60

Years of Excellence

The ANGRAU Journey

1964 - 2024

60 Years of Excellence

The ANGRAU Journey

The Diamond Jubilee Story

Acharya N G Ranga Agricultural University

LAM, Guntur-522034, Andhra Pradesh, INDIA

Dr. R. Sarada Jayalakshmi Devi
Vice-Chancellor
Acharya N G Ranga Agricultural University

FOREWORD

It is with immense pride that I pen this foreword for "60 Years of ANGRAU," a commemorative volume celebrating the remarkable journey of Acharya N.G. Ranga Agricultural University. This book serves as a testament to the unwavering dedication and remarkable achievements of our esteemed faculty, researchers, and extension workers who have tirelessly served the cause of Indian agriculture for six decades.

Since its inception, ANGRAU has stood as a beacon of agricultural innovations in education, research and extension. The establishment of agricultural colleges, network of research stations and extension centres was driven by a historical need to bolster agricultural education, research and extension, which resulted in addition of skilled human resource, release of improved varieties in different crops laid strong foundation for improvement in agricultural scenario in not only state of Andhra Predesh, but also in the country.

ANGRAU's educational endeavours have nurtured generations of agricultural graduates who have gone on to become leaders and changemakers across the globe. The book sheds light on the evolution of our agricultural colleges across the state, highlighting the impact these institutions have had on shaping careers and transforming lives.

Our contributions to the development of crops such as Paddy, Millets, Pulses, Oilseeds, and Commercial Crops have been pivotal in transforming the agricultural landscape of Andhra Pradesh and beyond. It underscores the significant progress made through crop improvement programs, advanced production methods, and effective plant protection technologies.

ANGRAU's commitment extends beyond research, through its impactful extension activities, bridging the gap between laboratory innovations and real-world applications, through dedicated Krishi Vigyan Kendras (KVKs) and other outreach programs, ensured that even the remotest corners of Andhra Pradesh benefit from the latest agricultural knowledge and technologies.

The book delves into ANGRAU's history and contributions across various agricultural domains, chronicles our impactful activities, presenting a fascinating transformation between the 1960s and 2024. The faculty, technical and supporting staff and their unwavering commitment to education, research, and extension activities has been instrumental in shaping the university's illustrious legacy. I extend my heartfelt gratitude to each member of our academic, research and extension community for their invaluable contributions, who all collectively laid the foundation for ANGRAU's success. We are immensely grateful for their passion in sharing their expertise and enriching the lives of countless farmers.

I also express my sincere appreciation to Dr. Cherukuri Sreenivasa Rao, Dean of Agriculture for his meticulous coordination, compilation, editing, designing and timely efforts in bringing this remarkable book to fruition. The cooperation and inputs from the University Officers, Directors, Associate Directors of Research, Associate Deans, Principal Scientists of Crops, Heads of Schemes, Stations and DAATTCs has been crucial in documenting our rich legacy and making this book a valuable resource for the university community and all stakeholders in the agricultural sector.

"60 Years of ANGRAU" is a valuable resource not just for the university community but for all stakeholders in the agricultural sector. It serves as a beacon of hope and inspiration, guiding us towards a future of sustainable and resilient agriculture.

Father of the Indian Peasant Movement

Prof. N. G. Ranga

(Ranganayakulu Gogineni)

Indian Freedom Fighter, Parliamentarian and Kisan Leader

ఆచార్య ఎన్. జి. రంగా

(రంగనాయకులు గోగినేని)

భారత స్వాతంత్ర సమరయోధులు, పార్లమెంట్ సభ్యులు, రైతు నాయకులు.

November 7, 1900 to June 9, 1995

60 Years of Excellence

The ANGRAU Journey

The Diamond Jubilee Story

Technical Expertise, Guidance and Editor-in-Chief

Dr. R. SARADA JAYALAKSHMI DEVI

Vice-Chancellor

Coordination, Compilation, Editing and Designing

Dr. Cherukuri Sreenivasa Rao
Dean of Agriculture

Technical Inputs & Suggestions

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Dr. G. Sivanarayana
Director of Extension
Dr. A. Mani
Dean of Agricultural Engineering and Technology
Dr. B. Sreelakshmi
Dean of Community Science
Dr. A.V. Ramana
Dean of P.G. Studies
Dr. G. Karuna Sagar
Dean of Student Affairs
Dr. G. Ramachandra Rao
Registrar
Dr. B.V.S. Prasad
Comptroller
Dr. D. Sampath Kumar
Controller of Examinations
Dr. P. Sambasiva Rao
University Librarian
Er. P. Ravi
Estate Officer

Layout & Designing
Sri. K. Dinesh Reddy & Sri. K. Hari Babu

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Technical Expertise, Guidance and Editor-in-Chief
Dr. R. Sarada Jayalakshmi Devi, Vice Chancellor, Acharya N G Ranga Agricultural University

Coordination, Compilation, Editing and Designing
Dr. Cherukuri Sreenivasa Rao, Dean of Agriculture, ANGRAU

Published by
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Lam, Guntur, Andhra Pradesh - 522034, India

CONTENTS

THE GENESIS & HISTORICAL BACKGROUND

The importance of applying science and technology to agricultural development was recognized as early as the beginning of this century. Among the several commissions appointed to suggest steps for streamlining agricultural development, the Royal Commission (1926) emphasized the need for a strong research base in agriculture.

Subsequently, the recommendations of the *Radhakrishnan Commission (1949)* on university education led to the establishment of rural universities for the overall development of agriculture and rural life in the country. Later, the Government of India constituted the *First Joint Indo-American Team (1955)* to study the status and future needs of agricultural education in the country. The report of this commission laid the foundation for all subsequent developments in agricultural education in India.

However, due to the lack of specific recommendations, the Government of India appointed the *Second Joint Indo-American Team (1960),* headed by Dr. M.S. Randhawa, the then Vice President of the Indian Council of Agricultural Research. The team submitted its report in 1960, specifically recommