522 & K6 (C)	Ist & *kharif*, 2019	1625	1464	11	Drought tolerant, high WUE, white testa, uniform maturity
		Ist & *rabi*, 2019-20	2304	2073	12	
3	TCGS 1416 & K6 (C)	Ist & *kharif*, 2019	1916	1672	14	Drought tolerant, high WUE, rose testa, uniform maturity, tolerant to PBND/ PSND
		Ist & *rabi*, 2019-20	2356	2080	14	
Sesame						
ARS, Yelamanchili (*rabi*-summer)						
1	YLM-142 and YLM-66	1st year *rabi*-summer 2019-20		715	595	20% Brown seed sesame culture
2	YLM-146 and YLM-66	1st year testing *rabi*-summer 2019-20	625	848	35%	Brown seed sesame culture

iii) Other Varietal / Yield Trials in Different Crops

The different crop cultures identified, their performance in different varietal and yield trials during the year 2019-'20 are presented in Table 22.

Table 22. Particulars of Other Varietal / Yield Trials in Different Crops during 2019-`20

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
CEREALS & MILLETS							
Rice							
ADVANCED YIELD TRIALS							
RARS, Maruteru							
1	AYT-Late	14	MTU 2137-1-2-6-1 MTU 2263-7-4-2	6816 6631	MTU 1223	4391	35.6 33.8
2	AYT-Medium	14	MTU 2613-29-1-1-1 MTU 2541-23-1-2-1	7170 7004	MTU 1075	5767	19.6 17.7
3	AYT-Early	18	MTU 2645-11-1-1-1 MTU 2645-9-2-1-1	7392 7241	MTU 1121	6201	16.1 14.3
4	AYT-Semi Deep Water	7	MTU2429-214-1-2-1 MTU 2429-239-1-1-1	5580 5560	MTU 1172	5355	4.0 3.7
ARS, Nellore							
1	AYT, Early *kharif*	9+3	NLR 3622	5213	NLR34 449	4544	14.7
2	AYT Late *kharif*	15+3	NLR 3652	5763	BPT 5204	3859	49.3
3	AYT, *rabi*	8+3	NLR 3548	5191	NLR 33892	4573	13.51
ARS, Bapatla							
1	AYT-Late	13	BPT 3133	6367	BPT 5204	5398	17.95
2	AYT-Medium	16	BPT 3085	6604	BPT 3291	5182	27.44
ARS, Machilipatnam							
1	AYT Salinity-*Kharif*, 2019	34	MCM 234-16-1-1-1	5456	MCM 100	4329	26.03

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
2	AYT Salinity-*Rabi*, 2019-20	11	MCM123-5-1-1-1	8087	MCM 109	5726	41.23
RARS, Nandyal							
1	AYT (Long duration)	4+ 3 (C)	AYT 8 AYT 3 AYT 10 AYT 9	6722 6472 6277 6027	NDLR-8 BPT 5204	5333 5222	
ARS, Utukur							
1	AYT (Long)	26	UTR-83-1	8308	NLR-3041	5355	55.14
2	AYT (Mid late)	15	UTR 222	8611	BPT-5204	5299	62.50
3	AYT (Early)	13	UTR 266	8958	NDLR-8	5403	65.79
ARS, J.M. Puram							
1	AYT	10	JMP 35 JMP 12 JMP 48 JMP 19	7383 7283 7058 6917	BPT 5204	5614	24.0 22.9
MULTI LOCATION TRIALS							
RARS, Maruteru							
1	MLT-Late	19	MTU 2091-14-2-1-1 MTU 2139-7-1-1-1	6351 6189	MTU 1223	4534	28.6 26.7
2	MLT-Medium	20	MTU 2622-4-1-1 MTU 2541-23-1-2-1	6446 6085	MTU 1075	5598	13.2 8.0
3	MLT-Early	26	MTU 2514-39-1-2-1 MTU 2691-24-1-1	7669 7234	MTU 1121	6203	19.1 14.3
4	MLT-Slender Grain-Early & Mid Early	15	MTU 2691-25-1-1 MTU 2578-5-2-4-1	6547 6388	NLR 34449	4961	24.2 22.3
5	MLT-Slender Grain-Medium & Late	24	MTU 2139-7-1-2-3 RM 67-60-1-1-1	6590 6078	MTU 1190	5300	19.6 12.8

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
6	MLT-Submer-gence	14	D99-3 (Stress) MTU 2244-39-20-4 (Normal)	5750 5164	MTU 1172	5406.2 4718	6.4 8.6
7	MLT-Salinity	13	DST37-24-1-1 (Stress) DST37-24-1-1 (Normal)	4355 5354	MTU 1061	3481 4019	20.1 24.9
ARS, Nellore							
1	MLT-Early	26	NLR 3580	6133	NLR 34449	5626	9.01
2	MLT-Mid	20	NLR 3564	5452	BPT 5204	5387	1.2
3	MLT-Late-fine	3	NLR 3418	6154	NLR 33892	4788	28.5
ARS, Ragolu							
1	MLT-Late	21	MTU 2139-7-1-1-1 MTU 2164-60-1-1-1 MTU 2293-8-2-1	9606 8760 8524	RGL 11414	7960	17.1 9.1 6.6
2	MLT-Medium	20	BPT 2787 MTU 2068-11-1-1 MTU 2541-23-1-2-1	7259 7040 6535	RGL 2538	3599	54.1 48.9 44.9
3	MLT-Early	26	MTU 2385-187-1-1-1 MTU 2553-52-1-1 MTU 2645-83-4-1	9129 8217 7936	RGL 1880	5689	37.7 30.8 28.3
4	MLT-SG-Early & Mid Early	15	MTU 2691-25-1-1 MTU 2578-5-2-4-1 MTU 2645-49-1-1	7993 6498 6471	BPT 5204	4579	42.7 29.5 29.2
5	MLT-SG-Medium & Late	22	CD 188 RM 67-60-1-1-1 NLR 3590	7685 6534 6435	BPT 5204	3631	52.8 44.4 43.6
ARS, Bapatla							
1	MLT-Late	21	NLR 3548	6711	BPT 5204	5176	29.65
2	MLT-Medium	19	MTU 1075	6654	BPT 3291	5010	32.81
3	MLT-Slender grain-Medium & Late	24	BPT 2846	6580	BPT 5204	5192	26.73

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
4	MLT-Slender grain-Early & Mid Early	15	BPT 3082	6318	BPT 5204	5150	18.48
5	MLT-Early	26	MTU 2645-83-4-1	6332	BPT 3291	5046	24.97
ARS, Machilipatnam							
1	MLT of Saline Tolerant	19	OYT 104	7836	MCM 100	5649	38.7
2	MLT-Early	24	MTU 2691-24-1-1	7939	MTU 1010	1914	314.8
3	MLT - Late	21	UTR 181	6229	MTU 1061	4235	47.1
4	MLT of Slender Grain- Early	21	RGL 7018	4087	BPT 5204	3584	14.0
5	MLT of Slender grain-Mid late	24	MTU 2513-24-2-2	4345	BPT 5204	3668	18.5
ARS, J.M.Puram							
1	MLT-Early	26	E-561	7989	BPT 5204	5722	28.4
2	MLT - Medium	20	M-614	7806	BPT 5204	5346	31.5
3	MLT-Late	21	L 634	7972	BPT 5204	5167	35.2
4	MLT–Slender grain (EME)	15	SG-EME 423	7278	BPT 5204	5297	27.2
5	MLT–Slender grain (ML)	24	SG-ML 406	7556	BPT 5204	5167	31.6
RARS, Anakapalle							
1	MLT (Medium)	20	M-601 (MTU 2622-4-1-1)	7896	MTU 1121	5694	38.67
2	MLT (Late)	21	L-644 (MTU 2547A-96-7-1-7)	9952	RGL 2537	7765	28.16
3	MLT (Slender Grain)	22	SG-395 (NLR 3595)	9357	BPT 5204	5121	62.71
OBSERVATION YIELD TRIALS							
ARS, Nellore							
1	OYT (Early *kharif*)	49+3	NLR 5913-3-3-1	4594	NLR 40024	4164	10.32
2	OYT (Late *kharif*)	37+3	NLR 5896-1-1-1-2	5891	BPT 5204	3393	64.7
3	OYT (*rabi*)	102+3	NLR 5902-22-2-2-1	7698	NLR 33892	5288	45.57

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
ARS, Bapatla							
1	OYT-Late	39	BPT 3299	6694	BPT 5204	5255	27.38
2	OYT-Medium	37	BPT 3241	7170	BPT 3291	5034	42.43
ARS, Machilipatnam							
1	OYT Salinity-*Kharif*, 2019	52	MCM 148-2-1-1-1	5661	MCM 100	4239	33.55
2	OYT Salinity-*Rabi*, 2019-'20	14	IR 05N341	7124	MCM109	6013	18.48
RARS, Nandyal							
1	OYT (Medium)	25+ 3 (C)	OYT 6 OYT 5 OYT 9 OYT 15	6459 6354 6326 6311	BPT 5204 NDLR 8	5750 5583	
ARS, J.M.Puram							
1	OYT	12	JMP 34 JMP 37	7622 7538	BPT 5204	5819	23.7 22.8
PRELIMINARY YIELD TRIALS							
ARS, Nellore							
1	PYT (Early *kharif*)	12+3	NLR 5882-4-1-1	6204	NLR 40024	5590	10.9
2	PYT (Late *kharif*)	19+3	NLR 5902-13-2-1	6590	BPT 5204 MTU 1010	3235 4191	57.2
3	PYT (rabi)	17+3	NLR 5891-33-2-2-1	4930	NLR 33892	4686	5.21
ARS, Bapatla							
1	PYT-Late	24	BPT 3149	6636	BPT 5204	5398	22.93
2	PYT-Medium	22	BPT 3183	6871	BPT 3291	5043	36.24
ARS, Machilipatnam							
1	PYT Salinity-*kharif*, 2019	27	MCM135-1-1-1	3947	MCM 100	2076	90.13
2	PYT Salinity-*rabi*, 2019-20	13	IR100120-B-B-B-B-11	6272	MCM109	5470	14.66
RARS, Nandyal							
1	PYT Long duration	4+ 3 (C)	PYT 4 PYT 5 PYT 6 PYT 7	6805 6111 6055 5666	NDLR 7 BPT 5204	5083 4916	

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
INITIAL VARIETAL TRIALS							
ARS, Ragolu							
1	IVT - Irrigated Medium	64	CR 4030-15-2-2-1-1-1-1 MTU 1276	6759 6676	RGL 2538	6011	11.1 9.96
PRELIMINARY VARIETAL TRIALS							
ARS, J. M. Puram							
1	PVT	11	JMP 18 JMP 6	7376 7237	BPT 5204	5842	20.8 19.3
ADVANCED VARIETAL TRIALS							
ARS, Ragolu							
1	AVT- I-Irrigated Medium	25	MTU 1280 PHI-17101 (Hybrid) MTU 1310	8051 7676 6990	RGL 2538	5865	27.2 23.6 16.1
SORGHUM							
1	AYT-*rabi* RARS, Nandyal	5+5 (C)	NJ 2672 NJ 2669	4138 2444	NTJ-5	2330	77 5
1	MLT-rabi RARS, Nandyal	6+2 (C)	NJ 2668 NJ 2667	3428 3243	NTJ-5	2908	18 11.5
1	MLT-kharif RARS, Lam	8	NJ 2668	1746	NTJ 5	840	107.85
RAGI							
1	OYT, ARS, Vizianagaram	26+3	VR 1171 VR 1163 VR 1175	4177 4140 3670	VR 847 VR 847 VL 352	3444 3444 3030	21.28 20.21 21.12
1	OYT, ARS, Perumallapalle	20	PPR 1163	4141	Vakula	3142	31.79
1	PYT ARS, Vizianagaram	20+3	VR 1159 VR 1152 VR 1146	4159 4126 4063	VR 847 VR 847 VR 847	3345 3345 3345	24.33 23.35 21.46
1	PYT, ARS, Perumallapalle	9	PPR 1163	5447	Vakula	4108	32.59
1	AYT, ARS, Vizianagaram	11+3	VR 1138 VR 1144 VR 1130	3833 3704 3689	VR 847 VR 847 VR 847	3087 3087 3087	24.17 19.99 19.50
1	IVT - *kharif* 2019 ARS, Perumallapalle	32	VR 1112	4912	PR 202	4516	8.1

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
1	IVT -*kharif* 2019, RARS, Chintapalle		VR 1112 IIMR-R18-5538	3498 3214	Bharathi PR-202	2730 3456	
ADVANCED VARIETAL TRIALS/COORDINATED TRIALS							
1	AVT, I&II-*kharif* 2019, ARS, Perumallapalle	15	WN 591 VR 1101	44.04 36.90	PR 202	34.12	22.5 7.5
1	AVT-*kharif* 2019, RARS, Chintapalle		VR-1101 WN-591 VR 1110	3502 3274	Bharathi	3908	
1	MLT, RARS, Lam	14	VR 1112	1763	Godavari Vakula Srichitnya	1193 1003 1170	47.8 75.8 50.7
1	MLT, ARS, Utukur	14	PR-16-43	3937	Godavari	3058	30.4
1	MLT, RARS, Chintapalle	14	VR 1112	3989	Bharati	3139	21.3
1	MLT -*kharif* 2019, ARS, Perumallapalle	14	VR 1099 VR 1101 PPR 1096	3739 3602 45.75	Srichaitanya	29.99	16.0 12.9 52.6
1	MLT -*rabi* 2019-20, ARS, Perumallapalle	14	PPR 1096	46.53	Godavari	46.47	0.12
1	MLT, ARS, Vizianagaram	14	VR 1112 VR 1101 PR-16-43	3800 3763 3615	Godavari	3256	30.5 16.7 15.6
FOX TAIL MILLET (*KORRA*)							
1	OYT-*Kharif* 2019, RARS, Lam	7	LFM 10	2142	Suryanandi	1549	38.28
1	PYT, RARS, Lam	9	LFM 001	2350	Suryanandi	1611	45.87
1	MLT, RARS, Lam	7	SiA 4201	1022	Suryanandi	911	12.18
1	MLT, ARS, Perumallapalle	7	SiA 3159	12.68	SiA 3156	10.40	21.92
1	MLT, ARS, Utukur	7	SiA 4148	3005	SiA3085	2785	7.89
1	MLT, ARS, Vizianagaram	7	SiA 4203	3490	SiA 3156	3350	

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
1	MLT, RARS, Nandyal	7	SiA 3159	4200	Suryanandi	3056	
1	Initial AVT, RARS, Nandyal	22	GPUF-4 TNSi 364 IIMR FXM-2 SiA 3220 SiA 3303	4790 4281 4168 4114 4059	SiA 3156	3590	
2	AVT, RARS, Nandyal	15	SiA 3159 SiA 4210 SiA 4154 SiA 4148 SiA 4213	7170 6030 4541 4096 3976	SiA 3156	3835	
1	IVT, RARS, Nandyal	13	SiA 4220 SiA 4219 SiA 4212	4967 3644 3300	SiA 3156	3270	
BROWNTOP MILLET (ANDUKORRA)							
	IET-*kharif* 2019, ARS, Vizianagaram	19+2	VBT 004 VBT 005	1266	GPUBT 6	1180	
LITTLE MILLET (*SAMA*)							
	Evaluation Trial, ARS, Vizianagaram	25+2	VS 33 VS 19 VS 36	1895 1801 1488	OLM 203 OLM 203 BL 6	1330 1330 1140	42.48 35.41 30.53
BARNYARD MILLET (*OODA*)							
	IET, ARS, Vizia-nagaram	11+1	VMBC 336 VMBC 335 VMBC 340	2303 2170 2104	VL 207 VL 207 VL 207	1861 1861 1860	23.75 16.60 13.12
1	AVT (INITI-AL), RARS, Nandyal	17	TNEf 317 VMBC 332 BMNDL-2 BMNDL 1	3723 3714 3156 3101	VL 207	2716	
PROSO MILLET (*VARIGA*)							
1	Evaluation Trial, ARS, Vizia-nagaram	19+2	VP 016 VP 008 VP 012	1605 1445 1439	GPUP 21 GPUP 21 GPUP 21	1109 1109 1109	44.72 30.30 29.76
1	AVT (Initial), RARS, Nandyal	19	PMNDL-3 IIMR 163 PMNDL-1 PMNDL-2	2128 2059 1995 1970	TNAU 164 TNAU 202	1649 1620	

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
1	OYT (*kharif*), RARS, Lam	16	LPM 19	2388	Nandyal Local	1769	32.84
1	PYT (*rabi*), RARS, Lam	8	LPM 004	1903	Nandyal Local	1700	11.94
			KODO MILLET (*AARIKA*)				
	AVT (initial), RARS, Nandyal	18	RPS 1005 DK 151 KMNDL-3 KMNDL-2	2770 2499 2420 2281	TNAU 86	2123	
			PULSES				
			Redgram				
1	OYT, RARS, Lam	30	LRG 521 LRG 519	1836 1815	LRG 52	1728	6.25 5.0
1	PYT-*kharif*, RARS, Lam	17	LRG 501	2124	LRG 52	1708	24.3
1	AYT-*kharif*, RARS, Lam	16	LRG 466 LRG 469	1865	LRG 52	1652	26.1 23.8
1	MLT-*kharif*, RARS, Lam	16	LRG 229 LRG 471	1865 1851	LRG 52	1652	12.8 12.0
1	MLT (kharif)	16	TRG-111 (RG-2)	1667	LRG-52	1283	29
1	AVT-*kharif*, RARS, Tirupati	09	TRG-117	1346	LRG-52	1251	8
1	IVT-*kharif*, RARS, Tirupati	13	TRG-147	1339	LRG-52	1251	8
1	MLT-*kharif*, ARS, Amada-lavalasa	16	LRG 465	14.6	LRG 52	9.74	
	MLT-*kharif*, ARS, Garikapadu	16	TRG-108 LRG-466 LRG-464 TRG-117	11.04 9.76 9.65 9.62	LRG 52	8.11	
	MLT-*kharif*, ARS, Utukur	16	LRG-465	11.02	LRG-52	6.02	
	MLT–kharif, RARS, Nandyal	16	TRG 117 TRG 111 LRG-454 LRG-465	18.47 16.11 15.19 14.98	LRG-52	9.44	

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
GREENGRAM							
1	OYT-*rabi*, RARS, Lam	30	LGG 694 LGG 706	981 926	LGG 460 53	605	62
	OYT-*rabi*, ARS, Ghantasala	40+2	GGG 82	1595	LGG 460	1007	58.4
	PYT –*rabi*, RARS, Lam	15	LGG 678	1294	LGG 460	1268	2.0
1	PYT –*rabi*, ARS, Ghantasala	20+2	GGG 32	1340	LGG 460	929	44.2
1	AYT, RARS, Lam	8	LGG 460	1002	LGG 460	-	-
1	AYT-*rabi*, ARS, Ghantasala	4+3	GGG 18	1179	LGG 460	956	23.3
1	MLT (rice fallow), ARS, Ragolu	14	LGG 410 LGG 641 LGG 606	940 931 883	LGG 460	731	
1	MLT, ARS, Garikapadu	13	LGG 600 LGG 630 LGG 606 LGG 608	643 638 628 625	LGG 460	546	
1	MLT, RARS, Tirupati	15	LGG-649	1606	LGG-410	1377	
1	MLT, ARS, Utukur	13	LGG 625	1457	LGG 460	1071	
1	MLT, ARS, Amadalavalasa	13	LGG 606	1441	LGG 460	1424	
1	MLT, RARS, Nandyal	16	LGG 604 LGG 600	1683 1681	LGG 460	1370	
1	MLT, ARS, Ghantasala	14	LGG 608 LGG 630	844 832	LGG 460	633	
BLACKGRAM							
1	OYT-*rabi*, RARS, Lam						
1	OYT-*rabi*, ARS, Ghantasala	50+2	GBG 223	1539	LBG 752	1145	34.41%

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
1	PYT-*rabi*, RARS, Lam	21	LBG 998	884	LBG 752	721	22
1	PYT-*rabi*, ARS, Ghantasala	32+2	GBG 137	1344	LBG 752	1077	24.79%
1.	PYT-*rabi*, ARS, Podalakur	15	PBG-32-2	1252.6	706.5 (PBG-1)	921.7 (TBG-104)	35.90
1	AYT-*rabi*, RARS, Lam	10	LBG 969 LBG 964	921 874	PU 31 47	595	55
1	AYT, ARS, Ghantasala	17+2	GBG 104	1143	GBG 1	928	23.17%
2.	AYT-*rabi*, ARS, Podalakur	8	PBG-32-1	1176.9	738.2 (PBG-1)	837.3 (PU-31)	40.56
1	MLT-*rabi*, ARS, Lam	15	LBG 933 LBG 918	1040 1018	GBG 1 27	791	31
1	MLT-*rabi*, RARS, Tirupati	15	TBG-141	2285	LBG-752	1652	38
1	MLT-Rice fallow, *rabi*, ARS, Ragolu	15	LBG 932 TBG 104 LBG 918	657 576 535	LBG 787	393	
2	MLT-*rabi*, ARS, Podalakur	15	LBG 946	2502	GBG-1	2402	
3	MLT-*rabi*, ARS, Amada-lavalasa	15	TBG 141 GBG 108	1143 1080	LBG 787	8.58	
4	MLT-*rabi*, RARS, Nandyal	15	LBG 932 TBG 129 TBG 141	1329 1255 1252	LBG 787	880	
ADVANCE VARIETAL TRIALS							
1	AVT-*rabi*, RARS, Tirupati	12	TBG-138	2235	LBG-752	1879	19
BENGAL GRAM							
OBSERVATIONAL YIELD TRIALS							
1	OYT (*Desi* I)		NBeG 1653 NBeG 1679 NBeG 1667	2785 2478 2456	NBeG 49	2139	

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
2	OYT (*Desi* II)		NBeG 1445 NBeG 1486	1667 1579	NBeG 49	1347	
3	OYT (*Kabuli* I)		NBeG 1699 NBeG 1707 NBeG 1702	2736 2719 2368	NBeG 119	1798	
4	OYT (*Kabuli* II)		NBeG 1554 NBeG 1516 NBeG 1506	1557 1382 1382	NBeG 119	1140	
PRELIMINARY YIELD TRIALS							
1	PYT (IYT) *Desi*		NBeG 1423 NBeG 1427 NBeG 1428	2115 2110 2082	JG-11	1628	
2	Preliminary yield trial (IYT) *Kabuli*		NBeG 1509 NBeG 1539	2356 2291	Vihar	1885	
(ADVANCED YIELD TRIALS)							
1	AYT I *Desi*		NBeG 1328 NBeG 1632	2232 2199	NBeG 49	2086	
2	AYT II Desi		NBeG 1337 NBeG 1174	2181 2017	NBeG 49	1896	
3	AYT I *Kabuli*		NBeG 1635	1540	NBeG 119	1102	
(MULTI LOCATION TRIALS)							
1	Multi location Trial *Desi*		NBeG 699	2014	NBeG 49	1872	
2	Multi location Trial *Kabuli*		NBeG 810 NBeG 1010	1782 1732	NBeG 119	1586	
(INITIAL VARIETAL TRIALS)							
1	IVT Desi		BDNG 2017-49 NBeG 690 PG 237	2188 2079 2015	JG 11	1847	
2	IVT Rainfed		GJG 1721 BG 4015 RVSSG 852 NBeG 857	2044 1956 1928 1895	JAKI 9218	1765	
3	IVT Kabuli +ELSK		NBeG 789 RVSSG 89 RSJK 176	1804 1690 1544	NBeG 119	1263	
4	IVT MH		RG 2016-84 NBeG 699	1655 1602	NBeG 47	1386	

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
(ADVANCED VARIETAL TRIALS)							
1	AVT 1 Desi		NBeG 798	2064	JG 11	1753	
2	AVT 1 Rainfed		PBC 510	1855	JAKI 9218	1741	
3	AVT I MH		NBeG 779	2147	JG 11	2002	
4	AVT I Kabuli +ELSK		RK 13 416 CSJK 142	1633 1560	KAK 2	1404	
OILSEEDS							
GROUNDNUT							
ARS, Kadiri							
1	AVT-I *kharif*	16	K 2368 K-2372	2778 2592	Kadiri 9	1852	50%
2	AVT-II-*kharif* RARS, Tirupati	9	K-2348	2870	Kadiri 9	2222	48%
(*Kharif*)							
1	Screening for Stem Rot Resistance/ Tolerance	15+ 2 (C)	TCGS2252 TCGS2254	4744 4433	Narayani	3078	54 44
2	Screening for Bold Seed Entries	17+ 2 (C)	TCGS 2278 TCGS 2213	3091 3019	Kadiri 7	2678	15 13
3	Screening for Moisture Stress Tolerance	27+ 3 (C)	TCGS2160 TCGS2013	3884 3427	Dharani	2217	75 72
4	Screening for Export/ Table Purpose	15+ 2 (C)	TCGS2120 TCGS2134	3906 3870	Bheema	2212	77 75
5	Screening for *kharif* suitability	7+ 3 (C)	TCGS 1788 TCGS 1783	2918 2719	Dharani	2401	22 13
6	Screening for Bold Seed entries	9+ 2 (C)	TCGS 2030 TCGS 2032	2200 2186	Kadiri 7	1967	12 11
(*Rabi*)							
1	Screening for *rabi* Suitability (Trial I)	16+ 4 (C)	TCGS 2017 TCGS 2011	4370 4343	Nithya Haritha	4313	1.3 0.7
2	Screening for *rabi* Suitability (Trial II)	6+ 3 (C)	TCGS 2025 TCGS 2019	4005 3885	Dharani	3833	4 1

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
3	Screening for Bold Seed Entries	9+ 2 (C)	TCGS 2033 TCGS 2034	4027 3934	Bheema	3960	2
1	MLT- Spanish Bunch (SB)- *kharif*, 2019, RARS, Tirupati	16	K 1812 TCGS 1157 TCGS 1522	4335 4288 4243	Dharani	3985	66 66 75
2	MLT- High Oleic Acid Trial –SB- *kharif*, 2019, RARS, Tirupati	36+ 3 (C)	ICGV 181024 ICGV 171040	3624 3595	ICGV 02266	2085	29 28
3	MLT- High Oleic Acid Trial (SB) r*abi*, 2019-20, RARS, Tirupati	36+ 3 (C)	ICGV 181029 ICGV 181030	4410 4138	ICGV 06142	2783	58 49
1	MLT, ARS, Kadiri	19	TCGS-1157	24.67	Kadiri Chithra-vavthi	16.67	
1	MLT, ARS, Utukur	16	K 1812	49.55	Kadiri Harithandra	42.54	
3	MLT-*rabi*, 2019-20, ARS, Vizianagaram	16	TCGS 1694 K 1812	22.2 22.0	Nitya Haritha	19.4	
4	MLT, ARS, Yelamanchili	17	TCGS-1346	18.3	Nitya Haritha	20.0	
5	MLT, ARS, Amadalavalasa	16	TCGS 1346 K-9	28.6 21.3	K6	7.75	
6	MLT-*kharif*, 2019, ARS, Garikapadu	16	TCGS-1694 TCGS-1157 Kadiri-9 TCGS-1346	38.2 36.4 33.6 31.8	Nitya Haritha	22.1	
7	MLT-r*abi*, 2019-20, ARS, Garikapadu	16	K-1812 TCGS-1694 Kadiri-9 TCGS-1346	45.2 36.4 35.3 33.2	Nitya Haritha	26.8	
SUNFLOWER							
1	MLT, ARS, Utukur	10	SH 2199	2507	DRSH-1	2360	6.22

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
SESAME							
1	MLT-White Seeded-*rabi* & summer, ARS, Yelamanchili	8	YLMW 151 YLMW 154 YLMW 156 YLMW 153	5.91 5.52 5.48 5.27	TKG-22	4.14	42.8 33.3 32.4 27.3
2	MLT-Brown seeded-rabi & summer, ARS, Yelamanchili	8	YLM-146 YLM-142 YLM-147	6.62 6.56 6.40	YLM-66	5.05	41.9 47.4 44.5
1	MLT-Brown seeded-RARS, Tirupati	8	YLM-142 YLM-146	4.11 4.08	YLM-66	3.18	22.6 22.1
1	MLT-White Seeded, ARS, Ragolu	8	YLMW 151 YLMW 153	5.18 4.02	Swetha till	3.62	30.1 9.95
1	MLT-White Seeded, ARS, Amadalavalasa	8	YLMW 151	6.75	Swetha till	5.09	32.6
1	MLT-Brown seeded, ARS, Utukur	8	YLM-142	3.84	YLM-66	3.26	15.1
COMMERCIAL CROPS							
COTTON							
(INITIAL/PRELIMINARY EVALUATION TRIALS)							
1	IET of *G. hirsutum* varieties		L1527 CPD 1902 GISV 323	3184 2897 2673	NDLH 1938	1843	
2	PET of compact genotypes		LHDP 5 LHDP 2	3147 3073	L 604	2062	
3	Initial evaluation trial of color cotton		LHCC 1 LHCC 2	2369 2345	Sivanandi	2262	
RARS, Nandyal							
1	IET of *G. hirsutum* cotton (rainfed)	34	AKH – 2013-2 CNH-09-119 NDLH-2056-4	2981 2745 2723	Sivanandi	2445	
2	IET of *G. arboreum* cottons (RF)	19	GAM 273 NDLA – 3104-4	2350 2295	Yaganti	2228	

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
(OBSERVATIONAL YIELD TRIALS)							
RARS, Lam							
	OYT		L1709 L2066	2421 2907	NDLH 1938	1508	
(PRELIMINARY YIELD TRIALS)							
RARS, Lam							
	PYT		L 1644 L 1646 L 1650 L 1651	2506 2380 2311 2044	NDLH 1938 L 604	1553 1415	
(ADVANCED YIELD TRIALS)							
	AYT		L 1532 L 1595 L 1557	2463 2345 2249	NDLH 1938 L 604	1530 1421	
(MULTI LOCATION TRIALS)							
RARS, Lam							
	MLT		L 1565 L 1536 L 1527 L 1563 NDLH 2010	2533 2421 2328 2067 2044	NDLH 1938 L 604	1596 1438	
RARS, Nandyal							
	MLT on *G.hirsutum*	14	MLT – 14 MLT – 6	2574 2455	Sivanandi	2289	
(PRELIMINARY VARIETAL TRIALS)							
RARS, Nandyal							
1	PVT of *G. hirsutum* Cotton trial (SZ)	8	NDLH-2035-5 GBHV-193	1895 1806	Sivanandi	1495	
2	PVT of *G. hirsutum* Cotton trial (RF)	8	GSHV -191 NDLH -2051-1	1937 1916	Sivanandi	1658	
3	PVT of mungari cotton	11	NDLA – 3140 NDLA – 3143-1	2375 2192	Yaganti	2110	

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
(ADVANCED VARIETAL TRIALS)							
RARS, Nandyal							
1	AVT of American cottons	16	NDLH – 2051-1 NDLH – 2051-3	2909 2865	Srirama	2216	
2	AVT of mungari cotton	18	NDLA – 3104-4 NDLA – 3113	3116 3008	Yaganti	1561	
(INITIAL HYBRID TRIAL)							
RARS, Nandyal							
	G. *hirsutum* IHT	22	NDLHH – 532	2943	NDLH H – 240	2457	
(ADVANCED HYBRID TRIALS)							
RARS, Nandyal							
	G. *hirsutum* AHT	15	NDLHH – 439	3147 NDLHH-462	NDLHH – 2972	2426 240	
(OTHER TRIALS)							
RARS, Nandyal							
1	Compact genotype trial-II (rainfed)	10	AKH 1302	2356	Sivanandi	2187	
2	Coloured cotton trial (*G.h*) (rainfed)	12	16301 DB	2723	Sivanandi	2489	
3	Long linted *G. arboreum* cottons (rainfed)	12	PA 837	1698	DLSa 17	1056	
4	*G. arboreum* cottons (rainfed) trial	11	GAM – 259	1923	Yaganti	1473	
5	High Density Planting System (*G. hirsutum*)	15	NDLH – 2051-1 Bhakthi BT	2468 2157	Srirama	1804	
6	High Density Planting System (*G. arborium*)	15	NDLA – 3116-4 NDLA – 3104-4	3285 3165	Yaganti	2358	

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
SUGARCANE							
(MAIN YIELD TRIAL)							
RARS, Anakapalle							
1	Main Yield Trial (Early)-I Plant crop	6	2015A187	105.00	87A298	96.00	9.38
2	Main Yield Trial (Early)-II Plant crop	6	2014A210	138.00	87A298	122.00	13.11
3	Main Yield Trial (Early)-Ratoon crop	6	2014A23	104.00	87A298	96.67	7.58
4	Main Yield Trial (Midlate) -I Plant	8	2015A233	119.68	83V15	101.85	17.50
5	Main Yield Trial (Midlate) -II Plant	6	2014A224	109.39	C086249	81.24	34.65
6	Main Yield Trial (Midlate) -Ratoon	6	2014A224	73.96	83V15	57.16	29.39
ARS, Perumallapalle							
1	Main yield trial (Early) plant crop I	12	2015 T 235	140.5	2003 V 46	122.7	14.5
2	Main yield trial (Early) plant crop II	8	2014 T 85	155.1	2003 V 46	118.3	31.1
3	Main yield trial (Early) ratoon crop	8	2014 T 85	124.1	2003 V 46	95.3	30.22
4	Main yield trial (Mid late) plant crop II	8	2014 T 39	143.1	Co 86032	103.9	37.72
5	Main yield trial (Mid late) ratoon crop	8	2014 T 39	125.1	Co 86032	106.8	17.15

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
ARS, Vuyyuru							
1.	Main Yield Trial (Early) – First Plant	8+3 stan-dards	2015 V 32	Cane Yield 127.78 t/ha; 19.73 % juice sucrose	2003 V 46	Cane Yield 110.24 t/ha; 19.56 % juice sucrose	15.91%; 0.87%
(PRELIMINARY YIELD TRIAL)							
ARS, Perumallapalle							
1.	PYT	20	2016 T 169	179.7	Co 86032	123.0	46.4
(ADVANCED VARIETAL TRIAL)							
RARS, Anakapalle							
7	AVT Early II Plant	6	CoV 15356	100.55	CoA 92081	96.30	4.22
(MULTI RATOONABILITY TRIAL)							
RARS, Anakapalle							
8	Multi ratoonability	10	2009A107	100.00	87A298	93.42	6.6
(MULTI LOCATION TRIALS)							
RARS, Anakapalle							
1	Plant crop – Early (*kharif*)	11	2009A107	105.33	2003V46	103.00	17.80
2	Plant crop – Midlate (*kharif*)	8	2009A252	129.44	83V15	99.31	30.34
ARS, Perumallapalle							
1	Multi location trial (Early) plant crop I	11	2009 A 107	119.6	2003 V 46	112.9	5.93
2	Multi location trial (Mid late) plant crop I	11	2009 A 252	142.9	83 V 15	115.5	23.72
SRS, Vuyyuru							
1.	Early – First Plant crop	11+3	2009 V 127	Cane Yield 142.01 t/ha; 18.78 % juice sucrose	2003 V 46	Cane Yield 124.48 t/ha; 18.63 % juice sucrose	14.08%; 0.81%
2.	Mid-late – First Plant	8+2	2009 V 89	Cane Yield 119.79 t/ha; 19.63 % juice sucrose	83 V 15	Cane Yield 105.38 t/ha; 19.04 % juice sucrose	13.67% 3.10%

S. No.	Trial	No of entries	Promising entries	Grain yield (Kg ha^{-1})	Local Check	Check yield (Kg ha^{-1})	% increase over check
MESTA							
1	Roselle IYT	18 +1	AHS 364	66.55	AMV 5	29.86	122
2	Roselle PYT	8+1	AHS 338	53.30	AMV 5	25.00	113
3	Roselle AYT	7+2	AHS 330	31.07	AMV 5	23.17	34
TOBACCO							
(ADVANCED VARIETAL TRIAL)							
RARS, Nandyal							
1	Advanced Varietal Trial I	4 +2	NyBD61 ABD189	2998 2955	Nandyal Pogakul	2387	25.60 23.77
2	Advanced Varietal Trial II	4+3	BTH 315 BTH 336 BTH 318	3277 3141 3113	Nandyal Pogaku 1	2454	28.8 23.5 22.4
(OTHER TRIALS)							
RARS, Nandyal							
3	Bulk Yield Trial	7+2	NBD290 ABD145	3391 3356	Nandyal Pogaku 1	2622	29.3 28.0
4	On-farm Trial	6+2	ABD132 NyBD 56	2955 2860	Nandyal Pogaku 1	2137	38.3 33.8
5	Station hybrid trial –I	6+3	NyBTH-175 NyBTH-179	2278 2267	Nandyal Pogaku 1	1762	29.3 28.7
6	Seed oil yield trial	6+2	ABD132 NBD290	2199 2150	Nandyal Pogaku 1	1671	31.6 28.7

iv) Crop Improvement Research in Different Crops

Cereals & Millets

Rice

Cultures completed three years of testing and ready for release:

- ❖ BPT 2615 (IR 20/Tulasi): Minikit entry completed three years of testing in Krishna zone. It matures in 125 days and possesses short slender grain. Besides high yield potential, it is tolerant to blast and BPH.
- ❖ BPT 2660 (BPT 1768/NLR 145): Minikit entry completed three years of testing in Krishna zone. It matures in 160-165 days and possesses medium slender grain. Besides high yield potential, it is tolerant to blast and BPH and suitable to single cropped areas.
- ❖ Under research on Biofortification, colored rice genotypes were analyzed for Amylose content, Protein content, Fe & Zn content, Phenol content, Flavonoid content, Antioxidant Activity, Resistant Starch, Slowly Digestible Starch, Rapidly Digestible Starch and Glycemic Index (GI). Many genotypes rich in micronutrients coupled with high antioxidant activity and low to medium GI are identified and are under different stages of testing.

Specific trait	Brown rice genotypes identified
Genotypes with high protein content	BPT 3136 (13.5%), BPT 2848 (13.1%), BPT 3141(13.3%), BPT 3142 (13.3%) and BPT 2841 (11.8%)
Genotypes with high Zn content	BPT 3143 (27.9 ppm), BPT 3141 (27.8 ppm), BPT 3136 (27.0 ppm), and BPT 2858 (26.8 ppm)
Genotypes with high Fe content	BPT 3111 (16.0 ppm), BPT 3141 (13.4 ppm), BPT 2848 (12.3 ppm) and BPT 3142 (11.1 ppm)
Genotypes with high Antioxidant activity	BPT 2841 (110.52 mg/100g), BPT 3140 (108.8 mg/100g), BPT 3141 (105.6 mg/100g) and BPT 3111 (110.9 mg/100g)
Genotypes with low to medium Glycemic index	BPT 2848 (50.1), BPT 5204 (52.7), BPT 2270 (53.3), BPT 2660 (54.2), BPT 3145 (56.4), BPT 2295 (56.6), BPT 2782 (59.0), BPT 3136 (59.4), BPT 2776 (60.0), BPT 2841 (61.4), BPT 2595 (62.0) and BPT 3137 (62.7)

Maize

Agricultural Research Station, Peddapuram

- Thirty hybrid combinations were evaluated in OYT-I in which PMH19482 (8043 kg ha^{-1}) and PMH1876 (8021 kg ha^{-1}) and PMH 171295 (7979 kg ha^{-1}) recorded 21.9%, 21.5% and 20.9% respectively over the best check DHM117 (6600 kg ha^{-1}).
- In OYT II, 10 hybrid combinations were evaluated in unreplicated observational yield trial in which PMH197 (20 kg) and PMH (18.6 kg) and PMH1899 (18.1 kg) recorded superior performance in kernel yield *per se*.
- In OYT III, 77 single crosses were evaluated and identified 5 promising entries viz., PMH 19053 (CML1884/CML1850)-5.89 kg, PMH19008 (CML1850/CML1811)-5.85 kg, PMH19015 (CML1871/CML1887)-5.59 kg, PMH19058 (CML1887/CML1871)-5.51 kg and PMH19005 (CML1811/CML1864)-5.44 kg based on the yield *per se*.
- In the multi location trial, nine hybrids were evaluated and found PDMH1817 (7139 kg ha^{-1}) been recorded 6.64% yield superiority over the check DHM117 (6694 kg ha^{-1}).

Agricultural Research Station, Vijayarai

- Out of 11 maize hybrids evaluated in MLT during *kharif*, 2019 the hybrid MMLT 10 (9277 kg ha^{-1}) followed by MMLT-11 (8722 kg ha^{-1}) showed significantly higher kernel yield over the grand mean (7697 kg ha^{-1}).
- Out of 14 maize hybrids evaluated during *rabi*, 2019-20 along with one local check (Kaveri 50), the hybrid MMLT 8 (15280.4 kg ha^{-1}) recorded significantly higher kernel yield (kg ha^{-1}) followed by MMLT 2 (14628.1 kg ha^{-1}) and MMLT 14 (14563 kg ha^{-1}) over the grand mean (12433.3 kg ha^{-1}).

Regional Agricultural Research Station, Nandyal

- In *kharif* maize multi location Trial, eleven entries were tested. The grain yield ranges from 4283 to 7433 kg ha^{-1} with trial average of 6058 kg ha^{-1}. Top entries PDMH 1222 (7433 kg ha^{-1}) followed by PDMH 171213 (7200 kg ha^{-1}), PDMH 1540 (6567 kg ha^{-1}), P 3396 (6500 kg ha^{-1}) recorded for grain yield.

Agricultural Research Station, Amadalavalasa

- Among 11 entries evaluated in Multi Location

Trial of Maize, the entries PDMH 1810 (24 q ha^{-1}) and PDMH-1817 (23.27 q ha^{-1}) have recorded higher grain yield compared to control, P 3396 (20.28 q ha^{-1}).

Pearl Millet (Bajra)

Agricultural Research Station, Perumallapalle

- In Initial hybrid trial, 36 entries of pearl millet were evaluated during *kharif*, 2019. One hybrid, *viz.* 86M94 (45.12 q ha^{-1}) recorded 44.29% higher grain yield which was significantly superior over best check 86M01 (31.27 q ha^{-1}). Straw yield ranged from 4.82 t ha^{-1} (MPMH 41) to 17.72 t/ha (YMT 1858).
- In population trial, 12 entries of pearl millet were evaluated during *kharif*, 2019. The mean grain yield of test entries ranged from 7.49 q ha^{-1} (ICMV 221) to 28.34 q ha^{-1} (Pusa Comp 612). None of the entries recorded higher grain yield than the check Pusa Comp 612.

Agricultural Research Station, Anantapuramu

- Among the 36 hybrids tested in Initial Hybrid Trial (Medium), entry GDHB -1 recorded 6250 kg ha^{-1} grain yield and ranked first followed by JKBH 1783 (6000 kg ha^{-1}) and 86M94 (5731 kg ha^{-1})
- Among the 34 hybrids tested in Initial Hybrid Trial (Late), the check entry 86M86 recorded 5299 kg ha^{-1}grain yield and ranked first followed by the test entries JKBH 1535 (5066 kg ha^{-1}) and YMT 1797 (4934 kg ha^{-1}).
- Among the four hybrids tested in Advance Hybrid Trial (Late), the entry 86M80 recorded 4591 kg ha^{-1} grain yield and ranked first followed by check entries Kaveri Super Boss (4451 kg ha^{-1}) and NBH 5061 (4235 kg ha^{-1}).
- In Population Trial, the entry GBL 5 recorded highest grain yield 3756 kg ha^{-1} and ranked first followed by Pusa Comp. 721 (3509 kg ha^{-1}) and Pusa Comp. 722 (3352 kg ha^{-1}).
- In evaluation of released Hybrid and Varieties, the hybrid 86M01 recorded highest grain yield (4272 kg ha^{-1}) followed by NBH 4903 (4121 kg ha^{-1}) and HHB 299 3752 kg ha^{-1}.
- Among seven hybrids tested in Multi-Location Trial, ABH 10 (3473 kg ha^{-1}) showed significant grain yield superiority over the check PHB 3(3074 kg ha^{-1}).
- In Observational Varietal Trial at Station level, ABV 04 ranked first for grain yield (3610 kg ha^{-1}) followed by Dhanshakti (3390 kg ha^{-1}) and Pusa Comp. 612 (2910 kg ha^{-1}).

Agricultural Research Station, Vizianagaram

- In multi location trial during *kharif* 2019, four experimental hybrids and three experimental varieties along with check were evaluated. The hybrid, ABH 15 (40.17 q ha^{-1}) recorded 4.0 per cent higher grain yield over the best check, PHB 3 (38.94 q ha^{-1}).

Finger Millet

Agricultural Research Station, Peddapuram

- The entry PR 1511 (3028 kg ha^{-1}) has completed three years of testing (2017-'18 to 2019-'20) in AICRP trials and recorded over all yield superiority of 5.48% over the best check GPU67 (2838 kg ha^{-1}).
- Entry PR 1506 (3319 kg ha^{-1}) was promoted to AVT-I and the entry PR 1639 (2911 kg/ha^{-1}) was promoted to AVT-II.

Browntop Millet (Andukorra)

Regional Agricultural Research Station, Nandyal

- In Browntop millet initial varietal trial, twenty one entries were tested. Highest grain yield was recorded by GPUBT 6 (check) (2380 kg ha^{-1}), local check (2257 kg ha^{-1}), BTMNDL 2 (2143

kg ha^{-1}). However, KMBT-1 (9383 kg ha^{-1}) recorded the highest fodder yield.

Agricultural Research Station, Perumallapalle

❖ In Brown top millet initial and advanced varietal trial, twenty one entries were tested including two checks during *Kharif*, 2019. Entry GPUBT 3 (20.44 q ha^{-1}) recorded higher grain yield with no significant difference for grain yield among the tested entries.

Little Millet (Sama)

Regional Agricultural Research Station, Nandyal

❖ In initial varietal trial, 16 entries were tested. Higher grain yield was recorded by DHLM 36-3 (check) (2281 kg ha^{-1}), DLM 5 (2217 kg ha^{-1}), BL 6 (check) (1916 kg ha^{-1}), LMNDL-3 (1896 kg ha^{-1}) and LMNDL-2 (1620 kg ha^{-1}). In addition, IIMR-R18-5004 (6222 kg ha^{-1}) recorded the highest fodder yield.

❖ In advanced varietal trial, 16 were tested. Higher grain yield was recorded by TNPSu 186 (2173 kg ha^{-1}), IIMR-LM 7162 (2104 kg ha^{-1}) compared to checks DHLM 36-3 (2074 kg ha^{-1}) and BL 6 (2035 kg ha^{-1}). In addition, TNPSu 186 (27457 kg ha^{-1}) recorded the highest fodder yield.

Agricultural Research Station, Perumallapalle

❖ In advanced varietal trial 12 entries were tested against four checks during *Kharif*, 2019. Among tested entries, IIMR-LM-7162 (25.20 q ha^{-1}) was the top yielder followed by GPUL 7 (24.40 q ha^{-1}) which were on par with the check DHLM 36-3 (22.82 q ha^{-1}).

Pulses

Bengalgram

Regional Agricultural Research Station, Nandyal

Entries promoted to All India coordinated varietal trials

❖ Nine promising entries viz., N BeG 690, N BeG 698 (IVT *Desi*), N BeG 1633 (IVT Late sown), N BeG 857, N BeG 1632 (IVT Rainfed), N BeG 1635, N BeG 789 (IVT *Kabuli* + ELSK), N BeG 699, N BeG 1634 (IVT MH) were contributed for testing in coordinated trials during 2019-'20.

Cowpea

Agricultural Research Station, Anantapur

❖ In Cowpea Initial Varietal Trial during *Kharif* 2019, out of 15 entries were evaluated the entry CP-5 recorded significantly highest seed yield of 1750 kg ha^{-1} followed by CP-2 (1229 kg ha^{-1}), CP-7 (1042 kg ha^{-1}), CP-4 (985 kg ha^{-1}), CP-3 (954 kg ha^{-1}) and CP-9 (907 kg ha^{-1}) compared to the grand check (591 kg ha^{-1}).

Horsegram

Agricultural Research Station, Anantapur

❖ During *Kharif* 2019, the station entry ATPHG-11 (778 kg ha^{-1}) recorded significantly highest seed yield compared to check CRHG-19 (572 kg ha^{-1}).

❖ During *Kharif* 2019, 14 entries were evaluated in Horsegram Initial Varietal Trial. The entry ATPHG-11 (935 kg ha^{-1}) recorded highest seed yield followed by HG-2 (875 kg ha^{-1}) and HG-10 (845 kg ha^{-1}) compared to check CRHG-19 with seed yield of 834 kg ha^{-1}.

Oilseeds

Groundnut

Agricultural Research Station, Kadiri

❖ K-1812 is a foliar disease resistant and high yielding variety with yield potential of 35 - 40 q ha^{-1} and has completed three years of minikit

testing and is ready for release. It matures in 115 days.

- Two entries K 1609 and K 1800 proposed for minikit testing. K 1609 is Spanish bunch variety with an average yield of potential of 25 q ha^{-1}.
- The entry, K 2313 was proposed for AICRP – G trials for *kharif* 2020. It is a Virginia type having the yield potential of 30.0 q ha^{-1} with 110 days duration tolerant to foliar diseases.

Sunflower

Regional Agricultural Research Station, Nandyal

- NDSH 2216 entry was nominated to AICRP sunflower Initial Hybrid testing during *Kharif*, 2019
- In Multi location testing, during *Rabi* 2019-20, SH 2199 (2041 L^{-1}) and SH 2335 (1936 kg ha^{-1}) recorded higher seed yield and these were 24.51 % and 17.76 % higher than check NDSH 1012 (1644 kg ha^{-1}), respectively.
- In Advanced Hybrid Trial- II, SH 2509 (2608 kg ha^{-1}), SH 2515 (2411 kg ha^{-1}) and SH 2551 (2234 kg ha^{-1}) recorded significantly higher seed yield with 52.06, 40.58 and 30.26% higher than best check, KBSH 44 (1715 kg ha^{-1}). SH 2411 recorded higher oil content of 40.20 %.
- In Advanced Hybrid Trial - I, SH 2603 (2472 kg ha^{-1}) and SH 2561 (2378 kg ha^{-1}) recorded higher seed yield with 26.51 and 21.70 % higher than best check, NDSH 1012 (1954 kg ha^{-1}). In test entries, SH 2581 recorded higher oil content of 41.81%.
- Out of the 32 germplasm lines tested in *kharif* 2019, GMU 111, GMU 260, GMU 400 and GMU 1012 recorded seed yield of 29 g $plant^{-1}$ which is on par with the check, DRSF 108 (29.17 g $plant^{-1}$) and in all these entries the oil content is > 31%.

Sesame

Agricultural Research Station, Yellamanchili

- In Advanced Varietal Trial (AVT) of white seeded entries, out of nine entries tested, YLMW-153 (3.65 q ha^{-1}) and YLMW-154 (3.45 q ha^{-1}) were found significantly superior in seed yield compared to the check TKG 22 (1.25 q ha^{-1}) with duration of 87 & 88 days and oil content of 44.10% & 48.03% respectively.

Regional Agricultural Research Station, Tirupati

- In Initial Varietal Trial during *kharif* 2019, out of 26 entries tested, DS-19-56 entry recorded significantly higher seed yield of 502 kg/ha^{-1} followed by DS-19-51 (470 kg ha^{-1}) when compared to national check, GT-10 (396 kg ha^{-1})
- In Initial Varietal Trial during *Rabi/* Summer 2019-'20, out of 18 entries tested, IVT 13 (1075 kg ha^{-1}) and IVT 5 (989 kg/ha^{-1}) entries recorded significantly higher seed yield when compared to check (786 kg ha^{-1})
- Among the eleven entries tested in AVT, three entries *viz.*, AVT 3 and AVT 1 recorded significantly superior seed yield of 849.8 and 737.2 kg ha^{-1} respectively over the check (625 kg ha^{-1}).

Agricultural Research Station, Utukur

- Out of 4 entries tested in Advanced Yield Trial for high yielding sesame varieties suitable for Southern zone of Andhra Pradesh, UTS 204 (1486 kg ha^{-1}) recorded significantly higher seed yield with 44.6% increase over the check, YLM 66 (1028 kg ha^{-1}).

Castor

Agricultural Research Station, Anantapuramu

- In development of early maturing and high yielding castor varieties suitable for rainfed alfisols, among all the entries in Preliminary Varietal Trial, MP-25 (595 gm), MP-31 (552 gm) and ICS-250 (525 gm) recorded significantly highest seed yield per 5 plants compared to the best check Haritha (408 gm).
- In k*harif* 2019, among the 18 castor entries evaluated in Initial Varietal / Hybrid Trial Set-I, IVHT-64 (806 kg/ha^{-1}) followed by IVHT-55 (633 kg ha^{-1}), IVHT-57 (622 kg ha^{-1}), IVHT-59 (582 kg ha^{-1}), IVHT-58 (568 kg ha^{-1}) and IVHT-54 (566 kg ha^{-1}) have recorded significantly superior seed yield compared to the local check (DCH-177).
- Among 9+1 entries evaluated in Advanced Varietal/ Hybrid Trial Set-II, the hybrids AVHT-1 (1921 kg ha^{-1}) followed by AVHT-2 (1783 kg ha^{-1}) and AVHT-7 (1739 kg ha^{-1}) have recorded significantly superior seed yield compared to the check (DCH-177).

Niger

Regional Agricultural Research Station, Chintapalle

- Out of 15 entries + 1 check evaluated in IVT during *rabi*, 2019, the genotypes *viz.*, IVT-19-1(937.8 kg ha^{-1}), IVT-19-2(942.81 kg ha^{-1}), IVT-19-5 (913.89 kg ha^{-1}), IVT-19-6 (933.94 kg ha^{-1}) and IVT-19-09 (905.79 kg ha^{-1}) were found significantly superior over check KGN-2 (854.88 kg ha^{-1}).
- A total of 6 entries + 1 check were evaluated in advanced varietal trial during *rabi*, 2019. The genotypes AVT 19-03 (886.57 kg ha^{-1}) found to be superior over the check variety KGN-2 (854.74 kg ha^{-1}).

Commercial Crops

Cotton

Regional Agricultural Research Station, Lam

- The inter specific hybrid (*G. hirsutum* x *G. barbadense*) LAHB 1 completed all levels of AICCIP testing and agronomic evaluation during 2019-'20 and was proposed for varietal identification through CVRC for south zone and identified for cultivation in south zone of India under irrigated conditions. This hybrid recorded superior fibre quality parameters of mean fibre length 37.7 mm and strength (36.6 g tex^{-1}) besides having the yield potential of 2200 kg ha^{-1} of seed cotton yield.

Agricultural Research Station, Amadalavalasa

- Out of fourteen entries of cotton evaluated in MLT, V4 (19.30 q ha^{-1}), V9 (17.0 q ha^{-1}) and V14 (15.61 q ha^{-1}) entries have recorded significantly higher kapas yield than general mean (12.10 q ha^{-1}).

Sugarcane

Agricultural Research Station, Perumallapalle

- During 2019-'20, midlate clone 2014 T_{39} (Co T 19366) and early clone 2016 T_{7} (Co T 19367) were accepted for coordinated trials under AICRP (Sugarcane) zonal testing.
- Three clones viz., 2005 T 50 (Co T 10369), 2011 T 70 and 2012 T 58 (Co T 17366) were contributed to National Hybridization Garden, Sugarcane Breeding Institute, Coimbatore.

Mesta

Agricultural Research Station, Amdalavalasa

- Out of eight Kenaf entries evaluated under IET, JRK 2018-3 recorded significantly higher fibre yield of 32.47 q ha^{-1} followed by JRK 2018-4 (29.22 q ha^{-1}), JRHC 14 (27.49 q ha^{-1}) and

JRHC 13 (25.75 q ha^{-1}) compared to the best check AMC 108 (25.00 q ha^{-1}) .

❖ Among the six entries evaluated under AVT 1 for calyx, the entry HSLC-1 recorded higher fresh calyx yield of 10.50 q ha^{-1} followed by HSLC- 2 (6.12 q ha^{-1}).

1. Crop Production and Crop Protection

Cereals & Millets

Rice

Crop Production

Regional Agricultural Research Station, Maruteru

❖ Evaluation of different crop establishment methods for paddy varieties during *Kharif*, 2019 revealed that highest grain yield of 5350 kg ha^{-1} was recorded with machine transplanting followed by Bengal method of planting with 5258 kg ha^{-1}. Among the varieties, MTU 1172 recorded 5450 kg/ha followed by MTU 1262 (5342 kg ha^{-1}). During *Rabi* 2019-'20, highest grain yield was recorded with MTU 1121 in Bengal method of planting (7767 kg ha^{-1}) followed by machine planting (7567 kg ha^{-1}). Among methods of establishment machine planted recorded significantly higher grain yield of 6942 kg ha^{-1}.

❖ Studies on efficacy and evaluation of liquid biofertilizers in paddy during *Rabi*, 2019-'20 revealed that highest grain yield of 7900 kg $ha^{-1}$was recorded with 100% RDF along with all NPK liquid biofertilizers which was on par with 75% RDF along with all NPK liquid biofertilizers (7767 kg ha^{-1}) and 100% RDF (7333 kg ha^{-1}). This clearly shows that, with reduction of 25% RDF along all three major NPK fertilizers through liquid form performed better.

❖ During *kharif*, 2019 the highest grain yield was recorded (6580 kg ha^{-1}) with the application of 100% RDF along with Organic farming and Natural farming practices which was on par with the application of 100% RDF (6240 kg ha^{-1}) and were significantly higher than Control, 100% organic farming and natural farming practices.

❖ Studies on evaluation of weed management practices under organic production system during *kharif*, 2019 revealed that mulching with locally available weed mulch *(Eichhornia)* + one hand weeding treatment recorded significantly higher yield of 5183 kg ha^{-1} and is on par with hand weeding twice treatment (4950 kg ha^{-1}).

❖ In the long term experiment in rice - rice cropping system of Godavari delta, the highest mean grain yield of 6.63 t ha^{-1} was recorded in treatment applied with 100% NPK + Zn +S + FYM @ 5 t/ha^{-1} and was significantly superior over the control and was at par with 100% NPK + Zn +S treatment 5.95 t ha^{-1}. The organic carbon increased from 0.55% to 1.28% from 1989 to 2019 during *Kharif* and 1.3% during *Rabi* seasons

Agricultural Research Station, Nellore

❖ Among the different age of seedlings, 15, 20 & 25 days aged seedlings did not differ significantly followed by 30 days aged seedlings in machine transplanted rice.

❖ During *Rabi* 2019-20, evaluation of stress tolerance of lowland rice cultivars grown in different agro ecological zones of A.P. inferred that NLR 34449 and MTU 1010 recorded on par yields (5359 kg ha^{-1} and 5096 kg ha^{-1} consecutively) and among the irrigation treatments highest grain yield 5795 kg ha^{-1} was recorded with continuous flooding with

recommended depth of irrigation water and was on par with with-holding irrigation at tillering (5496 kg ha^{-1}).

- During *Kharif*, 2019 among the weed management practices, the highest grain yield was recorded with weed free condition (5648 kg ha^{-1}) and was on par with chemical weed control (5556 kg ha^{-1}) and mechanical weeding (5444 kg ha^{-1}). Among the varieties tested, DRR Dhan 50 & 52 got superior yields (5583 & 5667 kg ha^{-1} consecutively) when compared to NLR 34449 (5083 kg ha^{-1}) which is a dwarf variety and cannot smother weeds.

Agricultural Research Station, Ragolu

- Management of *Cuscuta* and *Xanthium* in rice fallow blackgram, revealed that weed count and dry weight of *Cuscuta* and *Xanthium* and higher seed yield of blackgram were found with Hand weeding at 15 & 30 DAS (580 kg ha^{-1}) followed by post emergence application of Fomasofen + Fluazifop-p-butyl @2.4 ml/l (493 kg ha^{-1}) and post emergence application of Sodium aciflourfen + Clodinofoppropargyl @ 1.5 ml l^{-1} at 25 DAS (465.28 kg ha^{-1}).

Regional Agricultural Research Station, Nandyal

- In deriving genetic coefficients of popular rice cultivars of Andhra Pradesh for *ORYZA* model, higher productive tillers per sqm (400.4) and harvest index (47.4) were observed in NLR 33358. Higher seeds per panicle (250.7) were observed in NDLR 7. Higher test weight (16.37 g) and grain yield (7907 kg ha^{-1}) was observed in BPT 2270.

- Among the 28 genotypes screened for thermotolerance, CPD-185 and ARBH-1851 have showed no reduction in shoot and root growth after induction of sub-lethal temperatures. Genotypes NDLH-1938, CNH-09-73 and ABD-645 have shown no reduction in root growth and QC –Surat, NDLH2057-1 have shown no reduction in shoot growth and 100% seedling survival was recorded in ARBH-1851

Agricultural Research Station, Bapatla

- Among different sources and time of phosphorus application through DAP @ 60 kg ha^{-1}+ 25 kg P_2O_5 at maximum tillering stage recorded significantly higher grain yield (5764 kg ha^{-1}) and straw yield (7722 kg ha^{-1}). The lowest grain yield (5185 kg ha^{-1}) and straw yield (6611 kg ha^{-1}) was recorded with application of phosphorus through SSP @ 60 kg ha^{-1} as basal application.

- Significantly the highest zinc content (34 mg/kg) of whole grain of rice was recorded with soil application of $ZnSo_4$ ha^{-1} @ 50 kg ha^{-1} + foliar application of zinc at grain filling stage @ 0.5% followed by soil application of $ZnSO_4$ ha^{-1} @ 50kg ha^{-1} + foliar application of zinc at grain filling stage @ 1%. In brown rice, significantly highest zinc content (22.4 mg/kg) was observed with soil application of $ZnSO_4$ ha^{-1} @ 50 kg ha^{-1}+ foliar application of zinc at grain filling stage @ 1% over control. Highest zinc content in double polished rice was recorded with soil application of $ZnSO_4$ ha^{-1}@ 50 kg ha^{-1} + foliar application of zinc at grain filling stage @ 0.5% (17.9 mg kg^{-1}).

Regional Agricultural Research Station, Anakapalle

- Application of fertilizers estimated based on the nutriexpert software (119-54-45 NPK ha^{-1}) for rice was high nitrogen, low phosphorus and potassium as compared to the recommended dose of fertilizers (80-60-40 kg NPK ha^{-1}) in

North Coastal Zone. Application of fertilizers based on nutriexpert recorded highest grain and straw yield of 5.02 t ha^{-1} and 6.75 t ha^{-1} respectively, which was significantly high as compared to the recommended dose of fertilizers (4.05 t $ha^{-1}$and 5.60 t ha^{-1} of grain and straw yield, respectively.)

Agricultural Research Station, J.M.Puram

- During *kharif* 2019, among the nine alternate crops to paddy under non availability of NSP right canal water for irrigation, groundnut (37.42 q ha^{-1}) performed better crop equivalent yields followed by sorghum (36.50 q ha^{-1}). The highest value of BC ratio was recorded with sorghum (2.03) followed by sesamum (1.10).

Agricultural Research Station, Utukur

- During 2019-20, treatment receiving 100% RDF + Bio-fertilizers recorded highest grain yield of 5413 kg ha^{-1} which was at par with 75% RDF + Bio-fertilizers recording 4825 kg ha^{-1}. Fertilizer application through STCR equation + Bio-fertilizers and 75% of fertilization through STCR equation + Bio-fertilizers as 4810 and 5048 kg ha^{-1} which were at par. However, the treatment receiving only biofertilizers recorded statistically low yield of 2149 kg ha^{-1}.

Crop Protection

Entomology

Regional Agricultural Research Station, Maruteru

- Of various combinations of insecticides and fungicides tested against BPH and sheath blight in Pesticide Compatibility Trial during *kharif* 2019, Triflumezopyrim + Azoxystrobin + Tebuconazole @ 0.48 ml + 1.5 ml l^{-1} recorded the highest per cent reduction (96.01%) in BPH population and sheath blight severity (67.23%) over control followed by Pymetrozine + Azoxystrobin + Tebuconazole @ 0.60 g + 1.5 ml/l (94.97% and 66.67%) and resulted in significantly highest grain yield of 7308 kg ha^{-1} and 6925 kg ha^{-1}, respectively.
- Of different combination of insecticides and fungicides tested against BPH and blast in Pesticide Compatibility Trial during *rabi* 2019-'20, Triflumezopyrim + Isoprothiolone @ 0.48 ml + 1.5 ml/l followed by Triflumezopyrim + Tricyclazole @ 0.48 ml + 0.60 g $/l^{-1}$, Pymetrozine + Tricyclazole @ 0.60 g + 0.60 g, Pymetrozine + Isoprothiolone @ 0.60 g + 1.5 ml/l^{-1} were found effective against brown planthopper and blast and registered significantly highest grain yields of 5614, 5377, 5358 and 5339 kg ha^{-1}, respectively.
- Effect of planting date (viz., early planting, normal planting and late planting) on insect pest incidence during *rabi*, 2019-'20 revealed that the incidence of stem borer in terms of per cent dead hearts was above ETL in early planting and late planting but below ETL in normal planting. But in terms of percent white ears, the highest damage was recorded in normal planting (17.25 % WE) than late (8.74 % WE) and early (5.67 % WE) plantings in descending order. Whereas the incidence of planthoppers was less in early planting compared to normal planting and late planting.

Agricultural Research Station, Nellore

- Brown Plant Hopper population collected from farmer's fields of Nellore district recorded 1.513 folds of resistance for chlorpyriphos during 2019-'20. Whereas, Pymetrozine, Dinotefuron and Ethofenprox recorded 0.738, 0.803, 0.963 folds of resistance, respectively against BPH which indicated there is no development of

resistance in BPH collected from farmer fields.

- Peak yellow stem borer catches (108 moths) and peak gall midge catches (170) were recorded during 41st std week. Peak leaf folder catches (379) were recorded at 42nd std. week. During early *kharif*, severe leaf mite incidence was noticed ranging from 7.94 to 100% during 27th to 31st standard weeks. During *kharif*, maximum leaf folder (11.77%) incidence was recorded at 45th std week, maximum gall midge (4.9%) incidence was recorded at 46th std week and maximum stem borer (26.9%) incidence was recorded at 43rd std. week. During *Rabi*, pest incidence was negligible except for gallmidge with 9.47 per cent incidence during 11th std. wk.
- Maximum reduction (36.9%) in leaf folder incidence was found with spraying of Silicon (in the form of potassium silicate) @ 80 mg/l^{-1} at 2 wks after transplantation and at active tillering stage followed by *B. bassiana* @ 1.3x10^6 conidia/ml application, compared to *B. bassiana* spraying alone (14.25 %).

Agricultural Research Station, Ragolu

- In Gall midge Biotype Monitoring Trial at both 30 and 50 DAT, gallmidge incidence was very low with per cent silver shoots range of 0.00 to 0.73 and showed SSRRR pattern instead of SSRRS pattern (for gallmidge Biotype-4).
- In multiple resistance screening trial, eight entries viz., Cul M9, JS 3, JS 4, JS 6, JS 7, PTB 33, WGL 811 and RP 5588-B-B-B-B-232 recorded zero incidence of both gallmidge and stem borer at 50 DAT and no white ears at pre-harvest.
- Spray of Chlorantraniliprole 0.4G 25-30 DAT + Cartap hydrochloride 50% SC at 50-55 DAT+ Triflumezopyrim 65-70 DAT resulted in lower per cent of leaf folder damaged leaves (2.81 and 1.35 at 30 and 50 DAT, respectively) and white ears at pre-harvest (0.73%), lower incidence of BPH (32.50, 40.25 and 40.75/hill at 30, 50 and 75 DAT, respectively) and WBPH (28.75, 51.25 and 56.50 no./hill at 30, 50 and 75 DAT, respectively) and recorded higher grain yield.

Agricultural Research Station, Bapatla

- Effect of different cultivation systems revealed that the leaf folder damage was statistically less in SRI and drum seeder method of sowing from 40 to 90 DAT. Normal transplanted rice recorded highest yield of 4750 kg/ha^{-1}, followed by drum seeder (4687 kg ha^{-1}) and dry direct sowing (4650 kg ha^{-1}).
- Evaluation of 20 entries under controlled conditions for resistance against leaf folder revealed that CULM 4 (7.96%) and Kalluruli (8.29%) recorded least leaf folder damage and on par with CULM 6-2 (7.94%). Under natural conditions, least leaf folder damage was observed in CULM 8 (1.30%) followed by Kalluruli (2.50%). BPH population was less in CULM-8 (2.20 $hill^{-1}$) followed by CULM -4 (2.57 $hill^{-1}$) and Matali (2.30 $hill^{-1}$). In case of WBPH, least population of 2.80 nos./ hill was recorded in Matali and it was followed by CULM-8 (3.50 $hill^{-1}$) and CULM- 4 (4.40 $hill^{-1}$).
- In insecticide and botanical evaluation trial, results revealed that highest yield was recorded in all insecticide's treatment (Chlorantraniliprole 0.4G 25-30 DAT, Cartap hydrochloride 50% SC 50-55 DAT and Triflumezopyrim 10% SC 65-70 DAT) (4905 kg ha^{-1}) followed by botanical insecticides treatment (Neemazal 1% EC 25-30 DAT, Eucalyptus oil 45-50 DAT and Cartap hydrochloride 50% SC 60-65 DAT)

(4760.25 kg ha^{-1}) leading 26.85 and 23.11 % yield increase over control.

Pathology

Regional Agricultural Research Station, Maruteru

- Application of Poultry manure (@ 2 t ha^{-1}) as basal and at 45 DAT along with sprays of Validamycin @ 0.3% (2 ml/L) at 30 and 60 DAT was found best in reducing stem rot incidence (9.23%) followed by imposing of poultry manure application as described above along with Tebuconazole spray @ 0.15% at 30 and 60 DAT (31.91%) over other treatments including control (100% disease).
- Among different fungicides evaluated against sheath blight, least disease incidence was recorded in Azoxystrobin 18.2% + Difenoconazole 11.4% SC (35.78%); Hexaconazole (39.07%); Difenoconazole (48.24%) and Propiconazole (53.60%) treated plots with no significant differences among them. The sheath blight severity was also least in Azoxystrobin+ Difenoconazole (39.5%); Hexaconazole (42.90%); Difenoconazole (43.03%) and Propiconazole (49.71%) compared to control (78.57%). The grain yields in Azoxystrobin + Difenoconazole (5050 kg ha^{-1}), Hexaconazole (4976 kg ha^{-1}), Propiconazole (4715 kg ha^{-1}), Tricyclazole (4493 kg ha^{-1}); Difenoconazole (4261 kg ha^{-1}); were significantly superior over control (2754 kg ha^{-1}).
- Sheath blight incidence was least in seed treatment (ST) with Carbendazim + spray of Trifloxystrobin + Tebuconazole plots (24.22% incidence and 34.34% severity), followed by seed treatment with Carbendazim + spray with Propiconazole at booting stage (34.03% incidence and 48.4% severity) and were significantly superior over control (95.76% incidence and 79.61% severity). ST with carbendazim + spray with combination fungicide of Trifloxystrobin + Tebuconazole at booting stage have recorded lower blast incidence (40.33%) over control plots (75.33%). The grain yields were highest with ST with carbendazim + spray with combination of trifloxystrobin + tebuconazole at booting stage (4450 kg ha^{-1}) over control (2939 kg ha^{-1}).
- Presence of *Xa4, Xa5, Xa13* and *Xa21* bacterial leaf blight resistance genes was detected in 30 genotypes. Promising resistance gene, *Xa21* was detected in IRBBN-52 and Br. No. 1635 with marker PTA 248. *Xa13* was detected in 6 rice genotypes, whereas *Xa5* was detected in four genotypes.

Agricultural Research Station, Nellore

- Among all the manures studied under IDM of stem rot in Rice, FYM @ 4 tones /acre+ dhaincha recorded significantly least incidence of stem rot (25.65%) and highest grain yield (5950 kg ha^{-1}). Among the bio agent and or fungicides treatments, Soil application of *Trichoderma asperellium* 90 kg+ Neem Cake 10 kg/acre recorded least stem rot (24.51%) incidence and highest grain yield (5760 kg ha^{-1}) .
- Among the fungicide treatments evaluated against leaf blast, Prochloraz 23.5%+ tricyclazole 20% SE @ 2 ml l^{-1} recorded least PDI of 26.22% with highest grain yield of 6026 kg ha^{-1} and it is at par with Prochloraze 45% EC @ 2ml/l with PDI of (30.22%) and grain yield of 5512 kg ha^{-1}.
- Severity/incidence of leaf and neck blast, grain discoloration and sheath rot was highest in October second forth night sown crop, whereas

BLB severity was highest in First fort night sown crop.

Agricultural Research Station, Utukur

- Spraying of Azoxystrobin + Tebuconazole @ 1.5 ml/l^{-1} twice after the initial appearance of the symptoms and second spray at 15 days after the first spray proved effective by recording minimum Per cent Disease Index (PDI) of 21.45 % and grain yield of 5600 kg ha^{-1} followed by Spraying of Azoxystrobin @ 1.0 ml l^{-1} with PDI of 23.39 % and grain yield of 5300kg ha^{-1}.

Maize

Crop Production

Agricultural Research Station, Vijayarai

- *Kharif* maize sown during 1st and second fortnight of July and *rabi* maize sown during 1st and 2nd fortnight of November found to give optimum for realizing higher yields
- Experiments conducted on nitrogen response in both *kharif* and *rabi* 2019-'20 indicated that application of 200 kg N ha^{-1} in *kharif* and 240 kg N in *rabi* found to be optimum.

Agricultural Research Station, Garikapadu

- Studies on the performance of maize under different irrigation schedules and dates of sowing during *rabi* season showed that 31st October sowing at IW/CPE ratio of 1.0 (7896 kg ha^{-1}) recorded significantly highest kernel yield followed by 30th November sowing at IW/CPE ratio 0.8 (7590 kg ha^{-1}).
- Among dates of sowing, significantly higher kernel yield was recorded with 30th November sowing (6708 kg ha^{-1}) which is comparable with 15th November sowing (6249 kg ha^{-1}).

Agricultural Research Station, Peddapuram

- The pre-release medium maturing genotypes were tested at two densities (recommended and high) and two nutrient levels (RDF and 150% RDF) during *kharif*, 2019. Grain yield, net returns & B:C ratio did not differ significantly with planting densities. The 150 % RDF recorded significantly more grain yield and straw yield over 100 % RDF. Pre-release genotype INDAM 1122 recorded significantly higher grain yield and B:C ratio.
- Validation of sensor based nitrogen management in maize during *kharif*, 2019 revealed that the application of 35% Basal N + 35% at 25 DAS + Green Seeker based N at tasseling stage recorded significantly higher grain yield (8139 kg ha^{-1}) which was at par with 30% Basal N + 30% at 25 DAS + Green Seeker based N at tasseling stage and RDF. Similarly, highest net returns and B:C ratio (Rs.84814 /ha & 2.45 respectively) was recorded with 35% Basal N + 35% at 25 DAS + Green Seeker based N at tasseling stage which was at par with 30% Basal N + 30% at 25 DAS + Green Seeker based N at tasseling stage and RDF.
- Weed management in maize systems during *kharif*, 2019 revealed that application of Tembotrione 120 g/ha + Atrazine 750 g/ha^{-1} at 15 DAS or Atrazine 1000 g/ha (PE) fb Tembotrione 120 g/ha at 25 DAS can be recommended for efficient weed control and improved grain yield with high B:C ratio in maize.
- Effect of detopping on growth, yield attributes and yield in maize during *kharif*, 2019 revealed that significantly more grain yield (7225 kg ha^{-1}), net returns (Rs. 68340) and B:C ratio (2.16) was observed with detopping at 40 days after silking and it was on par with detopping at 30 days after silking.

Agricultural Research Station, Utukur

- Maize crop was raised with treatments (T_1: Grain Targeted yield of 60 q ha^{-1} with RDF; T_2: Targeted yield of 60 q ha^{-1} with chemical fertilizers; T_3: Targeted yield of 70 q ha^{-1} with chemical fertilizers; T_4: Farmer's Practice (300:100:95); $T_{5:}$ Control), recorded 64.53, 63.79, 74.00, 62.35 and 10.72 q ha^{-1}, respectively. Pooled analysis data clearly brought out efficacy of STCR regression equation by recording highest grain yield in T_3 treatment to the tune of 74 q ha^{-1} besides saving the cost on fertilizers.
- Among the amendment levels, 10 and 20 t ha^{-1} of waste mica recorded higher grain yield in maize as 7239 and 7136 kg ha^{-1} whereas microbes *viz.*, *Bacillus mucilaginosus*, Amaravati strain recorded 6623 kg ha^{-1} and 6577 kg ha^{-1}, respectively.

Agricultural Research Station, Reddipalle

- Maximum maize seed yield (3262 kg ha^{-1}) and Water use efficiency were recorded (10.5 kg/ha^{-1} mm) with 15 mm depth of irrigation.

Agricultural Research Station, Seethampeta

- During *Rabi*, 2019-'20 the highest green cob yield was recorded with 75% RDF -N through inorganic fertilizer + 25% equivalent N through poultry manure (87.66 q ha^{-1}) followed by 75% RDF- N + 25% N through vermicompost and 75% RDF- N + 25% N through FYM and was at par with 100% RDF.

Crop Protection

Agricultural Research Station, Vijayarai

- Management of fall army worm by different insecticides during *rabi*, 2019-'20 in maize revealed that Novaluron 10 EC @ 1.0 ml l^{-1}, Spinotoram 11.7SC @ 0.5 ml l^{-1}, Chlorantraniliprole 20 SC @ 0.4 ml/l^{-1} and Novaluron + Emamectin Benzoate @ 2.5 ml/l^{-1} were found to be effective in controlling the fall army worm and resulted in higher yields.
- Studies on evaluation of biorational insecticides against fall army worm in Maize during *rabi*, 2019-'20 showed that percent infestation by fall army worm was lowest in *Nomuraea rileyi* @ 5.0 g/l^{-1} followed by *Beaveria bassiana* @ 5 g L^{-1} and *Bacillus thuriengensis* @ 2.0 g L^{-1} and resulted in higher yields.
- Studies on evaluation of different modules of IPM for control of *S. frugiperda* in Maize during *rabi*, 2019-'20 indicated that lowest percent plant infestation by fall army worm was noticed in seed treated with cyantranilliprole 19.8 + thiomethoxam 19.8 @ 6 ml followed by spraying of neem oil 1500 ppm @ 5 ml at 20 - 25 DAS, whorl application of Poison bait @ 50 kg/ha at 35 DAS and spraying of novaluron @1.0 ml l^{-1} at 50 DAS.
- Studies on management of Fall Army Worm, *S. frugiperda* in maize with Biocontrol agents during *rabi*, 2019-'20 showed that lowest percent plant infestation by fall army worm was noticed in seed treated with cyantranilliprole 19.8 + thiomethoxam 19.8 @ 6 ml followed by releasing of *T. Preteosum* @ 50,000/acre at 20 -25 DAS, and spraying of *N. rileyi* @ 5 g l^{-1} at 40, 50 and 60 DAS.
- Screening of popular hybrids against Fall Army Worm, *S. frugiperda* in Maize during 2019-'20 showed that no significant difference in percent plant infestation by fall army worm at 20, 30, 40 and 50 Days after sowing but yield was varied among the different hybrids tested. Highest yield (7696 kg ha^{-1}) was noticed in Advanta 759 followed by NK 6607 (7319 kg ha^{-1}).

Agricultural Research Station, Peddapuram

- Out of 395 entries with different maturity groups screened against Banded leaf sheath blight in artificially created BLSB epiphytotics in *Kharif* 2019, FH 3891, 3879, JH 31947, 32057, VAMH 12014 etc. are under score 3.0.
- A total of 139 entries with different maturity groups were screened against *Turcicum* leaf blight disease in artificially created TLB epiphytotics in *Rabi* 2019-'20. Out of which, thirty six resistant lines from diverse genetic background were identified. 10021, 10017, 20024, 20049 etc. entries were under score 3.0 which were resistant to *Turcicum* leaf blight.

Regional Agricultural Research Station, Nandyal

- Per cent cob damage by fall army worm *Spodoptera frugiperda* in Maize was low with the application of poison bait 20 Kg rice bran + 2 Kg Jaggery + 200 g thiodicarb 75 SP @ 50 Kg/ha (10.8 per cent), novaluron 10 Ec @ 500 ml/ha (14.5) and spinotoram 11.7 SC@250 ml/ ha (15.3 percent). Higher grain yield of 7698 kg ha^{-1} and high B:C ratio of 2.8:1 were recorded with poison bait treatment.

Regional Agricultural Research Station, Lam

- Integrated pest management module comprising of seed treatment with cyantraniliprole 19.8 + thiomethosxam 19.8 @ 6 ml kg^{-1} seed, spraying of neem oil 1500 ppm @ 5 ml l^{-1} at 25 DAS, application of poison bait in the whorl (10 kg rice bran + 1 kg jaggery + 1^{-1} of water + 100g thiodicarb 75 WP @ 50 kg ha^{-1}) at 35 DAS, spraying of spinosad 45 SC @ 0.3 ml l^{-1} at 50 DAS and 65 DAS found effective in managing the *Spodoptera frugiperda* on maize. IPM module recorded 85.5 percent FAW infestation reduction over control with an ear damage score of 2. Control plot recorded an ear damage score of 6. IPM plot recorded a seed yield of 5250 kg ha^{-1} with a C:B ratio of 1.23 compared to Control plot (seed yield of 3467 kg ha^{-1} and C:B ratio of 1.01).

Agricultural Research Station, Utukur

- Evaluation of IPM modules for the management of FAW in maize during *rabi*, 2019-'20 revealed that NSKE @ 5% and Spinetoram @ 0.5 ml l^{-1} was found to be effective with lowest mean per cent plant infestation (7.83), mean per cent leaf damage (9.33), lowest per cent cob damage (9.25) and highest yield (8265 kg ha^{-1}) followed by Neem oil 1500 ppm @ 5 ml l^{-1} and Spinetoram @ 0.5 ml l^{-1}; NSKE @ 5% and Chlorantraniliprole @ 0.4 ml l^{-1}

Regional Agricultural Research Station, Tirupati

- In management of fall armyworm, seed treatment and Neem oil 1500 ppm/ 5 ml^{-1} spray in combination with Chlorantraniliprole 20 SC recorded low plant % damage (6.03), followed by Emamectin benzoate 5% SG (8.26) .

Sorghum

Crop Production

Regional Agricultural Research Station, Nandyal

- In *rabi* grain sorghum, significantly higher grain yield (3283 kg ha^{-1}) and net returns (Rs. 48,619/ - per ha) were recorded with application of 100 % RDF along with enriched vermicompost [100 kg vermicompost/ha + 11.25 kg $ZnSO_4$/ ha + 11.25 kg $FeSO_4$/ ha] as compared to 100 % RDF (2414 kg ha^{-1}).
- Seed treatment with *Azospirllum* @ 2 ml and PSB @ 4 ml kg^{-1} seed in addition to 100% RDF has recorded significantly higher grain yield

(3774 kg ha^{-1}) of *rabi* grain sorghum as compared to powder form of bio-fertilizers (3171 kg ha^{-1}).

❖ Among the genotypes screened for drought tolerance under rainfed conditions, maximum plant height was recorded in NJ2631 (338.8 cm), leaf area in NJ 2621 (3765 cm2), higher relative water content in in NJ 2647 at 30 and 60 days after sowing, dry matter production in NJ2628 (6515 kg ha^{-1}) and higher grain yield was recorded in NJ 2647 (3274 kg ha^{-1}), followed by NJ 2670 (2981 kg ha^{-1}).

Crop Protection

Regional Agricultural Research Station, Nandyal

❖ Lowest per cent plant infestation due to *Spodoptera frugiperda* in sorghum at 20 DAS (32 %) and 35 DAS (20.80 %) were recorded in plots treated with poison bait (20 Kg rice bran + 2 Kg Jaggery + 200 g thiodicarb 75 SP) @20 kg acre^{-1}. At 50 days after sowing plots treated with Poison bait (20+2+1+0.2) @20 kg acre^{-1} (8.7%), spinosad 45 % SC @ 70 ml acre^{-1} (10.9 %) and Rynaxypyr 18.5 SC @ 80 ml acre^{-1} (11.0 %) recorded the lowest plant infestation. Grain yield was high (5933 kg ha^{-1}) in the treatment with Poison bait (20+2+1+0.2) @20 kg acre^{-1} with 3:1 benefit cost ratio.

Agricultural Research Station, Darsi

❖ Among the different mulches in sorghum, raised bed with pigeonpea bhusa mulch recorded more number of arthropods with total of 215 which includes total of seven different classes of arthropods and lowest number of arthropods were recorded in the conventional practice with 13 which includes five classes of arthropods. Further, raised bed with pigeonpea bhusa mulch recorded highest Shannon Diversity Index (0.84) and 0.37 Simpson's index than that of raised bed with mulches of paddy husk and saw dust.

Agricultural Research Station, Bapatla

❖ Out of 18 entries screened for resistance to pests in sorghum revealed that the mean per cent stem borer incidence was ranged between 0.00 and 6.45. The least mean per cent (0.00) stem borer incidence was recorded in IIMRH -1 and NTJ-1 and highest mean per cent stem borer incidence of 6.45 was recorded in IIMRH-6.

Pearl Millet (Bajra)

Agricultural Research Station, Utukur

❖ In the Zn fortification of pearl millet, Zinc fertilization through soil and foliar application of $ZnSO_4$@ 0.2% recorded grain yield of 1937 and 1774 kg ha^{-1} in ABV 04 and ICMV 224, respectively. Besides this, highest fortification of zinc @ 30 mg kg^{-1} was observed in variety ABV 04 and 09 mg kg^{-1} in ICMV 224.

Finger Millet (Ragi)

Crop Production

Agricultural Research Station, Vizianagaram

❖ Incorporation of ragi straw shredded material +Urea @ 5 kg ha^{-1} + SSP @ 5 kg ha^{-1} fertilizers + 75% RDF has shown the highest grain (2207 kg ha^{-1}), straw yields (7482 kg ha^{-1}) and BC ratio of 1.88:1, which was on par with 100% RDF (2155.6 kg ha^{-1} and 7288.9 kg ha^{-1} respectively).

Agricultural Research Station, Seethampeta

❖ Studies on INM in finger millet during *kharif* 2019 revealed that higher yield was recorded with 50% RDN through inorganic fertilizer

along with 50% equivalent N through poultry manure treatment (22.6 q ha^{-1}) and was at par with RDF treatment. Fertility status of soil in terms of OC, N, P, K was higher in 50% RDF N+50% poultry manure after harvest.

❖ Zero tillage method in rice fallow ragi in tribal areas, recorded higher ragi seed yield of 1860 kg ha^{-1} over transplanting of ragi (1300 kg ha^{-1}). Net returns and benefit cost ratio was also higher in zero tillage ragi plot compared to farmer practice.

Agricultural Research Station, Peddapuram

❖ Response of prerelease finger millet varieties to different levels of NPK fertilizers under rainfed conditions during *kharif*, 2019 revealed that application of 125 % RDF recorded significantly higher grain yield (3120 kg ha^{-1}) and B: C ratio (2.41) which was at par with 100 % RDF. Among the finger millet varieties, significantly higher grain yield of 3028 kg ha^{-1} was recorded with FMV-1118 and it was found to be on par with PR-202.

Regional Agricultural Research Station, Tirupati

❖ Sixty ragi genotypes were tested for heat tolerance through TIR technique. Nineteen genotypes were found tolerant to heat stress. KMR-204 and KOPN-942 showed to possess heat tolerance in terms of high SCMR, lower leaf temperatures and higher chlorophyll stability index compared to all other entries.

Agricultural Research Station, Perumallapalle

❖ In finger millet, the variety Champavathi recorded highest grain yield when transplanted with 21 days aged seedlings at a spacing of 25 cm x 25 cm, whereas Vakula recorded highest grain yield with 21 days aged seedlings at a spacing of 22.5 cm x 10 cm.

Crop Protection

Agricultural Research Station, Vizianagaram

❖ Spraying of propiconazole at the time of flowering and after 10-15 days of 1st spray @1 ml/L resulted in lower Neck blast (7.7%) and Finger blast (7.0%) and recorded highest grain yield (1580 kg ha^{-1}) and fodder yields (4134 kg ha^{-1})

❖ Spraying of Trifloxystrobin + Tebuconazole @ 0.04% at 20 DAS and *Bacillus subtilis* @ 10 g L^{-1} after 35 DAS recorded the lowest incidence of blast and highest grain yield of 26.0 q ha^{-1} as against 9.3 q/ha^{-1} in control.

Foxtail Millet (Korra)

Crop Production

Regional Agricultural Research Station, Nandyal

❖ In intercropping studies on millets with redgram, maximum millet grain equivalent yield was recorded with foxtail millet + redgram in 6:1 ratio (5042 kg ha^{-1}) followed by foxtail millet + redgram in 4:1 ratio (4466 kg ha^{-1}).

❖ In a study on evaluation of sequence crops prior to bengalgram, maximum Bengalgram Equivalent Yield (2152 kg ha^{-1}) and net returns (Rs. 64897 ha) were recorded with foxtail millet-bengalgram cropping system which was on par with Sunflower-Bengalgram.

Regional Agricultural Research Station, Tirupati

❖ Performance of small millets under different sowing windows revealed that there were no significant difference in grain yield among the three dates of sowing, however numerically higher grain yield was obtained with 2nd FN of June compared to 1st FN of July. Among the crops, korra has recorded the highest grain yield

of 2547 kg ha^{-1}and the lowest was recorded with samalu (733 kg ha^{-1}). Further, korra has recorded the highest gross returns (Rs.76413 ha^{-1}), net returns (Rs.51832 ha^{-1}) as well as benefit cost ratio (3.05). Next best crop was andukorra with grain yield of 1278 kg ha^{-1}, gross returns (Rs.63903 ha^{-1}), net returns (Rs.41847 ha^{-1}) and benefit cost ratio (2.90).

Crop Protection

Regional Agricultural Research Station, Nandyal

- In screening of foxtail millet varieties for diseases, GPUF 4 and FXV 662 recorded less blast grade of 4.3, SiA 4200 recorded less brown spot grade of 4.7 and DHFT 109-3 recorded less downy mildew (9.8%)
- In national Screening Nursery**,** SiA2667, TNSi 418, GS 2236 recorded less blast incidence (grade 4), GS 1204 recorded less downy mildew incidence (4.5%).
- In survey for diseases blast ranged from grade 3 to 8, brown spot ranged from grade 0 to grade 4 and downy mildew ranged from 2-5%.

Little Millet (Sama)

- Among little millet intercropping systems higher millet grain equivalent yield was recorded with little millet + redgram in 4:1 ratio (4051 kg ha^{-1}) and was on par with little millet+ redgram in 6:1 ratio (4028 kg ha^{-1}).

Kodo Millet (Aarika)

Agricultural Research Station, Vizianagaram

- Studies on performance of small millets to different sowing windows revealed that, the grain yield of kodo millet (1632 kg ha^{-1}) was significantly high followed by barnyard millet (1366 kg ha^{-1}) and little millet (452 kg ha^{-1}). Among different sowing dates, July 1st fortnight sowing has resulted in highest grain yield (2243 kg ha^{-1}).

Pulses

Redgram

Crop Production

Regional Agricultural Research Station, Lam

- Among the different graded levels of fertilizers alone and in combination with bio fertilizers, 100% RDF + seed inoculation with *Rhizobium* + PSB + 1.0 g Ammonium Molybdate kg^{-1} seed and 100% RDF + seed inoculation with *Rhizobium* + PSB were found to be superior and on par with each other with grain yield of 3127 and 3034 kg ha^{-1}, respectively.
- Inorganic P application across Zn levels and VAM influenced significantly the yields of Redgram. The mean seed yield showed a significant increase from 1725 to 1860 kg ha^{-1} with application of Zn @ 40 kg ZnSO4 ha^{-1}; while there was a significant increase from 1680 to 1827 kg ha^{-1} with inorganic P @ 45 kg P2O5 ha-1. VAM inoculation resulted in significantly higher mean seed Zn (µg g^{-1}) of 14.89 against 13.79 in the control.
- Foliar application of different drought mitigation chemicals in Redgram variety LRG 223 tested, highest yield was recorded in DAP 2 percent (1706.6 kg ha^{-1}) followed by Triacontanol 1 ppm (1694 kg ha^{-1}) compared to control (1518 kg ha^{-1}).

Agricultural Research Station, Utukur

- Application of 10 and 20 t ha^{-1} of waste mica recorded higher seed yield of 1468 and 1323 kg ha^{-1}, respectively and among microbes *Bacillus mucilaginosus* recorded 1358 kg ha^{-1} over control.

Agricultural Research Station, Garikapadu

❖ While studying the quantity of water required for higher productivity in redgram under different methods of supplemental irrigation during *kharif* season, it was revealed that providing 20 mm irrigation each at pre-flowering and pod filling stages (1366 kg ha^{-1}); 20 mm irrigation at pre-flowering (1292 kg ha^{-1}) and 10 mm each at pre-flowering and pod filling stages (1325 kg ha^{-1}) recorded higher seed yield. Pre-flowering stage is found to be more responsive stage for protective irrigation.

Crop Protection

Regional Agricultural Research Station, Lam

❖ The pooled data (2017-'18 to 2019-'20) on efficacy of insecticides in the management of pod bugs in pigeonpea revealed that deltamethrin 2.8 EC @ 12.5 g a.i/ha (0.9 ml/l) was found to be very effective against pod bugs with 89.4 per cent reduction of pod bug population over control with only 7.30 per cent shriveled seeds. Further, it has recorded more yield (1664 kg ha^{-1}) with more net returns (Rs. 22251/-) and high Incremental Cost Benefit Ratio (ICBR) of 11.1 over rest of the treatments.

❖ Dinetofuron 20 SG @ 40 g a.i/ha^{-1} (0.3 g/l^{-1}) was found effective against pod fly and recorded less seed damage and high grain yield. However, ICBR was in the order of deltamethrin 2.8 EC (4.51) followed by Buprofezin 25 SC (3.14) and Dinetofuron (2.75).

❖ Thiamethoxam @ 10.0 ml kg^{-1} seed has recorded less jassid incidence followed by imidacloprid @ 8.0 ml/kg^{-1} seed.

Agricultural Research Station, Podalakur

❖ In screening of different redgram entries against pod borer during *Kharif* 2019, lowest *Maruca* pod borer pod damage was recorded in LRG 464 (10.8 %) and highest was recorded in LRG 267 (30.6 %).

Regional Agricultural Research Station, Tirupati

❖ In management of pod borer complex in red gram, Cyantraniliprole @0.3ml/L^{-1} was found to be effectove in reducing the incidence of *Helicoverpa armigera* (6.46 per cent) and pod fly (8.04 percent) followed by Chloratraniliprole@ 0.3ml.

Agricultural Research Station, Darsi

❖ Survey was carried out in pigeonpea growing areas of 153 villages representing 31 mandals of Prakasam district for SMD. Highest disease incidence was recorded in the pigeonpea fields cultivated with the variety LRG-41 (26.54%) followed by PRG-176 (15.03 %) and LRG-52 (12.03 %). No incidence was observed in the BSMR-736 pigeonpea variety.

❖ Among the acaricides and insecticides evaluated in the farmers' field for SMD, the mean per cent reduction of disease was highest in the treatment Fenazaquin 10% EC @ 3.0 ml/l (9.49) and was followed by Fenpyroximate 5% EC @ 1.0 ml/l^{-1} (10.03 %) and was on par with Spiromesifen 22.9 SC @ 1.0 ml//l^{-1} (10.59 %). The treatments Dicofol 18.5% EC and Wettable sulphur 80% WP were on par with each other.

Agricultural Research Station, Seethampeta

❖ The insecticidal spray schedule consisting of Chlorantraniliprole 18.5 SC followed by Flubediamide 480 SC and Dimethoate 30 EC at 10 days interval starting from 50% flowering was proved better in recording less pod damage due to pod borer complex (13.80%) over untreated control (57.61%).

Agricultural Research Station, Utukur

- Maruca spotted pod borer incidence was high during third week of December (50th Standard week) in LRG-41 (8.43 larvae per plant) followed by LRG- 52 (6.21) and TRG-108 (2.13) in July I FN sown crop. Pod fly maggots and pupae were high during second week of January (1st standard week) in LRG- 41 followed by LRG-52 and TRG-108 in July I FN sown crop.

Greengram

Crop Production

Regional Agricultural Research Station, Lam

- 125% RDF recorded significantly higher grain yield (934 kg ha^{-1}) than that of 75% RDF (867 kg ha^{-1}) but it was on par with 100% RDF (895 kg ha^{-1}). Application of FYM had significant influence on grain yield (932 kg ha^{-1}) of mungbean than without FYM (865 kg ha^{-1}). Combined inoculation of *Rhizobium*+LNm16 recorded significantly superior grain yield (946 kg ha^{-1}) than with *Rhizobium* (867 kg ha-^{1}) and LNm16 (882 kg ha^{-1}) alone.
- Bio-fortification through foliar spray of zinc and iron in mungbean showed that the highest grain yield of 952 kg ha^{-1} was registered with soil application of $FeSO_4$ @ 25 kg ha^{-1} against grain yield of 741 kg ha^{-1} from absolute control plot.
- Greengram genotypes studied during *rabi*, 2019 for physiological and biochemical traits responsible for YMV indicated that LGG 630, WGG 42 and LGG 602 recorded higher concentration of phenols, tannins, Trichome density and lower concentration of Sugars. Maximum seed yield was recorded in LGG 630 (1020 kg ha^{-1}) followed by WGG 42 (1002 kg ha^{-1}) and the lowest seed yield was recorded in LGG 460 (611 kg ha^{-1}).

Agricultural Research Station, Nellore

- Greengram sown in May II F.N recorded highest seed yield of 1017 kg ha^{-1} followed by March II F.N (923 kg ha^{-1}) and April I F.N (642 kg ha^{-1}) consequently.

Agricultural Research Station, Amadalavalasa

- Foliar spray of Urea (2%) + Salicylic acid (75 ppm) on greengram at flower initiation recorded highest seed yield of 1093.6 kg $ha^{-1}$and proved superior over foliar application of 19:19:19 (2%) twice at flower initiation and 7 days after first spray (1027 kg ha^{-1}) or KNO_3 (2%) at flower bud initiation (997.8 kg ha^{-1}) compared to control (610 kg ha^{-1}).

Crop Protection

Regional Agricultural Research Station, Lam

- New chemicals such as diafenthiuron 50 % WP @ 1.25 g/l^{-1}, spiromesfin 240% SC @ 1.25 ml/lt^{-1} and flonicamid 50 WP @ 0.3 g/l were found effective against thrips upto 10 days and were found superior over clothianidin 50 WDG @ 0.1 g/l^{-1}, spinosad 45 SC @ 0.3 ml/l^{-1} and thiamethoxam 25% WG @ 0.3 g/l in reducing the thrips population in greengram.
- Adoption of IPM practices such as Seed treatment with imidacloprid 600 FS @ 5.0 ml/ kg^{-1} seed, sowing of maize as guard crop in four rows around the greengram, installation of yellow sticky traps and blue sticky traps for each @ 20/acre, foliar application of neem oil 10000 ppm @ 1.5 ml/lt^{-1} at 20 DAS and need based application of insecticides in IPM module realized B:C ratio of 2.90:1 as against 2.59:1 in farmers practice (Weekly application of insecticides).

Blackgram

Crop Production

Regional Agricultural Research Station, Lam

- Highest grain yield of 716 kg ha^{-1} was obtained with pre-emergence application of pendimethalin followed by Post Emergence application fomesafen+flizifop p butyl at 20 DAS and it was closely followed by pre-emergence application of pendimethalin followed by Poste Emergence application of Propaquizafop @ 33.3 g + Imazethapyr @ 50 g/ha at 20 DAS (711 kg ha^{-1}) against lowest grain yield of 485 kg ha^{-1} in unweeded control plot
- During *rabi* 2019, nine Blackgram varieties grown under receding soil moisture conditions, maximum seed yield (902 kg ha^{-1}) was recorded in LBG 884 followed by LBG 806 (805 kg ha^{-1}) whereas lowest seed yield was recorded in LBG 623 (554 kg ha^{-1}).
- Blackgram genotypes studied during rabi, 2019 for physiological and biochemical traits for YMV indicated that LBG 884, GBG 1, TBG 104 and LBG 808 recorded higher concentration of phenols, tannins, Trichome density, SCMR and lower concentration of sugars. Maximum seed yield was recorded in LBG 884 (945 kg ha^{-1}) followed by GBG 1 (862 kg ha^{-1}) and the lowest seed yield was recorded in LBG 623 (583 kg ha^{-1}).

Regional Agricultural Research Station, Tirupati

- Application of 100% recommended dose of fertilizers (20 N: 50 P_2O_5 kg/ha) along with foliar sprays of $ZnSO_4$ @ 0.2% at 20 & 45 DAS resulted in higher productivity of 746 kg/ ha^{-1} (23.5 %) over RDF (571 kg ha^{-1}) in blackgram in kharif season.

Agricultural Research Station, Nellore

- Blackgram sown during March II F.N recorded highest seed yield (687 kg ha^{-1}) and advancement of sowing from April I F.N recorded drastical reduction in yield.

Crop Protection

Regional Agricultural Research Station, Lam

- Seed treatment with Imidacloprid @ 5ml/ kg^{-1} + foliar spray of trifloxystrobin + tebuconazole (Natio) @ 0.75 g/l^{-1}, three sprays at 15 days interval recorded the lowest PDI (12.81) of alternaria leaf spot and powdery mildew (2.21) and highest grain yield (1273 kg ha^{-1}) in blackgram during rabi 2019-20.
- Lowest PDI of MYMV (12.52) and leaf curl/ bud necrosis (4.72) and leaf crinkle (7.15) were recorded in IPM module along with higher seed yield (1640 kg ha^{-1}).

Agricultural Research Station, Podalakur

- Among the tested treatments for management of sucking pests with novel insecticides in blackgram, the cost benefit ratio was highest in the treatment used with spinetoram (1.76) which was on par with spiromesifen (1.27) followed by Spinosad (1.19).

Agricultural Research Station, Utukur

- Pooled analysis of novel insecticides efficacy against sucking pests during *rabi*, 2017-'18, 2018-'19 and 2019-'20 revealed that spinetoram 0.6 ml l^{-1} was effective with lower thrips population per plant (0.70) with highest yield (1458 kg ha^{-1}) followed by spinosad (1.15) and cyantraniliprole (1.51). Spiromesifen 1 ml l^{-1} effectively reduced whitefly population per plant (0.48) followed by diafenthiuron (0.88) and spinetoram (1.47).

- Pooled analysis (2017-'18, 2018-'19 and 2019-'20) of novel insecticides efficacy against viral diseases in blackgram during *rabi*, revealed that seed treatment with imidacloprid 600 FS @ 5 ml kg^{-1} + 4 border rows of jowar/ maize + removal of virus infected plants + yellow sticky traps @ 4 /acre + spraying of diafenthiuron @ 1.25 g $/l^{-1}$ @ 30 & 45 DAS proved effective for YMV & Bud necrosis with Per cent Disease Incidence (PDI) of 4.05 & 4.96 % respectively and recorded yield of 1257 kg ha^{-1}. This was followed by Seed treatment with Imidacloprid 600 FS @ 5 ml/kg + yellow sticky traps @ 4 $acre^{-1}$ + Spraying of thiamethoxam @ 1.25 g/l^{-1} at 30 & 45 DAS with PDI of 8.22 & 8.60 % respectively and yield of 1041 kg ha^{-1}.

Agricultural Research Station, Amadalavalasa

- Management of sucking pests in blackgram through insecticides revealed that incidence of thrips was low in Fipronil 5% SC @ 2.0 ml l^{-1} and mites in Spiromesifen 240 SC @ 1.0 ml l^{-1}. However, higher seed yield of 12.34 q $ha^{-1}$was recorded in Cyatraniliprole 10% OD @ 1.0 ml L^{-1}.

- Survey on pests in rice fallow blackgram in Srikakulam District revealed that incidence of both leaf thrips (0.0 to 3.3 $plant^{-1}$) and flower thrips (0.0 to 7.9 $flower^{-1}$) was more at different stages of crop growth compared to other pests.

Agricultural Research Station, Ragolu

- In efficacy of insecticides against sucking complex of rice fallow blackgram during *rabi* 2019, spray of fipronil 5%SC @ 2.0 ml L^{-1} or Spinetoram 12%SC @0.2 ml L^{-1} recorded low incidence of thrips (4.04 and 4.19 thrips $plant^{-1}$, respectively) and whiteflies (3.13 and 2.87 thrips/flower, respectively) and were on par with each other. Highest seed yield of 405 and 403 kg ha^{-1} was recorded in fipronil 5% SC @ 2.0 ml L^{-1} and Cyantraniliprole 10% OD @1.0 ml L^{-1} treatments and were significantly superior to remaining treatments.

Bengalgram

Crop Production

Regional Agricultural Research Station, Nandyal

- To optimize the spacing for pre released chickpea kabuli cultures, higher pods (238.7 $sq.m^{-1}$) and grain yield (1671 kg ha^{-1}) was observed with 30 cm x 10 cm spacing. NBeG 119 recorded lower plant height (39.2 cm), higher no. of branches (8.8 $plant^{-1}$), early flowering (41.9 days to 50% flowering), higher pods (256.6 $sq.m^{-1}$) and higher grain yield (1754 kg ha^{-1}) and on par with NBeG 833 (1619 kg ha^{-1}).

- To find out the optimum dose of nitrogen levels for pre release chickpea cultures, application of 40 kg N ha^{-1} recorded higher pods (411.0 $sq.m^{-1}$) & grain yield (1930 kg/h^{-1}) and was at par with application of 20 kg N ha^{-1} (385.0 $sq.m^{-1}$ & 1838 kg ha^{-1}). NBeG 452 recorded higher pods (454.8 $sq.m^{-1}$), grain yield (2116 kg ha^{-1}) & harvest index (61.8) and was on par with NBeG 776 (2061 kg ha^{-1}). NBeG 440 recorded higher pods (356.2 m^{-2}), grain yield (1541 kg ha^{-1}) & harvest index (52.5).

Regional Agricultural Research Station, Lam

- Foliar application of different drought mitigation chemicals in chickpea variety JG 11 revealed that DAP 2 per cent increased the yield (1988 kg ha^{-1}) by 5.85% when compared to control (1878 kg ha^{-1}). It was followed by potassium orthophosphate 2 per cent (1941.3 kg ha^{-1}) and salicylic acid (1913 kg ha^{-1}).

Crop Protection

Regional Agricultural Research Station, Nandyal

- Out of 10 chickpea advanced breeding material screened against major diseases, JG 11, NBeG 857, NBeG 49, NBeG 699, NBeG 47, NBeG 805, NBeG 1010, NBeG 810 and NBeG 119 exhibited resistant reaction against *Fusarium* wilt and NBeG47, NBeG 699, NBeG 49, NBeG 857, JG 11 and NBeG 1010 exhibited resistant reaction against dry root rot.
- Studies on compatibility of different insecticides with foliar nutrients in chickpea, there were no phytotoxic symptoms when the recommended insecticides against *H. armigera i.e.*, chlorantrinilliprole 18.5 SC and Emamectin benzoate – at recommended doses in combination with foliar nutrients *viz.*, Urea @ 2 %, DAP 2% and KNO_3 @ 2 % were sprayed at pod initiation stage. High yield (2503 kg ha^{-1}) was recorded with chlorantranilliprole 18.5 SC + KNO3 @ 2 %.
- Ten advance breeding material of RARS Nandyal were screened against major pest of chickpea. Pod damage was high in the test entry MNK-1 (6.52) and low pod damage was recorded in NBeG 49 (0.49 %) and JG 11 (2.29 %).

Rajmash

Crop Production

Regional Agricultural Research Station, Chintapalle

- Seven rajmash varieties were evaluated for their suitability for HAT zone during *rabi*, 2019 and the results showed that the variety Amber (898.33 kg ha^{-1}) recorded the highest seed yield followed by Utkarsh (873.00 kg ha^{-1}) where as the local variety CTPL red recorded the seed yield of 345 kg ha^{-1}.
- Effect of staking methods on yield and yield attributes in vine type Rajmash (*Phaseolus vulgaris* L) in HAT Zone showed that the staking technique with sticks is the most yielding, followed by live staking by maize. In terms of economic assessment, intercropping of maize in climbing bean had the highest gross margins after staking with sticks. Maize also added value to both incomes of the associated communities.
- Different combinations of Macro nutrients (NPK) had significant effect on yield and yield attributes of rajmash *viz.*, no. of pods per plant (9.3), 100 grain yield (28.0 g) and Yield (17.03 q ha^{-1}) with 100-60-40 NPK kg ha^{-1}.

Crop Protection

Regional Agricultural Research Station, Chintapalle

- Screening of Rajmash varieties against major insect pests showed that Amber, Utkarsh and Uday were found tolerating the sucking pest population (Aphids and Hoppers) with seed yield of 6.83, 5.79 and 5.61 q ha^{-1}, respectively. Chintapalle Red variety was found more susceptible to sucking pest with seed yiled of 2.81 q ha^{-1}. Short duration variety (Phalguna and Arkakomal) recorded low yields.
- Evaluation of different IPM practices against major pests of Rajmash showed that seed treatment with imidachloprid @ 4.0 ml kg^{-1} seed followed by spray with dimethoate @ 2.0 ml L^{-1} spray at 40 DAS, treatment recorded high yields (4.19 q ha^{-1}) followed by spray with Neem oil @ 5 ml/lit. (3.58 q ha^{-1}).

Cowpea

Crop Production

Agricultural Research Station, Darsi

- Cowpea sown during the 2nd fortnight of September recorded highest grain yield which is at par with October sowings and significantly superior over November sowing. Tirupati-1 recorded significantly highest grain yield (1593 kg ha^{-1}) compared to local varieties.

Oilseed Crops

Groundnut

Crop Production

Agricultural Research Station, Kadiri

- Higher groundnut pod yield (1700 kg ha^{-1}) and haulm yield (2435 kg ha^{-1}) were recorded with the application of 100% RDF and was at par with 75 % RDF. Regarding the effect of bio formulations, higher pod yield (1733 kg ha^{-1}) was recorded with the application of Bio grow as seed treatment which was on par with the application of NPK liquid formulation + Zinc formulation and significantly superior over the control (no bio formulations). Application of 100 % RDF along with Biogrow recorded significantly higher pod yield (1700 kg ha^{-1}) and was on par with 75 % RDF along with Biogrow treated seed (1637 kg ha^{-1}).
- Among twelve crops evaluated for delayed sowings starting from 2nd FN of August to 2nd FN of September 2019, groundnut resulted in negative returns. Higher groundnut pod equivalent yield was recorded with clusterbean when sown in the 2nd FN of August followed by greengram, pigeon pea and horse gram. While, considering the cost of cultivation, higher net returns were obtained with greengram (Rs. 43,227 ha^{-1}) followed by pigeon pea (Rs. 31,562 ha^{-1}) and cluster bean (Rs.25,508 ha^{-1}).
- Higher groundnut pod yield was recorded when sown during 1st fortnight of June (2098 kg ha^{-1}) and it was at par with 2nd fortnight of June (1885 kg ha^{-1}). Among the four varieties sown under different dates of sowing, higher pod yield was recorded with Chitravathi (2055 kg ha^{-1}) and it was at par with Amaravathi (1993 kg ha^{-1}) and Dheeraj (1819 kg ha^{-1}) which are significantly superior than Kadiri-6.

Regional Agricultural Research Station, Tirupati

- During *rabi* 2019-'20**,** higher groundnut pod yield, net returns and B:C ratio were recorded with groundnut varieties including check variety (TAG-24) at 22.5x10 cm compared to farmers practice of close spacing of 11.25cm x 10 cm (sown with planter) in coastal sandy soils in Ballavolu village, Chillakur Mandal, Nellore district. Among three varieties (Dharani, TCGS-1694, and Nithya Haritha) evaluated against check variety (TAG-24) with spacing of 22.5cm x 10 cm, TCGS-1694 (4452 kg ha^{-1}) and Nithya Haritha (4388 kg ha^{-1}) recorded higher groundnut pod yield compared to Dharani (4148 kg ha^{-1}) and TAG-24 (4152 kg ha^{-1}).
- Pre emergence application of (PE) Butachlor @ 1.25 kg a.i./ha *fb* Po EImazethapyr 10% SL @ 75 g *a.i* ha^{-1} recorded higher pod yield of groundnut (4347 kg ha^{-1}) and was on par with – PE Pendimethalin @ 750 g a.i./ha^{-1} *fb* Po EImazethapyr 10 % SL @ 75 g *a.i* ha^{-1} (4160 kg ha^{-1}), hand weeding at 20 & 40 DAS (4027 kg ha^{-1}), PE Pendimethalin @ 750 g a.i./ha^{-1} *fb* Po EImazethapyr 10 % SL @ 75 g *a.i* ha^{-1} (3738 kg ha^{-1}). While unweeded control recorded lowest groundnut pod yield (2547 kg ha^{-1}).

- ❖ Raising summer legumes with summer rainfall and incorporating prior to *Kharif* groundnut maintained the soil health by reducing soil temperatures and increasing the soil biota. Among different legume crops, cowpea before *Kharif* groundnut resulted higher yields (1744 kg ha^{-1}) followed by greengram (1699 kg ha^{-1}). Application of FYM during summer rains also resulted good yield (1609 kg ha^{-1}) next to cowpea and greengram.
- ❖ Results on long term effect of fertilizers and manures from 39 yrs of LTFE revealed that, significantly the highest pod yield of 3840 kg/ ha^{-1} was recorded with NPK+Gypsum+Zn followed by only P, NPK+Gypsum, NPK and FYM (3462 kg ha^{-1}). Whereas the lowest pod yield was recorded with control (2394 kg ha^{-1}) followed by only N (2845 kg ha^{-1}).
- ❖ Application of 100% RDF along with foliar sprays of 13:0:45 @ 0.5% at 30 & 60 DAS recorded higher productivity of 2801 kg ha^{-1}over RDF (2207 kg ha^{-1}) in *rabi* groundnut.
- ❖ Studies on the effect of shale on *rabi* groundnut productivity**,** the highest pod yield (3737 kg ha^{-1}) was recorded in 50% NPK+shale @ 250 t ha^{-1} followed by 75 % NPK + shale @ 200 t/ha (3657 kg ha^{-1}) and 100 % NPK + shale @ 150 t/ha (3604 kg ha^{-1}) and are 24.5%, 22.9% and 21.7% higher than RDF+FYM @ 5 t ha^{-1}. In addition, shale application reduced the soil bulk density and soil strength by improving porosity.
- ❖ In *rabi* groundnut, 100% RDF recorded significantly higher pod yield (3123 kg ha^{-1}) and kernel yield (2259 kg ha^{-1}) over 25% and 50% RDF but comparable with 75% RDF in terms of pod (2937 kg ha^{-1}) and kernel (2073 kg ha^{-1}) yield. Significantly higher gross (Rs.140511 ha^{-1}) and net (Rs.94544 ha^{-1}) monetary returns were realized with 100% RDF which was superior over 25% RDF and 50% RDF but at par with 75% RDF.

Agricultural Research Station, Utukur

- The treatments receiving the biochar 5, 10 and 15 t ha^{-1} recorded highest drymatter yield of groundnut as 6.40, 6.49 and 6.56 g pot^{-1} which are statistically at par. Maximum ammonium absorption was noticed at 2 hrs and desorption after 01 hour. Maximum desorption was observed with 0.01 M KCl.
- In pot culture experiment, highest drymatter yield was recorded (61.20 g pot^{-1}) in the treatment receiving the non ferruginous shale 4.5 g kg^{-1} soil. The dominant elemental composition in shale was phosphorus, potassium, calcium and magnesium. No significant difference was found among the quantity of shale applied.

Agricultural Research Station, Darsi

- ❖ Effect of boron, calcium and zinc nutrition on growth, yield and its attributes in groundnut in costal sandy soils revealed that recommended dose of fertilizers + Basal (Borax + $ZnSO_4$) + Gypsum at 35 DAS recorded the maximum leaf area (54.6 sq.cm) and seed yield (999.5 kg ha^{-1}) followed by the application of RDF + Gypsum at 35 DAS.

Regional Agricultural Research Station, Chintapalle

- ❖ Evaluation of the effects of nanoparticulate delivery of zinc on the productivity of rainfed Groundnut revealed that increased pod yield upon application of RDF along with foliar application of nanoscale ZnO 200 ppm at 25 & 45 DAS has showed highest pod yield (23.36 q ha^{-1}) whereas RDF along with foliar application of nanoscale ZnO 150 ppm at 25

& 45 DAS has showed highest test weight (159.3 g)

Agricultural Research Station, Garikapadu

- Among methods of irrigation, significantly highest pod yield was recorded with drip method of irrigation (2079 kg ha^{-1}). While, rainport mini sprinkler irrigation and check basin method have recorded significantly comparable pod yields.
- Drip irrigation at 75% RDF (2206 kg ha^{-1}) and STBF (2119 kg ha^{-1}) were comparable and recorded significantly highest pod yield. A combination of drip irrigation at IW/CPE ratio of 1.0 with STBF (2573 kg ha^{-1}) and drip irrigation at IW/CPE ratio of 0.6 with 75% RDF (2512 kg ha^{-1}) were at par with each other and recorded significantly highest pod yield.

Crop Protection

Entomology

Agricultural Research Station, Kadiri

- Spinosad 45 SC @ 0.6 ml kg^{-1} recorded significantly highest mean mortality of groundnut bruchid (91.60%) followed by neem oil 10 % @ 10 ml L^{-1} with 90.0% mortality.
- Soil drenching with Chlorpyriphos 20 EC @ 8 ml/10 L of water was significantly superior and effective against white grub, termite damage (reduced to 6.10%) and protected groundnut crop recorded high dry pod (1500 kg ha^{-1}) and haulm yields (2665 kg ha^{-1}).
- Foliar application of Cyantraniliprole @ 0.3 ml/l^{-1} was significantly effective in reducing mean leaf damage of *Spodoptera* (8.79%), *Helicoverpa* (8.43%) and leaf miner (5.64%) and resulted in highest dry pod (1892 kg ha^{-1}) and haulm yields (3458 kg ha^{-1}). This was followed by Spinoteram 0.4 ml L^{-1} (8.97%, 9.61% and 6.15% of damage by *Spodoptera*, *Helicoverpa* and leafminer) with 1630 kg ha^{-1} of dry pod and 2900 kg ha^{-1} of haulm yield.

Regional Agricultural Research Station, Tirupati

- Studies on compatibility of insecticides, fungicides and nutrients as foliar spray in groundnut indicated that combination of Monocrotophos @ 1.6 ml + Hexaconazole @ 2.0 mL L^{-1} + 19-19-19 @ 5.0 g L^{-1} was found effective in reducing thrips (11.33%) and low incidence of LLS score (4.33).
- Management of root-feeders in groundnut indicated that seed treatment with Imidacloprid 600 FS @ 2.0 ml kg^{-1} of seed before sowing found to be effective against root grubs with high pod yield of 2265 kg ha^{-1} followed by furrow application of Carbofuran 3 G @ 33 kg ha^{-1} before sowing with pod yield of 2228 kg ha^{-1}.

Pathology

Agricultural Research Station, Kadiri

- Per cent decrease in dry root rot (55.7 %) and stem rot (56.3 %) over control and per cent increase in pod (34.0 %) and haulm yield (23.6 %) over control with highest ICBR of 4.7 were recorded by following 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 PGPR @ 625 g kg^{-1} of seed + soil application of *T. asperellum* @ 4 kg ha^{-1} enriched in 250 kg FYM ha^{-1} at 35 and 60 DAS.
- Incidence of Peanut Stem Necrosis Disease (PSND) increased as sowing delayed from II FN of June to I^{st} FN of July. Significantly low

PSND (3.7 %) and low thrip damage per cent and low thrip number/plant was recorded at 20, 40 and 60 DAS and significantly high pod (2428 kg ha^{-1}) and haulm yield (2548 kg ha^{-1}) recorded with II FN of June.

❖ Among different modules evaluated against diseases and insects, numerically low incidence of dry root rot at 90 DAS (2.8 %) and stem rot (1.5 %) and numerically low mean damage per cent of leaf by jassid (13.8 %) and *Spodoptera* (15.7 %) with numerically high pod yield (1854 kg ha^{-1}) by following practices such as seed treatment with Carboxin 37.5% + Thiram 37.5% @ 3 g kg^{-1} seed and Thiamethoxam 5% FS @ 3 g kg^{-1} seed + Foliar spray of Rynaxypyr 20% SC @ 100 ml ha^{-1} for defoliators at 50-70 DAS + Foliar spray of Difenconazole 13.9 % EC @ 1.0 ml L^{-1} at 50-70 DAS.

Regional Agricultural Research Station, Tirupati

❖ In the management of foliar diseases, spraying with Tebuconazole 50 % + Trifloxystrobin 25 % WG @ 1.3 g L^{-1} at 40 and 65 DAS was found effective in controlling of early leaf spot, late leaf spot and rust of groundnut.

❖ In the management of PSND and PBND in groundnut, module consisting of border crop with bajra (4 rows) + seed treatment with gaucho 600 FS @ 1 ml kg^{-1} of seed + foliar sprays using thiocloprid 480 SC @ 0.3 ml L^{-1} at 20-25 DAS followed by fipronil 5 SC @ 1 ml L^{-1} @ 40 DAS and acetamaprid 20 SP @ 0.2 g L^{-1} at 60 DAS was found effective.

Sunflower

Crop Production

Regional Agricultural Research Station, Nandyal

❖ Evaluation of good agricultural practices in sunflower crop in *rabi*, 2019-'20 recorded 2306 kg ha^{-1} seed yield with net returns Rs. 49448/- per ha whereas farmers' practice recorded 1711 kg ha^{-1} seed with net returns of Rs. 32141.

❖ Response of sunflower to varying planting geometry and fertilizer levels under different land configurations under rainfed conditions, broad bed and furrow with paired row planting at 45 cm x 30 cm with 125 % RDF recorded higher sunflower yield of 1271 kg/ha^{-1} with net returns of Rs. 17641/- per ha followed by ridge and furrow planting with 125% RDF recorded 1194 kg ha^{-1} seed yield and Rs. 15640/- per ha net returns.

❖ Foliar spray of boron @ 0.2 % to 0.3 % twice at vegetative and reproductive stage has proved superior over one time spray at reproductive stage and observed sunflower yield increase up to 11.6% in *kharif* and 13.2% in *rabi*, 2019-'20.

❖ Seed soaking treatments significantly influenced the seed parameters than the untreated seeds whereas the highest germination percentage (100 %) was recorded with hydration with PEG – 6000 (200gm L^{-1}) solution followed by hydration treatment (97%).

Crop Protection

Regional Agricultural Research Station, Nandyal

❖ In management of leaf curl disease of sunflower, seed treatment with Imidacloprid 600FS @ 5.0 ml kg^{-1} seed+ foliar spray with Diafenthiuron 50 wp@1.25 g L^{-1} 30,45 and 60 DAS and the treatment comprising seed treatment with Imidacloprid 600 FS @ 5.0 ml kg^{-1} seed + foliar spray with Flonicamide 50WG @ 0.25 g L^{-1} at 30, 45 and 60 DAS

have shown 42.82% and 39.29% of disease reduction and recorded higher yields of 17.53 % and 16.05% over control with higher B:C ratio of 1.92 and 1.89, respectively.

❖ In management of Alternaria leaf spot in sunflower, the treatments comprising Seed treatment with carbendazim 12% + mancozeb 63% WP (Saaf 75 WP) @ 2.0 g kg^{-1} seed followed by two foliar sprays with difenconazole 25% + propiconazole 25% (Taspa 500EC) @ 0.25 ml L^{-1} and the treatment comprising Seed treatment with carbendazim 12% + mancozeb 63% WP @ 2.0 g kg^{-1} seed followed by two foliar sprays with Trifloxystrobin 25%+ tebuconazole 50% (Nativo 75WG)@ 0.25g/l^{-1}) have recorded less disease percentage of 34.35% and 44.97% and higher yields of 16.51% and 17.42%, respectively over control and the same treatments also recorded higher B:C ratio of 1.92 and 1.85, respectively.

Sesame

Crop Production

Regional Agricultural Research Station, Tirupati

❖ Among the pre and post emergence herbicides, post- emergence application of Quizalofop-ethyl 50 g *a.i.*/ha @ 2.0 ml L^{-1} at 20 DAS effectively controlled the grasses and broad leaved weeds and resulted in higher yield (223 kg ha^{-1}) and higher net returns (Rs.5766) without any phytotoxicity on the sesame. Post-emergence application of Sodium Acifluorfen 16.5% SL+ Clodinafop-Propargyl 8% EC (premix) @ 100 g *a.i*/ha (408 ml ha^{-1}) at 20 DAS and pre-emergence application of pendimethalin 30 % EC (@ 0.50 kg *a.i.*/ha^{-1} (833 ml ha^{-1}) + post-emergence application of sodium acifluorfen 16.5% SL+ clodinafop-Propargyl 8% EC (premix) @ 100 g *a.i*/ha (408 ml/ha) at 20 DAS exerted phyto toxicity and resulted in the lower yields 154 and 127 kg ha^{-1}, respectively.

❖ Among different i*n situ* moisture conservation practices, ridges and furrow with crop residue mulch on alternate furrows recorded the highest seed yield (338 kg ha^{-1}) with higher net monetary (Rs.9939 ha^{-1}) and benefit: cost (1.53).

Agricultural Research Station, Utukur

❖ Among the times of sowings during *rabi*, the better sowing window for sesame is November 2nd fortnight to January 1st fortnight.

❖ Field validation of fertilizer requirement for targeted yield of sesame: T_1: Targeted yield of 5 q ha^{-1} with RDF ; T_2: seed Targeted yield of 5 q ha^{-1} with chemical fertilizers; T_3: seed Targeted yield of 6 q ha^{-1} with chemical fertilizers; T_4: Farmer's Practice; T_5 : Control recorded 5.07, 5.60, 6.58, 5.04 and 2.60 q ha^{-1} respectively. Pooled analysis data clearly brought out efficacy of STCR regression equation by recording highest seed yield in T_3 treatment with 7.85 q ha^{-1} besides saving the cost on fertilizers.

Agricultural Research Station, Reddipalle

❖ Significantly higher seed yield and WUE were recorded (377 kg ha^{-1}) with January 1st sowing followed by October 16th date of sowing (364 kg ha^{-1}).

Agricultural Research Station, Ragolu

❖ In Rice-Sesame system, seed yield of sesame was significantly highest with conventional tillage (458 kg ha^{-1}) and among subplots it was highest with 100% RDF (325 kg ha^{-1}) but was on par with 75% RDF (310 kg ha^{-1}).

Agricultural Research Station, Nellore

- Evaluation of high yielding varieties of Sesame at different sowing dates during summer (Early Kharif, 2019) revealed that sowing of sesamum during May II F.N recorded significantly highest seed yield (375 kg ha^{-1}), followed by April II (366 kg ha^{-1}) & May I F.N (363 kg ha^{-1}) sowings. Among the varieties tested, YLM 66 recorded significantly highest grain yield of 403 kg ha^{-1}.

Crop Protection

Agricultural Research Station, Yellamanchili

- Seed treatment with Imidacloprid 600FS @ 5 mL kg^{-1} and foliar spray with Imidacloprid @ 0.3 mL L^{-1} at 30 & 45 DAS recorded the minimum Phyllody incidence (0.8 %) in sesame with highest yield (220 kg ha^{-1}).
- Seed treatment with *Trichoderma harzianum@10* gkg^{-1} +soil application of *Trichoderma harzianum* @2.5 $kgha^{-1}$ recorded the lowest incidence of *Macrophomina* root rot *in sesame* with highest yield (260 kg ha^{-1}).
- Seed treatment with Tebuconazole @ 1 g kg^{-1} recorded less incidence (5.1 %) and highest pod yield of 1020 kg ha^{-1} compared to control where maximum incidence (13.2%) of stem and root rot and minimum pod yield of 890 kg ha^{-1} was recorded.

Regional Agricultural Research Station, Anakapalle

- In screening of promising lines of sesame for resistance against pests, the germplasm lines viz., EC-370686, EC-355653, SKL-14, MLTS-4, MLTS-6, YLMW- 148, YLMW-154 and Gouri showed better tolerance to sucking pests and thus can be used in breeding programmes for resistance to sucking pests.
- Seed treatment Imidacloprid 70WS @ 7.5 g kg^{-1} seed was found effective in reducing the sucking pests in sesamum up to 30 DAS. However, persistent and significant reduction in pest incidence was observed with foliar spray of Imidacloprid 17.8SL (0.25 ml L^{-1}), diafenthiuron 50WP (1.25 g L^{-1}) and thiacloprid 240SC (0.25 ml L^{-1}) at 30 and 60 DAS.

Agricultural Research Station, Utukur

- Twenty promising entries were screened against leaf hopper in four different dates of sowing in *kharif*, 2019. Highest leaf hopper and phyllody incidence was observed in first date of sowing (15.07.19). Among the entries, lowest leaf hopper per plant (0.50) was observed in entry 59 followed by IC-205556 (0.90) and 208 (1.60). The leaf hoppers were collected and sent for identification to Division of entomology, IARI, New Delhi and identified as *Orosius albicinctus*, a vector of phyllody.
- Seed treatment with tebuconazole @ 1.0 g kg^{-1} seed + soil application of *Trichoderma* @ 2.0 kg $acre^{-1}$ recorded the lowest percent disease incidence of 15.33% stem and root rot in sesamum with highest seed yield of 806 kg h^{-1} and cost benefit ratio of 1: 4.11.

Castor

Crop Production

- Among the different cropping systems tested, castor + foxtail millet recorded the highest seed yield (2240 kg ha^{-1}) with Land Equilent Ratio and Area Time Equilent Ratio, gross returns and net returns, which is significant over the other treatments followed by the Castor + Cowpea (1585 kg ha^{-1}), Castor + Pearl millet (1585 kg ha^{-1}) and Sole castor (1505 kg ha^{-1}) respectively.

Niger

Crop Production

Regional Agricultural Research Station, Chintapalle

❖ Influence of pollinators (European and Indian honeybee) on Niger productivity revealed that open pollination was found effective as all type of bees (Little bee, Indian bee, Stingless bee and other Pollinators) were allowed to pollinate the Niger crop and recorded the highest yield (3.49 q ha^{-1}) compared to individual bee pollinations and without bee pollination. Lowest yield was recorded in Crop caged without bees with 0.9 q/ha^{-1}. Quantity of honey was non significant, but there was significance in pollen collection by European and Indian bees.

Crop caged with Indian bee

Crop caged with European bee

Crop caged without Bee

Open Pollination

Mustard

Crop Production

Agricultural Research Station, Reddipalli

❖ Significantly higher seed yield was obtained with November 1st sowing date (1431 kg ha^{-1}) followed by October 16th date of sowing (1256 kg ha^{-1}). Gross returns (Rs. 50085 ha^{-1}) and net returns (Rs. 40685/ha^{-1}) were higher with November 1st date of sowing of mustard. The returns were significantly lower with January 1st date of sowing of mustard. Water use efficiency was highest with November 1st date of sowing (4.47 kg/ha^{-1}) and lowest with January 1st date of sowing (1.33 kg ha^{-1}).

❖ Significantly superior seed yield (755 kg) was recorded with mustard variety, Sangam over Sita variety (563 kg ha^{-1}). Irrespective of variety, three days irrigation interval registered significantly higher seed yield of 696 kg ha^{-1} compared to irrigation interval of seven days, 10 days and 12 days. There is no difference in mustard seed yield between varieties when irrigated at seven days or 10 days of interval. Maximum gross returns (Rs. 29068 / ha^{-1}) and net returns (Rs. 19668 ha^{-1}), and BCR (2.09) was obtained with Sangam variety over Sita variety. Among irrigation intervals, three days recorded higher gross returns (Rs. 26796 ha^{-1}) net returns (Rs. 17396 ha^{-1}) and BCR (1.85) over seven days, 10 days, 12 days irrigation interval.

Commercial Crops

Cotton

Crop Production

Regional Agricultural Research Station, Lam

❖ In the agronomic evaluation of pre-release inter specific (H x B) cotton hybrids, ARBHB 1 and LAHB 1 recorded similar yields. Maximum seed cotton yield was recorded in 90 cm x 45 cm (2833 kg ha^{-1}) and was significantly superior to 105 cm x 60 cm (2347 kg ha^{-1}). Application of different levels of nutrients did not influence the seed cotton yield.

- In the agronomic evaluation of pre-release *G. barbedense* cotton varieties, DB1601 (2501 kg ha^{-1}) and DB1602 (2441 kg ha^{-1}) recorded similar yields. Maximum seed cotton yield was recorded in 90cm x 45cm (3065 kg ha^{-1}) and was significantly superior to 105cm x 60cm (1877 kg ha^{-1}). Maximum seed cotton yield was recorded with application of 150% RDF (2722 kg ha^{-1}) and was significantly superior to 100% and 125% RDF.
- Significantly higher seed cotton yield was recorded at 150% RDF coupled with mepiquat chloride application @ 20g *a.i.* /ha^{-1} at 60 DAS and 75 DAS (3500 kg ha-1)
- Foliar application of 2% KNO_3 (four sprays at weekly interval) recorded significantly superior seed cotton yield of 2874 kg ha^{-1} followed by foliar application of glycine betain @ 100 ppm (single spray) which recorded seed cotton yield of 2797 kg ha^{-1}.
- Effect of bio stimulant on growth and development of cotton revealed that seed cotton yield recorded was maximum in Jaadoo BG II (3888 kg ha^{-1}) when compared to NDLH 1938 (2675 kg ha^{-1}). Among the plant growth regulators tested, significantly superior seed cotton yield (3502 kg ha^{-1}) was recorded with the application of ethrel 45 ppm at 40 DAS and mepiquat chloride 100 ppm at 90 DAS.

Regional Agricultural Research Station, Nandyal

- Higher seed cotton yield (2515 kg ha^{-1}) was recorded with 75 % of RDN + spot application in 4 splits at basal, squaring, flowering and boll development stages + foliar application of 1% urea at squaring, flowering, boll development and was on par with 75 % RDN + spot application in 4 splits at basal, squaring, flowering and boll development stages + foliar application of 1% urea at squaring, flowering, boll development + raising of fodder cowpea between rows incorporated before flowering (2163 kg ha^{-1}). Lower seed cotton yield (1571 kg ha^{-1}) was recorded with no nitrogen treatment.
- In studies on long-term fertilization on the productivity of rainfed cotton and soil quality in vertisols, highest seed cotton yield of 5207 kg ha^{-1} was recorded with 150% RDF + FYM @5 t ha^{-1} + Gypsum @ 500 kg ha^{-1} + $ZnSO_4$ @ kg ha^{-1} followed by 4997 kg ha^{-1} in 100% RDF + FYM @5 t ha^{-1} + Gypsum @ 500 kg ha^{-1} +$ZnSO_4$ @50 kg ha^{-1} compared to Control (1263 kg ha^{-1}) and FYM@5 t ha^{-1}only applied plots (1976 kg ha^{-1}).
- In a study on effect of plant growth regulators, maximum number of bolls per plant (33.8), boll weight (3.25 g), higher Nitrate reductase activity (22.32 µg NO_2 g^{-1} h^{-1}) total chlorophyll content (1.47 mg g -1) and yield 2533 (kg ha^{-1}) were recorded with application mepiquat chloride 750 ppm @ 90 DAS. Among the varieties, Yaganti recorded higher number of bolls per plant (34.7), sympodia (22) and yield (2956 kg ha^{-1}) compared to NDLH 1938 with application mepiquat chloride 750 ppm @ 90 DAS.

Crop Protection

Regional Agricultural Research Station, Lam

- During *kharif* 2019, first peak incidence of leafhoppers (8.64 three $leaves^{-1}$) was observed during 39th Standard week (last week of September). Second peak (6.0 three $leaves^{-1}$) was observed during 49th standard week (1st week of December). Severe incidence of pink bollworm was observed and no. of larvae per

20 green bolls ranged from 2 to 52 (3rd week of November to last week of January).

- Higher incidence of aphids (2.0 three leaves^{-1}) and jassids (2.2 three leaves^{-1}) were recorded in IPM. Where as in Farmers Practice (FP), the incidence of both aphids (1.2 three leaves^{-1}) and jassids (1.7 three leaves^{-1}) was low and the incidence of thrips (10.2 three leaves^{-1}) and whitefly (0.6 three leaves^{-1}) was high in FM than IPM.
- In evaluation of insecticides for pink bollworm, green boll locule damage (%) was lowest in cypermethrin 25EC, bifenthrin10 % EC and profenophos 40 EC and superior to rest of the treatments. Highest yields were obtained in cypermethrin 25 EC, profenophos 40 EC and bifenthrin 10 % EC.
- During *kharif* 2019, min. temperature, RH I, RH II and rainfall significantly influenced the progress of Corynespora leaf spot. Rust was severe at boll development and boll bursting stages as influenced by min. temperature, RH I, rainfall and no. of rainy days.
- Multiple disease resistant reactions were recorded in entries *viz.*, BGDS 1047, CNH 17395, RAH 1075, NDLH 1938, ARBHH 1902, SBSD 5-6, CCB 51, and RHC HD 1420.

Regional Agricultural Research Station, Nandyal

- For the Pink bollworm management in cotton, Chloropyriphos 20% EC @ 2.5 ml spray at 90 DAS and Lamda Cyhalothrin 5% EC @ 1ml of water spray at 120 DAS had recorded lowest green boll, open boll and locule damage of 20.0%, 19.3% and 25.8 %, respectively and recorded highest yield of 2965 kg ha^{-1}.
- IPM module adopted for pink bollworm in cotton has recorded 1.3 pink bollworm larvae per 20 green bolls where as in farmers practice 3.3 larvae were recorded in 20 green bolls. IPM plot had recorded green boll damage, open boll damage and locule damage of 6.6%, 10% and 5% respectively, whereas in farmers practice green boll damage, open boll damage and locule damage was 25%, 25% and 8.4% respectively. Yield of 2375 kg ha^{-1} was recorded in IPM plot whereas in farmers practice it was 1875 kg ha^{-1}.
- In evaluation of new chemicals/ scheduled sprays against pink bollworm, the mean lowest green boll damage, open boll damage and number of pink bollworm larvae per 25 green bolls i.e. 33.56%, 10.66% and 6.67%, respectively (boll basis) by pink bollworm was recorded in treatment pheromone traps along with sprays of neem oil 1500 ppm @ 5.0 ml, Chlorantraniliprole 18.5 SC @ 0.3 ml of water followed by Bifenthrin 10% EC @ 1.0 ml of water sprayed at weekly intervals.

Sugarcane

Crop Production

Regional Agricultural Research Station, Anakapalle

- Among different early maturing sugarcane genotypes 2010A 229 registered higher cane yield (86.7 t ha^{-1}) followed by 2006 A 223 (84.4 t ha^{-1}). Among different nitrogen levels, 150% recommended dose of nitrogen along with FYM @ 25 t/ha (88.7 t ha^{-1}) registered significantly higher cane yield than 100% RDFN along with FYM @ 25 t ha^{-1}.
- Performance of early maturing sugarcane genotypes at different harvesting stages indicated that, sugarcane genotypes 2010A229 (82.5 t ha^{-1}) and 2009 A 107 (80.6 t ha^{-1}) registered significantly higher cane yield

compared to other varieties. All the early maturing sugarcane genotypes registered significantly higher cane yield when harvested at 10 months (83.5 t ha^{-1}) or 11 months age (86.0 t ha^{-1}) and yield decreased beyond 11 months of harvest.

- Working with trash shredder + spraying of Gibberellic acid @ 100 ppm at one week after ratooning registered significantly higher ratoon cane yield (69.2 t ha^{-1}) in late initiated ratoons and it was closely followed by working with trash shredder (67.5 t ha^{-1}). Control plot registered the lowest cane yield of 56.8 t ha^{-1}.
- Mean data over three years (2017 to 2019) on profitability of different alternate cropping systems to rainfed sugarcane showed that, Groundnut – Horsegram crop sequence (38.79 t ha^{-1}) or Ragi – Horsegram (32.70 t ha^{-1}) registered higher sugarcane equivalent yield closely followed by Redgram (29.88 t ha^{-1}) than other crop sequence. Redgram registered higher B.C ratio of 2.49 followed by Ragi – Horsegram (1.97) Rainfed sugarcane registered 1.02 B.C ratio.
- Response of sugarcane ratoon to micro nutrient application through drip recorded relatively higher yield than soil application. Application of micro nutrient mixture (formula 4) recorded maximum cane yield of 87.7 t ha^{-1} followed by application of zinc through drip (86.9 t ha^{-1}) while application of NPK alone recorded lower cane yield of 78.7 t ha^{-1}. Quality parameters did not vary much with micro nutrient application.
- Studies on effect of Nano scale oxides of Zinc and Iron in sugarcane revealed that, highest cane and sugar yields of 86.27 and 13.55 tha^{-1} was observed with RDF+$ZnSO_4$ @ 50 kg ha^{-1} soil application at basal and it was on par with aapplication of nano ZnO @ 0.04 % at 45 & 90 DAP (84.75 & 13.20 t ha^{-1}) and application of nano Iron Oxide @ 0.1 % at 45 & 90 DAP (84.10 & 13.28 t ha^{-1}), respectively. Per cent zinc content (23 ppm) in sugarcane whole plant was significantly higher with nano ZnO @ 0.04 % at 45 & 90 DAP over soil application of Zinc Sulphate @ 50 kg ha^{-1} (20 ppm).
- Performance of sugarcane clones / varieties under limited irrigated conditions (early planting) revealed that 2009A 107 (57.02 t ha^{-1}), 2006A 223 (57.93 t ha^{-1}) recorded on par yield compared with check 87A 298 (54.48 t ha^{-1}). Under midlate group sugarcane clones 2011A 222 (55.42 t ha^{-1}), 2009A 252 (56.20 t ha^{-1}) and 2011A 319 (55.69 t ha^{-1}) recorded on par yield with standard 83V 15 (57.98 t ha^{-1}).
- In identification of suitable chemicals for arresting inversion and cane quality deterioration in sugarcane, chemical spray on freshly harvested canes with Benzyl Konium Chloride @ 2000 ppm +Sodium meta silicate @ 1 % recorded highest juice sucrose (18.80 %) and less percent dextran.

Agricultural Research Station, Perumallapalle

- Four pre release early varieties in sugarcane were tested for nitrogen doses with three planting methods. Among these early varieties 2012 T 81 recorded highest average cane yields when planted in wide row method of planting with 125 % of RDN (114.2 t ha^{-1}) followed by 2012 T 180 (98.5 t ha^{-1}).
- Four pre release midlate varieties in sugarcane were tested for nitrogen response. Among these, 2012 T 58 recorded highest average cane yield at 150% RDN (124.2 t ha^{-1}).
- Optimum time of planting is January for midlate varieties (December-January for ratooning)

and for early varieties February (November-December for ratooning) is to be recommended for optimum plant and ratoon cane yields in southern agro-climatic zone.

Sugarcane Research Station, Vuyyuru

- The cane yield was increased significantly from 10th -12th month in new genotypes 2011 V 127, 2011 V 226 and 2008 V 257, whereas no significant difference in 2003 V 46 (check) in different months of harvest.
- During 2019-20, Liquid Bio-Fertilizers (LBF) evaluated in ratoon I and Ratoon II revealed that the highest plant population and brix content was noticed in 100% RDF + LBF as basal (83338 no. and 21.53) at 60 DAR whereas, stalk population was highest in 100% RDF + LBF as basal & at 45 DAP + FYM @ 10 t h^{a-1} at 240 DAP (88048 no.and 19.44). However, highest yield was noticed in later treatment i.e 100% RDF + LBF as basal & at 45 DAP + FYM @ 10 t ha^{-1} at 240 DAP (108.38 t ha^{-1}).

Crop Protection

Entomology

Regional Agricultural Research Station, Anakapalle

- In survey of insect pests in sugarcane agroecosystem, maximum incidence of early shoot borer (30-60%) was recorded during the months of March-June due to high temperature and low relative humidity prevailed during that period. Low to moderate incidence of fall army worm (2-20%) was observed during the months of March to May with maximum incidence during April (20%). Maximum incidence of oriental thrips, *Fulmikiola orientalis* (10-30%), termite (50-60%), yellow mealybug, *K. sacchari* (20-50%) were observed during the month of June in rainfed sugarcane.
- In formulation and validation of IPM module in sugarcane, high per cent germination (76.74%), less incidence of early shoot borer (11.22% dead hearts), internode borer (40.41%) with low intensity (3.88%) and scale insect (6.27%) with low intensity (0.86%) were recorded in IPM module compared to untreated control (61.60%; 52.41% Dead Hearts (DH), 76.33%, 9.59%; 46.34%,7.10%). More millable canes (69,390 ha^{-1}) and superior cane yield (74.50 t ha^{-1}) were recorded in IPM module with a B:C ratio of 1.64 compared to untreated control (53,340 millable canes ha^{-1}; 55.08 t ha^{-1}; 1.42).
- In assessment of yield losses caused by borer pests of sugarcane under changing climate scenario, high cumulative incidence of early shoot borer (74.11% DH), high incidence of internode borer (92.80%) with 6.48% intensity were recorded in unprotected plot which resulted in reduced cane weight (0.88 kg cane-1), less NMC/ha^{-1} (55,290) and 48.6 per cent reduction in cane yield (48.57 t ha^{-1}) compared to protected plot in which less cumulative incidence of early shoot borer (14.62% DH) and internode borer (68.41%) with low intensity (4.94%) were recorded and resulted in good cane weight (1.48 kg/cane), more number of NMC/ha (63,860) and superior cane yield (94.52 t ha^{-1}).

Sugarcane Research Station, Vuyyuru

- The Bio Intensive based IPM (BIPM) strategies comprising of f**ield release of *Trichogramma chilonis* @ 50,000 ha^{-1} at 30 DAP and two times after node formation at an interval of seven days in combination with i**nstallation of pheromone traps @ 20 ha^{-}

^{1} for mass trapping at 30 DAP till harvest had registered cumulative per cent dead hearts (7.28) by early shoot borer and per cent incidence (19.15) of internode borer as against highest in control plots with 39.47 per cent dead hearts by early shoot borer, 50.52 per cent incidence of internode borer infesting sugarcane.

- Among various biopesticides evaluated against termites infesting sugarcane, *M. anisopliae* (1 x 10^{5} Colony Farming Units) @ 1 kg a.i. ha^{-1} had registered lowest mean no. of infested canes (7.49%) and lowest mean portion of cane infestation (8.87%) with 75.8 and 81.9 per cent reduction of infested canes and portion of cane infestation, respectively over control.
- During the year 2019-'20 without destrashing the lower leaves the chemical application of imidacloprid @ 0.25 ml L^{-1} and clothionidin @ 0.25g L^{-1} were found effective in suppressing scale insect with 75.8 and 68.5 per cent reduction over control, respectively. However, destrashing the lower leaves followed by spraying with imidacloprid @ 0.25 ml/l^{-1} had registered 86.9 per cent reduction of scale insect incidence over control.
- Among various insecticides assessed against sugarcane *Pyrilla* during 2019-'20, application of imidacloprid @ 0.25 ml L^{-1} had registered significant superiority with respect to per cent mortality at 3, 7 and 15 days after spraying recording 39.5 -57.2 per cent adult mortality over control. The insecticides acephate @ 1.0 g L^{-1}, dimethoate @1.7 ml L^{-1} were also found effective and on par with application of imidacloprid in suppressing the sugarcane pyrilla incidence.

Agricultural Research Station, Perumallapalle

- The lowest incidence of early shoot borer (6.33%) was recorded in Trash mulching+ earthing up + Detrashing at 20 days interval from 100 DAP. The next lowest was 8.19% in T3 (Trash mulching+ earthing up +Detrashing at 100 DAP). In untreated control, 28.10% incidence was recorded. In Trash mulching+ earthing up, granular application of Fipronil/Chlorantraniliprole treatments, 20-21% incidence of ESB was recorded.

Pathology

Regional Agricultural Research Station, Anakapalle

- Among 50 entries evaluated against smut under artificially inoculated conditions during 2019-20, 16 entries *viz.*, CoC 16336, CoA 17324, CoC 17337, CoOr 17346, PI 17337, CoOr 15346, CoC 16339, CoV 16357, 2016A 151, 2016A 275, 2016A 291, 2016A 387, 2016A 254, 2016A276, 2016A743 and 2015A222 exhibited moderately resistant reaction.
- Out of 52 entries screened for red rot resistance in plug method of inoculation, 23 genotypes, *viz.*, CoA 17321, CoA 17322, CoA 17323, CoA 17324, CoC 17337, CoOr 17346, PI 17377, CoA 16321, CoC 15336, CoOr 15346, CoV 16357, 2015A 51, 2015A 59, 2015A 228, 2015A 230, 2015A 233, 2016A 232, 2016A 165, 2016A 276, 2016A 286, 2016A 369 and 2016A 743 exhibited resistant reaction to the established pathotypes (Cf 419, Cf 671 and Cf 997) of red rot fungus.
- Among 50 entries evaluated against wilt (*Fusarium sacchari)* under artificially inoculated conditions, 11 entries *viz.*, PI 17376, PI 17377, CoV 15356, 2015A 51, 2015A 85, 2015A 93, 2015A 137, 2015A 228, 2015A 230, 2016A 165, 2016A238, 2016A387, 2016A737 and 2016A 743 exhibited resistant reaction.

- Sett treatment followed by foliar spray with carbendazim @ 0.05% was found effective for the management of top rot disease of sugarcane.
- Spraying of tebuconazole (0.1%) or Trifloxystrobin+tebuconazole (0.1%) immediately after ratooning followed by another spray at 30 days after ratooning was found highly effective for management of smut in sugarcane ratoon crop.

Agricultural Research Station, Perumallapalle

- Among the 41 sugarcane entries tested for red rot reaction against four pathotypes (Cf 04, Cf 05, Cf 06 and Cf 10) 2016 T 84, 2015 T 128, 2015 T 189 and 2015 T 235 showed resistant to moderately resistant reaction to all four pathotypes in plug method and cotton swab method.

Sugarcane Research Station, Vuyyuru

- Plant extracts of Pongamea, Tobacco, Eucalyptus, Garlic, Turmeric, Neem, Ginger and Tulasi, were tested against *Colletotrichum falcatum* by poisoned food technique *in vitro.* Among which Eucalyptus leaf extract was shown 100 % inhibition at 20 % conc. Tobacco extract inhibited the mycelial growth up to 89.04 percent at 25 % conc. followed by pongamea (88.09 %), Turmeric (71.42 %) and ginger (49.28 %) @ 25 % conc.

Mesta

Crop Production

- Among different mesta based cropping sequences, Mesta - Maize sequence recorded higher fibre equivalent yield of 92.73 q ha^{-1} followed by Mesta – Groundnut crop sequence (38.72 q ha^{-1}), whereas sole mesta crop recorded fibre yield of 18.65 q ha^{-1} only.
- In mesta based inter cropping system, mesta + maize inter cropping system (2:1) recorded highest equivalent fibre yield of 63.91 q ha^{-1} with B:C ratio of 2.34 followed by mesta + sunhemp intercropping system (3:4) (31.33 q ha^{-1}) with B:C ratio of 2.94, whereas sole mesta crop recorded fibre yield of 20.10 q/ha only with B:C ratio of 1.51.
- Application of NPK fertilizers @ 80: 60: 60 kg ha^{-1} along with 25% lime requirement (458 kg ha^{-1}) and FYM @ 5 t ha^{-1} recorded highest seed and fibre yield of 11.15 q ha^{-1} and 22.19 q ha^{-1}, respectively with B: C ratio of 3.9. Whereas application of only NPK @ 80: 60: 60 kg ha^{-1} recorded seed and fibre yield of 3.77 q ha^{-1} and 20.51 q ha^{-1} respectively with B: C ratio of 2.6.
- The Sisal hybrid, Leela recorded significantly higher number of leaves (57) as compared to the local variety (37). However, the local variety recorded significantly greater leaf length (67.0 cm) and leaf width (9.4cm) than the hybrid Sisal (49.3 cm and 8.0 cm, respectively). Highest Green biomass yield (316.52 q ha^{-1}) was recorded with 90:30:60 kg NPK ha^{-1} + vermicompost @ 2.5 t ha^{-1}.
- Among different intercropping systems evaluated during rabi season in Sisal, Sisal + Blackgram system recorded highest green biomass (52.50 t ha^{-1}) followed by Sisal + Greengram system (47.90t ha^{-1}). Among different inter crops, cowpea recorded highest yield (11.22 q ha^{-1}) followed by greengram (10.00 q ha^{-1}).
- Pre-emergence (PE) application of Pretilachlor 50 EC @ 900 g ha^{1} at 45 - 48 hrs of sowing with sufficient soil moisture + one hand weeding recorded higher fibre yield of 24.97 q ha^{-1} and proved superior over two hand weedings (23.46 q ha^{-1}). Post emergence (PoE) application of

Quizalofop ethyl 5 EC 60 g + Ethoxysulfuron @100gha^{-1} at 15 DAE (20.61 q ha^{-1}) registered on par yields with two hand weedings. Higher B:C ratio (2.81) was recorded in PoE application of Quizalofop ethyl 5 EC 60 g + Ethoxysulfuron @100 g ha^{-1} at 15 DAE as compared to PE application of pretilachlor + one hand weeding at 15-20 DAE.

Crop Protection

- Seasonal incidence of major diseases of mesta revealed that, foot and stem rot was higher during September month. Correlation studies indicated that A.N. relative humidity (0.553) and rainfall showed positive correlation (0.504) with foot and stem rot disease incidence.
- Out of 44 germplasm entries of mesta (Roselle) tested for foot and stem rot incidence, the entries REX-4 (25.0%), AR-20 (25.8%) and AR-66 (25.4%) were moderately susceptible while the remaining entries were found to be highly susceptible.

Tobacco

Crop Production

- To test the response of bidi tobacco to different drought mitigation measures, higher leaf length (51.5 cm), leaf width (25.2 cm) spangle score (8.6), higher relative water content (92.6%) at 90 DAP and dry wt/ unit leaf area (11.0 mg cm^{-2}) and cured leaf yield (2789 kg ha^{-1}) was observed with application of foliar spray with Triacontanol 0.1%EW @ 2 ml L^{-1} at early growth stage and grand growth stage.
- To find out the alternative use of tobacco as a sustainable crop for seed oil, higher seed yield (444 kg ha^{-1}) was observed with planting at 60 cm x 60 cm spacing. Higher seed yield (446 kg ha^{-1}) was recorded with application of 150 RDF (165 N+105 P_20_5+75 K_2O). Leaf quality analysis indicated poor quality of leaf (lower nicotine, higher reducing sugars and higher chlorides). A119 recorded higher seed yield (532 kg ha^{-1}) and oil yield (173.4 kg ha^{-1}) when planted at 60 cm x 60 cm with application of 150 % RDF (165 N+105 P_20_5+75 K_2O).
- In studies on chemical sucker control in natu tobacco, significantly lower number of ground suckers per plant (1.7), fresh weight of ground suckers per plant (24.3 g), dry weight of ground suckers per plant (5.0 g), number of auxiliary suckers/ plant (2.5), fresh weight of auxiliary suckers per plant (20.6 g), dry weight of auxiliary suckers per plant (3.6 g), cured leaf yield (2213 kg ha^{-1}), net returns (Rs 90717 ha^{-1}) with BCR of 2.70 were observed with application of fatty alcohol @ 5 % either at button or flowering stage without affecting the leaf quality.

Fodder Crops

Regional Agricultural Research Station, Tirupati

- Bio-fortification of annual cereal fodder crops for enhancing zinc and iron content revealed that significantly highest green fodder yield of 50,825 kg ha^{-1} and economics (net returns: Rs 74,689 ha^{-1} and B:C of 0.96) were realized with African tall maize variety compared to fodder sorghum SSV-74 (44,486 kg ha^{-1}, net returns Rs/ha 46,673 and B:C ratio of 0.54). With regard to application of different methods and levels of zinc and iron, significantly highest green fodder yield of 49,269 kg/ha with net returns of Rs 65,892/ha was recorded with application of 10 kg Fe SO_4 /ha as basal + 1% $FeSO_4$ foliar spray at 45 DAS, however comparable with 10 kg $ZnSO_4$ /ha as basal + 1% $ZnSO_4$ foliar spray at 45 DAS, 20 kg $ZnSO_4$ /ha as basal + 1% $ZnSO_4$ foliar spray

at 45 DAS, 20 kg $FeSO_4$/ha as basal + 1% $FeSO_4$ foliar spray at 45 DAS.

C. DISCIPLINE ORIENTED RESEARCH

1. Dryland Agriculture

Agricultural Research Station, Anantapuramu

- The study on the effect of subsoiling on growth and yield of dryland crops indicated that, higher pigeonpea equivalent yield was recorded with subsoiling @ 1.0 m distance (870 kg ha^{-1}), which was significantly superior to subsoiling @ 2.0 ml distance and no subsoiling (control). Among different rainfed crops tested, groundnut crop recorded significantly higher pigeonpea equivalent yield (1413 kg ha^{-1}) as compared to other tested crops.
- In an experiment on *in situ* moisture conservation through conservation furrows in groundnut + pigeonpea (8:1) intercropping system, formation of conservation furrows after every row of groundnut at 30 DAS produced more number of filled pods per plant, test weight, shelling per cent and total groundnut pod equivalent yield (2223 kg ha^{-1}). Also, higher net monetary returns (Rs. 95,909 ha^{-1}), benefit cost ratio (4.17) and rain water use efficiency (3.87 kg/ha^{-mm}) were registered with formation of conservation furrows after every row treatment as compared to other tested treatments.
- Among the treatments tested under supplemental irrigation, groundnut + pigeonpea (15:1) intercropping system recorded higher groundnut pod equivalent yield (1661 kg ha^{-1}), net returns (Rs.68380 ha^{-1}) and B:C ratio (3.46) as compared to other cropping systems.
- In an experiment on real time monitoring and management of agricultural drought in major rainfed crops (groundnut, pearl millet and horsegram), real time drought management recorded higher pod yield in groundnut (1660 kg ha^{-1}), higher seed yield in pearl millet (1995 kg ha^{-1}) and horsegram (363 kg ha^{-1}) as compared to control. However, when compared to all tested crops, groundnut crop registered higher benefit cost ratio (3.13) and pearl millet recorded higher rain water use efficiency (4.48 kg/ha^{-mm}).
- Assessment of millet based pigeonpea intercropping systems for *vertisols* of scarce rainfall zone, sole pearl millet crop recorded higher seed yield (1680 kg ha^{-1}) and foxtail millet equivalent yield (1866 kg ha^{-1}), net returns (Rs.21094 ha^{-1}), B:C ratio (2.69) and rain water use efficiency (2.62 kg/ha^{-mm}) as compared to other intercropping systems.
- Among various agroforestry systems tried in class IV lands, under delayed monsoon conditions fodder sorghum (MP Chari) recorded higher total green fodder yield (17.2 t ha^{-1}) as sole crop, which was followed by fodder sorghum in custard apple as intercropping (16.9 t ha^{-1}) compared with other systems (simarouba and jamun).
- During *kharif* 2019, among the various moisture conservation practices evaluated in groundnut, pigeonpea and castor, subsoiling @ 1.0 m distance treatment recorded higher pod (1386 kg ha^{-1}) and haulm (2980 kg ha^{-1}) yield, net returns (Rs. 53465 ha^{-1}), benefit cost ratio (2.74), rain water use efficiency (2.82 kg ha^{-mm}) in groundnut; higher seed yield (459 kg ha^{-1}), net returns (Rs. 10,467 ha^{-1}), benefit cost ratio (1.69) in pigeonpea and higher seed yield (1088 kg ha^{-1}) , net returns (Rs. 21,467 ha^{-1}), benefit cost ratio (2.08) and rain water use efficiency (2.22) in castor as compared to other treatments.

- Among different crops tried under delayed monsoon as contingent crops, pearlmillet recorded higher grain yield (2431 kg ha^{-1}), rainwater use efficiency (5.23 kg ha^{-mm}). However, higher net returns were realized with groundnut (Rs.43073 ha^{-1}), pearlmillet (Rs. 37,850 ha^{-1}), greengram (Rs.37,442 ha^{-1}) and foxtail millet (Rs.33,875 ha^{-1}).
- In development of microbial consortia for drought tolerance in rainfed groundnut, significant groundnut pod yields (1595 kg ha^{-1}) were recorded with soil application of Consortia 1, consisting of *Pseudomonas putida* P7 + *Bacillus subtilis* B30.
- In enhancement of nutrient use efficiency and productivity using biofertilizer consortia in rainfed groundnut, significant groundnut pod yields (860 kg ha^{-1}) were recorded with soil test based fertilizer application along with application of P consortia+ K mobilizer.
- Groundnut sown during 2nd FN of July has given significantly higher yield (2086 kg ha^{-1}) than 1st FN of July (1541 kg ha^{-1}) and 1st FN of August sown crop.
- Groundnut irrigated at 0.6 IW/CPE ratio recorded lower Kc (crop coefficient values) for different growth stages and produced higher yield (1956 kg ha^{-1}) than 0.8 (1725 kg ha^{-1}) and 1.0 (1774 kg ha^{-1}) IW/CPE.
- Among different *in situ* rain water conservation practices, inter plot rain water harvesting at 10 m interval + deep ploughing with 5 row duck foot cultivator has recorded significantly higher yield (2016 kg ha^{-1}) and was on par with inter plot rain water harvesting at 10 m interval + Chisel plough at 2 m interval (1850 kg ha^{-1}).
- Studies on Endophytes for drought mitigation in rainfed groundnut revealed that higher pod yield of 1458 kg ha^{-1} in seed treatment with Endophytes culture J-22, followed by R-51 (1241 kg ha^{-1}) and S-15 (1214 kg ha^{-1}) and the lower groundnut pod yield of 1061 kg h^{a-1} was recorded in control. Whereas the ANGRAU Package of practices and foliar spray with multi K recorded on par yields of 1189 and 1145 kg ha^{-1}, respectively.

Regional Agricultural Research Station, Tirupati

- Among different contingent crops sown during II fortnight of August for rainfed *Alfisols*, red gram recorded highest seed yield of 1836 kg/ha^{-1} and net returns, followed by field bean (2598 kg ha^{-1} vegetable and 965 kg ha^{-1} seed yield and net returns Rs.48,270, castor (1818 kg ha^{-1} seed yield and Rs. 45,580 ha^{-1}), fodder sorghum (51,543 kg ha^{-1}green fodder and Rs.37,223 net returns) and pearl millet as fodder (44,032 kg ha^{-1} green fodder and Rs.30,912 ha^{-1} net returns). Among different contingent crops sown during I fortnight of September, castor recorded highest seed yield of 3369 kg ha^{-1} and net returns of Rs.1,35,965 followed by red gram with 1634 kg ha^{-1} seed yield and Rs.40,460 net returns, fodder sorghum with 51,543 kg ha^{-1} green fodder and net returns of Rs.37,223 and pearl millet as 47,793 kg ha^{-1} green fodder and Rs.34,673 ha^{-1}net returns.

2. Cropping Systems

Regional Agricultural Research Station, Maruteru

- Studies on identification of cropping systems module revealed that, system net returns were

highest with Rice-Marigold cropping system (Rs. 86,400/- per ha) followed by Rice-Greengram (Rs. 81,067/- per ha) and Rice-Blackgram cropping system.

Regional Agricultural Research Station, Chintapalle

❖ Evaluation of rice-based cropping systems for higher productivity with non-traditional crops in HAT zone revealed that groundnut (59.2 q ha^{-1}), maize (51.9 q ha^{-1}) and wheat (48.2 q ha^{-1}) crops recorded more system productivity than the remaining crops.

Agricultural Research Station, Darsi

❖ Among the suitable millet-pulse based cropping sequence for rainfed regions the highest system productivity in terms redgram equalent yield was recorded with korra- greengram (2691 kg ha^{-1}) and korra-cowpea sequence under rainfed conditions.

3. Integrated Farming Systems

Regional Agricultural Research Station, Maruteru

❖ During 2019-20, **C**rop component of paddy under organic production system during both *kharif* (3885 kg ha^{-1} in sole paddy block and 4203 kg/ha in Fish pond) with BPT 5204 variety and *rabi* season (6120 kg ha^{-1} in sole paddy block and 6367 kg/ha in Fish pond) with MTU 1121 Variety was recorded. As fish component, three species of fingerlings viz., Rohu, Indian carp and Grass carp of 12 months aged 5-7'' size were released in fish tank in two spells. First crop was realized with 101 kg fish crop and the second fish crop was realized 54.5 kg. A total amount of Rs. 18,640/- was realized from 800 m^2 pond with fish component. Poultry bird's *viz.*, Kadaknath and Aseel birds rearing in cages on fish pond realized an amount of Rs. 10,084/- (Rs.9,040/- from live bird and Rs. 1,044/- from Eggs). From Horticulture component an amount of Rs. 19,107/- was realized which was grown on raised bunds of fish tank cultivated with seasonal vegetables, gourds, flower crops and fruit crops like Banana and Guava. An amount of Rs. 19,890/- was realized from cow milk under Dairy component. An additional amount of Rs. 7,850/- realized from value addition of rice as raw brown rice from the organic IFS unit. A total amount of Rs. 87,374/- (Rs. 16,175/- from paddy and Rs. 71,199/- from various components) was realized from IFS unit during 2019-'20 besides recycling of farm waste.

❖ Studies on Carbon crediting and GHG emission in IFS model revealed that, net GHG emission was - 5042 CO_2-e which indicates the established IFS model at RARS, Maruteru is more suited for environmental sustenance and further there is an ample scope to include more number of components for better income generation and recycling of components. Hence, the IFS model of RARS, Maruteru sinks more carbon in the system and emits less CO_2. This IFS model is environmentally friendly unit.

Agricultural Research Station, Vizianagaram

❖ On-farm evaluation of farming system modules

for improving profitability and livelihood of small and marginal farmers revealed that cropping system diversification with short duration rice variety MTU-1121 and Zero tillage ragi recorded 1124 kg ha^{-1} more rice grain yield when compared to farmer varieties *viz*., BPT-3291 or BPT-5204. With livestock diversification, supply of perennial fodder grass strips and pillipesara seed to the farmers recorded additional milk yield of 408 L per house hold. With the introduction of Kadakanth Birds (5 female +1 male) as back yard poultry units, there were additional 308 eggs and three kg meat with an additional net monetary benefit of Rs.4648 per house hold. In product diversification, supply of high yielding varieties of all types of vegetable seed as minikits to all farmer households, recorded an additional 318 kgs of vegetables per house hold.

4. Organic Farming

Rice

Regional Agricultural Research Station, Nandyal

❖ Organic Farming Research in Rice Grown in Vertisols under K.C. Canal ayacut revealed that Organic practice recorded 4280 kg $ha^{-1}$of grain yield which is 37% less yield compared with inorganic rice cultivation method (6840 kg ha^{-1}). Economics of organic rice practices costs Rs 55500/- per ha against Rs 50500/- per ha in inorganic rice practices. Similarly C:B ratio of 1.6 was obtained with organic practices and 2.8 in inorganic practice.

Regional Agricultural Research Station, Maruteru

❖ Studies on development of package for organic rice indicated that green manuring - *in situ* with Daincha and FYM application @10 t ha^{-1} as basal and top dressing of neem cake @ 500 kg ha^{-1} and Vermicompost @ 500 kg ha^{-1} in two splits at tillering and P.I stage recorded a grain yield of 4745 kg ha^{-1} whereas inorganic fertilizer dose (60-40-40 kg NPK ha^{-1}) recorded 5895 kg ha^{-1} for MTU 1061 variety during *kharif* season.

Agricultural Research Station, Ragolu

❖ In a trial on organic rice, grain yield of 6259 kg ha^{-1} was recorded with application of NPK @ 120-60-50 kg ha^{-1} + $ZnSO_4$@ 50 kg ha^{-1} with the variety Srikurma (RGL 2332) whereas organic production practices gave 5490 kg ha^{-1}. Green manuring +NPK @ 80-60-50 kg ha^{-1} (INM approach) gave 5685 kg ha^{-1} and all the treatments were higher than control (No fertilizer or manurial application) which recorded the lowest yield of 4878 kg ha^{-1}. Seed yield of succeeding blackgram was also highest with application of NPK @ 120-60-50 kg ha^{-1}+ $ZnSO_4$@ 50 kg ha^{-1} (555 kg ha^{-1}).

Agricultural Research Station, Bapatla

❖ Long term effect of organic and inorganic farming on rice yields indicated that significantly highest grain (5698 kg ha^{-1}) and straw yield (6245 kg ha^{-1}) was observed in inorganic treatment plots and lowest yields were recorded in organic treated plots.

Agricultural Research Station, Garikapadu

❖ During *Kharif* 2019, inorganic treatment in rice recorded highest grain yield (8250 kg/ha^{-1}) and yield attributes compared to organic treatments (6850 kg/ha^{-1}). Whereas, organic package recorded higher net returns by Rs 5000 ha^{-1} compared to inorganic package.

Groundnut

Regional Agricultural Research Station, Tirupati

- Organic farming in groundnut revealed that 18.2 % higher pod yield was recorded in Integrated Crop Management (ICM) package compared to organic farming (2151 kg ha^{-1}) during *kharif*, 2019.
- In *rabi* season, groundnut yield was 22.6 % higher in ICM compared to organic farming.
- Soil characteristics *viz.*, organic carbon (0.38%) and available phosphorous (58 kg ha^{-1}) were higher under organic farming than ICM (0.24% & 45 kg ha^{-1}). The plant uptake of nitrogen and phosphorous were higher in organic farming than ICM, but reverse trend was noticed with potassium uptake. The soil infiltrability in organic farming is low (8.91 In ha^{-1}) compared with ICM (9.9 In hr^{-1}).

Agricultural Research Station, Annatapur

- The long term study on organic farming in rainfed groundnut from 2002 – 2019 (18 yaers) revealed that pod yield ranged from 233 – 2140 kg ha^{-1} under organic farming and 146 – 1591 kg ha^{-1} under inorganic farming. Soil organic carbon content increased from 0.22% to 0.57 % under organic treatment gradually over 18 years.

Finger Millet

Regional Agricultural Research Station, Chintapalle

- Effect of seedling age and crop geometry of finger millet under organic farming revealed that greater number of productive tillers (10.69) was produced with 25 days aged seedlings planted at 25 X 25 cm spacing. Higher yield (10.16 q ac^{-1}) was recorded with 25 days aged seedlings planted at 25 X 25 cm spacing under organic farming method (application of vermicompost @ 2 t ha^{-1}).

Agricultural Research Station, Seethampeta

- Organic farming studies in finger millet during *kharif*, 2019 showed that applications of only organic manures recorded lower yields (14.5 q ha^{-1}) compared to integrated (16.9 q ha^{-1}) and inorganic treatments (18.4 q ha^{-1}). Post-harvest analysis of soils showed higher organic carbon and lower N, P_2O_5 and K_2O in organic treatment plot compared to inorganic and integrated plots.

Little Millet (Sama)

Agricultural Research Station, Vizianagaram

- A study on production package for organic little millet under rainfed conditions in red sandy loam soils of North Coastal Zone revealed that grain yields of inorganic plot (11.47 q ha^{-1}) was found to be 17.3 % higher than organic plot (9.77 q ha^{-1}) in the 5^{th} year (2019-20) of the experiment. The B:C ratio was higher in inorganic plot (2.31:1) over organic plot (1.35 :1) even after five years of the study. The soil organic carbon in organic plot has shown an increase from 0.43 to 0.46% but was not significant over the inorganic plot.

Sugarcane

Sugarcane Research Station, Vuyyuru

- Comparatively more shoot population at different stages of crop growth and yield were recorded in inorganic plot. The highest yield was noticed in inorganic farming (87.99 t ha^{-1}) over organic farming (72.88 t ha^{-1}). However, with regard to quality aspects and sugar recovery, the organic farming found superior over inorganic farming.

Agricultural Research Station, Perumallapalle

❖ Application of 100% RDF recorded higher cane yield (133 t ha^{-1}) which is at par with organic manure application (128 t ha^{-1}). Available N, P_2O_5 and K_2O showed 22.33%, 64.07% and 1.41% build up with organic manures and 20.38%, 68.45% and 3.16% build up with 100% RDF, respectively when compared with initial soil fertility status (2012). Organic carbon increased from 0.34% to 0.49% with organic manures and from 0.34% to 0.47% with 100% RDF.

Cotton

Regional Agricultural Research Station, Nandyal

❖ In organic cotton production during 2016-2019**,** higher seed cotton yield (2495 kg ha^{-1}) was recorded with recommended dose of nutrients through inorganic sources i.e 20-20-0 NPK kg/ha and was on par with recommended dose of nutrients through organic based on P equivalent basis (12.5 t ha^{-1}) which recorded 2483 kg ha^{-1}.

5. Natural Farming

In the state of Andhra Pradesh, a network project on influence of natural farming on soil properties, crop protection and production of quality produce in different cropping systems was initiated in Acharya N.G. Ranga Agricultural University. The project was initiated during 2018-19 and the results were documented. The experiment has been carried out with three treatments, *viz.*,$T_{1:}$ Integrated Crop Management (ICM) as per ANGRAU recommendation, T_2: *Sahaja mariyu sendriya vyavasaya vidhanalu* (SSVV) as per DOA, T_3 : Subash Palekar Natural Farming method (SPNF/NF) (as per the book "*Pettubadileni Prakrithi Vyavasayam Cheyadam Ela* by Subhash Palekar Krishi).

Regional Agricultural Research Station, Maruteru – Rice

❖ Studies on network experiment on Natural Farming in Rice during *Kharif*, 2019 revealed that, higher number of tillers (399 in *kharif* and 451 in *rabi*), panicle count (353 in *kharif* and 402 in *rabi*), panicle length (24.6 cm and 23.9 cm), panicle weight (4.0 g and 2.8 g) and higher grain yield (7220 kg ha^{-1} in *kharif* and 7240 kg ha^{-1} in *rabi*) was recorded in ICM plot compared to natural farming plot as well as Palekar method plot. The magnitude of increase in grain under ICM (ANGRAU) practice was 26.8% in kharif and 39.2% in *rabi* compared to natural farming and 19.9% in *kharif* and 44.8% in *rabi* compared to Palekar method.

Agricultural Research Station, Nellore – Rice

❖ During *Rabi* 2019, highest grain yield (9120 kg ha^{-1}) was obtained with ANGRAU- ICM practice followed by SPNF (5187 kg ha^{-1}) and SSVV by DOA (4043 kg ha^{-1}) and both were on par with each other. B:C ratio recorded was 2.18 in ICM practice followed by SPNF (1.26) and SSVV (0.98). The per cent reduction of yield in SPNF was 43% and in SSVV was 56% compared to ANGRAU-ICM practice.

❖ Pest incidence was low during *rabi*, 2019 except for the incidence of gall midge in all the treatments (silver shoots beyond ETL i.e., 5%) and incidence of stem borer with 6.69 per cent (dead hearts at 50 DAT) in ANGRAU practice.

Regional Agricultural Research Station, Lam – Cotton+redgram (7:1) and Redgram+ greengram

- In the natural farming on cotton (NDLH 1938), ICM package (2052 kg ha^{-1}) resulted in an increase of 149% *kapas* yield over Palekar package (946 kg ha^{-1}) and 124 % over Department of Agriculture practice (913 kg ha^{-1}).
- The incidence of all the sucking pests (except whitefly) was high throughout the season in SBNF plot when compared to the ICM and the incidence of leafhoppers was above ETL in SBNF package in all the observations and there is severe incidence of hopper burn.
- The larval incidence, boll and locule damage in green bolls (32.7%) due to pink bollworm was high in SBNF plot and the intensity of the pest is very severe at the end of the crop than in ICM (11.07%).
- Intensity of Alternaria leaf spot, grey mildew and rust intensity was relatively more in ZBNF than that in ANGRAU package.
- During 2019-20, yield attributes (pods plant^{-1}, seeds pod^{-1} and test weight (g)) were superior with ICM treatment than that of both SSVV and SPNF treatments. The redgram yield was higher in ICM plot (1820 kg ha^{-1}) than that of SSVV (1165 kg ha^{-1}) and SPNF (812 kg ha^{-1}). The lowest cost of cultivation was observed in ICM treatment (Rs.106990/-) followed by SPNF (Rs. 114710/-) and SSVV (Rs. 161778/-). The gross returns and net returns were more with ICM (Rs.105560/- and Rs.1430/-) than SSVV (Rs.67570/- and Rs.100008/-) and SPNF (Rs.47096/-and Rs.67614/-).

Regional Agricultural Research Station, Tirupati – Groundnut+redgram (7:1)

- During *kharif* 2019, highest pod yield (1982 kg ha^{-1}) and haulm yield (1686 kg ha^{-1}) were recorded with ICM which was superior over SSVV (1554 kg ha^{-1}pod yield and 1068 kg ha^{-1} haulm yield) and Palekar concept (1488 kg ha^{-1}pod yield and 776 kg ha^{-1}).
- During *kharif* 2019, groundnut/red gram (7:1) intercropping system recorded significantly higher groundnut pod equivalent yields in ICM (3054 kg ha^{-1}) followed by SSVV (1934 kg ha^{-1}). Significantly the lowest groundnut pod equivalent yield (1634 kg ha^{-1}) was recorded in Palekar concept.
- The highest gross returns, net returns and B:C ratio was recorded in ICM compared to SSVV. The negative gross, net returns and B:C ratio was recorded in Palekar concept.

Regional Agricultural Research Station, Anakapalle - Sugarcane

- Among three methods of cultivation, higher tiller population, stalk population, yield attributes and yield were higher with ICM (88.5 t ha^{-1}) followed by OF and NF (74.9 t ha^{-1}) while the lowest cane yield (60.5 t ha^{-1}) was recorded with Palekars ZBNF.
- Soil beneficial microbial population (*Azotobactor* and *Azospirillum*) at different growth stages was higher in OF & NF followed by ICM whereas phosphorus solubilizers population was higher in ZBNF plots.
- Dehydrogenase activity was higher in OF & NF while Urease activity was higher in ICM.
- Incidence of YLD varied from 0.88 to 1.26%

in ICM, 0.08 to 0.84% in OF and NF and 0.07 to 0.62% in Palekar's ZBNF.

- The cumulative incidence of Early shoot Borer (ESB) at 120 Days After Ratooning (DAR) was more in OF and NF (5.55%) followed by ICM (4.61%) while it was lowest in Palekars ZBNF (2.76%). The incidence of Inter node borer was higher in Palekar's ZBNF (60%) while it was lowest in ICM (20%).

Regional Agricultural Research Station, Chintapalle - Maize-Rajmash cropping system

- During *kharif* 2019, ICM had recorded 37.0% and 24.6% higher maize yields over SSVV and SPNF practices respectively, after raising preceding exhaust crop (maize). Yield recorded in ICM, SSVV and SPNF package were 54.8, 34.5 and 41.3 q ha^{-1}, respectively.
- After harvesting of Maize crop soil properties like avail. N (300 kg ha^{-1}), avail P (15.5 kg ha^{-1}) and avail K (98 kg ha^{-1}) recorded lowest in ICM compared to organic (SSVV) farming and SPNF. Water Holding capacity recorded highest in organic (SSVV) (58.9%) and SPNF (56.4%). At the time of harvest, Rhizobium population was increased in organic (SSVV) (4×10^5) and SPNF (9×10^5) compared to initial soil samples data at the time of sowing. Phoshorus solubilizing bacteria was increased in ICM (7×10^5) compared to initial soil sample data.
- Per cent infestation of cobs by fall armyworm in ICM, SSVV and SPNF packages were 14.63, 29.66 and 38.88 respectively. Cost Benefit Ratio (CBR) recorded in ICM, SSVV and SPNF package were 1:2.33, 1:1.38 and 1:1.59 respectively.

ICM Package **Palekar Natural Farming** **Organic (SSVV) Package**

- Rajmash crop grown after maize during rabi, 2019-20 under three methods of farming recorded the yields of 8.9, 2.1 and 3.6 q ha-1 in ICM, SSVV and SPNF package, respectively. Yield recorded in ICM, OF and PF package were 8.9, 2.1 and 3.6 q ha^{-1} respectively. Benefit Cost Ratio (BCR) recorded in ICM, SSVV and SPNF package were 1:2.51, 1:0.48 and 1:0.79, respectively.

- The highest no of nodules was recorded in ICM package of practice at 50 DAS (8.0), 75 DAS (9.0) and 90 DAS (8.5) compared to SSVV at 50 DAS (4.0), 75 DAS (4.5) and 90 DAS (5.0) and in SPNF at 50 DAS (6.5), 75 DAS (6.8) and 90 DAS (7.0) was recorded.
- At the time of harvest of Rajmash crop, organic carbon content was increased in all three treatments ICM (0.62%), SSVV (0.50%) and SPNF (0.54%) compared to initial organic carbon content in ICM (0.60%), SSVV (0.50%) and SPNF (0.54%)
- Per cent reduction in population of hoppers, thrips and aphids in ICM Package was 49.71, 52.33 and 83.41, respectively while it was 3.27, 41.10 and 61.53, respectively in SSVV Package. But in Palekar package, per cent reduction in population of above sucking pests was very poor as neemastra was found least effective against sucking pest population.

Regional Agricultural Research Station, Nandyal - Korra-bengalgram sequence

- Higher foxtail millet grain yield was recorded in ICM (1556 kg ha^{-1}) when compared to SSVV (1274 kg ha^{-1}) and Palekar method (1136 kg ha^{-1}). Whereas higher chickpea grain yield was recorded in ICM (2143 kg ha^{-1}) when compared to SSVV (1811 kg ha^{-1}) and Palekar method (1596 kg ha^{-1}). Higher net returns (Rs 72,950 ha^{-1}) and BCR (2.11) was recorded in ICM when compared to DOA (Rs 38,850/ha^{-1} and BCR of 1.44) and Palekar method (Rs 34,550 ha^{-1} and BCR of 1.44).

6. Integrated Weed Management

Regional Agricultural Research Station, Lam

- During *kharif* 2019, application of paraquat dichloride 24% SL@ 600 g ha^{-1} was found to be more effective for the control of weedy vegetation in fallow fields before sowing of crop compared to application of glufosinate ammonium 13.5 % at 500 g ha^{-1}. Weed control efficiency of herbicide treatments was highest at 21 days after application recording 97% with paraquat dichloride 24% SL at 600 g $ha^{-1}$and 87% with glufosinate ammonium 13.5 % SL at 500 g ha^{-1}. However, during *rabi* 2019, weed dry matter recorded with paraquat application was found to be on par with glufosinate ammonium application at 500 g ha^{-1} at 7 and 45 days after application.
- In horsegram, pre emergence (PE) application of pendimethalin + imazethapyr @ 750 + 50 g ha^{-1} (Vellore 32) alone or the combination of pendimethalin @ 750 g ha^{-1}*fb* by one hand weeding recorded on par seed yield with two hand weedings. The PE application of pendimethalin @ 750 g ha^{-1}*fb*. post emergence imazethapyr @ 50 g ha^{-1}or acifluorfen + clodinafop @ 165+ 80 g ha^{-1}or fomesafen + fluazifop butyl 111+ 111 g ha^{-1} though showed slight toxicity initially, recorded on par seed yield with two hand weedings.
- In chickpea, pre emergence application of pendimethalin + imazethapyr @ 750 + 50 g ha^{-1} alone showed on par grain yield (3023 kg ha^{-1}) with that of hand weeding at 20 & 40 DAS (3043 kg ha^{-1}) and also comparable with pendimethalin @ 0.75 kg ha^{-1} PE fb acifluorfen + clodinafop @ 0.165 + 0.080 kg ha^{-1} PoE (2880 kg ha^{-1}).
- In *kharif* sorghum, pre emergence application of atrazine + alachlor @ 0.60 + 0.75 kg ha^{-1} fb 2,4 -D sodium salt @ 0.8 kg ha^{-1} (4547 kg ha^{-1})

and atrazine + alachlor @ 0.60 + 0.75 kg ha^{-1} fb intercultivation @ 20 DAS (4465 kg ha^{-1}) recorded on par grain yield with that of hand weeding @ 20 & 30 DAS (4897 kg ha^{-1}).

7. Saline Water Management

Saline Water Scheme, Bapatla

- The analysis of underground irrigation water samples of Chittoor district for water quality revealed that 65.6 per cent samples were good in irrigation water quality, 25.7 per cent samples are marginally saline, 6.7 per cent samples are marginally alkaline and 1.1 per cent are alkaline in nature.
- Surveyed 57 villages in 18 mandals of Kadapa district and collected 79 soil samples for mapping of Salt Affected Soils. The pH of soil samples varied from 7.2 – 10.6 and EC ranged between 0.4 dS m^{-1} to 46.0 dSm^{-1}. Most of the soils in surveyed area come under non-saline, alkali and saline-alkali soils.
- Among different plantations studied, casuarina was found to be tolerant at high soil salinity (15.0 dS m^{-1}) and subabul was growing in alkaline soils (pH 9.0).
- Foliar application of proline (0.6g/l) at vegetative growth phase of sorghum in saline soils increased the grain yield by 15.0% (3380 kg ha^{-1}) as compared to control (2925 kg ha^{-1}.)
- The yield reduction (21.0%) is observed in chilli with use of saline irrigation water at water salinity of 4.0 dS m^{-1} and it is further reduced to 34.6 and 57.0% at water salinity of 6.0 and 8.0 dS m^{-1}, respectively. The highest yield of 28.6 t ha^{-1} (green pods) is recorded with good quality water (0.6 ECiw).

The details of soil samples analyzed at different research stations of ANGRAU during 2019-'20 are given in Table 23.

Table 23. Soil Testing and Soil Health Cards Distribution in ANGRAU during 2019-`20

S. No	Particulars	No. of Samples Analysed				
		RARS, Tirupati	RARS, Anakapalle	RARS Lam	ARS, Utukur	Total
1	Micronutrient analysis in soils of AP	1370	108	—	100	1578
2	Samples received from farmers' on their own	102	58	227	240	627
3	Samples received from other Departments / Research Stations of ANGRAU	755	50	410	100	1315
4	Total No. of samples tested in 2019-20	**2227**	**216**	**637**	**440**	**3520**

8. Seed Production in ANGRAU

A quantity of 9501.2 quintals of breeder seed was produced during 2019-'20. Among the various crops, large quantity of groundnut breeder seed 6000.7 quintals was produced covering the major varieties *viz*., K6, Dharani, Narayani, Kadiri Harithandra, K7, Kadiri Amaravati and K9 during 2019-'20. A sizeable quantity of breeder seed (2954.5 q) of rice particularly in 11 varieties of *viz*., BPT 5204, MTU 1001, MTU 1010, MTU 7029, MTU 1121, MTU 1156, MTU 1075, NLR 34449, BPT 3291, RGL 2537 and NDLR 7 was also produced during 2019-`20. In addition, 7131.7 and 2564.5 quintals of foundation and certified seed was produced in different crops during the year 2019-'20 (Table 24).

Table 24. Seed Production in ANGRAU during 2019-`20

S. No.	Crop(s)	Breeder Seed (quintals)	Foundation Seed (quintals)	Certified Seed (quintals)
1.	Rice	2954.5	5908.13	1884.0
2.	Ragi	1.06	76.3	—
3.	Bajra	0.20	3.0	
4.	Foxtail millet	140.1	139.0	52.0
5.	Redgram	50.71	550.63	—
6.	Greengram	16.44	153.0	—
7.	Blackgram	91.40	88.85	628.5
8.	Bengalgram	236.0	—	—
9.	Cowpea	—	6.95	—
10.	Groundnut	6000.7	191.47	—
11.	Sesamum	10.08	10.3	—
12.	Mesta	—	2.0	—
13.	Sunhemp	—	2.10	—
Total		**9501.2**	**7131.7**	**2564.5**

9. Biotechnology

Regional Agricultural Research Station, Tirupati

- Conducted Quantitative Trait Loci (QTL) mapping for YMV resistance in blackgram with 147 Simple sequence Repeat (SSR) markers and identified one major QTL on Linkage group I and validated in 20 blackgram genotypes with accuracy of 85%.
- Cloned and sequenced full length sequence of Kurnool, Prakasam and East Godavari isolate of MYMIV-A and submitted to GenBank. Based on nucleotide and amino acid sequence analysis, the YMV infected blackgram of Prakasam and Kurnool isolates are same variant and that of East Godavari is another variant.
- MYMIV is predominant begomovirus species in major growing areas as compared to MYMV. Similarly MYMV is predominant species in late *kharif* early *rabi* (Sep, Oct, Nov) as compared to MYMIV (Dec, Jan, Feb, March). Hence, genotypes should have resistance to both the species.

- Identified association of pigeonpea sterility mosaic virus 1 (PPSMV I) and PPSMV 2 with Sterility mosaic diseases of pigeonpea (cv. LRG41) in Andhra Pradesh and developed Real Time Polymerised Chain Reaction (RT-PCR) detection.

Regional Agricultural Research Station, Maruteru

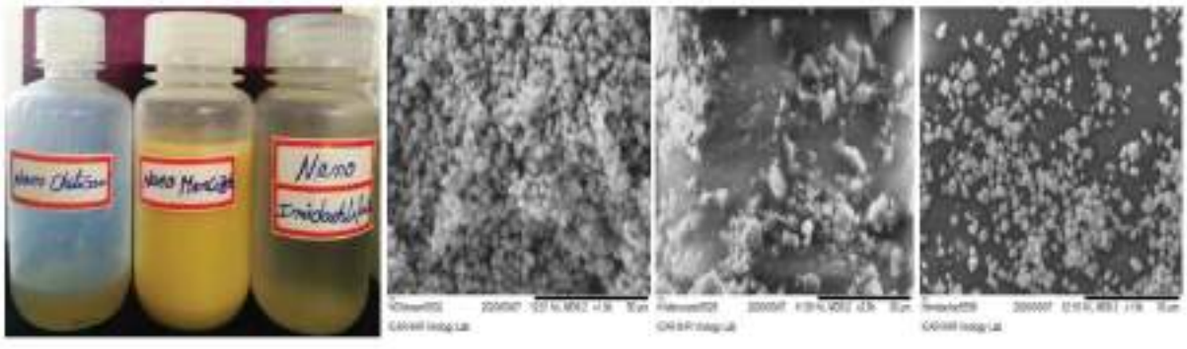
Molecular breeding for the improvement of Swarnasub1

- The 17 Back cross Inbred Lines (BILs) with *Sub1+SCM2+Salotl+qAG 3.1* for sub-mergence lodging resistance, salinity and anaerobic germination in the back ground of Swarnasub1 were screened for target traits. For all 17 families collected 14 random samples and bulked and genotyping was done using fore ground and recombinant markers.
- Of all the 17 PILs (bulked samples) genotyped for fore ground markers, five families had shown SCM_2 (for lodging resistance) and one family had *saltol* (for salinity tolerance), whereas 14 families had shown heterozygotes for *qAG 3.1 (*for anaerobic germination) and all 17 families had *sub1* (for submergence tolerance).
- Genotyping of all plants (5950) pertaining to 17 PILs for submergence, lodging resistance, salinity and anaerobic germination using fore ground markers was done and identified nine single plants with all target QTLs.
- During WS-2019, 100 ATGC lines were evaluated under wet direct seeding for yield and its contributing traits along with number of plants/m^2. Large variation was observed among all the entries for all the traits. The average seed yield/$plant^{-1}$ was 19.5g with a maximum of 34g (ATC15) and a minimum of 10g (ATGC71).

10. Nanotechnology

Regional Agricultural Research Station, Tirupati

- Nanoscale materials were effective in promoting germination per cent, plant growth and yield. Concentration of GA3 significantly increased in groundnut with the application of nanoscale zinc oxide (2466 ($\mu g/g^{-1}$)).
- Nanoscale biochar (size < 80 nm) was prepared using modified chemical method. Further, nitrogen and potassium ions were loaded on to the surface of the prepared nanobiochar to develop them as nanobiochar based nitrogen and potassium fertilizers.
- Standardized the protocols for the synthesis of nanoscale chitosan encapsulated mancozeb and imidacloprid
- Standardized the protocols for the synthesis of nanoscale silicon dioxide



Nanoscale chitosan, Nanoscale chitosan encapsulated mancozeb and nanoscale chitosan encapsulated imidachloprid and scanning electron microscopic images

Scanning Electron Microscopic image of nanoscale silicon dioxide

11. Geospatial Technology

Geospatial Technology Centre, Lam, Guntur

- The common aqua pond area left empty during the years 2017, 2018 and 2019 was found to be 3513 ha^{-1}. Further, the empty pond area during Nov. 2019 was found to be 5594 ha^{-1} Accuracy assessment resulted in an overall accuracy of 0. 941 and a kappa coefficient of 0.908, which indicates a strong agreement between classified product and reference data.
- The unsupervised classification of Landsat 2018 image using K-means for Prakasam district indicated that the area under perennial vegetation (silviculture, forest, hill vegetation *etc.*) was found to be 2,49,397 ha^{-1}.
- Prepared soil fertility maps of East Godavari district using the analytical data generated by Department of Agriculture, Govt. of AP. Soils were high in organic carbon; low in available nitrogen; medium in available phosphorus except in Seethanagaram, Kajuluru, Pamarru, Ramachndrapuram, Rayavaram and Sakhinetipalle mandals where, P availability is high. More than 40 per cent of the soils were high in available potassium. All the soils were sufficient in micronutrient content.
- Drones mounted with multispectral cameras were used for estimating pest and disease incidence in groundnut growing regions of Ananthapuramu and YSR Kadapa districts. It was estimated that approximately 14 – 28 per cent of the area was affected in the study area that resulted in corresponding yield reduction.

12. Biofertilizers

Agricultural Research Station, Amaravathi

- Maize and foxtail millet were found better for Arbuscular Mycorhizae (AM) fungal mass multiplication
- 1: 1 sand –soil mixture was better medium for Arbuscular Mycorhizae (AM) fungal mass multiplication
- Foliar application of Pink Pigmented Facultative Methylotrophs (PPFMs) enhanced chlorophyll, proline content and enhanced over all plant growth. Panicle emergence was advanced by 8-10 days with application of PPFM.
- Decomposing consortia A & B developed at ARS, Amaravathi were on par with Ghaziabad Waste decomposer in decomposing agricultural wastes.

The details of biofertilizer production in different centres of ANGRAU during 2019-'20 are given below (Table 25).

Table 25. Biofertilizers Production in ANGRAU during 2019-`20

S. No.	Name of the Unit	Installed Capacity per Annum (MTs)	Powder biofertilizers Production (MTs)	Liquid biofertilizers Production (MTs)	Details of Biofertilizers Produced
1	**ARS, Amaravathi**	350	32.011	4.642	*Azospirillum, Azatobacter, Rhizobium,* *PSB, *VAM
2	**RARS, Anakapalle**	80	8.850	2.623	*Azospirillum, Azatobacter, Rhizobium* and PSB
3	**RARS, Tirupati**	200	1.000	—	*Azospirillum, Azatobacter, Rhizobium* and PSB
4	**ARS, Utukur, Kadapa**	80	5.500	—	Rhizobium, PSB, *KSB, *Azospirillum*
	Total	**710**	**47.361**	**7.265**	

*PSB- Phosphorous Solubilizing Bacteria; VAM – Vesicular arbuscular Mycorhizae; KSB- Potash Solubilizing bacteria

13. Biological Control

Regional Agricultural Research Station, Anakapalle

- Management of FAW in maize using biocontrol agents and biopesticides indicated that *Trichogramma pretiosum* two releases from one week after seedling emergence and three sprays of *Bacillus thuringiensis* (NBAIR Bt G4) @ 2.0 g L^{-1} from 25 DAS was found effective with higher cob yield (55.45 q ha^{-1}) and C : B ratio (13.24) followed by *T. pretiosum* two releases + *M. anisopliae* (NBAIR Ma-35) @ 5.0 g L^{-1} three sprays.
- Field efficacy of entomopathogenic fungi, *Isaria fumosorosea* (NBAIR- Pfu 5 (5 g/l^{-1} of water) two sprayings at one month interval with release of parasite, *Encarsia guadeloupae* for augmentation after first spraying of *Isaira* fungus effectively controlled Coconut rugose spiralling whitefly and recorded intensity by 71.01 to 75.5 %.

The production details of different biocontrol agents in ANGRAU for managing pests for the year 2019-'20 is given in Table 26.

Table 26. Production of Biocontrol Agents in ANGRAU during 2019-`20.

Particulars	Qty. produced
Trichogramma chilonis as Trichocards (@ 20,000 egg parasitoids/ card) @ Rs.50/- per trichocard	2666 No.
Trichogramma japanicum	700 No.
Temparature tolerant *Trichogramma chilonis*	120No.
Trichogramma pretiosum	500 No.
Metarhizium anisopliae Ma4Ma35	160 kg
Metarhizium anisopliae Ma 35	20 Kg
Isaria fumosorosea, NBAIR- Pfu5	50 kg

14. Vertebrate Pest Management

AINP on Vertebrate Pest Management, RARS, Maruteru

- Bromadiolone 0.005% applied in 10% jaggery liquid recorded 83.4% control success with 61.75 % consumption as against 25.3% control success with 15.5 % consumption in regular broken rice based bait.
- In 2019 *kharif* nurseries, the trap catches in TBS were highest with 174 in 30 day period. Whereas in *rabi* nurseries trap catch was only 41 due to low level of incidence. TBS offered 100 per cent protection to rice seedlings and crop against *Bandicota bengalensis* in nurseries and main field as well.

- Consumption of De-hulled maize cob bait was relatively higher (52.5%) over the regular broken rice bait (16.75%) and it was found very promising for effective delivery of rodenticides at much lower bait costs.

15. Honey Bees & Pollinators

AICRP on Honey bee & Pollinators, Agricultural Research Station, Vijayarai

- A study on artificial domiciliation of non-Apis Pollinators revealed that Pollinator insects constructed their nests in *Saccharum sp* sticks (8.73 %) and *Megaclile sp* preferred 1.00-1.5 cm diameter *Saccharum* stick for their nest construction.
- Role of stingless bees in pollination of cucumber revealed that *A. cerana* was found to be the dominant pollinator at 9.00 am & 12.00 noon (2.12 & 1.33) whereas *A. mellifera* was 1.95/ 2 min and 1.12/ 2 min were recorded on cucumber flowers. The number of flowers visited/2 min was also highest at 9.00 am (6.87) by *A.cerana* and it was 5.75 flowers/2 min at 9.00 am by *A.mellifera. Tetragonula* was also found during noon time.

16. Storage Pest Management

Post Harvest Technology Centre, Bapatla

- Treatments of groundnut oil, sesame oil and neem oil at 5 mL per kg of pulse seeds *i.e.*, black gram, green gram and pigeonpea could effectively prevent bruchid infestation. However, there was a decline in germination per cent of the oil treated pulse seed upon storage beyond three months.
- Essential oils of clove, sweetflag, eucalyptus and orange @ 0.5 ml impregnated on wooden cubes and placed over the grain surface could prevent oviposition by pulse beetle and subsequent population build up.
- Pulse bruchid infestation was not observed in blackgram even after 150 days in gunny bags treated with spinosad at doses of 7.5 and 10.0 mL per litre.

17. Agroforestry

Agricultural Research Station, Kavali

- Effect of different plant spacings on growth and yield of Malabar Vepa (Meliadubia) showed that spacing of 2 x 2 m recorded highest plant height of 3.28 m and was significantly superior to rest of the treatments.
- Effect of different plant spacings on growth and yield of Red Sanders (*Pterocarpus santalinus* Linn. F.) showed that adopting spacing of 3 x 3 m recorded higher plant height of 2.30 m and was on a par with 3 x 2m and 5 x 3 m spacing and these were significantly superior to rest of the treatments.
- Performance of Acid lime varieties in lateritic soils of Andhra Pradesh indicated that variety Petlur Selection-1 recorded the highest plant height of 2.15 m which is on par with variety Balaji (2.01 m) and both were significantly superior to variety Pramalini.

18. Agrometeorology

Agricultural Research Station, Anantapuramu

- Effect of wind mills on micro climate, growth and yield of groundnut inferred that lower yield was observed in the vicinity 20 m away of wind mill (1323 kg ha^{-1}) when compared to the 60 m away from wind mill (1727 kg ha^{-1}). With respective to yield and no of pods/plant (1592 kg ha^{-1}) the highest was observed in crop sown in north direction and the lowest (1252 kg ha^{-1}) in crop sown in west direction. Difference in canopy and air temperature was high in the crop sown near to wind mill and the crop sown in the west direction of wind mill.
- Maximum temperature ranged from 28 to 32 ^{0}C and minimum temperature ranged from 16 to 19^{0}C during flowering to maturity found optimum for obtaining higher yield in chickpea. Crop sown during 1st FN of November has recorded higher seed yield (1758 kg ha^{-1}) followed by 2nd FN of October (1736 kg ha^{-1}) and 1st FN of October (1629 kg ha^{-1}).
- Lowest pod set in chickpea was observed when there is a drop of 4.8C in morning minimum temperature, increase in morning RH by 10%, afternoon RH by 12% along with dew fall of 0.09 to 0.19 mm. Higher pod set was obtained when the minimum temperature is between 15-19.5^{0}C.
- Spraying of KNO_3 (58%), SNP (sodium nitro prusside @ 150 ìM (57%) and Boron @ 2g l^{-1} (56%) of water retained higher pods and found promising in alleviating the fog/low temperature effect on podset in chickpea.

Regional Agricultural Research Station, Tirupati

- During *kharif* and *rabi* 2019-20, 99 Agro-advisory weather bulletins were issued and SMSs were sent to the farmers on every Tuesday and Friday. Block level weather based Agro advisories were also prepared and disseminated to 11 blocks of Chittoor district.
- In Crop Weather Relationship studies of groundnut during *kharif* 2019, Groundnut varieties (Narayani, Dharani, K6, K9, TCGS-1694, TCGS-1157 and TCGS-1416) sown during second fortnight of July (4261 kg ha^{-1}) gave highest pod yield compared to the crop sown during second fortnight of June (2903 kg ha^{-1}) and first fortnight of July (3168 kg ha^{-1}). Among the varieties Dharani (4069 kg ha^{-1}) recorded highest yield followed by TCGS-1157 (3896 kg ha^{-1}) and TCGS-1694 (3877 kg ha^{-1}). Accumulation of Growing Degree Days (GDD) of 1950 to 1980 is optimum to attain

maturity in southern Agroclimatic zone.

- Studies to develop a forewarning model for YMV in blackgram revealed that with increase in temperatures and diurnal variation from 50th standard week (10th Dec- 16th Dec) followed by continuous dry spell for a period of three weeks (51st to 1st Std. week), the whitefly population increased due to which YMV intensity increased.

19. Agro Economic Research

Regional Agricultural Research Station, Lam

- The gross returns obtained in paddy-paddy system were Rs.187181/- per hectare whereas the net returns were Rs.-49787/- The gross margin realized was Rs.38613 ha^{-1} realizing a return on variable cost with 1.28 in paddy-blackgram system.
- The cost of paddy production has increased by more than 60% whereas the price was increased only by 16% showing a huge cost being incurred by the growers compared to the return realized between 2014 and 2019.
- Even though the total cost of cultivation of ZBNF in paddy was 13.26 % less than the traditional practice, the labour cost 6.33 % more due to preparation of ZBNF ingredients. The cost of production of ZBNF paddy and cotton was more i.e Rs.2088.91/-, Rs.6219.81/- when compared to traditional farmer practice i.e Rs.1849.75 and Rs.6219.81 due to low productivities. The return on rupee of investment of ZBNF paddy and cotton was 0.001,-0.15 when compared to traditional farmer practice 0.02 and -0.06 respectively.
- *Rabi* maize (11.23), bengalgram (29.44), redgram (11.84), *kharif* greengram (10.76) *kharif* maize (11.31), *rabi* jowar (7.49), cotton (1.81), *kharif* chilli (4.40), *rabi* chilli (5.30) and *kharif* blackgram (4.55) showed positive Compound Annual Growth Rate (CAGR) values indicating the increase in area under these crops between 2000-2019.

Regional Agricultural Research Station, Anakapalle

- The average price of jaggery for 2020-21 predicted to be Rs. 3,199 against the current year (2019-20) price of 3,158. The ranges of forecast prices (per quintal) from April'2020 to March'2021 arrived through Best Fit (Hybrid Model) method are as Rs. 2,941 to 3,472, Rs. 2,748 to 3,660, Rs. 2,849 to 3,721, Rs. 3,030 to 3,645, Rs. 3,070 to 3,628, Rs. 3,099 to 3,726, Rs. 3083 to 3,785, Rs. 2,988 to 3,584, Rs. 2,984 to 3,469, Rs. 2,917 to 3,486, Rs. 2,760 to 3,318 and Rs. 2,737 to 3,463, respectively.
- For sugarcane under irrigated conditions in plant crop the total cost of cultivation was Rs. 1,08,952 (out of which, Rs 81,876 was operating cost). Benefit Cost Ratio (BCR) for operating cost was 0.94 and for total cost was 0.71. While in ratoon crop, the total cost of cultivation was Rs. 80,469 (out of which Rs. 57,773 was operating cost). BCR for operating cost was 1.27 and for total cost was 0.85. For rain-fed sugarcane in plant crop the total cost of cultivation was Rs. 77,027 (out of which Rs. 57,332 was operating cost). BCR for operating cost was 0.96 and for total cost was 0.71. While, in ratoon crop, the total cost of cultivation was Rs. 53,891 (out of which Rs. 37,455 was operating cost). BCR for operating cost was 1.25 and for total cost was 0.87.
- In Transplanted rice total cost of cultivation was Rs. 56,072 (out of which operating cost was Rs. 35,091). BCR on operating cost was 1.18 and for total cost was 0.74. In Direct sown condition, total cost of cultivation was Rs.

42,550 (out of which operating cost was Rs. 28,073). BCR on operating cost was 1.39 and for total cost was 0.92. In Drum Seeder sowing, total cost of cultivation was Rs. 43,671 (out of which operating cost was Rs. 28,724). BCR on operating cost was 1.58 and for total cost was 1.04. In SRI method of cultivation, total cost of cultivation was Rs. 65,188 (out of which operating cost was Rs. 42,109). BCR on operating cost was 1.13 and for total cost was 0.73.

- In Maize, total cost of cultivation was Rs. 49,280 (out of which Rs. 25,962 was operating cost). BCR on operating cost was 1.96 and for total cost was 1.20. In Ragi, total cost of cultivation was Rs. 23,625 (out of which Rs. 18,666 was operating cost). BCR for operating cost was 1.27 and for total cost was 0.95.
- Among the pulses, in Black Gram, total cost of cultivation was Rs. 5,950 (out of which Rs. 4,150 was operating cost). BCR on operating cost was 2.40 and for total cost was 1.68. In Green Gram, total cost of cultivation was Rs. 5,750 (out of which Rs. 3,850 was operating cost). BCR on operating cost was 2.75 and for total cost was 1.84. In Redgram, total cost of cultivation was Rs. 12,950 (out of which Rs. 8,750 was operating cost). BCR on operating cost was 2.49 and for total cost was 1.68.
- In Groundnut, total cost of cultivation was Rs. 30,800 (out of which Rs. 23,530 was operating cost). BCR for operating cost was 1.31 and for total cost was 0.94. Total cost of cultivation in sesamum was Rs. 8,950 (out of which Rs.6,050 was operating cost). BCR on operating cost was 1.94 and for total cost is 1.40. Among the other major crops, in Mesta, total cost of cultivation was Rs. 30,491 (out of which Rs. 24,163 was operating cost). BCR for operating cost was 1.06 and for total cost was 0.84.

20. Market Intelligence

Regional Agricultural Research Station, Lam

- The seasonal index of paddy price was high during October to December month because of low arrivals to the market yards. The maize prices were high during April and May, Chilli index of price was low during the month of January to April and June to November because of increased export demand, Cotton seasonal index of price was found higher during the crop production season because of scanty arrivals of produce, Blackgram, greengram, and bengalgram seasonal index of prices were found high during the rainy season and scarcily decreased as the arrivals increased during January to March where as Onion seasonal index of price shows an abrupt increase between April to December 2019.
- The price forecasts for the important crops of state were regularly released by the Agril Market Intelligence Centre with an accuracy of 86-94% and the Reliance foundation is disseminating the same to 40 lakh farmers. The forecasted price bulletins were uploaded in the ANGRAU website and the information was shared by the toll free call centers.

21. Extension Research

Regional Agricultural Research Station, Anakapalle

- Perception of farmers towards Soil Health Cards (SHC) in Visakhapatnam revealed that majority of the farmers (72%) had moderate or medium perception followed by low (28%) and high (10%). With regard to adoption of SHC prescriptions, majority (82%) comes

under low adoption category. Good percentage (60%) of respondents are following recommendations related to Nitrogen fertilizer followed by use of organic manures and less adoption was observed in case of use of micro nutrient application (10%) and soil reclamation practices (2%).

- **S**tudy conducted on adoption of ANGRAU technologies in rice cultivation revealed that majority (40%) of the farmers adopting recommended agronomic practices like correct seed rate, proper nursery management etc. followed by IPM (35%) and IDM (20%).Very low adoption was observed in use of correct dose of fertilizers and weedicides (10%).
- Constraint analysis on low productivity of ragi in Visakhapatnam district of Andhra Pradesh revealed that non availability of high yielding varieties was the main constraint for low productivity followed by lack of knowledge regarding improved package of practices (41%), and lack of interest due to less market price (20%).
- Assessment of usefulness of mobile app on sugarcane developed by RARS, Anakapalle revealed that majority (75%) of users expressed that the app is useful for educated farming community and students. The utility of the app was rated high by nearly 50% of the users. However, majority (62%) expressed that symptoms of crop diseases are not mentioned according to different stages of crop growth, font of the text is not readable (51%), poor quality of pictures (48%), and no information related to weed flora (35%).

D. AGRICULTURAL ENGINEERING

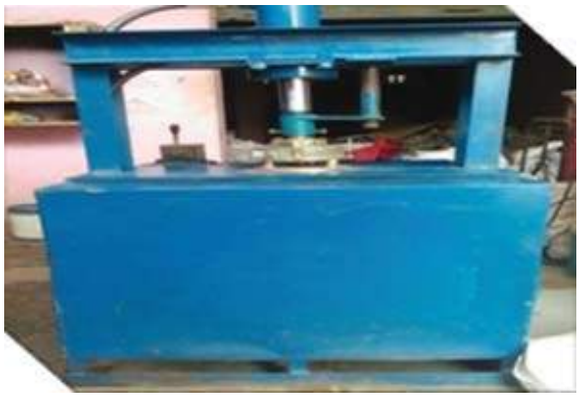
1. Post Harvest Engineering and Technology

Regional Agricultural Research Station, Anakapalle

- Using briquetting machine, briquettes of 40 mm diameter, 25 cm length were prepared with 100% sugarcane bagasse, combination of sugarcane bagasse and sugarcane trash (50:50) and 100% sugarcane trash without using any binder. Briquette made from sugarcane bagasse reduced the volume of bio mass by 88-92%.
- The equipment *viz.*, pre heater, primary juice heater, secondary juice heater, rotary screen, clarifier, evaporator, vacuum pan etc. for development of Modern Jaggery plant of one ton per day capacity were designed and fabricated. Installation of all equipment was done and trial run was conducted using sugarcane juice and jaggery was prepared.

- Standardized process technology for preparation of sugarcane juice powder using spray drying technology.
- Developed manual operated hand compression machine for moulding of food packaging material from sugarcane bagasse. Standardized the process of making food packaging material

from dry sugarcane bagasse (90%), paper waste (5%), Starch (1%), Glycerol (2%) in 1% Poly vinyl alcohol using hand compression moulding machine.



- Among different power weeders (Mini tractor with rotavator, Garuda weeder, Greaves weeder) tested, inter-cultivation in sugarcane planted at 150 cm spacing using mini-tractor with rotavator resulted in 98% saving in time and 78% saving in cost of operation towards weeding with a highest cane yield of 85 t/ha compared to manual weeding (79 t ha^{-1}).
- Developed Centrifugal clarifier for Clarification of Sugarcane Juice

Technical Specifications:

Capacity of clarifier : 75 litres
Filter pore size : 5 & 10 ì m
Rpm of clarifier : 1200 rpm

Post Harvest Technology Centre, Bapatla

- For by-product utilization of mango, Mango seed kernel oil (7.8%) was extracted through soxhlet extraction method using hexane as solvent. Major fatty acid compounds found in mango kernel oil were oleic acid (18:1), palmitic acid (16:0), linoleic acid (18:2), linolenic acid (18:3) and steric acid (18:0).
- Maximum de-hulling efficiency of 91.91% and 98.86% were obtained in foxtail millet in single and double pass, respectively, with TNAU single chamber centrifugal dehuller. Whereas, with TNAU double chamber centrifugal dehuller, the maximum de-hulling efficiency was 99.17% for foxtail millet and 63.57% for kodo millet in single pass.

A centrifugal de-huller was fabricated and performance trials were conducted for various millets. Maximum de-hulling efficiency obtained in single pass and double pass were 94.23 and 96.13%, respectively for the foxtail millet followed by 87.24% and 88.00% for kodo millet.

- Milling efficiency of IIPR Dhal mill was 88.16% and 91.89% for blackgram and pigonpea, respectively with dhal yield of 80.15% and 82.80% which is more or less same as in PKV dhal mill
- A low cost rapid testing kit (lateral flow assay device) for the on-site quick detection of aflatoxin of agricultural produce is being developed by AICRP on PHET, Bapatla.
- Low cost protocols for determination of glycemic index of food products along with Resistant Starch (RS), Rapidly Digestible Starch (RDS) and Slow Digestible Starch (SDS) were developed and validated.
- Addition of ghee to rice at a ratio of 1:10 is effective in lowering the glycemic Index of rice to 10% and addition of pigeonpea at the same ratio lowered up to 8%. Heat moisture treatment and retrogradation were found to be the most effective methods of converting RDS to SDS and lowering the glycemic index up to 22%.

Regional Agricultural Research Station, Tirupati

- The portable solar tunnel dryer took 4, 13, 24 and 44 h to reduce moisture content of groundnut pods (K-7 Variety of *Kharif*, 2019) from 54% (wb) to 40, 30, 20, 10% (wb) whereas open sun drying method above polypropylene sheet took 6, 21, 42 and 57 h respectively. Shade drying took 22, 43, 62 h to reduce the moisture content to 40, 30, 20 % (wb). The solar tunnel dryer took 13 hours less time compared to open sun drying method to reduce the moisture content from 54% (wb) to 10% (wb). The shade drying took 99 h to dry the groundnut pods upto only13.29% (wb). The germination percentage of groundnut was 76% (solar tunnel dried), 78% (sun dried) and 81% (shade dried).
- The GAB mono layer moisture contents of paddy and rice (BPT-5204) were 6.62, 7.19% (d.b.) at 25°C, 5.73, 6.32% (d.b.) at 35°C and 5.19, 5.67 % (d.b.), respectively at 45°C. The GAB mono layer moisture contents of paddy and rice (NDLR 7) were 6.56, 7.64 % (d.b.) at 25°C, 5.71, 6.22 % (d.b.) at 35°C and 5.15, 5.46 % (d.b.), respectively at 45°C.

2. *Farm Mechanization*

AICRP on Farm Implements and Machinery Scheme, Bapatla

- Feasibility testing of paddy straw chopper conducted in 4.3 ha^{-1} of farmers' field revealed that the straw cutting efficiency was 99% with a field capacity of 0.8-1.2 hr ha^{-1}. The cost of operation worked out to be 3182 Rs. ha^{-1}.

- Feasibility testing of Tractor operated cotton plant shredder has been conducted in an area of 3.1 ha^{-1} at various farmers' fields. The Minimum power required is 45 hp, Stalk cutting efficiency is 99% and Fuel consumption is 4.5-5 lit/h with field efficiency of 72.21 to 88.50%. The Cost of operation is 3000 Rs. ha^{-1}
- Feasibility testing of laser levelling system in paddy was conducted in 10 ha of farmers' field at different locations and 7 ha at ARS, Bapatla. The results showed that the field Capacity is 0.25 ha^{-1} hr with a puddling index of 86% and

the cost of operation is 1200 Rs./hr. However, the signal receiver unit of laser leveller is getting disconnected from the transmitter unit due to sinkage of the tractor in wet soil resulting in non-matching of signal height.

❖ Feasibility testing of Tractor operated millet planter has been conducted in an area of 0.9 ha^{-1} at the research farm of Dr.NTR CAE, Bapatla. Working depth of planter is 75 mm and plant spacing varies from 180 to 250 mm with missing index varies from 4 to 15%. Multiple Index varies from 2 to 13%. The field capacity of the planter is 1.32 ha h^{-1}. The Cost of operation is 2000 Rs. ha^{-1}

❖ Under studies on testing of different nozzles for drone sprayer, the droplet sizes with hollow cone nozzle is observed as 213.2 µm, 213.18 µm and 188.02 µm at top, middle and bottom position of plant. The droplet sizes Teejet flat spray nozzle is observed as 191.2

µm, 199.3 µm and 165.01 µm at top, middle and bottom position of plant.

Regional Agricultural Research Station, Tirupati

❖ Performance evaluation of multi crop thresher

Groundnut Threshing: Threshing efficiency: 92.6%; Losses (breaking) : 6.2%

Redgram Threshing: Threshing Efficiency: 96.2%; Losses through stalk: 2.9%

❖ The pooled analysis data on trash shredding by Trash shredder recorded significantly highest cane yield (124 t ha^{-1}) followed by trash (119 t ha^{-1}).

❖ In a study on development of double trench former to avoid lodging of the cane and maintain the yields, there was no lodging is observed in the field where the developed double trench maker was administered. 18.2% increase in the cane yield was also observed in the Experiment. The yield 3% further increased when the double trench former administered along with sub-soiling.

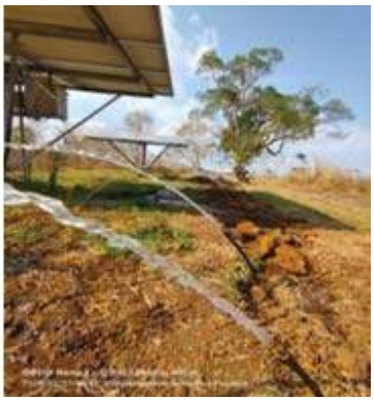
Regional Agricultural Research Station, Chintapalle

❖ Under a study on modification and evaluation of Mini Paddy Harvester, brush cutter was modified in to mini paddy harvester by changing cutting blades and a frame was fabricated with wheel support to reduce load on operator. Field capacity of modified reaper was observed to

be 0.03 ha^{-1} hr and fuel consumption is 0.25 liters/hour. Shattering losses was observed to be more in manual harvesting when compared with modified reaper.

- During *Rabi*, 2019 Solar system capacity of 4800 wp with 16 pieces of solar panels with capacity of 300 wp each were installed to supply the required power to 5 hp surface mounted Monoblock pump. A pump house was constructed near perennial stream for providing roof to 5 hp monoblock pump and a pumping well was constructed in the perennial stream for providing proper water suction conditions to the pump. Micro irrigation and automation was installed for yearlong irrigation to the fields.





E. COMMUNITY SCIENCE

- Sensory evaluation of the recipes prepared using organic and conventionally grown foods revealed that four organic products – zeera, turmeric, pepper and honey were found to be superior in all the sensory qualities *viz.*, colour, taste, flavour, texture and overall acceptability compared to the non organic products. The organic products dominated in terms of colour and flavour but not in terms of appearance and texture.
- Under empowering rural families and field level functionaries through Mobile app- "AALAMBANA" e-Content was developed in selected areas - Health and nutritional care during pregnancy,Scientific child rearing practices, Early childhood care and education, Importance of early stimulation, Identification of developmental delays, Importance of early stimulation, Developmental assessment of young children, Interventions for developmentally challenged,Management of behavioural problems, Guidance and counselling techniques,Family life education, Life skill education to adolescents, Elderly care, Physical and psychological wellbeing of elderly, Parent education, Adolescent education on reproductive and child health, Menstrual hygiene and sanitation, Care and management of low birth weight and pre mature babies, Hazards during prenatal development, Personality development. The content was developed in telugu language in APK format. The AALAMBANA App will be available in the Google play store for the open access after field testing.

V. EXTENSION

Agricultural Extension is one of the major mandates of ANGRAU in disseminating proven technologies to farmers from research laboratories of Agricultural Colleges, Agricultural Research Stations and on farm research in the farmers' fields. Disseminating of day to day crop production and crop protection management practices is being carried out through the extension wing in ANGRAU. The Extension wing also takes the responsibility of educating rural people in agriculture and allied sectors through various outreach methods including frontline demonstrations, on-farm trials and other variety of extension services. Besides, Extension wing also assists the Development Departments of State and Central Governments. Given below is the organogram with different functionaries under Extension wing of ANGRAU (Fig 08).

A. EXTENSION UNITS

The research results are being disseminated through the wide spread extension units of the University comprising of 13 Krishi Vigyan Kendras (KVKs) and 13 District Agricultural Advisory and Transfer of Technology Centres (DAATTCs and one each of Agricultural Information and Communication Centre (AI&CC), Electronic Wing (EW) and Farmers Call Centre. Besides, the Extension Units in RARS also function as effective lab to land agents.

1. Krishi Vigyan Kendras (KVKs)

Altogether, there are 13 KVKs under ANGRAU located in 13 districts of Andhra Pradesh. Towards achieving the goal of doubling the farm income by 2022 as a mark of celebrations of 75 years of Independence, ANGRAU has been playing an epi-centric role of ensuring livelihood security in rural areas through Vocational Training in agriculture and allied sectors. The KVKs are being assigned with the task of "Technology-Assessment and Refinement" under real-time farm situations. Application of ICTs by KVKs has been able to provide tangible and substantial benefits in providing timely information on weather, markets and offering solutions on day to day problems faced by farmers.

2. District Agricultural Advisory and Transfer of Technology Centres (DAATTCs)

A total of thirteen (13) DAATTC are housed in ARSs or KVK premises *w.e.f.* 09/11/2017 for achieving synergy between KVK & DAATTC in discharging their duties.

3. Agricultural Information & Communication Centre (AI&CC)

The AI&CC documents and transfers the developed technologies through various means such as publications and media combinations. The Electronic Wing and the FCC that were earlier functioning separately under the Director of Extension, were now merged with AI&CC since 29.12.2017 for effective Transfer of Technology (TOT) through print and electronic media.

4. Farmers Call Centre (FCC)

The FCC was initially established in Andhra Pradesh by ANGRAU during 2003 through the integration of "Information and Communication Technology" (ICT) and "Agricultural Technology" (AT) with an objective to disseminate information in all aspects in agriculture, horticulture and allied sectors. The Centre works with a toll-free number, 1800-425-0430 at Lam, Guntur and is accessible to the farmers for two way communication. The farmers' queries as well as solutions offered by the Scientists are also being published regularly in "*Vyavasayam*", "*Padipantalu*" and other monthly magazines.

During 2019-'20, at total of 4151 queries were received from all over AP and solutions for the same were offered by the Faculty.

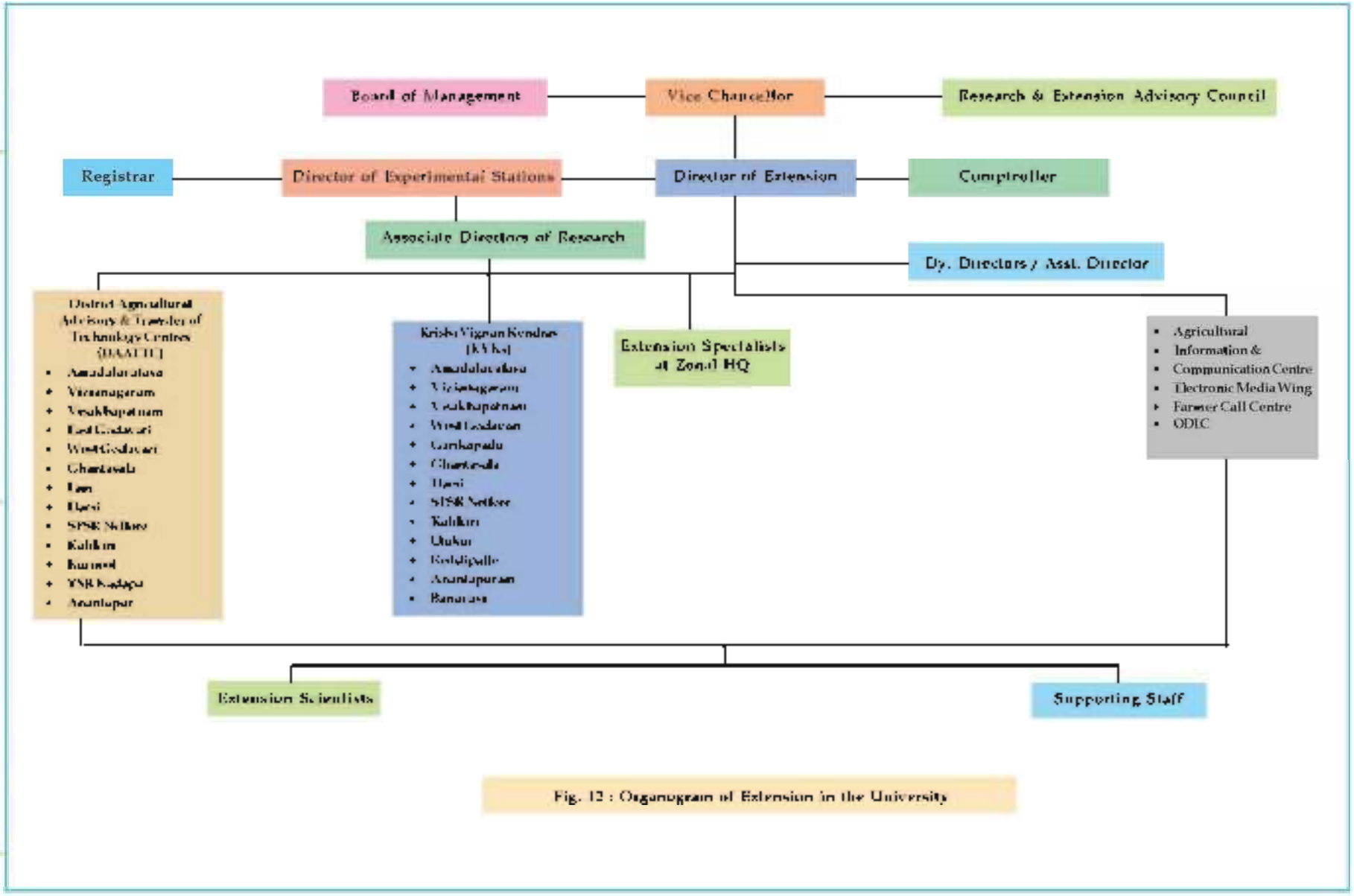


Fig. 12 : Organogram of Extension in the University

B. EXTENSION ACTIVITIES

1. Technology Assessment and Refinement (TAR)

Assessment/evaluation of proven technologies evolved at research stations under farmers' field conditions is a crucial step in delivering successful technologies to farmers. Since, not all the proven technologies at research stations evolved by agricultural scientists work successfully under farmers' field situations, it is imperative that the proven technologies need to be evaluated at real-time situations before advocating them as blanket recommendations. In this direction, "On-experimental Station / research-adaptive research-extension" is a continuous process that helps to generate practicable, successful and sustainable technologies to farmers. Besides, technological developments, refinement of already proven technologies that are being adapted at farmers level is another important area where a proven technology will be refined suiting to local needs or based on the situation in demand for the up surging problems. In fact, these aspects like "technology development" and "technology refinement" is a continuous process that helps to generate profitable technologies. Both these two are crucial steps between research and extension for developing location specific sustainable and profitable technologies. Both the DAATTCs and KVKs have enhanced extension reach through TAR.

Minikits:

During the year 2019-'20, two KVKS and 13 DAATTCs have tested 29 minikit cultures of 8 crops such as rice (13), ragi (1), redgram (1), blackgram (2), greengram (2), bengalgram (4), groundnut (4) and sesame (2). These minikits were evaluated both during kharif (692 locations) and rabi (461 locations) seasons in the state.

On-Farm Trials (OFTs):

For a technology to be proven as economically viable, technically feasible and sustainable, On-Farm evaluation is a pre-requisite. In this context, OFTs across the State assume significance. During 2019-'20, a total of 290 technologies (190 technologies by KVKs in 902 locations & 100 technologies by DAATTCs and Extension Specialists (ES) in research stations) in a) Field crops, b) Horticultural Crops, c) Animal Husbandry and Fisheries, and d) Community Science were evaluated. Among the 290 technologies, the technologies evaluated under the major themes included, a) Varietal Evaluation (83); b) Integrated Pest Management (59), c) Integrated Nutrient Management (26), and d) Integrated Crop Management (20).

Front Line Demonstrations (FLDs):

The KVKs, DAATTCs and Extension Specialists in RARS are entrusted with FLDs both during kharif and rabi seasons across the State with an objective of demonstrating improved technologies at farmers' fields, popularizing them for effective management of resources, and to build synergy among all stakeholders. These FLDs act as direct interface between researchers and farmers. Along with FLDs, training programmes and field days were also organized to enable rapid dissemination of improved technologies. During 2019-'20, a total of 205 FLDs were organized by KVKs in 762.7 ha, involving 2268 farmers. The DAATTCs organized 58 FLDs in 97.7 ha involving 217 farmers. These FLDs were organized in cereals, millets, pulses, oilseeds, commercial crops, fodder crops, vegetables, fruits, flowers, spices, plantation crops, medicinal plants, farm machinery, animal husbandry, aquaculture and community science.

2. Diagnostic Field Visits

Diagnostic field visits are conducted every season in a year by the scientists of KVKs, DAATTCs and ARSs along with Officers of Department of Agriculture to diagnose the field problems and to advocate farmers in crop production and protection. For making these diagnostic surveys more effective, capacity building programmes are also being organized regularly to the Scientists working in the ToT centres on latest technological developments, survey and surveillance procedures and diagnosis of pests and diseases. During 2019-'20, a total of 1943 diagnostic surveys were undertaken in different districts of AP. Of these, the DAATTCs and research stations were involved in 779 surveys, whereas the KVKs have conducted 1,164 diagnostic surveys. During the surveys, different problems were identified in various crops and suitable remedial measures were suggested. The following are the details of biotic and abiotic stresses identified in various crops in AP during 2019-'20 (Table 27).

Table 27. Details of biotic and abiotic stresses noticed during diagnostic surveys (2019-'20)

Crop	Biotic/Abiotic Constraints
	Cereals & Millets
Rice	Iron deficiency in nurseries, Zinc deficiency, Blast, Sheath blight, False smut, Ear head bug, BPH, Leaffolder, Inundation due to heavy rains, Rodent damage, Stem rot, BLB, Sulphide injury, and Sheath Rot.
Maize & Jowar	Fall army worm, Bacterial stalk rot, Leaf blight, and Banded blight Pink stem borer, Leaf blight, Fall army worm, Shoot fly
	Pulses & Oilseeds
Blackgram & Greengram, Bengalgram	YMV, Maruca pod borer, Cuscuta, Leaf crinckle, White fly, Alternaria blight Redgram Pod fly, Wilt, Spotted pod borer, Sterility mosaic virus Wilt, *Spodoptera exigua*, Terminal moisture stress,
Groundnut	Collar rot, *Spodoptera*, Tikka leaf spots, PSND, PBND, Whitefly, Jassids, Red hairy caterpillar, Thrips, Root rot, Moisture stress, and Stem rot
Sesame	Macrophomina dry root rot, Phyllody, Alternaria blight, and Powdery mildew
Sunflower	Poor seed setting
Castor	Semi looper
	Cash Crops
Cotton	Boll rot, Pink boll worm, Magnesium & Boron deficiencies, Para wilt, Wilt,
Sugarcane	Creeper weeds, Early stem borer (ESB) Internode Borer,, Scale insect, Yellow Leaf Disease (YLD), Mosaic, Smut, Top rot, Grassy shoot, Mealy bugs, Yellow & Red mites, Red rot

Crop	Biotic/Abiotic Constraints
	Vegetables
Onion	Thrips, Leaf blotch
Bhendi	YMV, Fruit and shoot borer
Chillies	Thrips, Mosaic complex, Die back & Fruit rot, Viral diseases, Micronutrient deficiencies, Leaf curl, Flower drop, Sucking pests, and Cuscuta
Tomato	Tomato leaf miner (*Tuta absoluta*), Fusarium wilt, Blight, Thrips
Brinjal	Shoot & Fruit borer
	Horticultural Crops
Acid Lime/Citrus	Canker, Boron deficiency, Leaf miner, Micronutrient deficiencies, Root rot
Oilpalm	Boron deficiency
Papaya	Mosaic, Ring spot, Micronutrient deficiencies
Pomegranate	Fruit sucking moth, Bacterial blight, Fruit spots
Sweet Orange	Twig blight, Wilt
Melons	Thrips, Boron deficiency, Mosaic, Downy Mildew
Cashew	Root and Shoot Borer, Tea mosquito bug
Mango	Fruit fly & borer, Micronutrient deficiency, Irregular bearing, Hoppers, Fruit drop
Coconut	Spiralling whitefly, Black headed caterpillar, Mite
Banana	Sigatoka leaf spot, Rhizome rot, Micronutrient deficiency, Poor bunch quality
Guava	Fruit fly
	Spices
Turmeric	Rhizome fly, Rhiozome rot, Leaf spots
Coriander	Powdery mildew
	Floriculture
Chrysanthemum	Root rot, Thrips, Mealy bug
Jasmine	Midge fly
	Aquaculture
Fish & Prawn	Red disease (fish), Fish lice, Dactylgyrosis (Fish), EHP (Prawns); White faecal syndrome (Prawns), Whitegut (fish); Low plankton (fish); Plankton bloom (Fish)

3. Capacity Building Programmes

Various capacity building programmes were organized by DAATTCs, KVKs and Extension Specialists (ES) during 2019-'20 to build the capacity of clientiele groups on crop production and protection in Agriculture, Horticulture, Community Science, and Fisheries. The total number of Capacity Building Programmes conducted is a) 866 to Farmers and Farm Women; b) 103 to Rural Youth; c) 238 to Extension Personnel); d) 140 to NGOs & Input Agencies) etc. Besides, a) 497 Method Demonstrations; f) 603 Group Discussions; g) 150 Field Days; h) 88 Rythu Sadassus; and i) 101 Vocational Training Programmes were also conducted during the year.

Vocational Training Programmes

A total of 101 Vocational Training Programmes were organized by 13 KVKs, benefitting 2469 stakeholders. These trainings were imparted on Value addition in millets, Fruits & vegetables, milk; Vegetable seedling production under shade net; Mushroom production; Vermicomposting; IPM in vegetables; Management practices in *rabi* crops; Farm mechanization; Friends of coconut; Quality seed growers; Nursery management; Use of liquid biofertilizers in vegetables; Portray technology in nursery raising; Preparation of botanical pesticides and its usage in different crops; soil testing and STBF; Nutrigardens and backyard poultry; Beekeeping; Fabric dyeing and printing techniques; Organic farming; BMP in cotton; Production technology in rice, cotton, groundnut and mango; Captive nursery rearing of fish seed etc.

T& V Monthly Workshops

Being an important Research-Extension linkage mechanism, these T&V monthly workshops are conducted on regular basis by research stations in all the 13 districts of AP. Active participation and interaction between ANGRAU faculty and Officials/Functionaries of the State Dept. of Agriculture and line departments (Joint Director; Assistant Directors; etc) on important topics such as seasonal and crop condition, field problems, and impact points will be discussed. During 2019-'20, about 112 T&V meetings were organized by ANGRAU and solutions were offered to farm problems.

4. Extension Studies

During the year 2019-'20, the studies taken up by the extension scientists of KVKs, DAATTCs and Research Stations has resulted in the following salient findings.

Perception & Adoption of Soil Health Cards (SHCs) by Farmers

As per the farmers' opinion, depiction of insufficient doses of fertilizers in SHC, delay in issue of SHC, lack of proper guidance, awareness about soil sampling, reaping of less yields due to adoption of SHC based fertilizer recommendations, non-availability of gypsum, majority of the farmers being non-adoptive, etc. are the major constraints. Based on the identified constraints, suitable suggestions such as timely distribution of SHC, organizing meetings on SHC, provision of information on procedure for calculating fertilizer doses based on soil nutrient status on SHC, imparting training to farmers on soil sample collection and its importance.

Identified Integrated Farming System (IFS) models by different KVKs/DAATTCs

KVK, Reddipalli

a) Agriculture+Horticulture+Dairy
b) Agriculture+Horticulture+Dairy+ Fodder Crops
c) Agriculture+Horticulture+Sheep
d) Agriculture+Dairy+Sheep+Fodder Crops

KVK, Kondempudi

a) Tomato+Ridgegourd+Dairy falling under Borewell based Red Sandy Loams

DAATTC, Anakapalle

a) Paddy+Groundnut
b) Paddy+Sugarcane+Dairy

KVK, Kalyandurg

a) Agriculture+Horticulture+Dairy &Sheep rearing
b) Agriculture+Horticulture+Poultry
c) Agriculture+Horticulture+Dairy+ Fodder crops

KVK, Banavasia)

a) Agriculture+Horticultureb)
b) Agriculture+Goat & Sheep Rearingc)
c) Agriculture+Poultry

DAATTC, Guntura)

a) Agriculture+Horticulture+Dairyb)
b) Agriculture+Dairyc)
c) Agriculture+Fisheryd)
d) Agriculture+Sheep

Impact of ANGRAU interventions

Significant impact was noticed with timely interventions in various crops. Major impact was noticed in technological adoption by interventions in crops (KVK, Anantapuramu; KVK, Kalyandurg); Rice varietal occupancy, optimum seed rate, weed management in dry direct seeded rice, transplanted rice, plant protection measures (KVK, Kondempudi); Plant protection and farm mechanization in paddy (KVK, Garikapadu; KVK, Utukuru); seed treatment, tractor drawn sowing, varieties, weed management, INM, harvesting methods, land preparation and value addition in groundnut (KVK, Banavasi); seed treatment, spacing, INM, intercropping with maize/bajra/ jowar, water management, weed management, post harvest and storage methods, intercropping in redgram (KVK, Banavasi); recommended seed rate, management of weeds, stem borer, blast, rodent control, FYM application, SHC recommendations (DAATC, East Godavari); High adoption of rice variety BPT 5204 and INM, IWM, IPM, IDM practices including rodent management in rice (DAATTC, Guntur); rice varietal occupancy of NDLR 7, NDLR 8, BPT 5204, NLR 34449, JGL1798, JGL384; nursery management; weed management and BPH management (DAATTC, Kadapa); adoption of rice BPT 5204, optimum seed rate, weed management, management of sheath rot, sheath blight and false smut, stem borer management (RARS, Guntur).

Other important studies

a) Survey on paddy production practices using Open Data Tool Kit under CSISA project (KVK, Undi) and b) Constraint analysis of sesame in Vizianagaram district (DAATTC, Vizianagaram).

5. Distance Education

Open and Distance Learning Centre (ODLC)

Open and Distance Learning Centre (ODLC) at Guntur was established in the year 2018, with the objective of extending agricultural education through distance learning to aspiring farmers, farm women, rural youth, students and other

stakeholders in Andhra Pradesh. The centre is organizing skill oriented short term certificate courses across the state (KVK premises as study centres for contact classes and scientists as resource persons) such as Organic Farming, Terrace Gardening, Bee Keeping, Mushroom Production, Millets Promotion, Agricultural Journalism, etc. During 2019-'20, nine ODLCs were offered by seven KVKs (Utukur, Rastakuntubai, Nellore, Kalikiri, Banavasi, Reddipalli, Undi) and a total of 299 candidates have participated in ODLC of which 147 candidates in Organic Farming, 79 candidates in Terrace Gardening, 19 candidates in Bee Keeping and 54 candidates in Mushroom production. Three contact classes at monthly intervals and a final exam were conducted for each batch.

CCertificate course on bee keeping organised at KVK, Rastakuntabai

Certificate course on bee keeping organised at KVK, Banavasi

Diploma in Agriculture Extension Services for Input Dealers (DAESI)

Under DAESI programme, 120 members of input dealers were transformed as Para-Extension professionals by enrolling them in one-year long training. One DAESI programme each with a capacity of 40 members was organized by KVK, Darsi, KVK, Banavasi and ARS, Utukur during 2019-'20 to acquaint them with location-specific field problems and expose them to relevant technologies and transform them as Para-Extension Professionals. The DAESI programme was spread over a period of 48 weeks, with 40 classroom sessions and 8 field visits to various institutions.

AI & CC Programmes

ANGRAU is one of the few Agricultural Universities in the country to start distance education through a private TV channel, Vyavasaya Patasala, Phone in Live Programme and Video Conferences. On every Wednesday and Friday, Pasidipantalu Phone-in-Live Programme on Agriculture and Allied Subjects are being organized in Doordarshan for answering farmers' queries on a pre-informed topic from 6.00 PM to 7.00 PM. During 2019-'20, a total of 48 such programmes were telecasted.

A total of 48 Vyavasaya Patasala programmes were broadcasted every Monday at 7.15 PM in All India Radio (AIR) during 2019-'20.

6. Publications

Technical Publications

During 2019-'20, the AI & CC has brought out the following publications.

- Vyavasaya Panchangam 2019-'20 & 2020-'21
- Journal of Research, ANGRAU (Quarterly)
- e-News Letter

- Vyavasayam (Monthly Telugu Farm Magazine)
- Diaries, Wall Calendars and Table Calendars of the University-2020
- Crop Diagnostic Bulletins on Rice, Cotton, Blackgram, Greengram, Groundnut, and Sugarcane.

Release of ANGRAU Diary 2020 by Dr. V. Damodara Naidu, Hon'ble Vice – Chancellor at Administrative Office, Lam, Guntur on 31. 12. 2019

Vyavasaya Suchanalu

For wider dissemination of ANGRAU technologies, the technical content is published in Telugu daily newspapers in 13 districts of AP since 2014. The weekly advisories are covered in Sakshi (Padipanta column) on every Monday; Prajasakthi (Agri Plus column) on every Friday; Andhra Prabha; Eenadu; and Andhra Jyothi newspapers. A total of 78 weekly advisories were published during 2019-'20. The technical information was communicated to farmers through Kalgudi and Reliance Foundation Information Services as well.

7. Technology Dissemination through I.C.Ts and Other Mass Media

Mobile Applications for Smart Phones

Several android based mobile applications were developed for farmers and the technical information is being updated from time to time. The ANGRAU developed/supported applications are:

- ANGRAU Pasuposhan: Developed by KVK, Banavasi, Kurnool district during 2018 with information on livestock, covering cattle management, sheep and goat rearing, poultry (layer & broiler), strategies that help in doubling farmers income, best management practices and technologies.
- Fertilizer Calculator: Developed by KVK, Banavasi in 2019 and is useful to farmers, academicians, scientists, extension personnel, students, input dealers, and other stakeholders.
- ANGRAU KVK Banavasi CFLDs: Developed by KVK, Banavasi in 2018 to cater the information needs of CFLD farmers on crop production & protection, varieties, marketing of pulses, oilseeds etc.
- Krishi Vigyan: Developed by KVK, Amadalavalasa in 2016 for providing information on package of practices for rice, blackgram, greengram, coconut and maize in telugu with photographs, video clips and telephone directory of ANGRAU.
- Farm Radio: (www.farmradio.in): The first of its kind online radio initiated by DAATTC, Kondempudi of ANGRAU, facilitating the freedom to podcast what you want and when you want it, with better sound quality to listeners. The services include ready availability of audio files (podcast) on ICM in groundnut, pests and disease management in sugarcane and IPM in rice. Short videos (1-2 minutes) on pests and diseases of rice, maize, sugarcane, cotton and apiary were also made available.
- Annapurna Krishi Prasaar Seva (AKPS): The AKPS is an interactive information dissemination system (IIDS), a joint initiative of Digital Indian Corporation and ANGRAU that delivers web, mobile and IVRS (Interactive

Voice Response System) based solutions. This system enables data to be transferred from farmers to experts and back in the form of voice, text, images and videos. In ANGRAU, AKPS is being implemented through 8 KVKs (Nellore, Amadalavalasa, Utukur, Darsi, Reddipalli, Garikapadu, Undi and Kalikiri) and 5 DAATTC (Banavasi, Guntur, Vizianagaram, Peddapuram and Kondempudi). During 2019-'20, a total of 1359 text and 705 voice based advisories were given by the KVKs and 807 text, 142 voice SMS and 1089 VRS call advisories were given by DAATTCs.

- Kisan Mobile Advisories (m-Kisan Portal): For disseminating latest information on weather, market prices on various commodities, livestock and crop based technologies to farmers, "Kisan Mobile Advisories" were facilitated by KVKs through text and voice messages. During 2019-'20, a total of 1356 text messages and 9399 voice messages were sent through "m-Kisan".
- Mass Communication Channels: The success stories of ANGRAU-Extension Wings are frequently communicated through mass media. During 2019-'20, all the KVKs have brought about 241 publications, 1,936 press releases, 115 radio talks, and 151 TV coverages. The efforts of DAATTCs have come up with 99 publications, 860 press releases, 34 radio talks, and 96 TV coverages. The ARS staff of Podalakur, Utukur, and Seethampeta altogether has produced 6 publications, 20 press releases, 9 radio talks and 2 TV coverages.

C. EXTENSION EVENTS

1. Kisan Melas

Kisan Melas provide an opportunity for farmers to gain first hand information on the latest technologies, live demonstrations, informative agricultural exhibitions, interaction with the scientists, input agencies and inculcate the habit of visiting research stations frequently for exposure and timely advice.

During 2019-'20, a total of 16 Kisan Melas were organized out of which, two at RARSs (Lam & Tirupati), one at ARS (Peddapuram); 12 at KVKs (2 each at Reddipalli & Utukur, 5 at Amadalavalasa, one each at Kalikiri, Kondempudi, Garikapadu); one at Agricultural College, Bapatla with a total participation of 10,736 farmers. Important themes presented at Kisan Melas are on a) improved production technologies of maize, millets, and pulses; b) seed production in maize, finger millet, pulses, and sesame; c) productive management strategies for sustainable agriculture; d) water conservation and rainwater harvesting, renovation of traditional and other water bodies/ tanks, bore well recharge structures, watershed development and intensive afforestation; e) organic farming; f) water conservation technologies in field and horticultural crops such as direct sowing in rice, alternate wetting and drying, alternate furrow irrigation in ID crops, drip and sprinkler irrigation methods in horticultural crops etc. Exhibitions, Rythusadassus and Field Visits were arranged during Kisan Melas. Seed of improved varieties and ANGRAU publications were sold to the farmers besides releasing 12 booklets/folders and crop videos with number of copies for distribution to farmers on free of cost.

Hon'ble Minister for Agriculture Shri K. Kanna babu visiting exhibition at RARS, Anakapallii

Hon'ble Deputy Speaker of Legislative Assembly Sri Kona Raghupathi visiting exhibition at Kisan Mela at College Farm, Agricultural College, Bapatla

Kisan Mela at RARS, Lam

Kisan Mela At RARS, Tirupati

2. Exhibitions

The KVKs, DAATTCs, Research Stations and AI&CC organize exhibitions at special events/ occasions like *Eruvaka Purnima*, *Kisan Melas*, *Rythusadassus*, World Soil Day, *Mahila Kisan Diwas*, Pre *Rabi* Campaign, Farmers Day, *Sankranti Sambaralu*, Nutrition Week Celebrations, Conferences and Workshops, Awareness Programmes etc. During 2019-'20, a total of 78 exhibitions were organized in which 14,716 farmers have participated.

3. Village Adoption Programme

The Village Adoption Programme is implemented by ANGRAU since 1998 by every major and medium research station and the College. Each of these institutes will adopt a village for its overall development. Besides conducting on-farm research, attending to malady-remedy analysis, monitor and forecast pests, diseases, nutritional disorders, the Scientists and teaching Faculty regularly visit and render on the spot advices to farmers on various aspects of agriculture, animal husbandry, horticulture, fisheries etc. Further, assistance is rendered in procuring quality inputs, arranging credit through banks and cooperatives, improve literacy and in overall economic development. During 2019-'20, about 11 centres comprising 5 colleges (Agricultural College, Rajamahendravaram; Dr. NTR College of Food Science & Technology, Bapatla; Agricultural College, Bapatla; Agricultural College, Mahanandi; College of Agricultural Engineering, Madakasira), 2 RARSs (Lam and Tirupati), and 4 ARSs (Seethampeta, Peddapuram, Podalakur and

Utukur) conducted 83 diagnostic team visits covering 400 farmers, 14 demonstrations on 230 farm holdings, 26 training programmes benefitting 577 farmers, one animal health camp covering 304 animals. The final year undergraduate students of different Colleges have conducted NSS programme in the adopted villages.

4. Rural Agricultural Work Experience Programme (RAWEP)

The DAATTCs and KVKs have been involved to guide the final year undergraduate students of Agricultural Colleges to provide practical training and experience for one semester by residing/placing them in villages and by attaching one host farmer per student. A total of 602 students from constituent and affiliated agricultural colleges of ANGRAU had undergone RAWEP during the year 2019-'20.

D. SPECIAL SCHEMES

1. Cluster Frontline Demonstrations (CFLDs)

CFLDs on Pulses under NFSM

For increasing the production and productivity of pulses, the CFLD programme was initiated by Ministry of Agriculture and Farmers Welfare, GoI during *rabi* 2015-'16 under National Food Security Mission (NFSM). During 2019-'20, all 13 KVKs implemented CFLD on Pulses during *kharif* and *rabi*. A total of 440 ha area was covered by organizing 1,100 demonstrations on redgram, greengram, blackgram, and bengalgram crops in cluster approach in interior areas benefitting small & marginal farmers and weaker sections. Improved seed varieties released and notified by CVRC (Central Varietal Release Committee) in the past 15 years were provided as critical inputs for conducting demonstrations. A financial assistance of Rs. 9,000/ha was sanctioned to each crop for inputs, extension activities and monitoring of the programme.

CFLDs on Oilseeds under NMOOP

CFLDs on oilseeds were conducted under the National Mission on Oilseeds and Oil Palm (NMOOP) during *kharif, rabi* and summer seasons on groundnut, sesame, sunflower, castor, and safflower. A total of 1085 CFLDs on oilseeds were conducted in 540 ha during *kharif* 2019 (100 ha & 250 Demos), *rabi* (400 ha & 725 Demos) and summer (40 ha & 100 Demos). Crop-wise, the number of CFLDs was 460 (Groundnut); 25 (Sunflower); 250 (Sesame); 235 (Castor); and 115 (Safflower).

2. National Innovations in Climate Resilient Agriculture (NICRA)

National Innovations in Climate Resilient Agriculture (NICRA) is a multi-institutional and multi-disciplinary network project launched by ICAR in 2011 that aims to build resilience in Indian Agriculture to climate change and climate variability through strategic research and technology demonstrations. The Technology Demonstration Component (TDC) of NICRA was implemented in ANGRAU through 3 KVKs (Amadalavalasa, Undi and Reddipalli). Demonstrations, capacity building on livestock & fisheries and institutional interventions were taken up by KVKs. Demonstrations were organized for benefitting farmers under NRM interventions viz., water harvesting and recycling, in-situ moisture conservation and ground water recharge. Under Crop Production module, various interventions such as drought tolerant, flood tolerant, short duration varieties, pest & disease management, nutrient management and crop diversification etc. were taken up. Under livestock and fisheries, the interventions included improved fodder production, improved breeds of backyard poultry, captive

rearing of fish, management of fish ponds etc. were taken up benefitting 20 stakeholders. Under institutional interventions through Custom Hiring Centre (CHC), 20 farmers were benefitted.

E. INSTITUTIONAL INTERVENTIONS

1. Custom Hiring Centres (CHC)

Brush cutters for CHC are maintained by KVK, Undi in 20 ha with 50 farmers.

2. Tribal Sub Plan (TSP)

Three KVKs at Darsi, Rastakuntubai and Kondempudi have been identified by the ICAR for implementing the activities under Tribal Sub-Plan, with an aim to provide physical and financial security to the members of the tribal areas against any kind of oppression and exploitation. Certain activities were taken up by these KVKs to improve the socio-economic conditions, reducing poverty and unemployment in the operational area and include technology assessment (OFTs), FLDs, capacity building programmes (training to farmers, rural youth, extension personnel and skill development training programmes), extension activities and physical assets/micro-enterprises creation for income generation. During 2019-'20, a total of 18 OFTs (88 beneficiaries); 28 FLDs (231 beneficiaries); 75 Trainings to farmers (2512 beneficiaries); 19 Trainings to rural youth (547 beneficiaries); 16 Trainings to Extension Personnel (504 beneficiaries); 15 Skill Training Programmes (450 beneficiaries); 61 Extension Activities (2656 beneficiaries); 52.4 Q of seed supply (1206 beneficiaries); 1,70,600 number of planting material (2391 beneficiaries); Supply of 2,700 livestock strains (202 beneficiaries); Analysis of 759 soil samples (706 beneficiaries); 1145 Mobile advisories (3456 beneficiaries) were taken up under TSP.

Supply of chilli seedlings to TSP farmers at KVK, Darsi

Distribution of mini rice mills at KVK, Rastakuntubai as part of TSP

3. Attracting and Retaining Youth in Agriculture (ARYA)

Attracting and Retaining Youth in Agriculture (ARYA) is a flagship project of ICAR that was launched during March, 2015 as one of the components of National Agricultural Innovations Fund. The main objectives of the programme are to attract rural youth to take up various agriculture, allied and service sector enterprises, to enable youth to establish network groups to take up capital and resource intensive activities like processing, value addition and marketing and to demonstrate linkages with different stake holders for sustainable development of youth. ARYA has been implemented by two KVKs in ANGRAU viz., Nellore and Utukur.

During 2019-'20, four enterprise units each of Vermicompost, Mushroom cultivation, Nursery

under shadenet, Value addition to millets were established by KVK, Utukur. Further, eight enterprise units each of Mushroom cultivation and Nursery under shadenet were established by KVK, Nellore.

4. Seed Hub Programme

Three KVKs of ANGRAU (Amadalavalasa, Reddipalli, & Ghantasala) in AP under Seed Hub Programme have produced 899.78 q of Certified and Foundation seed of redgram (LRG 52, PRG 176); greengram (WGG 42, IPM 2-14); blackgram (TBG 104, LBG 752, LBG 787); and bengal gram (NBeG 49).

5. Krishi Kalyan Abhiyan (KKA)

Three districts (Vizianagaram, Visakhapatnam, and YSR Kadapa) in AP were identified as Aspirational Districts for implementation of the KKA programme from July 1, 2018 to August 15, 2018 during phase I and from October 2, 2018 to December 25, 2018 during phase II. The phase III was initiated during January 15 to April 15, 2019 for genetic upgradation programme through High Yielding Indigenous Breed (HY-IB) bovine semen and delivery of quality artificial insemination services at farmers' doorstep to 100 more villages/district in the selected districts.

6. District Agro-Met Units (DAMUs)

ICAR entered into MoU with Indian Meteorological Department (IMD) for setting up of District Agro Met Units (DAMUs) under the *Gramin Krishi Mausam Seva* (GKMS) in 660 districts of the country. Seven DAMU units were established in ANGRAU, one each at KVKs-Amadalavalasa, Rastakuntubai, Garikapadu, Darsi, Nellore, Utukur, and Banavasi and these units are functional since October 2019. A total of 38 Farmers Awareness programmes were organized by these KVKs and 272 messages relating to weather were sent. Further, a total of 2209 Agromet Advisory Bulletins were issued in 48 blocks.

7. Soil Health Cards

Soil Health Management (SHM), one of the important interventions under National Mission on Sustainable Agriculture (NMSA) aims at promoting INM by juxtaposing chemical fertilizers, organic manures and biofertilizers for improving soil health and crop productivity. Under this scheme, soil health cards (SHC) are issued to farmers with crop-wise recommendations of nutrients and fertilizers for the individual farms. During 2019-'20, all KVKs of ANGRAU had analyzed 6,066 soil samples with the established Soil Testing Laboratories (STLs) and Mini Soil Testing Laboratories (MSL). A total of 5,948 Soil Health Cards were distributed, benefitting 5,183 farmers from 388 villages.

8. Skill Development Training Programmes by ASCI

Fourteen Skill Training Programmes under Agricultural Skill Council of India (ASCI), coordinated by eight KVKs (Rastakuntubai, Garikapadu, Undi, Darsi, Nellore, Utukur, Kalyandurg, and Banavasi), were organized on various aspects, benefitting 278 trainees during the year 2019-'20.

9. Doubling of Farmers Income (DFI)

As per the guidelines of ICAR, each KVK should contribute to doubling of farmers' income by selecting one or two villages in convergence with all stakeholders. During 2019-'20, all 13 KVKs of ANGRAU had conducted 11 OFTs, 21 FLDs, 5 CFLDs accounting to an area of 132.4 ha in 26 selected DFI villages. A total of 13 training programmes, 5 awareness campaigns and 9 other extension activities were conducted, benefitting

1331 stakeholders, including 1036 farmers, 198 farm women and 97 rural youth. Micro enterprises (Mini rice mill, Dal mill, Mini Pulveriser) and physical assets (Shade nets, Threshing floors, Tarpaulin sheets) were created in DFI villages.

10. Cereal System Initiative for South Asia (CSISA)

The CSISA project was established in 2009 for benefitting more than 8 million farmers by the end of 2020. The CSISA is led by CIMMYT and is implemented jointly by IFPRI and IRRI. The CSISA generates data from multi-locational adaptive trials, production practices, diagnostic surveys in SAARC countries, for determining yield attributing factors and other pertinent information for refining recommendations and advisories. The KVKs were exposed to methods of collecting error free field data using digital data collection tools such as Open Data Kit (ODK). Eight KVKs (Amadalavalasa, Kondempudi, Undi, Ghantasala, Darsi, Kalikiri, Reddipalli, and Banavasi) implemented CSISA during the year 2019-'20. Diagnostic surveys for production practices and on farm evaluation of zinc fertilizer application in rice were carried out.

11. Biotech Kisan Hub-ANGRAU

Biotech-KISAN Hub is a farmer centric scheme for farmers developed by and with farmers. It is a Pan-India programme, following a hub and spoke model and stimulates entrepreneurship and innovation in farmers and empowers women. During the year 2019-'20, a total of 182 demonstrations were conducted across four districts (Kurnool, Ananthapuramu, Visakhapatnam, and Srikakulam) on groundnut, pigeonpea, chickpea, blackgram and greengram covering 39 mandals including four ITDA mandals. Extension programmes such as trainings, exposure visits, field days, method demonstrations, farmer-scientist interaction programmes, workshops were organized and success stories on Value Addition Units were demonstrated.

12. Reach Every Panchayat

Reach every Panchayat is a unique programme formulated and implemented by ANGRAU with a goal of reaching every Panchayat of the state to disseminate improved technologies developed by the University. As a part of the programme, one key informant farmer is identified in each Panchayat who will influence other farmers' decisions in farming. The key farmer along with Sarpanch of the Panchayat are trained and oriented with the best management practices, critical interventions for increasing the productivity of major crops grown in that area, government schemes and ICT applications. During 2019-'20, this programme was implemented in three districts by a) DAATTC, Darsi, b) KVK, Banavasi, and c) KVK, Kondempudi covering 303 panchayats and 626 participants.

F. PARTNERSHIP PROGRAMMES

1. Partnership Activities with Reliance Foundation

Reliance Foundation Information Services (RFIS) provides validated information services with help of ANGRAU expertise to different livelihood information seekers using modern Information and Communication Technologies (ICT). The Information is disseminated though audio, dial out conferences, local cable TV scrolls, live-phone-in programmes, agro advisories on daily basis, weather news bulletins, voice advisories, text SMSs, Jio Chat, Whats app and field based programmes such as knowledge on wheels, plant clinics and training programmes covering agriculture and allied sectors. During the year, 2019-'20, about 610 advisories were sent to 1,08,641 farmers covering 1895 villages.

2. Partnership with SERP under APRIGP

In order to upgrade the knowledge and skills of the members of Farmers Producer Organizations (161 mandals) assisted by the Society for Elimination of Rural Poverty (SERP), the University had entered MoU with SERP and implementing the project entitled "Collaborative Strategies of ANGRAU – SERP in enhancing the livelihoods of small and marginal farmers & Nutri & Hygiene entrepreneurship promotion in Andhra Pradesh" under Andhra Pradesh Rural Inclusive Growth Project (APRIGP). Under this project, during 2019-'20, a total of 160 training programmes were conducted by KVKs/DAATTCs with a participation of 3700 FPO members. Further, about 114 demonstrations were conducted, benefitting 2423 FPO members.

3. Farming System for Nutrition (FSN) with MSSRF, Chennai

Farming System for Nutrition (FSN) is a model that entails mainstreaming the nutrition dimension in designing the farming system model which includes a combination of sustainable measures including advanced crop production practices, biofortification, promotion of nutrition gardens of fruits and vegetables, livestock and poultry development to address the problem of malnutrition and hidden hunger. The MSSRF has been engaged in advocating the FSN approach in three KVKs (Reddipalli, Undi & Rastakuntubai) under ANGRAU. Important activities carried out during 2019-'20 are a) demonstrations on FSN model, b) nutrition education programmes, c) creating awareness on biofortified and nutria dense varieties for tribal areas, d) developing education material in local languages and distributing in adopted villages, *anganwaadies*, schools, and e) organizing field visits and field days to the FSN demo plots at KVKs.

G. COORDINATED ACTIVITIES WITH LINE DEPARTMENTS

1. Eruvaka Purnima

Eruvaka Purnima was celebrated on June 9, 2019 and on this occasion all the best management practices (BMPs) were showcased for the benefit of the farmers, with the active participation of DAATTs and KVKs in all the districts of state. Farmers were also educated about the critical interventions impacting the productivity, good agricultural practices leading to cost reduction and profitable farming.

2. Dr. Y.S.R. POLAMBADI

All the scientists of DAATTCs and KVKs have actively participated in the Dr. Y.S.R. *Polambadi* as resource persons organized by the Dept. of Agriculture in all the districts of AP held on Thursday and Friday of every week during 2019-'20 to train the farmers regarding agro-ecosystem analysis, importance of predators, ICM practices and importance of botanicals/bioagents.

3. A.M.C. Level Interaction Meetings

All the Scientists of DAATTCs and KVKs of ANGRAU have actively participated in the AMC level interaction meetings organized by the State Government in all the districts of AP held on 1st and 16th of every month during 2019-'20.

4. Rythu Bharosa

All the scientists of KVK, DAATTCs have participated in Farmers-Scientist interaction meetings in Rythu Bharosa programmes organized

by Dept. of Agriculture in all the districts of AP on October 15, 2019.

H. SPECIAL EVENTS

a) Swachhata Hi Sewa Programme: From 11.09.2019 to 02.10.2019

b) World Soil Day: On December 5, 2019 to create awareness on importance of soil testing & distributing Soil Health Cards to Farmers.

c) Mahila Kisan Diwas: On October 15, 2019

d) Parthenium Awareness Week: From August 16-22, 2019

e) World Honee Bee Day: On May 5, 2019

f) Pradhan Mantri Kisan Samman Nidhi (PM-KISAN): On the eve of YSR Rythu Bharossa

g) Awareness on Energy Efficiency: In agriculture and allied areas along with active involvement of all line departments, NEDCAP, Electricity Department, NGOs for sensitizing farmers on saving energy.

h) Disaster Management Activities:

- Scientiss of KVK, Amadalavalasa visited heavy rain affected fields in Srikakulam district on October 22-23, 2019 and contributed to crop recovery
- Scientists of KVK, Garikapadu visited cyclone affected rice, cotton, sugarcane, chillies, maize and pulses in Krishna district during 9-25 April, 2019 & during 3rd week of August, 2019 and suggested remedies
- DAATTC, Peddapuram scientists visited heavy rain affected fields in EG district during August 2019 and suggested crop recovery measures

I. CRITICAL TECHNOLOGY PRODUCTS

The KVKs also act as resource centres for supply of quality inputs. During 2019-'20, a total of 1,941.53q of seed material, worth of Rs. 60, 89, 788/- of various crops and planting material/ livestock species/Bio-products of Rs. 17, 94, 256/- was supplied to the farmers.

J. DOCUMENTATION OF SUCCESS STORIES & PROPOSAL OF RESEARCHABLE ISSUES

- A total of 43 success stories (district-wise) were documented by the KVKs and DAATTCs during the year 2019-'20.
- A total of 38 researchable issues in cereals, millets, pulses, oilseeds, commercial crops, horticulture crops, climate change studies, and live stock were proposed by the KVKs

VI. PLANNING AND MONITORING CELL

The Planning & Monitoring Cell (P&M Cell) was established during the year 1986 in ANGRAU. Previously, this Cell was headed by the Director (Planning & Monitoring). However, since December 2017, the post of Director was withdrawn and is now headed by Dean of Post Graduate studies. The P & M Cell works with the overall objectives of planning, monitoring and evaluation of various developmental programmes and activities of the University.

The P&M Cell acts as a liaison office between ANGRAU and other Government and Non-Government Institutions. The Cell does the job of compilation and submission of data and information of ANGRAU in different formats to various agencies at National and International level. It is also responsible for the maintenance and up-gradation of human resource data base of the University; information provider to statutory bodies; preparation of convocation report of the Vice Chancellor reflecting the objectives and achievements of University etc.

The P & M Cell submits reports from time to time to State and Central Governments and other statutory bodies. The Significant Events of ANGRAU are prepared and presented to Board of Management-ANGRA as Agenda Item No. (1).

As a "Nodal Officer" for the ICAR, the Principal Scientist (P&M Cell) discharges duties relating to day to day correspondence on various issues in general to information pertaining to Indian Rankings; ICAR Rankings of ANGRAU; Preparation and submission of Annual Reports of ANGRAU to be submitted to ICAR under "Strengthening and Development Grant"; uploading the information regarding JRF/SRF, NTS UG/PG, Student Ready Programme; Strengthening of Library Facilities; Audit Utilization Certificates etc. in ICAR Education Portal.

Broadly, the job description of P&M Cell is categorized as below.

S. No.	Activity/Report Submission (for the year 2019-`20)
I.	**Specific works at University level**
1	Significant events for meetings of BoM
2	Updating information pertaining to RTI Act (website)
3	Annual Convocation Reports and Annual Report of ANGRAU
4	Preparation and updating University Profile, University Brochure, Telephone Directory of ANGRAU
II.	**Job Description at State Level (AP)**
1	Monthly Report of ANGRAU to be included in Hon'ble Governor's report for submission to Hon'ble President of India
2	Monthly Appraisal Report of ANGRAU to be submitted to "The Deputy Secretary to Govt., Agrl. & Cooperation (Agrl. IV Dept.), Govt. of AP
3	Information to Outcome Budget for inclusion in the Governor's speech.
4	Other works on regular correspondence with Govt. of AP
III.	**ICAR Works**
1	Tribal Sub Plan Report
2	ELP Report
3	Impact Assessment Report and Library Impact Assessment Report
4	Strengthening and Development of Higher Agricultural Education-Progress of works, Receipts and Expenditure etc.
5	Uploading of demand proposals of ELP/JRF-SRF/Library strengthening/Niche area of excellence/NTS (UG/PG)/Student Ready/TSP/Development Grants/Rural Agricultural Work Experience Program (RAWEP)/International Fellowship, Merit cum Means Scholarship etc. in ICAR Education Portal
6	Submission of AUC and UC with purchase orders and proceedings
7	ICAR Annual Progress Report
8	Civil work proposals for technical vetting

S. No.	Activity/Report Submission (for the year 2019-`20)
9	Indian Rankings (NIRF) & Related proposals
10	Questionnaires
11	Compliance Reports & Action Taken Reports
12	Direct Benefit Transfer Information – Upload in the DBT DARE portal
13	Participation in ICAR Ranking of ANGRAU along with other Agricultural Universities
14	Demand under scheme being implemented in ANGRAU under Strengthening and Development Grant of ICAR
15	Experiential Learning Success Stories
16	Compilation and submission of reports on "International Yoga Day" & "Agricultural Education Day" & Related.
17	Nodal Officer for ICAR
IV.	**UGC**
1.	Consolidated Statistical Data
V.	**Others**
1	All India Survey on Higher Education (AISHE)-DCF & TIF consolidation report (11 Constituent Colleges + 6 Affiliated colleges) & other proformae related to AISHE.
2	Agenda points of IAUA and other related communication with IAUA
3	Information to Rashtriya Uchchatar Shiksha Abhiyan (RUSA) for MIS portal
4	Answers to agriculture related queries in Parliament (Lok Sabha & Rajya Sabha)
5	Answers to agriculture related queries in Legislative Assembly & Legislative Council of AP
6	APSCHE-Publication of Diary information
7	Implementation of monitoring of live interaction programmes of Hon'ble Prime Minister like "Pariksha Pe Charcha 2.0"; "Pradhan Mantri Kisan Sammelan" etc at University level in different research stations, colleges, KVKs etc and submission of report to UGC from time to time.

S. No.	Activity/Report Submission (for the year 2019-`20)
ANGRAU Website Development & Maintenance	
	• Web Portal Administration and security
	• Audit inspection of the official website
	• Content uploads from time to time
	• Handling of both fake and valuable contents of ANGRAU in Google search engine
	• Inspection and uploading of the domains of different colleges, RARSs, KVKs and DAATTCs Besides the aforementioned activities, the P&M Cell initiated the Accreditation Works of ANGRAU during 2019-'20 for submitting the Letter of Intent (LoI); Institutional Eligibility for Accreditation (IEA) and Statement of Compliance (SoC) for the University and its constituent colleges including programmes to ICAR.

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VII. FINANCE AND BUDGET

The major financial grants to the University come from the Andhra Pradesh State Government unde Plan and Non-Plan Schemes. The Non-Plan assistance is by way of Block Grants for running the University. The Block Grant approved in the budget for the year 2019-`20 and released was Rs. 34,533.00 lakh.

The ICAR assistance was Rs. 5,593.00 lakh and the Government of India assistance was Rs. 303.00 lakh. During the year, an amount of Rs. 1916.00 lakh was received under RKVY. During the financial year 2019-'20, an amount of Rs. 1600 lkah was released under other agencies (including NABARD – RIDF).

Thus, the total finances of the University during the year 2019-`20 was Rs. 63,1621.00 lakh (Rs. 34,533.00 + Rs. 28,628.00 lakh) as detailed below.

Table 28. Funding Sources to ANGRAU during 2019-`20

(Rupees in Lakhs)

S. No.	Particulars	Grants in Aid & Other Grants in Aid	%	Expenditure	%
1	Direct Receipts	2,471	3.91	1,776	2.90
2	Revenue Expenditure (Earlier non-plan)	34,533	54.67	33,771	55.23
3	Dept. Sponsored Schemes	73	0.12	108	0.18
4	NABARD - RIDF	1,600	2.53	2,426	3.97
5	RKVY	1,916	3.03	408	0.67
6	ICAR Plan	5,593	8.86	5,353	8.76
7	Government of India	303	0.48	103	0.17
8	Other Agencies	433	0.69	278	0.45
9	Other Accounts	16,239	25.71	16,918	27.67
	TOTAL	**63,161**	**100.00**	**61,141**	**100.00**

Table 29. Budgetary Support to ANGRAU including Funds Released under Development Grant of ICAR during 2019-`20

(Rs. in lakhs)

S. No.	Budget Heads	Total Funding from State Government			Funding Support from ICAR					Any Other Central Funding	Grand Total
		Plan	Non-Plan	Total	Educa-	AICRP	KVK	Any other ICAR Support	Total ICAR Support (6+7+8+9)		
1	2	3	4	5	6	7	8	9	10	11	12
1	Salary	5,593	34,533	40,126	666	2,610	2,077	-	5,353	-	45,479
2	Capital	1,600	-	1,600	-	-	-	-	-	-	1,600
	Total	7,193	34,533	41,726	666	2,610	2,076	-	5,353	-	47,079

VIII. BUILDINGS AND CONSTRUCTION PROGRAMMES

During the period under report, the following civil works worth Rs.20.7529 crore were completed by the Engineering Department of the University.

S.No.	Name of Work	Project Cost (Approximately) Rs. in Lakhs
1.	Construction of seed storage processing plant cum seed storage at KVK, Amadalavalasa	35.00
2.	Construction of Ground floor at left wing back side and at Right wing back side of main college building (First floor) at Ag. College, Naira	100.00
3.	Construction of Agro processing centre on Jaggery unit at RARS, Anakapalle	25.70
4.	Construction of Liquid Bio – Fertilizer Unit at RARS, Anakapalle	90.00
5.	Construction of compound wall at Home Science, Lam, Guntur	130.00
6.	Construction of compound wall at APGC., Lam, Guntur	46.00
7.	Construction of compound wall at RARS, Lam, Guntur	60.00
8.	Construction of Administrative building at KVK, Ghantasala, Krishna Dist.	177.38
9.	Construction of Farmers Hostel building at KVK, Ghantasala, Krishna Dist.	104.45
10.	Construction of seed godown building at ARS, Ghantasala, Krishna Dist.	39.37
11.	Construction of Chain link fencing, Amaravathi, Guntur dist.	56.00
12.	Construction of Administrative building at KVK, Darsi	177.38
13.	Construction of Administrative building at KVK, Kalikiri, Chittoor Dist.	177.38
14.	Construction of Farmers Hostel at KVK, Kalikiri, Chittoor Dist.	72.13

S.No.	Name of Work	Project Cost (Approximately) Rs. in Lakhs
15.	Construction of Liquid Bio-fertilizers lab at RARS, Tirupati	99.00
16.	Extension farm machinery exhibition cum training center at RARS, Tirupati	27.75
17.	Construction of compound wall wet lands of SVAC, Tirupati	38.00
18.	Construction of Girls Hostel at SVAC, Tirupati	450.00
19.	Bituminous Road at ARS, Nellore	50.00
20.	Cement Concrete road at KVK, Nellore	30.00
21.	Seed processing and storage godown at KVK, Reddipalli	35.00
22.	Solar Power Plant at RARS, Maruteru, WG Dist. (30+10 kWp)	24.75
23.	Solar Power Plant at S.V. Agricultural College, Girls Hostel Tirupati,	30.00
	Total	2075.29

IX. OTHER EVENTS OF THE YEAR

During the year 2019-'20, several important events have occurred at different centres of ANGRAU. An account of significant events, workshops, conferences, meetings, and other events that took place during the period under report is as follows.

A. SIGNIFICANT EVENTS

1. Inauguration and Foundation Stone Laying Ceremony

- Liquid Biofertilzer Laboratory & Modern Jaggery Plant were inaugurated by Dr. V. Damodar Naidu, Hon'ble Vice-Chancellor on 25.05.2019 at RARS, Anakapalle.
- Dr. V. Damodara Naidu, Hon'ble Vice-Chancellor inaugurated Roof Top Solar Power Plant at Agricultural College, Bapatla Campus on 03.10.2019.
- The Net House at Horticultural Nursery at KVK, Amadalavalasa and Value Addition Unit Building funded by NABARD at ARS, Vizianagaram were inaugurated by Dr. V. Damodara Naidu, Hon'ble Vice-Chancellor, ANGRAU, on 19.10.2019.
- Poultry Unit shed at KVK, Reddipalli was inaugurated by Dr. P. Rambabu, Director of Extension, ANGRAU, on 21-11-2019.
- "Dhal Mill" under DBT Kisan Hub project was inaugurated by Sri B. Muthyala Naidu, Hon'ble MLA and Chief Whip of Government of Andhra Pradesh, at Kothapenta (V) of Devarapalli (M), Visakhapatnam district, on 08.01.2020.
- Solar Panel (40 KWP) (CAPEX MODE) at RARS, Maruteru was inaugurated by Dr. V. Damodara Naidu, Hon'ble Vice-Chancellor, ANGRAU on 11.03.2020.
- Dr. V. Damodara Naidu, Hon'ble Vice-Chancellor inaugurated the "Cement Concrete Road" and "Poultry Shed", at KVK, Nellore, on 14.03.2020.
- B.T. Road at ARS, Nellore was inaugurated by Dr. V. Damodara Naidu, Hon'ble Vice-Chancellor, ANGRAU on 14.03.2020.
- Foundation Stones for internal B.T. Road at RARS, Maruteru and for Compound Wall at KVK, Undi were laid by Dr. V. Damodara Naidu, Hon'ble Vice-Chancellor, ANGRAU, on 11.03.2020.

2. Others

- Android mobile weather app **"***Vyavasaya Vathavarana Suchanulu***"** was released by the University Authorities of ANGRAU in Bimonthly Meeting held at Lam, Guntur on 24.
- Millet Processing machinery was installed on 25.07.2019, at Post Harvest Engineering & Technology Centre, RARS, Tirupati.
- RARS, Maruteru organized awareness programme on "Fall Army Worm in Maize" at Eluru, West Godavari district, in association with the South Asia Biotechnology Centre, New Delhi, on 02.12.2019.
- Agricultural Education Day was organized on 03.12.2019 in a befitting manner at all Colleges and Polytechnics of the Acharya N.G. Ranga Agricultural University on the eve of the birthday of Bharat Ratna Dr. Rajendra Prasad, the first President of Independent India.

B. OTHER SIGNIFICANT EVENTS

S. No.	Event	Date	Venue
1	University Formation Day	12.06.2019	All Centres of the ANGRAU
2	The fifth International Yoga Day	21.06.2019	All Centres of the ANGRAU
3	73rd Independence Day	15.08.2019	All Centres of the ANGRAU
4	*Parthenium* awareness week	16.08.2019 to 22.08.2019	KVKs at Kondempudi, Undi, Garikapadu, Darsi, Nellore, Kalyandurg and Banavasi
5	Teachers Day	05.09.2019	All Centres of the ANGRAU
6	National Animal Disease Control Day	11.09.2019	KVK, Amadalavalasa
7	Awareness programme on "PM-KMY (Pradhan Mantri Kisan Maan Dhan Yojana)"	12.09.2019	KVK, Amadalavalasa
8	Engineers Day	15.09.2019	All Colleges of Faculty of Agricultural Engineering & Technology, ANGRAU
9	"Swacctha Hi Seva Programme"	15.09.2019 to 21.09.2019	All the KVKs of ANGRAU
10	"Environmental Awareness Programme" cum "Tree Plantation Drive" in adopted villages	17.09.2019	All the KVKs of ANGRAU
11	NSS Foundation Day	24.09.2019	All constituent colleges of ANGRAU
12	Gandhi Jayanthi	02.10.2019	All Centres of the ANGRAU
13	Mahila Kisan Diwas	15.10.2019	All the institutions under ANGRAU
14	World Food Day-2019	16.10.2019	Dr. NTR CFST, Bapatla & CFST, Pulivendula
15	Fertilizer Awareness Programme and Mini Kisan Mela	22.10.2019	All the KVKs of ANGRAU
16	Vigilance Awareness Week	28.10.2019 to 02.11.2019	All the KVKs of ANGRAU
17	Rastriya Ekta Diwas & National Unity Day on the occasion of birth anniversary of Bharat Ratna Sardar Vallabhai Patel	31.10.2019	All constituent colleges under ANGRAU
18	Smart Indian Hackathon Awareness Programme	06.11.2019	CFST, Pulivendula
19	Acharya N.G. Ranga Jayanthi	07.11.2019	All Centres of the ANGRAU
20	Constitution Day of India	26.11.2019	All Centres of the ANGRAU

S. No.	Event	Date	Venue
21	World Soil Day	05.12.2019	All the colleges, research stations and KVKs
22	Dr. B.R. Ambedkar's 63rd Death Anniversary	06.12.2019	All the institutions under ANGRAU
23	Fall Army Worm in Maize awareness programme at Tenali	13.12.2019	RARS, Lam in collaboration with South Asia Biotechnology Centre, New Delhi
24	Sri Potti SreeramuluVardhanthi	15.12.2019	All the institutions under ANGRAU
25	Swacchtaa Pakhwada programme	16.12.2019 to 31.12.2019	All the KVKs of ANGRAU
26	Three days exposure visit to tribal farmers to ICAR institutions at Hyderabad	17.12.2019 to 19.12.2019	KVK, Darsi
27	National Kisan Diwas	23.12.2019	All the KVKs and DAATTCs
28	National Voters Day	24.01.2020	All constituent Colleges of ANGRAU
26	Republic Day Celebrations	26.01.2020	All the institutions under ANGRAU
30	World Tobacco Day	28.01.2020	DAATTC, Kalikiri & KVK, Kalikiri
31	Mahatma Gandhi Vardhanthi	30.01.2020	All the institutions under ANGRAU
32	Awareness programme to farmers on "Biological Control of Rugose white fly in coconut"	05.02.2020	AICRP on Biological Control, RARS, Anakapalle
33	Awareness programme to farmers on "Fall Armyworm in maize" and Integrated Management of Fall Armyworm at Vegendla village, Guntur district	12.02.2020	RARS, Lam
34	Awareness programme on "Pheromone traps" to SC farmers	13.02.2020	KVK, Darsi
35	Sri Uyyalawada Narasimha Reddy, a freedom fighter from Andhra Pradesh State-Death anniversary	22.02.2020	All the institutions under ANGRAU
36	Agri Education Fair on "Career Opportunities through Education in Food Processing Sector"	24.02.2020	Dr. NTR College of Food Science and Technology, Bapatla
37	National Science Day	28.02.2020	College of Home Science
38	International Women's Day	08.03.2020	All the institutions under ANGRAU
39	Consumer Rights day	15.03.2020	College of Home Science

S. No.	Event	Date	Venue Organized by
40	Agri-Education Fair Programme on "Career Opportunities in Agriculture and Allied Sectors"	16.03.2020	College of Agril. Engg., Madakasira
41	Awareness Camp on Corona Virus (Covid-19)	16.03.2020	CFST, Pulivendula
42	Sri Potti Sreeramulu Birth Anniversary	16.03.2020	All the institutions under ANGRAU
43	Agri Education Fair	18.03.2020	APGC, Lam, Guntur
44	World Water Day	22.03.2020	Dr. NTR College of Agril. Engg., Bapatla

C. MEETINGS ORGANIZED

S. No.	Event	Date	Venue	Organized by
1	A meeting on the awareness and preventive measures against the COVID-19	22.04.2020	Through ZOOM Platform	ANGRAU
2	SLTP Meetings	22.05.2020 to 19.06.2020	Different venues of the University	ANGRAU

D. TRAINING PROGRAMMES / SHORT COURSES / ORIENTATION PROGRAMMES ORGANIZED

S. No.	Event	Date	Venue	Organized by
1	STRY (Skill Training for Rural Youth) training programme on 'Value addition to millets' in coordination with Agriculture Technology Management Agency (ATMA)	18.06.2019 to 24.06.2019	KVK, Kalyandurg	KVK, Kalyandurg
2	Training programme on 'Measurement of Soil Physical Properties'	20.06.2019 & 21.06.2019	Regional Agricultural Research Station, Tirupati	Regional Agricultural Research Station, Tirupati
3	Training on 'Bee keeping'	22.07.2019 to 27.07.2019	ARS, Vijayarai	ARS, Vijayarai
4	Training on 'Farm Machinery Implements' for Women Farmers	26.07.2019 to 28.07.2019	Chandakacherla village	CAE, Madakasira
5	Vocational training programme on 'Value addition to millets' in collaboration with Andhra Pradesh State Skill Development Corporation (APSSDC), Kadapa	19.08.2019 to 30.08.2019	KVK, Utukur	KVK, Utukur

S. No.	Event	Date	Venue	Organized by
6	Training programme on 'Bee-keeping' under APRIGP project	29.08.2019 & 30.08.2019	RARS, Maruteru and ARS, Vijayarai respectively	RARS, Maruteru and ARS, Vijayarai
7	Training programmes on 'Millets based diet for the SHG women' under ANGRAU-SERP partnership Programme under APRIGP	01.11.2019 to 02.11.2019	Chinnagottigallu mandal and Yerravaripalem mandal	RARS, Tirupati
8	Vocational Training Programme on 'Value addition to millets'	01.11.2019 to 06.1102019	KVK, Kalikiri	KVK, Kalikiri
9	Training programme on 'Innovative Network Farmers Coordinators Review Meeting' under SERP	03.11.2019	RARS, Maruteru	RARS, Maruteru
10	Training programme on 'Farm Machinery and Food Processing Technologies'	06.11.2019 to 08.1102019	RARS, Tirupati	PHETC, RARS, Tirupati
11	Training programme on 'Pesticide residue analysis'	16.11.2019 to 19.11.2019	RARS, Tirupati	RARS, Tirupati
12	Training programme on 'Hands on Training on Remote Sensing & GIS'	28.11.2019 & 29.11.2019	Agricultural College, Raja-mahendravaram	The Andhra Pradesh Space Applications Centre (APSAC)
13	Training on 'KishoriVikasam (Adolescent Development)' to III year B.Sc. (Hons.) Community Science students	06.12.2019 & 31.12.2019	College of Home Science	College of Home Science in convergence with ICDS
14	Training programme to master trainers on 'Pulse crops'	09.12.2019 to 12.12.2019	KVK, Darsi	KVK, Darsi under SERP and ANGRAU
15	Vocational training programme on 'Beekeeping' to tribal farmers	13.12.2019	Dornala at KVK, Darsi	KVK, Darsi
16	Skill training for rural youth on 'Horticulture Nursery Management'	01.02.2020 to 27-02-2020	KVK, Amadalavalasa	KVK, Amadalavalasa in collaboration with ATMA
17	STRY training programme on 'Vermi compost preparation'	10.02.2020 to 16.02.2020	KVK, Garikapadu	KVK, Garikapadu

S. No.	Event	Date	Venue	Organized by
18	Training programme on 'Mushroom cultivation & Vermi compost production'	10.02.2020 to 13.02.2020	KVK Utukur	KVK Utukur
19	Skill training to Rural Youth on 'Farm mechanization for entrepreneurship promotion'	10.02.2020 to 16.02.2020	Krishi Vigyan Kendra, Banavasi, Kurnool district	KVK Banavasi in collaboration with ATMA Kurnool
20	Skill training to Rural Youth (STRY) on 'Preparation of bio fungicides and bio pesticides'	13.02.2020 to 19.02.2020	RARS, Anakapalle	RARS, Anakapalle with MANAGE funds through ATMA
21	Skill development training programme on 'Small poultry farmers and mushroom grower'	24.02.2020	KVK Banavasi	KVK Banavasi
22	STRY training programme on 'Value addition to minor millets'	24.0202020 to 29.02.2020	KVK, Amadalavalasa	KVK, Amadalavalasa in convergence with ATMA, Srikakulam
23	Training program to FPOs Master Trainers of SERP on 'Pulse production technologies'	28.02.2020 to 29.02.2020	ARS, Podalakur	ARS, Podalakur
24	Training on 'Pulses production technology and insect pests and diseases management in pulses' to FPO's under SERP	02.03.2020	ARS, Nellore and KVK Nellore	ARS, Podalakur
25	Training programme to master trainers on 'Rajmash, Niger, & Millets'	03.03.2020, 04.03.2020, 16.03.2020 & 17.03.2020	RARS, Chintapalle	RARS, Chintapalle
26	Training programme on 'Value addition to millets' under STRY programme	06.03.2020 & 07.03.2020	KVK, Kadapa	KVK, Utukur
27	Training programme on 'Friends of Coconut Trees (FoCT)'	16.03.2020 to 21.03.2020	KVK, Kalikiri	KVK, Kalikiri
28	Skill training on 'Fertigation in oil palm'	17.03.2020	Satiwada village of Gara Manadal	KVK, Amadalavalasa in collaboration with IIOPR, Pedavegi

S. No.	Event	Date	Venue	Organized by
29	ICAR training programme on 'Mesta Production Technologies' to the farmers of Therlam Mandal of Vizianagaram District	18.03.2020	ARS, Amadalavalasa	ARS, Amadalavalasa
30	Training programme on 'Seed production in paddy'	21.03.2020	Thotapalligudur farm	ARS, Nellore

E. WORKSHOPS / SEMINARS / CONFERENCES / SYMPOSIA ORGANIZED

S. No.	Event	Date	Venue	Organized by
1	National Conference on '3rd Agri Nano – Challenges and Opportunities in Agrinanotechnology (COAN-2019)'	13.06.2019 & 14.06.2019	RARS, Tirupati	ANGRAU
2	Brainstorming Workshop on 'Syllabus Review and Process of conduct of Examinations of Agricultural Engineering Polytechnics'	14.06.2019	Dr. NTR College of Agricultural Engineering, Bapatla	Dr. NTR Agricultural College of Engineering, Bapatla
3	National Symposium on 'The Choice of Farming Models for Income Security – Towards Equity and Sustainability'	21.06.2019 & 22.06.2019	Agricultural College, Bapatla & APHRDI, Bapatla respectively	ANGRAU
4	Mini workshop on 'Soil Spectroscopy'	24.06.2019 to 25.06.2019	RARS, Tirupati	RARS, Tirupati
5	Workshop on 'Finalization of course contents and development of study material for polytechnics of Agricultural Engineering'	08.08.2019	Dr. NTR College of Agricultural Engineering, Bapatla	Dr. NTR College of Agricultural Engineering, Bapatla
6	Workshop cum training programme on 'Future is Golden' by IIM, Ahmedabad Alumnus	27.08.2019	Agricultural College, Bapatla	Agricultural College, Bapatla
7	Central Zone Conference of Indian Phyto Pathological Society, New Delhi on the theme 'Climate Change Impacts on Plant Pathogens and Plant Diseases'	17.12.2019	Andhra University, Visakhapatnam	ARS, Vizianagaram

S. No.	Event	Date	Venue	Organized by
8	Seminar on 'Higher Education and Career Opportunities in the USA and Sustainable Management of Land and Water resources under Changing Climate'	23.12.2019	College of Agricultural Engineering, Madakasira	College of Agricultural Engineering, Madakasira
9	Annual Post-Graduate Students' National Conference on 'Challenges and opportunities for profitable agriculture'	30.01.2020 & 31.01.2020	Agricultural College, Bapatla	Agricultural College, Bapatla
10	Workshop on 'Data analytics with R using STATCRAFT'	08.02.2020 to 09.02.2020	Agricultural College, Bapatla	Agricultural College, Bapatla
11	Orientation Workshop on 'Farming System for Nutrition - A Pathway for Addressing Malnutrition in India'	11.02.2020	Regional Agricultural Research Station, ANGRAU, Lam, Guntur	College of Home Science, Guntur
12	National Seminar on 'Innovation in Agriculture for Rural Development (IARD-2020)'	21.02.2020 & 22.02.2020	Agricultural College, Bapatla	Andhra Agricultural Union

F. PARTICIPATION / VISITS OF VICE-CHANCELLOR

S. No.	Event	Date	Venue	Purpose
1	Mid-term review meeting of ICAR Regional Committee II	12.06.2019	ICAR - CIFRI, Barrackpore	Participation
2	10th Brain Storming Session of IAUA	28.06.2019 & 29.06.2019	CSKHPKV, Palampur	Participation
3	3rd Convocation of the Dr.Y.S.R. Horticultural University	01.07.2019	Venkatarama-nnagudem	Guntur
4	Cotton Association Meeting	05.07.2019	Participation	Participation
5	Attended to University Officers selection in the University of Agricultural and Horticultural Sciences	16.07.2019 to 19.07.2019	Shivamogga	As smember of Interview committee
6	Interaction meeting with Dr. Vijaya GopalKakani, Prof. and Warth Distinguished Professorship, Member OSU Faculty Council, Dept. of Plant and Soil Science, OSU	01.08.2019	Administrative Office, Lam, Guntur	Participation

S. No.	Event	Date	Venue	Purpose
7	Review meeting of NAHEP with Secretary, DARE & Director General, ICAR	05.08.2019 & 06.08.2019	New Delhi	Participation
8	Inauguration of A.P State Seed Certification Authority building by Hon'ble Minister for Agriculture	20.08.2019	Lam, Guntur	Participation
9	Met DG, ICAR and invited him as chief guest cum orator for 50th Convocation also requested sanction of KVK for Guntur	06.09.2019 to 08.09.2019	New Delhi	
10	13th National Symposium of IAUA on "Ranking of Agricultural Universities" in India	18.09.2019 to 21.09.2019	CCS HAU, Hisar	Participation
11	Meeting with scientists of Seed Science Centre, IOWA State University with referenceto AP State Mega Seed Park Ltd with Hon'ble Minister of Agriculture, Spl. Chief Secretary to Govt. (FAC), Agri. & Cooperation Dept.	23.09.2019	A.P. Secretariat, Velagapudi	Participation
12	NAHEP - IDP of ANGRAU for selection of students for International trainings - Personal Interview	24.09.2019 & 25.09.2019	Admn. Office, Lam, Guntur	Chairman
13	Visited Agricultural Research Station and Farm	29.09.2019	Kavali	Visit
14	The inaugural session of the First Phase of Inter-Collegiate Sports, Games, Cultural and Literary meet 2019-20	30.09.2019	S.B.V.R. Agricultural College, Badvel	Participation
15	Visited Agricultural Polytechnic College and Farm and Agricultural Research Station, Farm and Agricultural Polytechnic College	30.09.2019	Somasila & Podalakur	Visit
16	Interaction meeting with Network Coordinator, All India Network Project on Pesticide Residues, IARI, New Delhi on "Establishment of AINP on Pesticide Residue Laboratory at Guntur"	10.10.2019	Administrative Office, Lam, Guntur	Participation
17	IDP Training Valedictory function as Guest of Honour	10.10.2019 AN to 16.10.2019	ICAR - Central Island Agricultural Research Institute, Port Blair, Andaman & Nicobar Islands	Participation

S. No.	Event	Date	Venue	Purpose
18	The valedictory session of the 2nd Phase Inter-Collegiate Sports, Games, Cultural and Literary Meet 2019-'20	18.10.2019	Agricultural College, Bapatla	Participation
19	Kisan Mela	19.10.2019	Agricultural Research Station, Vizianagaram	Participation
20	Participated as Guest of Honour in the Inaugural Function at KVK, Sepahijala, Tripura and participated as Guest of Honour in the Inaugural Function at College of Horticulture & Forestry, Pasighat, Arunachal Pradesh	08.11.2019 to 13.11.2019	-	Participation
21	Kisan Mela	23.11.2019	Regional Agricultural Research Station, Anakapalle	Participation
22	Visited to Agricultural Research Station	24.11.2019	Seethampeta	Visit
23	Fall Army Worm awareness programme in maize	02.12.2019	Eluru	Participation
24	43rd VC's Annual Convention of Indian Universities Association	11.12.2019 to 15.12.2019	IGKV, Raipur	Participation
25	The Vice-Chancellor's Conference	20.12.2019	Rajbhavan, Vijayawada	Participation
26	AP State Police Housing Corporation Works Monthly review meeting	23.12.2019	Administrative Office, Lam, Guntur	Participation
27	Participated in the inauguration of Seed shed and monitored research activities	09.01.2020	Agricultural Research Station, Jangamaheswara-puram	Participation
28	Participated in the inauguration of Library and visited College of Agricultural Engineering, Bapatla	10.01.2020	Agricultural College, Bapatla	Participation
29	VC's Conference	20.01.2020 to 22.01.2020	New Delhi	Participation
30	Interaction meeting with World Bank team and ICAR team	24.01.2020	Administrative Office, Lam, Guntur	Participation

S. No.	Event	Date	Venue	Purpose
31	Met the Director General & Secretary (DARE) and Deputy Director General on official works for release of funds	03.02.2020 to 06.02.2020	ICAR, New Delhi	
32	Orientation Workshop on 'Farming System for nutrition - A pathway for addressing malnutrition in India'	11.02.2020	RARS, Lam with M.S. Swaminathan Research Foundation, Chennai	Participation
33	Kisan Mela	15.02.2020 & 16.02.2020	ARS, Nellore	Participation
34	Visited Agricultural Polytechnic, Somasila and farm at Krishi Vigyan Kendra, Kalikiri	17.02.2020 & 20.02.2020 respectively	-	Visit
35	Visited Farm and interacted with students of NBKR Agricultural Polytechnic, Seed Technology Polytechnic and NBKR Organic Farming Polytechnic, Adarana Agricultural Polytechnic	18.02.2020	Vidyanagar, Nellore District	Visit
36	Visited Roses farm (Poly house)	22.02.2020	Penukonda and Lepakshi	Visit
37	Visited Sadhineni Chowdaraiah Agricultural Polytechnic College	14.03.2020	Maddirala	Visit
38	Visited Regional Agricultural Research Station and S.V. Agricultural College, Tirupati	19.02.2020	-	Visit
39	Visited Agricultural College, Rajamahendravaram and Polytechnic College at Rampachodavaram	12.03.2020	-	Visit
40	The XI National Conference of KVKs - 2020	28.02.2020	NASC Complex, New Delhi	Participation

G. VISITORS

S. No.	Visitor (s)	Date	Place Visited
1	Dr Pawan Kumar Agarwal, Hon'ble Vice Chancellor, OUAT, Odisha	13.06.2019 and 14.06.2019	Soil Science laboratory and Biotechnology laboratory, RARS, Tirupati
2	The Nodal officer and a team of RKVY from NIRD, Hyderabad conducted a preliminary meeting for inspection of RKVY units of 2015-'16 & 2016-'17 in Visakhapatnam District along with department of Agriculture and Allied sectors	18.06.2019	RARS, Anakapalle
3	Dr. Arja Srikanth, CEO & MD, APSSDC and Special Secretary to Govt. of Andhra Pradesh	22.06.2019	KVK Banavasi
4	Mr. K. N. Mishra, Manager Farm Forestry, International paper APPM, Rajahmundry visited in connection with the initiative on collaborative research on Mechanization of Forestry operations	27.06.2019 02.07.2019	College of Agricultural Engineering, Bapatla KVK, Kondempudi
5	Dr. Y .G. Prasad, Director, ATARI, Hyderabad inaugurated the development activities for doubling the farmers income at DFI villages		
6	Shri Arun Kumar, Director of Extension, Ministry of Agriculture and Farmers welfare along with Manish Kumar, NIH Scientist; Shri Madduleti, ATMA Project Director and Shri Shankar, Assistant Project Director, DWMA, Rayadurg	12.07.2019	KVK, Kalyandurg
7	D.Tagore Naik, JDA, Kurnool U.Uma Maheswaramma Project Director, ATMA, Kurnool	24.07.2019	DAATTC, Banavasi, Kurnool
8	Dr. K.Vijaya Gopal Professor, Oklahoma State University	03.08.2019	College of Food Science & Technology, Bapatla
9	ICAR-ATARI, Director, Dr.Y.G.Prasad and Dr.J.V.Prasad	06.08.2019	KVK, Kondempudi and also DFI Villages
10	Principal Secretary for Agriculture, Shri Y. Madhusudan Reddy	06.08.2019	Apiary unit of DAATTC, Kalikiri
11	Dr. G. V. Krishna Lohi Das, Programme Director, Centre for Livelihoods, National Institute of Rural Development & Panchayat Raj reviewed the RKVY scheme 2016-17 activities	08.08.2019	KVK, Kalikiri

S. No.	Visitor (s)	Date	Place Visited
12	Assistant General Manager Sri.Jaichandra Reddy, of VST Company visited AINP on tobacco nursery	09.08.2019	RARS, Nandyal
13	M. Ravindra Prasad Alumni	24.08.2019	Ag College, Bapatla
14	Dr. Vinod Kumar, IAS, Project Officer ITDA Parvathipuram	27.08.2019	KVK, Rastakuntubai
15	Hon'ble Member of Parliament Sri M.Reddeppa, Member of Legislative Assembly Sri Venkata gouda, Gopalakrishnaronanki, IAS, Union Finance Ministry's Assistant Secretary, Sri Chandra Sekhar, PD, DWMA, Sri Vidyasankar, PD, APMIP, other line department officials	03.09.2019	KVK, Kalikiri
16	Dr. M. Thippeswamy garu, Hon'ble Member of the Legislative Assembly Sri. K. Devanandgaru, Circle Inspector of Police, Madakasira attended Fresher's Day Celebrations	20.09.2019	CAE, Madakasira
17	Dr. Sankar Narayana, Principal Scientist, Entomology , CICR, Coimbatore, visited to monitor the occurrence of fall armyworm on cotton in Kurnool district	20.09.2019	RARS, Nandyal
18	Hon'ble Dy. Speaker, Sri Kona Raghupathi Garu, Govt. of Andhra Pradesh	21.09.2019	Agricultural College, Bapatla
19	Sri Praveen Kumar Reddy Sub-Inspector of Police, Mahanandi attended Anti-Ragging Awareness Programme	25.09.2019	Agricultural College, Mahanandi
20	Mr. Rajesh, Programme coordinator, Sakshi and Gillet guard, Vijayawada attended Career counseling programme to the students	27-09-2019	CAE, Madakasira
21	Sunflower Kharif Monitoring Team	27.09.2019	RARS, Nandyal
22	Dr. S. Patel, Dean, College of Agricultural Engineering, IGKV, Raipur visited ELP units	30.09.2019	CFST, Bapatla
23	Dr. C.S. Murthy Head, Agricultural division NRSC-ISRO,Hyderabad	05.10.2019	RARS, Lam, Guntur
24	D. Venugopal, Asst. Director & Crop Insurance, O/o Commissioner & Directorate of Agriculture	05.10.2019	RARS, Lam, Guntur
25	Mr. Abhijit Goswami, Andhra Pradesh Government Official	09.10.2019	CFST, Pulivendula

S. No.	Visitor (s)	Date	Place Visited
26	Dr. A .V. V.Reddy, Director, ICAR-IIOR, Hyderabad, monitored the Kharif 2019 AICRP-sunflower scheme	09.10.2019	RARS, Nandyal
27	Dr. K. K. Sharma, Coordinator, Pesticide Residues, ICAR-IARI, New Delhi	10.10.2019 & 11.10.2019	Agricultural College, Bapatla
28	Dr. A. Vishnu Vardhan Reddy, Director, IIOR monitored CFLDs on oilseeds	10.10.2019	KVK, Reddipalle & ARS, Ananthapuramu
29	Monitoring team comprising of following scientists visited experiments on AICRP on Small millets Dr. Jayaramegowda, Principal Scientist (Plant Breeding), Dr. Palanna, PI (Plant Pathology), Dr. T. S. Sukanya, PI (Agronomy) and Dr. Prabhu Ganiger, PI (Entomology)	11.10.2019	RARS, Nandyal
30	Sri M. Arvind Kumar. Member Secretary & CEO, National Jute Board, Kolkata inspected the ongoing research project on Tossa Jute	11.10.2019	ARS, Amadalavalasa
31	All India Co-ordinated Research Project (AICRP-G) monitoring team	11.10.2019	ARS, Kadiri
32	Hon'ble Dy. Speaker, Sri Kona Raghupathi Garu, Govt. of Andhra Pradesh attended inaugural function of ANGRAU II Phase Inter Collegiate Sports, Games, Cultural and Literary Meet	14.10.2019 16.10.2019	Agricultural College, Bapatla CAE, Bapatla
33	Mr. Raj Mohan and Er. Venkateswara Rao of KCP sugars and Ind. Corporation Ltd.		
34	Dr. Hariprasanna PS (Plant Breeding) and Dr. Venkateswarlu, Sci. (Bio chemistry), ICAR-IIMR, Hyderbad	19.10.2019	RARS, Nandyal
35	Sri Bellana Chandrasekhar, Hon'ble Member of Parliament and Dr. Hari Jawahar Lal, IAS, District Collector and Magistrate participated in Kisan Mela	19.10.2019	ARS, Vizianagaram
36	Sri Samineni UdayaBhanu, Member of Legislative Assembly, Jaggayyapet and Chief Whip Govt. of AP, Sri Ramana Murthy, ADA, Nandigama, Sri G. Ravindranadh, State Manager, IFFCO Company, Sri Sridhar Reddy, IFFCO Manager in Krishna and Guntur district, Sri A.P. Srikanth Bharatiya Janatha Party leader and High court advocate, Kundavarapu	22.10.2019	KVK, Garikapadu

S. No.	Visitor (s)	Date	Place Visited
	Kondaiah, Ex AMC Chairman and Sri Tanneru Nageswarao, Ex Municipal Chairman, Jaggyyapet attended fertilizer awareness programme		
37	Dr. RenovorMatheiw and Dr. Tri Devi Setijones, Scientists from IRRI	24.10.2019	ARS, Bapatla
38	Dr.Trilochan Mohapatra, Secretary (DARE) & Director General, ICAR	28.10.2019	S.V. Ag College, Tirupati
39	Dr. A.Vishnuvardhan Reddy Project Director, IIOR, Hyderabad	02.11.2019	ARS, Nellore
40	The Commissioner & Director of Agriculture Government of A.P.	03.11.2019	RARS, Anakapalle
41	A team of scientists of CSISA demonstration plots in Gouripatnam and Medivada villages	04.11.2019	KVK, Kondempudi
42	Sri B. Sudheer, Asst. Professor, Bapatla College of Pharmacy, Bapatla	04.11.2019	CFST, Bapatla
43	Dr. P. Lakashamamma, Principal Scientist (Plant Physiology), Dr. D. K. Patel, Sr. Breeder (SK Nagar), Dr. P. K. Kathirvelan, Jr Agronomist (TNAU), Dr. G. P. Gangavar, Jr Pathologist (SK Nagar) and Smt. G. Madhuri, Jr. Entomologist (PJTSAU)	08.11.2019	ARS, Ananthapuramu
44	E.T. Chandrasekhar, Asst. Engineer, Cuddalore, Tamilnadu visited to know about Food Science and Technology Course and its prospects	12.11.2019	CFST, Bapatla
45	Sri C. Gunasekharan, Deputy Manager- Cane, EID Parry Ltd., Puducherry visited to know about the agricultural processing and sugarcane juice based value added products	12.11.2019	CFST, Bapatla
46	Dr. Vijay Kumar, Project Coordinator, AICRPAM, ICAR-CRIDA, Hyderabad	13.11.2019	ARS, Ananthapuramu
47	The Vice President & Cane Advisor of M/s. Nava Bharath ventures of Samarlakot	14.11.2019	RARS, Anakapalle
48	Sri KurasalaKanna Babu garu, Minister for Agriculture, Andhra Pradesh, Sri Muttam Setti Srinivasa, Minister for Tourisim, Andhra Pradesh, Smt B. Satyavathi, M.P., Anakapalle Constituency, Sri G. Amarnadh, MLA, Anakapalle Constituency and Sri B. Naga Jagadeeswara Rao,	23.11.2019	RARS, Anakapalle

S. No.	Visitor (s)	Date	Place Visited
	MLC, Anakapalle Constituency participated in 61st Kisan Mela celebrations		
49	ICAR monitoring team	23.11.2019	RARS, Lam, Guntur
50	ICAR monitoring team	23.11.2020	RARS, Nandyal
51	Dr. Polla Bhaskar, District Collector and District Magistrate conducted a meeting on "Rythu Prakasam"	27.11.2019	KVK, Darsi
52	BS monitoring Team of Paddy	29.11.2019	RARS, Nandyal
53	NitiAyog Team	04.12.2019	KVK,Kalikiri
54	Dr.ChinnababuNaik. CICR,Nagpur	05.12.2019	RARS, Nandyal
55	Seed Certification Officer, APSSCA, Tanuku	06.12.2019	RARS, Anakapalle
56	JNTU Quality Control Technical Team	07.12.2019	Agricultural College, Bapatla
57	AICRP Sugarcane monitoring Team visit	10.12.2019	RARS, Anakapalle
58	Dr.Sankar, Scientist, IIHR visited and monitored the performance of IIHR varieties of Chilli	11.12.2019	KVK, Kalyandurg
59	Hon'ble Dy. Speaker, Sri Kona Raghupathi Garu, Govt. of Andhra Pradesh attended Kisan Mela	13.12.2019	Agricultural College Farm, Bapatla
60	Dr. M. P. Thakur, IPS, President; Dr Pratibha Sarma, ICAR Emeritus Professor, Jaipur; Dr. A. Nagaraja, Professor and Head, GKVK, Bengaluru; Dr. Robin Gogoi, IPS, Secretary, New Delhi	18.12.2019	Agricultural Research Station, Vizianagaram
61	AICRIP Monitoring team	18.12.2019	ARS, Nellore and Paturu
62	Dr. Satish Naik, Scientist (Br), IIPR, Kanpur	21.12.2019	RARS, Lam
63	Dr. Srinivasulu Ale, Associate Professor (Geospatial Hydrology), Texas A&M Agrilife Research, Department of Biological and Agricultural Engineering, Texas A&M University delivered Guest Lecture	23.12.2019	CAE, Madakasira
64	Dr. N.S Kute, Dr. C.B. Wayal, Dr. V. A. Chavan and Dr. V.T. Jadhava, Scientists, Pulses Improvement project, MPKV, Rahuri, Ahmad Nagar	06.01.2020	RARS, Lam, Guntur
65	ICAR Scientists team Dr. B. Ramanujam, Dr.Bakthavatsalam, Dr.Rangeswaran, Dr.Shylesha, NBAIR, Bangalore on AICRP (Bio Control), Bangalore	08.01.2020	RARS, Anakapalle

S. No.	Visitor (s)	Date	Place Visited
66	Dr B Malathi Scientist , ATARI	17.01.2020	KVK, Amadalavalasa
67	Monitoring team from MPKVV, Rahuri	20.01-.020	RARS, Nandyal
68	Sunflower Rabi Monitoring team	23.01.2020	RARS, Nandyal
69	World Bank Team along with Mr. Abel Lufafa, Ms. KumudiniChoudary and Mr. Dilip Roy	24.01.2020	College of Home Science, Guntur
70	World Bank Team along with Mr. Abel Lufafa, Ms. KumudiniChoudary and Mr. Dilip Roy	25.01.2020	Agricultural College, Bapatla, CAE, Bapatla & CFST, Bapatla
71	Dr. N. Balasubramani, Director, MANAGE, Hyderabad reviewed the on-going activities of DAESI -II	30.01-2020	Nodal Training Institute- Agricultural Research Station, Utukur, Kadapa
72	Dr. B. MarutiPrasanna, Director, CIMMYTs Global Maize Programme and CGIAR Research Programme on Maize, Kenya, Sri S.Selvaraj, Chief General Manager, APRO, NABARD attended the APGSNC - 2020	30.01.2020 & 31.01.2020	Agricultural College, Bapatla
73	Dr. Suresh Itapu, CEO, Nutritech Consulting Service, Kokapet, Hyderabad delivered the Guest Lecture	31.01.2020	CFST, Bapatla
74	Sri. K.Kannababugaru Hon'ble Minister for Agriculture and Dr P.VenkataSidda Reddy garu, Hon'ble MLA, Kadiri	31.01.2020	ARS, Kadiri
75	Officials from Jigjiga University, Somalia	03.02.2020	Agricultural College and farm, Bapatla
76	Dr. U.Prakasaham P.C.G.F. & HOFF Forest Dept, Madhya Pradesh	05.02-.020	Agricultural College, Bapatla
77	Dr GN Hariharan, Executive Director, Biotechnology, MS Swaminathan Research foundation, Chennai	11.02.2020	ARS, Machilipatnam
78	Sri P. N. Praveen Kumar, Chief General Manager NABARD, Sri B. Ramesh Babu, Deputy General Manager, Sri K.R.D. Kartheek, District Development Manager reviewed the progress of project under RIDF	12.02.2020	Agricultural College, Bapatla

S. No.	Visitor (s)	Date	Place Visited
79	Smt. K. Bhagyalakshmi, Hon'ble M.L.A., Paderu, Sri Mallikarjuna Rao, Project Director, Visakhapatnam, Sri B. Mohan Rao, Joint director of Agriculture, Visakhapatnam, Sri M. Nageswara Rao, APD, Velugu, Paderu, Sri. T. Bhavani Shankara Rao, PAO, ITDA, Seethampeta and Sri Satyanarayana Reddy, PHO, ITDA, Seethampeta participated in the Kisan Mela	25.02.2020	RARS, Chintapalle
80	Ch. Paremeswara Reddy, Alumni	29.02.2020	Agricultural College, Bapatla
81	Dr. P. Anil Kumar Yadav, Minister for Irrigation, GoAP to enquire about the research station lands	29.02.2020	ARS, Nellore
82	Sri K. Kanna Babu, Hon'ble Minister for Agriculture, Govt. of Andhra Pradesh participated in Kisan Mela	29.02.2020	ARS, Peddapuram
83	Officials from Ethiopia	February 2020	Agricultural College, Bapatla
84	Hon'ble Deputy Speaker of Andhra Pradesh Sri Kona Raghupathygaru along with Joint Collector, Guntur and other dignitaries	12.05.2020	CFST, Bapatla
85	The Hon'ble MLA, Sri Gudivada Amarnadh garu	22.05.2020	RARS, Anakapalle
86	Hon'ble Deputy CM & Minster of Health Sri Alla Kali Krishna Srinivas, Hon'ble minister for Civil Supplies and Consumer Affairs Sri KodaliSrivenkateswararao, Hon'ble Minister for Transport & I&PR Sri Perni Venkatarammaya, District collector Sri MD Inthiaj, Joint collector Sri Madhavi Latha monitored the AGGRi alliance - Marginal environment project	27.05.2020	ARS, Machilipatnam

X. RESEARCH PUBLICATIONS

A. BOOKS AND CHAPTERS

01 Bhargava Rami Reddy, Ch. 2019. Principles and Practices of Soil Science. Akinik Publications.

02 Gurumurthy, P., Santhosh, B., Yasmin, C., Sudhakara Rao, D and Naga Ramya Krishna, T. Soil, plant, water and seed testing. *Education Publishing.* ISBN No.97893 53731069

03 Haseena Banu, SK and Saritha, R. 2019. Influence of dates of Sowing on Incidence of Major Diseases in Sesame. Book of abstracts on *Climate Change Impacts on Plant Pathogens and Plant Diseases*.

04 Madhan Mohan, M and Prabhu Prasadini. 2019. Manual on Practical Soil Physics. ISBN 978-93-5407-060-0: 73.

05 Mandali Rajasri, J., Alice, R P., Sujeetha, Chandra Shekhar Gupta and Geetha, P. 2019. Hand book on Stored Grain Pests and their Identification (Both English and Hindi).

06 Prasanna Kumar, B., Trimurtulu, N., Vijaya Gopal, A and Lakshmipahy, R. 2019. A multiphasic Approach of Bacterial Endophytes and their Involvement in Plant Growth-Promotion. In: *Research Trends in Multidisciplinary Research and Development*. Eds: Sergiy Fedorov. Weser Books, Zittau, Germany. 01-24.

07 Rajput, L S., Madhusudhan, P and Sinha, P. 2020. Epidemiology of Seed-borne Diseases. In: Kumar R, Gupta A (eds) *Seed-borne Diseases of Agricultural Crops: Detection, Diagnosis & Management*. Springer, Singapore.

08 Sreenivasa Rao, Ch. (Compiled and Edited) 2019. NIPHM (2008-2018): A decade in Promotion of Capacity Building for Environmentally Sustainable Agriculture. Published by NIPHM.

09 Sreenivasa Rao, Ch. (Compiled and Edited). 2019. Success stories of NIPHM. Published by NIPHM.

10 Sreenivasa Rao, Ch. (Principal Contributor). 2019. Ecologically Sustainable Strategies for Pest Management. *Extension Digest.*3(1). Published by MANAGE.

11 Sreenivasa Rao, Ch. (Principal Contributor). 2019. Krishi Sutras for Krishi Mitras. Published by MANAGE.

12 Sudha Rani, D., Chiranjeevi, Ch., Madhumathi, T and Krishnam Raju, S. 2019. Field Release and Evaluation Techniques of Bio Control Agents in Integrated Pest Management. *Pests and Parasites: Control and Elimination Strategies*. 136-159.

13 Vasanthi, R P., Naik, K S S., John, K., Srividhya, A., Amaravathi, Y., *et al*. 2019. Status of Groundnut Research in ANGRAU. *Annual Groundnut Workshop*. 25th to 27th May 2019 at Andhra University, Visakhapatnam. Published by ANGRAU, Lam, Guntur.

B. RESEARCH PAPERS

1 Abhijith, N., Murali Krishna, T., Koteswara Rao, SR., Padmodaya, B and Sudhakar, P. 2019. Study on use of insecticides on cauliflower crop in Chittoor district of Andhra Pradesh. *Journal of Entomology and Zoology Studies*. 7(6): 1166-1171.

2 Abhijith, N., Murali Krishna, T., Koteswara Rao, SR., Padmodaya, B and Sudhakar, P. 2019. Survey for the incidence of diamond back moth *Plutella xylostella* (L.) and natural enemies in Chittoor district of Andhra Pradesh. *Journal of Pharmacognosy and Phytochemistry*. 8(6): 2145-2150.

3 Aditi, B., Pawan, J., Neera, Y., Renu, S., Yashi, S., Balwant, S., Nisha, S., Sangeeta, S., Amitha, S., Vandana, R., Satish Verulkar, S., Ramana Rao, P V., Girija Rani, M., Anuradha, T., Satyanarayana, P V., Krishnamurthy, S L., Prabodh, S., Deepika, S., Singh, P K., Nilanjay, Rajesh Kumar, Sanjay, Chetiah, Ahmad, T., Mayank, R., Jawahar, K., Marandi, B., Padmini, S., Sarkar, R.K., Singh, D.P., Reddy, J.N., Nimai, M., Paramsivam, K., Nadarajan, S., Thirumeni, S., Jyoti, B., Padmavathi, G., Ram, T and Nagendra, K. Singh. 2019. Genomics-assisted backcross breeding for infusing climate resilience in high-yielding green revolution varieties of rice. *Indian Journal of Genetics and Plant Breeding*. 79(1) Suppl.: 160-170.

4 Aiswarya, N., Bhattiprolu, S L., Bayyapu Reddy, K and Rama Rao, G. 2019. Location of seedborne fungi in farmers saved samples of groundnut variety, TAG 24. *International Journal of Chemical Studies*. 7(4): 3103-3105.

5 Ajith, S., Srinivasa Rao, V., Nafeez Umar, Sk and Ramesh, D. 2019. Effect of National Food Security Mission on food grain production in India. *The Andhra Agricultural Journal*. 66(Spl.): 96-103.

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XI. AWARDS AND HONORS

A. INSTITUTIONAL AWARDS

★ KVK Banavasi received appreciation certificate from DDG, ICAR and the Director, ATARI, Zone-X, Hyderabadon the occasion of 91st ICAR Foundation Day celebrations on July 16th & 17th, 2019. The KVK, Banavasi also received the "Best KVK Award" for the year 2018-'19 by ANGRAU during the 49th REAC Meeting held on 18th-19th December, 2019 at RARS, Lam, Guntur.

★ Dr. NTR College of Food Science and Technology, Bapatla, received Certificate of Appreciation from Indian Association of Blind for the year 2019-'20 towards outstanding and amazing commitment and contribution for blind people on 18th September, 2019.

★ AICRP on Sugarcane Unit of RARS, Anakapalle received an award of excellence in Bienniel Workshop on AICRP on Sugarcane held at UAS, Dharwad during 15th-17th October, 2019.

★ ARS, Seethampet received award of Best Agricultural Research Station presented during the 49th REAC Meeting for the year 2019-'20 held on 18th-19th December, 2019 at RARS, Lam,Guntur.

★ DAATTC, Guntur received "Best DAATTC" inthe state for the year 2018-'19 by ANGRAU during the 49th REAC Meeting held on 18th-19th December, 2019 at RARS, Lam, Guntur.

★ KVK, Reddipalle received Best poster presentation during the NICRA Annual workshop on 4th-6th June, 2019.

★ KVK, Reddipalli received Best Fact Sheet award during Annual Zonal workshop of KVKs held on 24th-26th May, 2019 at Atari, Hyderabad.

★ ANGRAU has received ICAR award 2019 on the eve of securing 2nd position in PG Admissions at National Level under the category of Agricultural Sciences.

★ KVK, Amadalavalasa, received "Dhanuka Innovative Agricultural Award" from Central Jhalsakthi Minister, ShriGajendra Singh Shekavath on 09.01.2020 at New Delhi.

★ AICRP on Pearl Millet, ARS, Anantapuramu received Best Center Award for the year 2019-'20 in the 55th Online Annual Group meeting of ICAR-AICRP on Pearl Millet on 29-04-2020.

★ ARS, Vizianagaram has got the "Best Performing AICRP Centre Award" for overall performance for the period 2017-'20 among the 33 centres across the country during the Annual Group Meeting of AICRP on Sorghum & Small Millets, held on 28th-29th May, 2020 by AICRP on Small Millets, IIMR, Hyderabad.

B. INDIVIDUAL AWARDS

★ Dr. A. Radhika Ramya, Doctoral student of Department of Genetics and Plant Breeding, Agricultural College, Bapatla received the prestigious Jawahar Lal Nehru Award for the Outstanding Doctoral Thesis Research in Agricultural and Allied Sciences 2018 – Crop Sciencesin the ICAR Foundation Day Celebrations held on 16-07-2019 at NAAS Complex, New Delhi.

★ Dr. G. Raghunadha Reddy, Principal Scientist (Ag. Econ.), RARS, Nandyal received Best Poster Award in National Symposium on Tobacco 2019, held on 19th-20th July, 2019, at Rajamahendravaram.

★ The following teaching & non-teaching staff of ANGRAU received commendation from respective District Collectors &Magistrates on the occasion of 73rd Independence Day Celebrations on August 15th, 2019.

Teaching Staff

❖ Dr. P. Lavanya Kumari, Scientist, Department of Agricultural Statistics, RARS, Tirupati

❖ Dr.V. Uma Mahesh, Associate Professor, S.V. Agricultural College, Tirupati

❖ Dr.M.S.V.Chalam, S.V. Agricultural College, Tirupati

❖ Dr C.V.C.M. Reddy, Sr. Scientist (Genetics &Plant Breeding), RARS, Nandyal

❖ Dr. P. Udayababu, Scientist (Entomology) & Head, ARS, Seethampet

❖ Dr.T.Anuradha,Principal Scientist & Head, ARS, Machilipatnam

❖ Dr P. Venkata Rao, Scientist, TOT, DAATTC, Srikakulam

Non-teaching Staff

❖ Sri A.BalaSubramanyam, Superintendent, S.V. Agricultural College, Tirupati

❖ Ms.S.Vasantha, Senior Assistant, S.V. Agricultural College, Tirupati

❖ Sri G.Muralikumar, JACT, S.V. Agricultural College, Tirupati

❖ Sri V.Subramanyam, Office Subordinate, S.V. Agricultural College, Tirupati

Meritorious Non-teaching Awards from the University

❖ Sri K. Suryanarayana, Sr. Assistant, Administrative Office, Agricultural College, Bapatla

❖ Sri A. Durvasu, Shelf Assistant, Regional Library, Agricultural College, Bapatla

State Best Teacher Award received by the following faculty, ANGRAU on September 5, 2019 from Sri Y.S. Jagan Mohan Reddy, Honble Chief Minister, Andhra Pradesh

❖ Dr.G.Ramachandra Rao, Professor of Environmental Sciences, APGC, Guntur

❖ Dr. V. Prasanna Kumari, Associate Professor (Pl. Path), Agricultural College, Bapatla

❖ Dr. V.Sumathi, Professor, S.V. Agricultural College, Tirupati

❖ Dr. P. Gurumurthy, Associate Professor& Head, Dept. of Soil Science & Agril. Chemistry, Agricultural College, Naira

❖ Dr. S. N. Malleswari, Sadhineni and Dr. M.VijaySankar Babu, ARS, Anantapuramu received "Padmasri Dr. I. V. Subba Rao Rythunestham award -2019" by Sri Muppavarapu Foundation and Rythu Nestham Foundation at Swarnabharat Trust, Hyderabad on 22.09.2019.

❖ Dr. Manukonda Srinivas Senior Scientist (Agronomy), RARS, Maruteru awarded as Young Scientist during International Conference on "Global Research Initiatives for Sustainable Agriculture & Allied Sciences" (GRISAAS-2019) on October 20, 2019 organized by Society for Scientific

Development in Agriculture and Technology (SSDAT), Meerut, U.P. held at ICAR-NAARM, Hyderabad, Telangana.

- Smt.U.Triveni, ARS, Vizianagaram, received Best Women Scientist Award in North Coastal Zone at Kisan Mela organized by RARS, Anakapalle on 23rd November, 2019.
- Dr.K.Vemana, Principal Scientist (Plant Pathology), ARS, Kadiri received Certificate of Appreciation from Indian Phyto Pathological Society, Central Zone during the International Conference held at Visakhapatnam, A.P. on December 17th, 2019.
- Sivaprasad, M.V.B., Sumanth Kumar, M., Bhattiprolu, S.L., Prasanna Kumari, V., Jayalalitha, K and Anil Kumar, P, Dept. of Plant Pathology, Agricultural College, Bapatla received Best Poster Award during National Seminar on "Climate Change Impacts on Plant Pathogens and Plant Diseases, organized by Central Zone, Indian Phytopathological Society at Visakhapatnam on December 17th, 2019.
- Dr.K.Vemana, Principal Scientist (Plant Pathology), ARS, Kadiri received Excellence in Research Award by Astha Foundation, Meerut, Uttar Pradesh, India in 2019.
- Dr. M. Jayalakshmi, SMS, Crop Production, KVK, Banavasi received Young Extension Worker Award in 3rd National conference on "Promoting & Reinvigorating Agri-Horti Technological Innovations organized on December 24th & 25th, 2019 by Green Agri Professional Society at Jharkhand.
- Dr. V. Hari Kumar, SMS (Horticulture), KVK, Rastakuntubai received Best Scientist Award during the Kisan Mela organized at RARS, Chintapalle, ANGRAU on 25th February, 2020.
- Sri T. Sivakesava Rao (Extension Personnel), KVK, Rastakuntubai received Bio Diversity Award during the Kisan Mela organized at RARS, Chintapalle, ANGRAU on 25th February, 2020.
- The following Teaching / Non-teaching staff received commendation from respective District Collectors & Magistrate on the eve of 71st Republic Day Celebrations on 26th January, 2020
- Dr. K.Vemana, Principal Scientist (Plant Pathology), ARS, Kadiri.
- Sri B.M.D Rafi, Senior Assistant, ARS, Kadiri.
- Sayiprathap B R, Patibanda A K, Prasanna Kumari V, Jayalalitha K, Mangala U N, Ananda N, Ramesh N and Hari K Sudini Dept. of Plant Pathology, Agricultural College, Bapatla received Consolation Award for Poster during Annual Post Graduate Students National Conference on "Challenges and Opportunities for Profitable Agriculture organized during 30th & 31st January, 2020 at Ag College, Bapatla.
- Amulya G, Prasanna Kumari V, Manoj Kumar V and Y Ashoka Rani, Dept. of Plant Pathology, Agricultural College, Bapatla received Consolation Award for Oral presentation during Annual Post Graduate Students National Conference on „Challenges and Opportunities for Profitable Agriculture organized during 30th & 31st January, 2020 at Ag College, Bapatla.
- Dr. Manukonda Srinivas Senior Scientist (Agronomy), RARS, Maruteru awarded Fellow of Indian Society of Oilseeds Research, ICAR- Indian Institute of Oilseeds Research, Rajendranagar, Hyderabad, Telangana on February 8th, 2020.

- Dr. V. Jyothi, Assistant Professor (Agril. Extn.), Agricultural College, Bapatla received First prize in oral paper presentation in the National Seminar on "Innovations in Agriculture for Rural Development (IARD- 2020) organized by the Andhra Agricultural Union, Agricultural College, Bapatla, during February 21st & 22nd, 2020.

- Dr. D. Sudha Rani, Scientist (Entomology), SRS, Vuyyuru received best oral presentation award entitled "Bio intensive IPM strategies against sugarcane borer complex" in the national seminar on Innovations in Agriculture for Rural Development (IARD-2020) organized by the Andhra Agricultural Union, Agricultural College, Bapatla during February 21st & 22nd, 2020.

- Dr. P. Udayababu, Scientist (Entomology) & Head, ARS, Seethampet received meritorious award at zonal level at RARS, Chintapalle on the occasion of Kisan Mela on 25.02.2020.

- Dr. N. V. V. S. Durga Prasad, Principal Scientist, RARS, Lam received "Rythu Nestham Award" from Rythu Nestham Agricultural Magazine and Muppavarapu Foundation, Hyderabad on 22nd September, 2019.

- Dr CVCM Reddy,Sr. Scientist (GPB), RARS, Nandyal received Best Scientist Award by Seedsmen Association on 18th September, 2019.

- Dr. T. Raghavendra, RARS, Nandyal received Prof. M. S. Swaminathan, Best Young Scientist Award 2019-20 by Bose Science Society, Tamil Nadu on 28th February, 2020.

- Dr.T.S.S.K. Patro, ARS, Vizianagaram, received BRICPL Outstanding Achievement Award on March 28th, 2020, organized at Goa, India by ICAAAS.

ANNEXURE I

MEMBERS OF THE ACADEMIC COUNCIL (102nd & 103rd) DURING 2019-`20

OTHER UNIVERSITIES

Vice Chancellor
Andhra University Waltair, Visakhapatnam District

Vice Chancellor
Sri Venkateswara University, Tirupati

LINE DEPARTMENTS

Commissioner & Director of Agriculture
Government of Andhra Pradesh

UNIVERSITY OFFICERS, ANGRAU

Dr S R KoteswaraRao
Dean of Agriculture (FAC) and
Dean of Student Affairs

Dr K Yella Reddy
Dean of Agril. Engg. & Tech.

Dr D Balaguravaiah
Dean of Post Graduate Studies

Dr L Uma Devi
Dean of Home Science

Dr N V Naidu
Director of Experimental Stations
(Up to 30.06.2019)

Dr A S Rao
Director of Experimental Stations
(01.07.2019 onwards)

Dr P Ram Babu
Director of Extension

Nominated Members

Dr A Siva Sankar
Controller of Examinations, ANGRAU

Dr N C Venkateswarlu
(102nd AC) Professor (Entomology),
SVAC, Tirupati

Dr P Jamuma
(102nd AC) Associate Director of Research
RARS, Anakapalle

Dr V Sumathi
(102nd AC) Professor (Agronomy), SVAC,
Tirupati

Dr C V Rama Rao
(103rd AC)Principal Scientist & Head, ARS,
Bapatla

Dr B Venkateswarlu
(103rd AC) Professor (Agronomy), Ag. College,
Bapatla

Dr D Sampath Kumar
(103rd AC)Associate Director of Research
RARS, Nandyal

Co-opted Members

Dr K Ramasamy,
Former Vice Chancellor,
T N Agril. University, Coimbatore

Dr S Kanchana
(102nd AC) Professor (Food and Nutrition)
T N Agril. University, Coimbatore

Dr R Viswanathan
Professor (Food and Agril. Process Engg.),
T N Agril. University, Tiruchirapalli

Dr P Rajasekhar,
Associate Director of Research RARS,
Tirupati

Dr P Rajendraprasad,
Professor (Retd.) (Entomology) SVAC,
Tirupati

Dr D Krishnaveni
Principal Scientist (Plant Pathology)
ICAR – IIRR, Rajendranagar, Hyderabad

Prof. (Mrs.) Vijaya Khader
(103rd AC) Dean of Home Science (Retd.),
ANGRAU

Dr B Mukunda Rao
Principal Scientist (Polytechnics) O/o. Dean of Agril., ANGRAU

Special Invitees

Dr G Subbi Reddy
(102nd AC) Associate Dean
Sri N S Educational Society,
Markapur

Mr S Ramesh
(102nd AC) Principal, Gokul Agril. Polytechnic,
Bobbili, Vizianagaram

Dr P Kesava Rao
(102nd AC) Principal Sadineni Chowdaraiah Seed Polytechnic Chilakaluripet

Dr T Chakradhar
(102nd AC), Principal Aadarana Agril.
Polytechnic (Org. Farming) Anantapuramu

Dr G Veerendranadh
(103rd AC) Associate Dean,
Sri Krishna Devaraya College of Agril. Sciences,
Anantapuramu

Sri P Madan Mohan Reddy
(103rd AC)PrincipalArchana Agril Polytechnic,
Rayachoti, Kadapa Dist.

Sri C Manohar
(103rd AC), PrincipalRASS-KVK Agril.
PolytechnicVanastali, Chittoor

Sri K V Seetharamaiah
(103rd AC) Principal,
Pydah Polytechnic of Agril. Engg.,
Kakinada

Associate Deans

Dr D Lokanadha Reddy
(up to 25.09.2019)

Dr P V Krishnayya
(26.09.2019 onwards) Agricultural College,
Bapatla

Dr P Ramesh Babu
(up to 12.12.2019)

Dr R Sarada Jayalakshmi Devi
(13.12.2019 onwards)
S V Agril. College, Tirupati

Dr P V Krishnayya
(Up to 25.09.2019)

Dr A V Ramana
(26.09.2019 onwards)
Agril. College, Naira

Dr B Narendra
(up to 31.08.2019)

Dr L Vijaya Bhaskar
(FAC from 01.09.2019 to 08.09.2019)

Dr A Pratap Kumar Reddy
(09.09.2019 onwards) Agricultural College,
Mahanandi

Dr G V Nageswara Rao
(up to 31.07.2019)

Dr K Madhavi
(FAC from 01.08.2019 to 07.02.2020 &
01.05.2020 to 11.05.2020)

Dr D Srinivas
(08.02.2020 to 30.04.2020)

Dr J Krishna Prasadji
(12.05.2020 onwards) Agricultural College, Rajamahendravaram

Dr A Mani
Dr NTR College of Agril. Engineering Bapatla

Dr P V K Jagannadha Rao
College of Agricultural Engineering Madakasira

Dr D Vishnu Sankara Rao
(up to 31.07.19)

Dr Ch V V Satyanarayana
(01.08.2019 to 11.05.2020)

Dr Y Radha (11.05.2020 onwards)
Dr NTR CFST, Bapatla
Dr D D Smith College of Food Science & Technology Pulivendula

Dr L Uma Devi
(up to 10.05.2020)

Dr M S Chaitanya Kumari
(11.05.2020 onwards)
College of Community Science, Guntur

Dr G V lakshmi
(up to 04.02.2020)

Dr G Ramachandra Rao
(04.02.2020 onwards)
Advance Post Graduate Centre, Guntur

University Heads of Departments

Agronomy

Dr R Veeraraghavaiah
Principal Scientist & Head ARS, Anantapuram

Genetics & Plant Breeding

Dr B Govinda Rao
Principal Scientist, RARS, Lam, Guntur

Soil Science and Agricultural Chemistry

Dr P Prabhu Prasadini
ADR (HQ), Admn. Office, ANGRAU

Entomology

Dr P V Krishnayya
Associate Dean, Agril. College, Bapatla

Plant Pathology

Dr R Sarada Jayalakshmi
Professor, SVAC, Tirupati

Agricultural Economics

Dr D Vishnu Sankara Rao
(Up to 31.07.19) Associate Dean, Dr NTRCFST, Bapatla

Dr P Rajeswara Reddy
(Up to 31.12.2019) Professor, Agril. College, Mahanandi

Dr Y Radha
(28.02.2020 onwards)
Professor, Agril. College, Bapatla

Crop Physiology

Dr K L Narasimha Rao
Principal Scientist, RARS, Lam, Guntur

Agricultural Extension

Dr B Vijayabhinandana
Principal Scientist (Extension) Admn. Office, ANGRAU

Statistics and Computer Applications

Dr V Srinivasa Rao
Professor, Agril. College, Bapatla

Molecular Biology & Agril. Biotechnology

Dr V Padma,
Professor, APGC, Guntur

Environmental Science & Technology

Dr G V Lakshmi,
Professor, APGC, Guntur

Microbiology

Dr A Vijaya Gopal
Professor, APGC, Guntur

Horticulture

Dr V Srilatha,
Associate Professor SVAC, Tirupati

Farm Machinery and Power Engineering

Dr C Ramana
Principal Scientist, RARS, Tirupati

Soil & Water Engineering

Dr T V Satyanarayana
Professor, CAE, Madakasira

Agricultural Process and Food Engineering

Dr P V K Jagannadha Rao
Associate Dean, CAE, Madakasira

Renewable Energy Engineering

Dr B John Wesley
Principal Scientist & Head, PHTC, Bapatla

Food Technology Engineering

Dr B V S Prasad
Professor, Dr NTRCAE, Bapatla

Food Engineering

Dr Ch V V Satyanarayana
Associate Dean (FAC) Dr NTRCFST, Bapatla

Irrigation and Drainage Engineering

Dr M Raghu Babu
Professor (Academic), Admn. Office, ANGRAU
Foods and Nutrition
Dr J Lakshmi, Professor, CCSc, Guntur

Human Development and Family Studies

Dr Bilquis,
Senior Scientist
KVK, Rastakuntabai

Resource Management and Consumer Science

Dr T Neeraja,
Professor, CCSc, Guntur

Agribusiness Management

Dr I Bhavani Devi,
Professor SVAC, Tirupati

Other Members

Dr R Sekhar Babu
Professor (Agril. Economics) Agril. College, Rajamahendravaram

Dr Ch Syam Raj Naik
Professor (Crop Physiology) Agril. College, Rajamahendravaram

Dr P Israel,
Professor (Agril. Extension) Agril. College, Rajamahendravaram

Dr B Sahadeva Reddy
Professor (Agronomy) Agril. College, Rajamahendravaram

Dr S Krishnam Raju
Professor (Pl. Pathology) Agril. College, Rajamahendravaram

Dr S Dayakar,
Professor (Entomology) Agril. College, Rajamahendravaram

Dr A Appala Swamy
Professor (Genetics & Pl. Breeding), Agril. College, Naira

Dr M Suresh Kumar,
Professor (Agril. Extension) Agril. College, Naira

Dr E Narayana,
Professor (Agronomy) Agril. College, Bapatla

Dr P R K Prasad
Professor (Soil Sci. & Agril. Chemistry), Agril. College, Bapatla

Dr P V Sathya Gopal
Professor (Agril. Extension) Agril. College, Bapatla

Dr P Anil Kumar,
Professor (Pl. Pathology)
Agril. College, Bapatla

Dr K Jayalalitha
Professor (Crop Physiology) Agril. College, Bapatla

Dr Ch Chiranjeevi
Professor (Entomology)
Agril. College, Bapatla

Dr D V Subba Rao
Professor (Agril. Economics)
Agril. College, Bapatla

Dr G Anuradha
Professor (Genetics and Plant Breeding)
Agril. College, Bapatla

Dr B Sarojini Devi
Professor (Irrigation and Drainage Engg.)
CAE, Madakasira

Dr G Ravi Babu
Professor (Irrigation and Drainage Engg.),
Dr NTRCAE, Bapatla

Dr H V Hema Kumar
Professor (Soil & Water Conservation Engg.),
Dr NTRCAE, Bapatla

Dr S V Prasad,
Professor (Agril. Extension) S V Agril. College, Tirupati

Dr G Karuna Sagar,
Professor (Agronomy) S V Agril. College, Tirupati

Dr K Hari Prasad Reddy
Professor (Genetics & Pl. Breeding)
S V Agril. College, Tirupati

Dr T Giridhara Krishna
Professor (Soil Science & Agril. Chemistry)
S V Agril. College, Tirupati

Dr P Sandhya Rani
Professor (Crop Physiology)
S V Agril. College, Tirupati

Dr M V Ramana
Professor (Agril. Engineering)
S V Agril. College, Tirupati

Dr G Mohan Naidu
Professor (Stat. & Comp. Applications)
S V Agril. College, Tirupati

Dr L Vijaya Bhaskar
Professor (Entomology) Agril. College, Mahanandi

Dr M Subba Rao
Professor (Genetics & Pl. Breeding)
Agril. College, Mahanandi

Dr Y Narasimhudu
Professor (Pl. Pathology) Agril. College, Mahanandi

Dr K Radhika
Professor (Seed Sci. & Technology)
APGC, Guntur

Dr K Kiran Prakash
Professor (Stat. & Comp. Applications)
APGC, Guntur

Dr K Chandra Sekhar
Professor (Agronomy) (Water Management)
APGC, Guntur

Annexure II

MEMBERS OF THE RESEARCH AND EXTENSION ADVISORY COUNCIL DURING 2019-`20 (49th REAC)

Chairperson

Dr V Damodara Naidu,
Vice-Chancellor

Convener and Secretary

Dr A S Rao
Director of Experimental Stations

Members

Members of the Board of Management (7) representing the three regions of the state

1. **Dr V Chenga Reddy**
   Distinguished Agriculture Scientist, Guntur
2. **Smt. Viswasarayi Kalavathi**
   Hon'ble MLA, Palakonda
3. **Smt. Mukala Kasturi**
   Progressive Agriculturist
   N. K. R. Puram
4. **Sri V Balashowry**
   Hon'ble M.P, Machilipatnam
5. Sri Batchu Sreenivasa Rao
   Progressive Agriculturist, Guntur
6. **Sri C Rammohan Reddy**
   Agro-Industrialist, Orvakal, Kurnool dt.
7. **Dr S V S R K Netaji**
   Agro-Industrialist, Srikakulam

Member of the Academic Council (1)

Dr Lakka Vijay Bhaskar,
Professor, Agricultural College, Mahanandi

Ex-Officio Members (4)

Special Commissioner of Agriculture, GoAP
Managing Director, A P S S D C
Director, A P S S C A
Director, Women and Child Welfare, GoAP

Special Invitees (Officials)

1. Commissioner of Agril. & Marketing
2. CEO, SERP

Eminent Scientists

Research Experts

1. **Dr N Srirama Reddy**
   Dean of Agriculture (Rtd.), ANGRAU
2. **Dr L G Giri Rao**
   Director of Extension (Rtd.), ANGRAU

Extension Experts

1. **Dr P Venkata Ramaiah**
   Professor (Rtd.), ANGRAU
2. **Dr P Gidda Reddy**
   Director of Extension (Rtd.), ANGRAU

Farmer representatives (From each Agro-Climatic Zone) (9)

1. **Sri S Ramanjaneyulu,**
   Ananthapuramu
2. Sri M Madhava Reddy,
   YSR Kadapa
3. **Sri D Babu Rao,**
   Nellore

4. **Sri B Venkata Ramana,**
   Srikakulam
5. **Sri Ch Madhava Rao,**
   Vizianagaram
6. **Sri K Ramakrishna,**
   Prakasam
7. **Sri V Raveendranadh,**
   Guntur
8. **Sri N Nageswara Raju,**
   Chittoor
9. **Sri K Ramachandra Reddy,**
   Anantapuramu

Representatives of Agro Business Consortium

1. **Sri P Suryaprakash Reddy,**
   Kurnool
2. **Sri K Rama Rao,**
   Guntur

Women Members (5)

1. **Smt. S Masamma,**
   Visakhapatnam
2. **Smt K MAmatha,**
   Chittor
3. **Smt. M Shanthi,**
   Vizianagaram
4. **Smt. K Sujatha,**
   East Godavari
5. **Smt. K Venkata Lakshmi,**
   West Godavari

Representatives from KVKs (Operated by NGOs) (3)

1. **Dr Srinivasarao,**
   PC, KVK, Karakambadu
2. **Dr Sailaja,**
   PC, KVK, BCT, Yelamanchili
3. **Dr Dhanalakshmi,**
   PC, KVK, Yagantipalli

Special Invitees (Farmers) (7)

1. Dr A Nageswara Rao,
   AD (Retd.)
   S V Agricultural College, Tirupati
2. **Sri G Padmanabha Naidu**
   Hon'ble Member, BoM,
   Dr YSRHAU
3. **Sri M Gopala Naidu,**
   Progressive Farmer
   Nellore
4. **Sri G.Venkaiah Naidu,**
   Progressive
   Farmer, Nellore
5. **Sri Aadi Sekara Reddy,**
   Nellore
6. **Sri A VenkataRamanaiah Naidu,**
   Nellore
7. **Sri Pitcheswara Rao,**
   Krishna

Deans of Faculties of ANGRAU

Associate Directors of Research

Principal Scientists of Crops

University Heads of Departments

Coordinators of DAATTCs
Programme Coordinators of KVKs

ANNEXURE III

CADRE-WISE FACULTY STRENGTH DURING 2019-`20

S. No.	Name of the College / Polytechnic Research Station / Extension Unit / Administration	Professor / Principal Scientist		Associate Professor / Senior Scientist		Assistant Professor / Scientist	
		SS	I.P.	SS	I.P.	SS	I.P.
1	2	3	4	5	6	7	8
TEACHING							
1	Agricultural College, Bapatla	09	07	09	08	73	62
2	S.V. Agricultural College, Tirupati	05	04	10	07	56	50
3	Agricultural College, Naira	01	01	11	09	21	14
4	Agricultural College, Mahanandi	01	01	07	07	16	14
5	Agricultural College, Rajamahendravaram	02	01	09	03	22	13
6	Advanced P.G. Centre, Guntur	-	09	-	05	-	02
7	Dr NTR College of Agricultural Engineering, Bapatla	05	04	08	03	17	10
8	College of Agricultural Engineering, Madakasira	05	02	08	02	20	11
9	Dr NTR College of Food Science & Technology, Bapatla	01	01	05	03	09	06
10	College of Food Science & Technology, Pulivendula	05	01	13	-	18	06
11	College of Community Science, Lam, Guntur	01	03	-	-	10	04
12	Agriculture Polytechnic, Anakapalle	-	-	-	-	-	-
13	Agriculture Polytechnic, Maruteru	-	-	01	-	-	-
14	Agriculture Polytechnic, Podalakur	-	-	-	-	-	-
15	Agriculture Polytechnic, Reddipalli	-	-	-	-	-	-
16	Agriculture Polytechnic, Utukur	-	-	01	-	02	-
17	Agriculture Polytechnic, Garikapadu	-	-	-	-	-	-
18	Agriculture Polytechnic, Madakasira	04	-	-	-	-	-
19	Agriculture Polytechnic, Nandyal	-	-	02	-	02	-
20	Agriculture Polytechnic, Tirupati	-	-	-	-	01	-
21	Agriculture Polytechnic, Kalikiri	-	01	-	-	-	-
22	Agriculture Polytechnic, Somasila	-	01	-	-	-	-
23	Agricultural Polytechnic, Rampachodavaram	-	-	-	-	-	-

S. No.	Name of the College / Polytechnic Research Station / Extension Unit / Administration	Professor / Principal Scientist		Associate Professor / Senior Scientist		Assistant Professor / Scientist	
		SS	I.P.	SS	I.P.	SS	I.P.
1	2	3	4	5	6	7	8
24	Agricultural Polytechnic, J.M.Puram	-	-	-	-	-	-
25	Agricultural Polytechnic, Ghantasala	-	-	03	03	01	-
26	Agricultural Polytechnic, Ramagiri	-	-	-	-	-	-
27	Agril. Polytechnic (Seed Technology), J.M.Puram	-	-	01	01	-	-
28	Agril. Polytechnic (Organic Farming) Chintapalle	-	-	-	-	-	-
29	Polytechnic of Agricultural Engineering, Kalikiri	-	-	-	-	-	-
30	Polytechnic of Agricultural Engineering, Anakapalle	-	-	-	-	-	-
	Sub Total (Teaching)	**39**	**36**	**88**	**51**	**268**	**192**
RESEARCH							
I. KRISHNA ZONE (12)							
Guntur District							
1.	Regional Agricultural Research Station, Lam	01	01	04	04	08	06
2.	Agricultural Research Station, Bapatla	-	01	02	01	06	04
3.	Post-Harvest Technology Centre, Bapatla	-	-	01	01	04	04
4.	Saline Water Research Scheme, Bapatla	02	02	-	-	-	-
5.	AICRP on FIM, Bapatla	-	-	01	01	-	-
6.	Agricultural Research Station, Amaravati	-	-	-	-	02	01
7.	Agricultural Research Station, J. M. Puram	-	-	-	-	03	03
Krishna District							
8.	Agricultural Research Station, Vuyyuru	-	02	01	-	06	03
9.	Agricultural Research Station, Machilipatnam	-	-	-	-	03	01
10.	Agricultural Research Station, Garikapadu	01	01	02	01	02	-
11.	Agricultural Research Station, Ghantasala	-	-	01	02	03	03
Prakasam District							
12.	Agricultural Research Station, Darsi	-	-	01	01	04	02

S. No.	Name of the College / Polytechnic Research Station / Extension Unit / Administration	Professor / Principal Scientist		Associate Professor / Senior Scientist		Assistant Professor / Scientist	
		SS	I.P.	SS	I.P.	SS	I.P.
1	2	3	4	5	6	7	8
II. GODAVARI ZONE (3)							
West Godavari District							
13.	Regional Agril. Research Station, Maruteru	02	01	02	02	14	07
14.	Agricultural Research Station, Vijayarai	-	-	01	01	05	03
East Godavari							
15.	Agricultural Research Station, Peddapuram	-	-	-	-	06	03
III. NORTH COASTAL ZONE (5)							
Visakhapatnam District							
16.	Regional Agril. Research Station, Anakapalle	03	01	06	04	16	11
17.	Agricultural Research Station, Yelamanchili	-	-	01	-	03	02
Srikakulam District							
18.	Agricultural Research Station, Amadalavalasa	-	-	01	01	05	05
19.	Agricultural Research Station, Ragolu	-	-	01	01	03	01
Vizianagaram District							
20.	Agricultural Research Station, Vizianagaram	01	02	-	-	04	03
IV. SOUTHERN ZONE (6)							
Chittoor District							
21.	Regional Agricultural Research Station, Tirupati	03	02	11	11	13	13
22.	Agricultural Research Station, Perumallapalle	-	-	01	01	06	06
SPS Nellore District							
23.	Agricultural Research Station, Nellore	-	-	03	02	04	04
24.	Agricultural Research Station, Podalakur	-	02	01	01	05	02
25.	Agricultural Research Station, Kavali	01	01	-	-	-	-
YSR (Kadapa) District							
26.	Agricultural Research Station, Utukur	-	-	01	01	05	05
V. SCARCE RAINFALL ZONE (2)							
Kurnool District							
27.	Regional Agricultural Research Station, Nandyal	03	03	08	07	23	16

S. No.	Name of the College / Research Station / Extension Unit	Professor / Principal Scientist		Associate Professor / Senior Scientist		Assistant Professor / Scientist	
		S	I.P.	S	I.P.	S	I.P.
1	2	3	4	5	6	7	8
Anantapuramu District							
28.	Agricultural Research Station, Anantapuramu	01	01	05	05	10	08
29.	Agricultural Research Station, Reddipalli	01	01	-	-	-	-
30.	Agricultural Research Station, Kadiri	01	01	05	05	02	01
VI. HIGH ALTITUDE AND TRIBAL AREA ZONE							
	Visakhapatnam District						
31.	Regional Agril. Research Station, Chintapalle	01	01	01	-	08	05
Srikakulam District							
32.	Agricultural Research Station, Seethampet	-	-	01	01	02	02
	Sub Total (Research)	**21**	**23**	**62**	**54**	**175**	**123**
Extension							
Krishi Vigyan Kendras (KVKs) (13)							
1.	KVK, Reddipalli, Anantapuramu Dist.	-	-	01	01	06	05
2.	KVK, Rastakuntabai, Vizianagaram Dist.	-	-	01	01	05	02
3.	KVK, Amadalavalasa, Srikakulam Dist.	-	-	01	01	06	06
4.	KVK, Utukur, YSR (Kadapa) Dist.	-	01	01	-	06	04
5.	KVK, Undi, West Godavari Dist.	-	-	01	01	06	03
6	KVK, Darsi, Prakasam Dist.	-	01	01	-	06	05
7.	KVK, Nellore, SPS Nellore Dist.	01	01	-	-	06	05
8.	Dr. K. L.Rao KVK, Garikapadu, Krishna Dist.	-	-	01	01	06	04
9.	KVK, Kalyandurg, Anantapuramu Dist.	-	-	01	01	06	03
10.	KVK, Banavasi, Yammiganur, Kurnool Dist.	-	-	01	01	06	06
11.	KVK, Kalikiri, Chittoor Dist.	-	01	01	-	06	04
12.	KVK, Ghantasala, Krishna Dist.	01	01	03	03	02	02
13.	KVK, Kondempudi, Visakhapatnam Dist.	-	-	01	01	06	04

S. No.	Name of the College / Research Station / Extension Unit	Professor / **Principal** Scientist		**Associate Professor / Senior Scientist**		**Assistant Professor / Scientist**	
		S	**I.P.**	**S**	**I.P.**	**S**	**I.P.**
1	**2**	**3**	**4**	**5**	**6**	**7**	**8**
District Agricultural Advisory & Transfer of Technology Centres (DAATTCs) (13)							
14.	DAATTC, Guntur District.	-	-	-	-	04	02
15.	DAATTC, Machilipatnam, Krishna District.	-	-	-	-	03	01
16.	DAATTC, Eluru, West Godavari District.	-	-	-	-	04	01
17.	DAATTC, Kakinada, East Godavari District	-	-	-	-	03	02
18.	DAATTC, Darsi, Prakasam District	-	-	-	-	03	02
19.	DAATTC, Anakapalle, Visakhapatnam District.	-	-	-	-	03	02
20.	DAATTC, Vizianagaram District.	-	-	-	-	03	02
21.	DAATTC, Srikakulam District	-	-	-	-	02	02
22.	DAATTC, SPS Nellore District.	-	-	-	-	02	02
23.	DAATTC, YSR (Kadapa) District.	-	-	-	01	03	01
24.	DAATTC, Kurnool District.	-	-	-	-	04	02
25.	DAATTC, Anantapuramu District.	03	01	-	-	-	-
26.	DAATTC,Chittoor District	-	-	01	-	03	02
Other Extension Centres							
27.	Farmers Call Centre	-	-	-	-	03	05
	Sub Total (Extension):	**05**	**06**	**15**	**12**	**113**	**79**
	Administration	**10**	**18**	**-**	**07**	**05**	**08**
	Grand Total	**75**	**83**	**165**	**124**	**561**	**403**

SS: Sanctioned Strength

IP: In-position

ANNEXURE IV

STUDENTS' ENROLMENT BY COURSES, FIRST YEAR TO FINAL YEAR IN UNDERGRADUATE, POSTGRADUATE, DOCTORAL AND DIPLOMA PROGRAMMES DURING 2019-`20

Course	Year	Total Student Enrolment			Enrolment Distribution													
					SC Students		ST Students		BC Students		OC Students		Muslim Minority		Physically Challenged Students		Foreign Students	
		Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Faculty of Agriculture																		
UG Programmes																		
B.Sc. (Ag)	I	268	511	779	44	70	22	29	122	239	71	159	09	14	04	06	-	-
	II	280	396	676	47	67	20	26	125	189	74	105	14	09	06	05	-	-
	III	306	390	695	58	56	27	19	138	179	74	122	09	13	08	07	-	01
	IV	297	399	696	39	62	18	19	150	177	81	128	09	12	05	12	-	-
Sub Total (UG)		**1151**	**1696**	**2847**	**188**	**255**	**87**	**93**	**535**	**784**	**300**	**514**	**41**	**48**	**23**	**30**		**01**
PG Programmes																		
M.Sc. (Ag)	I	36	85	121	06	15	03	04	14	35	09	29	01	-	-	01	03	02
	II	32	70	103	05	14	01	04	18	24	08	27	-	-	-	02	-	01
	Total	68	155	224	11	29	04	08	32	59	17	56	01	-	-	03	03	03
M.Sc. (ABM)	I	06	07	13	-	-	-	-	04	05	02	01	-	01	-	-	-	-
	II	09	05	14	01	-	-	-	05	03	-	02	03	-	-	-	-	-
	Total	15	12	27	01	-	-	-	09	08	02	03	03	01	-	-	-	-
Sub Total (PG)		**83**	**167**	**251**	**12**	**29**	**04**	**08**	**41**	**67**	**19**	**59**	**04**	**01**	**-**	**03**	**03**	**03**
Doctoral Programmes																		
Ph.D. (Ag.)	I	20	26	47	03	01	02	02	09	10	06	13	-	-	01	-	-	-
	II	24	23	48	08	01	02	01	07	08	07	13	-	-	-	01	-	-
	III	16	26	42	02	04	02	-	08	09	03	12	-	01	-	-	01	-
Sub Total (Ph.D.)		**60**	**75**	**137**	**13**	**06**	**06**	**03**	**24**	**27**	**16**	**38**	**-**	**01**	**01**	**01**	**01**	**-**

Course	Year	Total Student Enrolment			Enrolment Distribution													
					SC Students		ST Students		BC Students		OC Students		Muslim Minority		Physically Challenged Students		Foreign Students	
		Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Diploma Programmes																		
Diploma	I	224	255	493	57	57	13	17	122	150	25	26	7	5	1	1	-	-
(Agriculture)	II	233	259	478	47	60	19	17	126	144	32	29	9	9	2	0	-	-
	Total	**457**	**514**	**971**	**104**	**117**	**32**	**34**	**248**	**294**	**57**	**55**	**16**	**14**	**3**	**1**	-	-
Diploma (Seed																		
Technology)	I	06	17	23	02	02	-	01	03	09	-	04	01	01	-	-	-	-
	II	05	16	21	-	03	01	-	02	08	02	04	-	01	-	-	-	-
	Total	**11**	**33**	**44**	**02**	**05**	**01**	**01**	**05**	**17**	**02**	**08**	**01**	**02**	-	-	-	-
Diploma	I	06	18	24	02	03	-	01	02	13	02	01	-	-	-	-	-	-
Organic Farming)	II	07	15	22	02	03	02	-	02	10	01	02	-	-	-	-	-	-
	Total	**13**	**33**	**46**	**04**	**06**	**02**	**01**	**04**	**23**	**03**	**03**	-	-	-	-	-	-
SubTotal (Diploma)		481	580	1061	110	128	35	36	257	334	62	66	17	16	3	1		
Sub Total (Agril.)		**1775**	**2518**	**4293**	**323**	**417**	**132**	**140**	**857**	**1212**	**397**	**678**	**61**	**66**	**27**	**35**	**4**	**4**
Faculty of Agricultural Engineering and Technology																		
UG Programmes																		
B.Tech.	I	50	52	102	07	05	04	03	24	27	11	14	01	03	-	-	03	-
(Ag.Engg.)	II	69	49	119	06	12	03	02	33	20	18	12	04	02	01	-	05	01
	III	61	41	102	04	07	03	01	29	21	17	11	02	-	01	-	05	01
	IV	66	50	116	07	07	02	-	36	32	14	10	-	01	-	-	07	-
	Total	**246**	**192**	**439**	**24**	**31**	**12**	**06**	**122**	**100**	**60**	**47**	**07**	**06**	**02**	**-**	**20**	**02**

Course	Year	Total Student Enrolment			Enrolment Distribution													
					SC Students		ST Students		BC Students		OC Students		Muslim Minority		Physically Challenged Students		Foreign Students	
		Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
B.Tech																		
(Food Tech.)	I	28	79	107	05	17	02	03	12	39	08	19	01	01	-	-	-	-
	II	55	42	97	05	07	06	01	30	13	14	20	-	01	-	-	-	-
	III	30	49	79	03	07	03	02	16	26	08	14	-	-	-	-	-	-
	IV	23	26	49	07	02	03	-	06	12	06	12	01	-	-	-	-	-
	Total	**136**	**196**	**332**	**20**	**33**	**14**	**06**	**64**	**90**	**36**	**65**	**02**	**02**	-	-	-	-
Sub Total (UG)		**382**	**388**	**771**	**44**	**64**	**26**	**12**	**186**	**190**	**96**	**112**	**09**	**08**	**02**		**20**	**02**
PG Programmes																		
M.Tech.	I	05	05	10	-	-	-	-	04	02	01	03	-	-	-	-	-	-
(Ag.Engg.)	II	07	08	15	-	03	01	01	06	01	-	03	-	-	-	-	-	-
Sub Total (PG)		**12**	**13**	**25**	**-**	**03**	**01**	**01**	**10**	**03**	**01**	**06**	**-**	**-**	**-**	**-**	**-**	**-**
Doctoral Programmes																		
Ph. D. (Ag.Engg.)	I	03	03	06	-	02	-	-	01	01	02	-	-	-	-	-	-	-
	II	02	03	05	-	-	-	01	01	02	01	-	-	-	-	-	-	-
	III	05	01	06	-	-	-	-	03	01	02	-	-	-	-	-	-	-
Sub Total (Ph.D.)		**10**	**07**	**17**	**-**	**02**	**-**	**01**	**05**	**04**	**05**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Diploma Programmes																		
Diploma	I	17	26	43	03	06	02	06	10	13	02	-	-	01	-	-	-	-
(Ag.Engg.)	II	21	29	50	03	05	05	08	13	09	-	05	-	02	-	-	-	-
	III	17	24	41	03	04	05	06	04	13	05	01	-	-	-	-	-	-
SubTotal (Diploma)		**55**	**79**	**134**	**09**	**15**	**12**	**20**	**27**	**35**	**07**	**06**	**-**	**03**	**-**	**-**	**-**	**-**
Sub Total (Ag.Engg)																		

Course	Year	Total Student Enrolment			Enrolment Distribution													
					SC Students		ST Students		BC Students		OC Students		Muslim Minority		Physically Challenged Students		Foreign Students	
		Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Faculty of Home science																		
UG Programmes																		
B.Sc. (CS)	I	07	71	78	01	29	-	04	05	24	-	11	01	03	-	-	-	-
	II	-	68	68	-	17	-	05	-	31	-	11	-	04	-	-	-	-
	III	-	72	72	-	18	-	07	-	31	-	15	-	01	-	-	-	-
	IV	-	88	88	-	17	-	10	-	42	-	16	-	03	-	-	-	-
Sub Total (UG)		**07**	**299**	**306**	**01**	**81**	**-**	**33**	**05**	**128**	**-**	**53**	**01**	**11**	**-**	**-**	**-**	**-**
PG Programmes																		
M.Sc. (HS)	I	-	08	08	-	01	-	01	-	05	-	01	-	-	-	-	-	-
	II	-	08	08	-	02	-	03	-	03	-	-	-	-	-	-	-	-
Sub Total (PG)		**-**	**16**	**16**	**-**	**03**	**-**	**04**	**-**	**08**	**-**	**01**	**-**	**-**	**-**	**-**	**-**	**-**
Ph.D. Programmes																		
Ph.D. (HS)	I	-	01	01	-	-	-	-	-	01	-	-	-	-	-	-	-	-
	II	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	III	-	02	02	-	02	-	-	-	-	-	-	-	-	-	-	-	-
Sub Total (Ph.D)		**-**	**03**	**03**	**-**	**02**	**-**	**-**	**-**	**01**	**-**	**-**	**-**	**-**	**-**	**-**	**-**	**-**
Sub Total (HS)		**07**	**318**	**325**	**01**	**86**	**-**	**37**	**05**	**137**	**-**	**54**	**01**	**11**	**-**	**-**	**-**	**-**
GRAND TOTAL		**2174**	**3374**	**5477**	**378**	**586**	**180**	**211**	**1070**	**1581**	**506**	**856**	**71**	**88**	**29**	**35**	**24**	**06**

ANNEXURE V

COLLEGE-WISE STUDENTS' STRENGTH -FIRST YEAR TO FINAL YEAR DURING 2019-`20

S. No.	Name of the College	Year	Students Enrollment			SC Students		ST Students		BC Students		OC Students		Muslim Minority		Disability Students		Foreign Students	
			Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
Faculty of Agriculture																			
								B.Sc.(Hons) Agriculture											
		I	83	177	260	14	22	07	11	35	79	22	58	05	07	01	02	-	-
		II	80	155	235	12	25	04	12	36	72	23	41	05	05	-	01	-	-
		III	77	147	224	11	27	06	05	32	67	24	43	04	05	03	01	-	-
		IV	84	143	227	10	25	05	06	40	51	24	53	05	08	01	05	-	-
1	Agricultural									**M.Sc. (Agril.)**									
	College,	I	17	31	48	03	08	-	01	12	10	02	12	-	-	-	-	-	-
	Bapatla	II	13	31	44	01	06	01	01	07	12	04	12	-	-	-	-	-	-
								Ph.D. (Agril.)											
		I	11	12	23	02	01	01	01	06	04	02	06	-	-	-	-	-	-
		II	15	09	24	03	01	01	01	06	03	05	04	-	-	-	-	-	-
		III	06	11	17	-	02	-	-	05	07	01	02	-	-	-	-	-	-
2	S.V.									**B.Sc.(Hons) Agriculture**									
	Agricultural	I	70	123	193	14	15	01	08	30	57	23	38	02	05	01	01	-	-
	College,	II	83	89	172	17	14	08	03	36	41	17	28	05	03	04	02	-	-
	Tirupati	III	78	84	162	18	10	09	04	23	30	24	34	04	05	03	01	-	01
		IV	66	84	150	07	11	04	04	27	29	25	37	03	03	01	03	-	-

S. No.	Name of the College	Year	Students Enrollment			SC Students		ST Students		BC Students		OC Students		Muslim Minority		Disability Students		Foreign Students	
			Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
M.Sc.(Agril.)																			
		I	08	30	38	-	03	-	01	03	11	05	14	-	-	-	01	-	01
		II	14	40	54	01	07	01	02	03	16	05	13	01	-	-	-	03	02
M.B.A. (Agril. Business Management)																			
		I	06	07	13	-	-	-	-	04	05	02	01	-	01	-	-	-	-
		II	09	05	14	01	-	-	-	05	03	-	02	03	-	-	-	-	-
Ph.D. (Agril.)																			
		I	08	10	18	01	-	01	-	02	03	04	07	-	-	01	-	-	-
		II	08	11	19	05	-	01	-	01	04	01	07	-	-	-	01	-	-
		III	09	14	23	01	02	02	-	03	02	02	09	-	01	-	-	01	-
03	**B.Sc.(Hons) Agriculture**																		
	Agricultural	I	50	90	140	09	14	08	03	23	54	08	17	02	02	02	02	-	-
	College,	II	54	50	104	07	08	03	05	22	30	18	06	04	01	02	01	-	-
	Naira	III	66	59	125	14	01	05	05	39	41	07	09	01	03	-	04	-	-
		IV	74	72	146	09	05	03	03	52	56	09	07	01	01	03	03	-	-
M.Sc.(Agril.)																			
		I	01	04	05	-	02	-	02	01	-	-	-	-	-	-	01	-	-
		II	02	03	05	01	01	-	01	01	01	-	-	-	-	-	-	-	-
B.Sc.(Hons) Agriculture																			
04	Agricultural	I	42	78	120	06	08	03	05	21	30	12	35	-	-	-	01	-	-
	College,	II	39	56	95	07	09	01	05	20	25	11	17	-	-	-	01	-	-
	Mahanandi	III	53	48	101	09	09	03	02	28	22	13	15	-	-	02	01	-	-
		IV	43	54	97	08	08	04	02	13	23	18	21	-	-	-	01	-	-

S. No.	Name of the College	Year	Students Enrollment			SC Students		ST Students		BC Students		OC Students		Muslim Minority		Disability Students		Foreign Students	
			Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
M.Sc.(Agril.)																			
		I	04	03	07	02	01	01	-	01	02	-	-	-	-	-	-	-	-
		II	05	02	07	02	01	01	-	02	01	-	-	-	-	-	-	-	-
B.Sc.(Hons) Agriculture																			
05	**Agricultural College, Rajamahen-dravaram**	I	23	43	66	01	11	03	02	13	19	06	11	-	-	-	-	-	-
		II	24	46	70	04	11	04	01	11	21	05	13	-	-	-	-	-	-
		III	32	52	84	06	09	04	03	16	19	06	21	-	-	-	-	-	-
		IV	30	45	75	05	13	02	04	18	18	05	10	-	-	-	-	-	-
M.Sc.(Agril.)																			
06	**Advanced Post Graduate Centre, Guntur**	I	02	02	04	-	-	-	-	01	01	01	01	-	-	-	-	-	-
		II	02	09	11	01	-	-	-	01	05	-	04	-	-	-	01	-	-
		Ph.D. (Agril.)																	
		I	01	04	05	-	-	-	01	01	03	-	-	-	-	-	-	-	-
		II	01	03	04	-	-	-	-	-	01	01	02	-	-	-	-	-	-
		III	01	01	02	01	-	-	-	-	-	-	01	-	-	-	-	-	-
Faculty of Agricultural Engineering & Technology																			
B.Tech. (Agril. Engg.)																			
07	**College of Agricultural Engineering, Bapatla**	I	27	38	65	03	04	02	03	14	19	04	10	01	02	-	-	03	-
		II	44	28	72	04	06	02	01	22	11	11	08	-	01	-	-	05	01
		III	40	25	65	03	05	02	-	17	11	12	08	01	-	01	-	05	01
		IV	41	33	74	04	04	01	-	18	21	11	07	-	01	-	-	07	-

S. No.	Name of the College	Year	Students Enrollment			SC Students		ST Students		BC Students		OC Students		Muslim Minority		Disability Students		Foreign Students	
			Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
M.Tech. (Agril. Engg.)																			
		I	05	05	10	-	-	-	-	04	02	01	03	-	-	-	-	-	-
		II	07	08	15	-	03	01	01	06	01	-	03	-	-	-	-	-	-
Ph.D. (Agril. Engg.)																			
		II	03	03	06	-	02	-	-	01	01	02	-	-	-	-	-	-	-
		II	02	03	05	-	-	-	01	01	02	01	-	-	-	-	-	-	-
		III	05	01	06	-	-	-	-	03	01	02	-	-	-	-	-	-	-
B.Tech. (Agril. Engg.)																			
08	**College of**	I	23	14	37	04	01	02	-	10	08	07	04	-	01	-	-	-	-
	Agricultural	II	25	21	46	02	06	01	01	11	09	07	04	04	01	01	-	-	-
	Engineering,	III	20	16	36	01	02	01	01	12	10	05	03	01	-	-	-	-	-
	Madakasira	IV	25	17	42	03	03	01	-	18	11	03	03	-	-	-	-	-	-
B.Tech. (Food Tech.)																			
09	**College of**	I	16	49	65	01	08	01	01	09	25	05	15	-	-	-	-	-	-
	Food Science	II	32	20	52	03	05	04	01	18	05	07	09	-	-	-	-	-	-
	& Technology,	III	17	32	49	02	05	01	01	08	18	06	08	-	-	-	-	-	-
	Bapatla	IV	15	19	34	06	01	03	-	03	10	03	08	-	-	-	-	-	-
B. Tech. (Food Tech.)																			
10	**College of**	I	12	30	42	04	09	01	02	03	14	03	04	01	01	-	-	-	-
	Food Science	II	23	22	45	02	02	02	-	12	08	07	11	-	01	-	-	-	-
	&Technology,	III	13	17	30	01	02	02	01	08	08	02	06	-	-	-	-	-	-
	Pulivendula	IV	08	07	15	01	01	-	-	03	02	03	04	01	-	-	-	-	-

S. No.	Name of the College	Year	Students Enrollment			SC Students		ST Students		BC Students		OC Students		Muslim Minority		Disability Students		Foreign Students	
			Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
B.Sc.(Hons) Community Science																			
11	**College of**	I	07	71	78	01	29	-	04	05	24	-	11	01	03	-	-	-	-
	Home	II	-	68	68	-	17	-	05	-	31	-	11	-	04	-	-	-	-
	Science	III	-	72	72	-	18	-	07	-	31	-	15	-	01	-	-	-	-
		IV	-	88	88	-	17	-	10	-	42	-	16	-	03	-	-	-	-
12	**Advanced**	**M.Sc.(H. Sc.)**																	
	PG Centre	I	-	08	08	-	01	-	01	-	05	-	01	-	-	-	-	-	-
	Guntur	II	-	08	08	-	02	-	03	-	03	-	-	-	-	-	-	-	-
M.Sc.(H. Sc.)																			
		I	-	1	1	-	-	-	-	-	1	-	-	-	-	-	-	-	-
		II	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
		III	-	2	2	-	2	-	-	-	-	-	-	-	-	-	-	-	-
Diploma Programmes																			
13	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	20	32	52	04	09	03	01	11	18	02	04	-	-	-	-	-	-
	Maruteru	II	23	31	54	08	08	02	01	10	17	03	05	-	-	-	-	-	-
14	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	26	37	63	06	05	02	03	16	25	01	04	01	-	-	-	-	-
	Anakapalli	II	19	42	61	02	07	01	02	13	31	03	01	-	01	-	-	-	-
15	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	-	23	23	-	06	-	-	-	14	-	01	-	02	-	-	-	-
	Podalakur	II	11	11	22	-	03	02	-	06	07	01	01	02	-	-	-	-	-

S. No.	Name of the College	Year	Students Enrollment			SC Students		ST Students		BC Students		OC Students		Muslim Minority		Disability Students		Foreign Students	
			Boys	Girls	Total	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls	Boys	Girls
16	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	15	10	25	03	02	01	01	10	04	01	03	-	-	-	-	-	-
	Reddipalli	II	11	16	27	-	03	02	02	06	09	03	02	-	-	-	-	-	-
17	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	09	16	25	02	04	01	-	04	09	02	03	-	-	-	-	-	-
	Utukur	II	07	18	25	01	04	-	01	04	08	02	05	-	-	-	-	-	-
18	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	18	21	39	07	05	-	01	06	12	03	02	02	01	-	01	-	-
	Garikapadu	II	22	16	38	05	02	01	01	09	10	04	01	03	02	01	-	-	-
19	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	10	13	23	02	03	02	01	04	07	02	-	-	02	-	-	-	-
	Madakasira	II	13	08	21	01	04	01	-	08	03	02	01	01	-	-	-	-	-
20	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	06	18	24	02	03	-	01	02	13	02	01	-	-	-	-	-	-
	Chantapalle	II	07	15	22	02	03	02	-	02	10	01	02	-	-	-	-	-	-
21	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	10	14	24	03	02	-	02	07	07	-	03	-	-	-	-	-	-
	Nandyal	II	16	08	24	02	01	-	01	12	04	02	02	-	-	-	-	-	-
22	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	14	09	23	04	01	-	01	08	06	01	01	01	-	-	-	-	-
	Tirupati	II	12	11	23	03	03	01	-	05	02	03	06	-	-	-	-	-	-
23	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	09	13	22	01	04	-	01	04	05	03	03	01	-	-	-	-	-
	Kalikiri	II	10	13	23	02	03	-	01	06	07	01	-	01	02	-	-	-	-

24	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	17	-	17	09	-	-	-	06	-	01	-	01	-	-	-	-	-
	Somasila	II	12	07	19	03	01	01	-	05	04	03	-	-	02	-	-	-	-
25	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	20	-	20	03	-	02	-	15	-	-	-	-	-	-	-	-	-
	Rampa-	II	13	-	13	03	-	01	-	08	-	01	-	-	-	-	-	-	-
	chodavaram																		
26	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
	J.M. Puram	II	10	16	26	05	03	01	01	03	09	-	01	01	02	01	-	-	-
27	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	33	05	38	07	01	01	02	17	02	07	-	01	-	01	-	-	-
	Gantasala	II	30	07	37	07	01	01	05	18	-	03	01	01	-	-	-	-	-
28	Agricultural	Diploma (Agriculture)																	
	Polytechnic,	I	17	43	60	04	11	01	03	12	28	-	01	-	-	-	-	-	-
	Ramagiri	II	18	40	58	04	14	03	02	11	23	-	01	-	-	-	-	-	-
29	Agricultural	Diploma (Seed Technology)																	
	Polytechnic,	I	06	17	23	02	02	-	01	03	09	-	04	01	01	-	-	-	-
	J.M. Puram	II	05	16	21	-	03	01	-	02	08	02	04	-	01	-	-	-	-
30	Agricultural	Diploma (Organic Farming)																	
	Polytechnic,	I	06	18	24	02	03	-	01	02	13	02	01	-	-	-	-	-	-
	Chintapalle	II	07	15	22	02	03	02	-	02	10	01	02	-	-	-	-	-	-
31	Polytechnic	Diploma (Agricultural Engineering)																	
	of Agricultural	I	05	11	16	01	01	01	05	03	04	-	-	-	01	-	-	-	-
	Engineering ,	II	09	11	20	-	01	04	07	05	01	-	-	-	02	-	-	-	-
	Kalikiri	III	07	06	13	02	-	05	05	-	01	-	-	-	-	-	-	-	-
32	Polytechnic of	Diploma (Agricultural Engineering)																	
	Agricultural	I	12	15	27	02	05	01	01	07	09	02	-	-	-	-	-	-	-
	Engineering,	II	12	18	30	03	04	01	01	08	08	-	05	-	-	-	-	-	-
	Anakapalle	III	10	18	28	01	04	-	01	04	12	05	01	-	-	-	-	-	-

ANNEXURE VI

AGRO-CLIMATIC ZONE-WISE LIST OF RESEARCH STATIONS OF ANGRAU AND THEIR FUNCTIONS

S. No.	Zone / Research Station	Functions		
		Main	Priorities	Verification
I.	**Krishna Zone**			
1.	Regional Agricultural Research Station, Lam -522 034.	• Development of sustainable, profitable technologies and integrated cropping/ farming systems for rainfed / ID conditions in pulses, cotton, millets and oil seeds • Extending of weather based agro advisory services, working out of viable effective price forecasting for major crops.	• Development of short / medium duration cotton varieties / hybrids. • Development of ideotypes in cotton suitable for HDPS and mechanical picking. • Climate resilient production technologies (including organic farming) for cotton and cotton based cropping systems. • Sustainable integrated management technologies for biotic and abiotic stresses. • Mechanization in cotton. • Value addition in cotton. • Weather based agro advisories to farmers. • Research on socio-economic aspects of farming community.	• Control of weeds in rice fallow pulses.
2.	Agricultural Research Station, Agricultural College Farm, Bapatla - 522101.	• Development of improved long duration rice varieties with good grain quality and sustainable agro-techniques suitable for black soils of Krishna Western Delta and NSP area.	• Development of climate resilient rice varieties for KW Delta and NSP area. • Development of varieties suitable for direct seeding. • Breeding long duration varieties with fine grain quality. • Evolving of cost reduction technologies. • Innovative and adaptable production and protection technologies. • Identification of efficient	

S. No.	Zone / Research Station	Functions		
		Main	Priorities	Verification
3.	Saline Water Scheme, Agricultural college campus, Bapatla - 522 101	• Research on water quality, soil survey & monitoring of benchmark sites and reclamation & fertility management of problematic soils.	• Water quality, soil survey and monitoring of bench-mark sites. • Up-coming problems of sea water in coastal sandy soils. • Reclamation of aban-doned aqua ponds, sandy soils. • Effective management and utilization of thorough harvesting techniques and irrigation methods. • Reclamation of salt affected areas-aqua ponds.	• Testing and identification of crops / varieties suitable for problematic soils.
4.	Post-Harvest Technology Centre Agricultural College campus, Bapatla-522101.	• Design, fabrication, valuation of post - harvest equipments/ machinery for reducing the crop losses and enhancing value addition. • Research on bio-chemical quality factors in storage and impact of abiotic and biotic factors on storage of food grains and control methods of storage pests.	• Design and development of crop specific and location specific technolo-gies and machineries for value addition and safe storage. • Development of value added products using innovative and novel technologies. Design and development of efficient storage structures for cereals, pulses and oilseeds and horticulture produces. • Design and development of low cost ripening chambers for fruits/crops. • Utilization of innovative biotechnological ap-proaches for preparation of value added products. • Development of complete protocol for agricultural waste management. • Development of process technology for utilization of by- products. • Design and development of Agro Processing Clusters based on produc-tion catchments of various agro climatic zones of the state	• Demonstra-tion and popularization of post-harvest related equipment / technologies.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
6.	Agricultural Research Station, Amaravati	•· Research, production and quality control of *Rhizobium* and *Azotobacter* etc. •· Research and mass production of biofertilizers and associated protocols.	---	• Testing efficacy of biofertilizers on mandatory crops of the zone.
7.	Agricultural Research Station, Jangamahe-swarapuram	• Development of high yielding rice varieties with good grain quality and resis-tance to pest & diseases suitable to NSP right canal area. • Production of breeder and founda-tion seed of different varieties of rice	• Development and identification of rice varieties suitable for NSP right canal area. • Evaluation of water saving technologies and micro irrigation systems to enhance water productivity. • Seed research & seed production technologies for rice and pulses. • Standardization of seed production technologies for fodder and green manure crops.	• Identification of HYVs in greengram and redgram suitable for the tract.
8.	Agricultural Research Station, Machilipatnam	• Development of medium duration, salt tolerant / resistant rice varieties suitable to coastal ecosystem and management strategies for improving productiv-ity in salt affected areas.	• Development of medium duration and salt tolerant rice varieties. • Conduct of basic, applied and adaptive research on increasing and stabilizing rice productivity in coastal saline ecosystems. • Production technologies for improving productivity in salt affected areas. • Collection, evaluation, conservation of rice germplasm.	• Testing and identification of suitable blackgram varieties for salt affected areas.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
9.	Agricultural Research Station, Ghantasala	• Development and identification of high yielding blackgram and greengram varieties suitable for rice fallows (*rabi*) and production and protection technologies for improving productivity.	• Development of short or medium duration greengram and blackgram varieties to escape terminal moisture stress and biotic stress with special emphasis on sucking pests & viral diseases. • Alternate crops to greengram and blackgram for rice fallows. • Mechanization in pulse crops. • Organic enrichment of soils to sustain rice fallow pulse cropping sequence.	• Identification of suitable mustard and maize varieties (Zero tillage) and production technologies under rice fallows.
10.	Agricultural Research Station, Ghantasala	• Development of sugarcane varieties possessing high cane yield potential and sugar content coupled with tolerance / resistance to biotic and abiotic stresses and viable agro techniques suitable for Krishna - Godavari Zone.	• To develop high yielding sucrose rich varieties with climate resilience and multiratooning ability. • To develop cost effective comprehensive production technologies. • Water saving technologies to enhance water and nutrient productivities. • To develop technologies for soil health, management of ESB, INB and red rot. • To identify efficient clones under water logged conditions & clones with tolerance for post-harvest deterioration. • Agro-techniques for mechanized sugarcane cultivation.	• Identification of suitable rice varieties for *kharif* and blackgram varieties for rice fallow situation.
11.	Agricultural Research Station, Garikapadu	• Research on water management of different crops grown under NSP left canal command area.	• To conduct research on crops and cropping systems and water management for NSP left command area.	• Testing and identification of suitable rice, pulses and soybean varieties for the tract. • Transfer of proven techno-logies through field demon-strations in farmers fields.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
12.	Agricultural Research Station, Darsi	• Development of economically viable and efficient cropping system models, Agro-forestry system, watershed management technologies suitable for NSP right canal area for enhancing the productivity of rainfed crops.	• Development of high yielding varieties with resistance to pests and diseases in millets, pulses and oilseeds. • Identification of crops and cropping systems suitable for NSP right canal area. • To ationin suitable agro-forestry system matching soil and environmental conditions. • To evaluate different techniques of modification of crop microclimates for enhancing the water-use efficiency and productivity of rainfed crops. • Development of suitable technologies for water harvesting and conservation. • Identification of viable agro-technologies for crops suitable to the tract.	• Identification of alternative crops to Tobacco. • Introduction of drought tolerant oilseed crops viz., safflower and castor. • Screening of cowpea and horsegram • varieties for their adaptability. • Introduction of millets in *kharif* season preceding to *rabi* bengalgram. • Organic enrichment to improve the physical properties of the soil. • Testing & identification of greengram, blackgram, redgram varieties suitable for the tract.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
II.	**Godavari Zone**			
1.	Regional Agricultural Research Station, Maruteru, West Godavari District.	• Rice, Rice based sustainable / integrated cropping / farming systems through development of suitable varieties, sustainable crop production and protection technologies.	• Development of climate resilient rice varieties. • Development of rice varieties for direct seeding. • Breeding for mid late duration rice varieties with fine grain. • Development of exportable rice. • Development of rice varieties for semi-deep water situations. • Bio-fortification in rice. • Cost reduction technologies. • Innovative and adaptable production technologies. • Processing and value addition. • Integrated farming systems. • Organic / natural farming. • Soil health management. • Mechanization in rice. • Research on summer pulses. • Imparting skill oriented training to farmers & extension functionaries. • Research on non-pesticide management. • Weather based Agro advisories to farmers. • Research on socio-economic aspects of farming community.	• Identification of suitable maize varieties for *rabi* season.
2.	Agricultural Research Station, Vijayarai, West Godavari District	• Research on maize and maize based cropping systems and on apiculture.	• Development of medium and short duration maize hybrids / varieties. • Development of specialty corn varieties/hybrids. • Development of location specific innovative production technologies for maize. • Research on honeybees - Breeding for disease resistance, high yielding, non-pestiferous pollinators. • Capacity building on bee keeping	----

S. No.	Zone / Research tation	Functions		
		Main	**Priorities**	**Verification**
3.	Agricultural Research Station, Peddapuram, East Godavari District.	• Research on finger millet, pulses (blackgram, greengram, redgram), maize and oilseeds (groundnut sesamum).	• Development of climate resilient finger millet varieties and profitable production technologies. • Evaluation of varieties/ hybrids of blackgram, redgram, greengram, sesamum, groundnut and maize.	----
III.	**North Coastal Zone**			
1.	Regional Agricultural Research Station, Anakapalle, Visakhapatnam District	• Research on sugarcane, sugarcane based cropping systems, cost reduction technologies and value addition.	• Development of high yielding climate resilient varieties of sugarcane. • Development of INM, IPM and IDM strategies for sustainable sugarcane production. • Development of cost reduction technologies for sustainable sugarcane production. • Processing and value addition of ationi and sugarcane by- products. • Identification of profitable and sustainable sugarcane based cropping systems for different agro climatic conditions. • Soil health, pest and disease management in multi ationing. • Mechanization in sugarcane. • Development of water smart technologies for increasing the crop / water productivity. • Popularization of feasible and adaptable technologies (bio-pesticides, bio-fertilizers). • To encourage small and marginal farmers to set up industries for value addition. • Weather based Agro advisories to farmers. • Research on socio-economic aspects of farming community.	• Testing & identification of thermo & photo insensitive varieties of sesame and groundnut. • Evaluation of varieties / hybrids of maize suitable for *kharif* and *rabi*. • Identification of suitable varieties in rice. • To evolve suitable package of practices for organic / natural farming.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
2.	Agricultural Research Station, Yellamanchili, Vishakhapatnam District	• Research on sesamum and sesamum based cropping systems.	• Development of climate resilient (Photo insensitive) sesame varieties and profitable production technologies. • Evolving varieties / hybrids of sunflower. • Breeding for improved varieties of groundnut suitable for North Coastal Zone	• Testing / Identification of varieties / hybrids of millets suitable for light soils & rainfed areas of North Coastal Zone. • Identification of suitable varieties of sugarcane, greengram, horsegram and redgram for rainfed situations.
3.	Agricultural Research Station, Amadalavalasa,	• Research on mesta, mesta based cropping systems, post harvest technology and on pulses.	• Development of climate smart varieties of mesta with biotic and abiotic stress tolerance. • Identification of profitable and sustainable mesta based cropping systems. • Development of innovative and climate resilient production technologies. • Post-harvest technology and value addition.	• Verification function of cotton, redgram upland pulses, maize and rainfed sugarcane. • Identification of suitable sugarcane, maize and other crops for rainfed conditions. • Evaluation / identification of cotton hybrids / varieties and IPM practices suitable for rainfed situation.
4.	Agricultural Research Station, Ragolu, Srikakulam District	• Rice, Rice based cropping systems, climate resilient, sustainable / integrated cropping / farming systems, soil and water management for canalfed and tankfed areas and research on rice fallow pulses.	• Development of fine grain, long and medium duration varieties for canalfed and rainfed areas. • Development of climate resilient short duration varieties for uplands. • Development of innovative and adoptable production technologies for different ecosystems (canal, tankfed and rainfed) including direct seeding. • Identification and popularization of profitable integrated farming systems.	• Testing and identification of suitable varieties of groundnut, mustard, sunflower for *rabi* season.

S. No.	Zone / Research tation	Functions		
		Main	**Priorities**	**Verification**
			• Standardization of organic / natural farming practices. • Research on rice fallow pulses. • Development of cost reduction technologies (planting methods, bio fertilizers and bio control agents). • Bio fortification and value addition. • technologies for zero tillage maize.	
5.	Agricultural Research Station, Vizianagaram, Vizianagaram District	• Research on *ragi*, *ragi* based cropping systems and minor millets (*proso*, *kodo*, *ooda* and foxtail).	• Development of climate resilient *ragi* varieties (with blast resistance and non-lodging nature) and production technologies. • Evaluation / identification of suitable varieties / hybrids in minor millets. • Evaluation / identification of groundnut varieties with biotic and abiotic stress tolerance. • Bio fortification, processing and value addition in *ragi* and other minor millets. • Identification of profitable *ragi* based cropping system including organic farming. • Mechanization in millets.	• Testing & identification of suitable varieties in greengram, blackgram, redgram, horsegram, maize and sunflower.
IV.	**Southern Zone**			
1.	Regional Agricultural Research Station, Tirupati, Chittoor District	• Research on groundnut and sustainable groundnut based cropping systems, pulses, soil and water management, farm mechanization and post-harvest technology	• Development of drought tolerance, high yield, pest and disease resistant varieties in groundnut and pulses for the zone. • Research on groundnut based cropping systems, production and protection technologies. • Soil, water and nutrient management technologies for groundnut and pulses including arid legumes. • Evaluation of farm machinery and post-harvest technologies.	• Identification of viable Integrated Farming Systems for dryland / rainfed farmer. • Agro-climate advisory services for dryland / rainfed farming.

S. No.	Zone / Research tation	Functions		
		Main	**Priorities**	**Verification**
			• Testing, production and distribution of efficient strains of bio-fertilizers. • Weather based agro advisories to farmers. • Research on Socio-economic aspects of farming community.	• Development of digital agricultural communica-tion technologies for efficient transfer of technology. • Creation of farmers organizations and technology commercialization. • Testing / identification of HYVs of fodders, organic / natural farming practices.
2.	Agricultural Research Station, Perumallapalle, Chittoor District	• Research on sugarcane, maize, jowar and millets.	• Development of high yielding sugarcane varieties possessing tolerance to biotic and abiotic stresses and suitable for jaggery mechanization and diversified uses in Southern Zone. • Development of input use efficient cane management technolo-gies. • Seed production of elite clones through conventional and micro propagation tech-niques. • Development of high yielding blast resistant finger millet varieties suitable for Andhra Pradesh. • Breeding varieties / hybrids of jowar, maize and pearl millet. • Development of input use efficient crop production and protec-tion practices for maize, jowar and millets.	• Testing / Identification of varieties / hybrids of millets suitable for light soils &rainfedares of North Coastal Zone. • Identification of suitable varieties of sugarcane, greengram, horsegram and redgram for rainfed situa-tions.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
3.	Agricultural Research Station, Nellore, Nellore District	• Rice and rice based cropping systems.	• Development of rice varieties of different duration maturity groups suitable to southern zone. • Development of rice varieties resistant/ tolerant to blast. • Screening / identification of resistant donors for major insect pests and diseases. • Development of pest and disease management strategies. • Development of varieties and technologies for aerobic, direct seeding of rice. • Working out package for organic rice cultivation / natural farming. • Basic research on the resistance to insect pests with particular reference to Brown Plant Hopper. • Monitoring and identification of rice gall midge biotypes in Southern Zone. • Development of Integrated pest and disease management including biological control. • Research on the methods of non-pesticide management.	• Evaluation and identification of suitable blackgram and greengram varieties for rice fallows. • Identification of suitable varieties in gingelly. • Identification of HYVs of sesamum. • Testing of pulses under rice fallows.
4.	Agricultural Research Station, Podalakur, Nellore District	• Development of high yielding insect pest & disease tolerant varieties in pulses, jowar and evolving climate resilient suitable agro-techniques.	• Development of blackgram, greengram and redgram varieties with high yield and tolerance to insect pests and diseases. • Development of sorghum varieties suitable for rabi rainfed conditions. • Research on sorghum based cropping systems. • Development of climate resilient agro techniques.	• Testing and identification of suitable groundnut varieties for the tract. • Evaluation of fodder sorghum, sunflower and gingelly varieties / hybrids. • Seed production in pulses, jowar and groundnut.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
5.	Agricultural Research Station, Kavali, Nellore District.	• Agro-forestry research	• Evaluation of different agro-forestry species including eucalyptus, casuarina, Malabar *vepa* and red sanders clones.	• Evaluation / identification of varieties in rice, pulses and groundnut.
6.	Agricultural Research Station, Utukur, Y.S. R. Kadapa District	• Rice and rice based cropping systems, water management and STCR research.	• Rice and rice based cropping systems. • Water management and dryland agriculture. • Mass multiplication of bio-fertilizers. • Basic and strategic research on soils. • Evaluation of fertilizer schedules for major crops.	• Identification of suitable oilseed and pulses.
V.	**Scarce Rainfall Zone**			
1.	Regional Agricultural Research Station, Nandyal, Kurnool District	• Development / identification and popularization of suitable crops / cropping systems, varieties and technologies pertaining to cotton, rice, jowar, small millets, chickpea, sunflower and tobacco.	• Development of climate resilient varieties / hybrids in cotton, rice, jowar, small millets, chickpea, sunflower and tobacco. • Research on climate smart technologies to cope up with the weather aberrations in mandate crops. • Intensification of research for innovative and small farmer friendly mechanization for mandatory crops. • Soil health management in major crops / cropping systems. • Development of water smart technologies in major crops / cropping systems. • To intensify quality seed production of newly released varieties of mandatory crops. • Working out organic production package of practices for small millets and blackgram. • Introduce hybrid rice research. • Weather based agro advisories to farmers. • Research on socio-economic aspects of farming community.	• Evaluation of varieties / technologies of upcoming crops like maize, redgram, blackgram, soybean, safflower, mustard and castor. • Development of Agro techniques for rice fallow sorghum.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
2.	Agricultural Research Station, Ananta-puramu, Ananta-puramu District	• Development and popularization of climate smart sustainable dryland agriculture technologies and groundnut, bajra integrated farming systems and extending weather based agro advisory services.	• Development of climate resilient technologies in groundnut and other major rainfed crops/cropping systems. • Strengthening the research on climate smart technologies to cope up with weather aberrations in rainfed crops. • Intensification of research for innovative and small farmer friendly mechanization in rainfed crops. • Development of integrated farming system models for rainfed agriculture. • Soil health management under rainfed situations. • Development and evaluation of climate resilient varieties / hybrids in pearlmillet and arid legumes. • Development of crop - weather - pest relationships and dissemination of Agro advisories.	• Evaluation of varieties of sorghum castor, foxtail millet, redgram, horsegram and field bean.
3.	Agricultural Research Station, Reddipalli, Ananta-puramu District	• Development and popularization of climate and water smart sustainable oilseed crop based cropping systems.	• Development of climate resilient technologies in oilseed crops / cropping systems. • Soil health management for oilseed crops. • Development of water smart technologies for oilseed crops / cropping systems.	• Evaluation of varieties / hybrids of oilseed crops, rice and redgram. • Transfer of technologies through OFTs.
4.	Agricultural Research Station, Kadiri, Ananta-puramu District	• Development and popularization of suitable groundnut varieties and climate smart groundnut based cropping systems.	• Development of climate smart groundnut varieties for different situations. • Evolving of efficient and sustainable production technologies. • Screening of groundnut varieties for major pests and diseases. • Development of management strategies for major pests and diseases in groundnut. • Intensification of seed research and quality seed production of newly released groundnut varieties. • Basic studies on management of viral diseases in groundnut.	• Evaluation of redgram, arid legumes and sunflower varieties / hybrids.

S. No.	Zone / Research tation	Functions		
		Main	Priorities	Verification
VI.	**High Altitude and Tribal Zone**			
1.	Regional Agricultural Research Station, Chintapalle, Visakhapatnam District.	• Development/ identification and popularization of suitable crop varieties and technologies on watershed basis for improving the livelihood of tribal farmers	• Research on rajamash and niger. • Evaluation of varieties/hybrids in upland rice, maize, wheat, millets, sugarcane & redgram. • Development / evaluation of soil and water conservation practices. • Development of integrated farming system models. • Improving organic / natural farming practices. • Weather based Agro advisories to farmers. • Research on socio-economic aspects of farming community.	----
2.	Agricultural Research Station, Seethampeta, Srikakulam District.	• Identification and popularization of suitable crops / crop varieties / cropping systems and development & popularization of technologies on watershed basis for improving the live hood of tribal farmers.	• Testing the performance of improved varieties of cereals, millets, pulses, oil seeds and fodder crops. • Soil and water conservation in the agency area. • Development of organic / natural farming package for major crops in the agency areas. • Identification of profitable and non-traditional crops and cropping systems. • Integrated farming system research for economic upliftment of tribal. • Promotion of processing and storage of millets.	• Identification of profitable cropping / farming system.

ANNEXURE VII

LIST OF ALL INDIA COORDINATED RESEARCH PROJECTS OPERATED IN RESEARCH STATIONS OF ANGRAU

I. NORTH COSTAL ZONE

1. AICRP on Sugarcane, RARS, Anakapalle
2. AICRP on PHE and Technology, RARS, Anakapalle
3. AICRP on Biological Control, RARS, Anakapalle
4. AICRP on Small Millets, ARS, Vizianagaram
5. AICRP on Jute and Allied Fibers, ARS, Amadalavalasa
6. AICRP on IFS, ARS, Vizianagaram

II. GODAVARI ZONE

7. AICRP on Rice, RARS, Maruteru
8. AICRP on Cropping System Research (MAE), RARS, Maruteru
9. AINP on Vertebrate Pests, RARS, Maruteru
10. AICRP on Honey Bee Research & Training, ARS, Vijayarai
11. AICRP on Maize, ARS, Peddapuram.

III. KRISHNA ZONE

12. AICRP on Pulses, MULLaRP, RARS, Lam
13. AICRP on Cotton, Main Centre, RARS, Lam
14. AICRP on Pulses (Pigeonpea), RARS, Lam
15. AICRP on Management of Salt Affected Soils and Use of Saline Water, Bapatla
16. AICRP on Post-Harvest Technology, Bapatla
17. AICRP on Farm Implements and Machinery, Bapatla
18. AINP on Soil Biodivesity & Biofertilizers, ARS, Amaravathi
19. AICRP on MULLaRP, ARS, Ghantasala
20. AICRP on Dryland Agriculture, Voluntary Centre, ARS, Darsi

IV. SOUTHERN ZONE

21. AICRP on Groundnut Sub Centre, RARS, Tirupati
22. AICRP on Forage crops, Voluntary Centre, RARS, Tirupati
23. AICRP on Sesamum, RARS, Tirupati
24. AICRP on Rice, ARS, Nellore

V. SCARCE RAINFALL ZONE

25. AICRP on Cotton, Sub-Centre, RARS, Nandyal
26. AICRP on Improvement of Small Millets, RARS, Nandyal
27. All India Network Project on Tobacco, RARS, Nandyal
28. AICRP on Oilseeds, Sub-Centre on Sunflower, RARS, Nandyal
29. AICRP on Chickpea, RARS, Nandyal
30. AICRP on Sorghum, RARS, Nandyal
31. AICRP on Dryland Agriculture, ARS, Anantapuramu
32. AICRP on Pearl Millet Improvement Project, ARS, Anantapuramu
33. AICRP on Agrometeorology, ARS, Anantapuramu
34. AICRP on Castor, ARS, Anantapuramu
35. AICRP on Oilseeds, Main Centre for Groundnut, ARS, Kadiri

IX. HIGH ALTITUDE AND TRIBAL ZONE

36. AICRP on Niger, RARS, Chintapalle

ANNEXURE VIII

LIST OF PROJECTS UNDER RASHTRIYA KRISHI VIKAS YOJANA (RKVY) DURING 2019-`20

S. No.	Title of the project	Research Station	Total budget allocation during 2019-'20 (Rs. in crore)
1.	Establishment of Referral Laboratory for soil, water and plant samples exploration	ARS, Amadalavalasa	1.46
2.	Strengthening of infrastructure facilities – Storage godown and threshing floor	ARS, Ragolu	0.75
3.	Construction of seed storage godown	ARS, Vizianagaram	0.75
4.	Construction of training hall cum chamber for millet value addition	ARS, Vizianagaram	1.00
5.	Establishment of seed godown for effective storage of sesame seed	ARS, Yalamanchili	0.75
6.	Establishment of farmers training hall for capacity building	ARS, Yalamanchili	1.00
7.	Establishment of rat proof storage godown	ARS, Garikapadu	0.75
8.	Establishment of tissue culture lab	ARS, Vuyyuru	1.70
9.	Establishment of biotechnology lab facility	RARS, Lam	1.95
10.	Establishment of advanced laboratory for soil health management	RARS, Lam	1.50
11.	Establishment of farm machinery testing, training and demonstration centre (FMTTDC)	AICRP on FIM, Bapatla	1.60
12.	Infrastructure facilities for maize research centre	ARS, Vijayarai	1.77
13.	Establishment of seed godown for processing and storage	ARS, Utukur	0.75
14.	Strengthening of tissue culture lab	ARS, Perumallapalle	0.80
15.	Setting up of oilseeds quality lab in RARS, Tirupati	RARS, Tirupati	2.03
16.	Strengthening of post harvest technology centre for primary processing and value addition	RARS, Tirupati	1.44
	Total		**20.00**

ANNEXURE IX

LIST OF EXTENSION CENTRES
KRISHI VIGYAN KENDRAS (KVKS) (13)

Krishi Vigyan Kendra Amadalavalasa – 532 185 Srikakulam Dist.	Krishi Vigyan Kendra Agricultural Research Station Nellore - 524 004 SPS Nellore Dist.
Krishi Vigyan Kendra Rastakuntabai – 535 523(via) Gummalaxmipuram Vizianagaram Dist.	Krishi Vigyan Kendra Kalikiri - 517 234 Chittoor Dist.
Krishi Vigyan Kendra, Kondempudi, Dr. No. 6-89, Opp. to Sakha Grandhalayam Main Road, Ravikamatham Visakhapatnam – 531 025 Visakhapatnam Dist.	Krishi Vigyan Kendra Agricultural Research Station Utukur - 516 003 YSR (Kadapa) Dist.
Krishi Vigyan Kendra Undi – 534 199 West Godavari Dist.	Krishi Vigyan Kendra Banavasi, Yemmiganur Kurnool - 518 003 Kurnool Dist.
Dr K L Rao Krishi Vigyan Kendra Garikapadu – 521 175 Krishna Dist.	Krishi Vigyan Kendra Garudapuram, Kalyandurg - 515 761 Anantapuramu Dist.
Krishi Vigyan Kendra Ghantasala - 521133, Krishna Dist.	Krishi Vigyan Kendra Bukkarayasamudram, Reddipalli Anantapuramu - 515 001 Anantapuramu Dist.
Krishi Vigyan Kendra Agricultural Research Station Darsi – 523 247 Prakasam Dist.	

DISTRICT AGRICULTURAL ADVISORY & TRANSFER OF TECHNOLOGY CENTRES (DAATTCs) (13)

District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises, Amadalavalasa – 532 185, Srikakulam Dist	District Agricultural Advisory & Transfer of Technology Centre Agricultural Research Station Premises Gajularega–535 003, Vizianagaram Dist.
District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises, Kondempudi –531026, Visakhapatnam Dist.	District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises, B.V. Nagar, Nellore – 524 004. SPSR Nellore District.
District Agricultural Advisory & Transfer of Technology Centre, Agricultural Research Station Premises, Peddapuram – 533 437 East Godavari Dt.	District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises Kalikiri – 517 234, Chittoor District.
District Agricultural Advisory & Transfer of Technology Centre, Krishi Vigyan Kendra Premises Undi – 534 199, Bhimavaram Road, W.G. Dt.	District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises, Utukur, Kadapa – 516 001, YSR Kadapa District
District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises Ghantasala – 521 133, Krishna District.	District Agricultural Advisory & Transfer of Technology Centre, Krishi Vigyan Kendra Premises, Banavasi, Yemmiganur – 518 360, Kurnool District.
District Agricultural Advisory & Transfer of Technology Centre, Regional Agricultural Research Station Premises, Lam, Guntur–522 034, Guntur Dt.	District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises Reddipalle – 515 701, Anantapuramu Dt.
District Agricultural Advisory & Transfer of Technology Centre Krishi Vigyan Kendra Premises, Darsi – 523 247, Prakasam District.	

OTHERS	
Farmers Call Centre Toll Free No.1800 425 0430 Guntur – 522 034, Guntur Dist.	Agricultural Information & Communication Centre (AI&CC), Flat 402, Srinivasa Citadel, Opp. Hosanna Mandir Guntur - 522 034, Guntur Dist.

Intercollegiate Sports Meet held at Agril. College, Bapatla on 4th October 2019

Hon'ble Minister for Agriculture, GoAP Sri K. Kanna Babu, Addressing at Kisan Mela organised at ARS Vizianagaram on 19th October, 2019


T4
Drone Research in ANGRAU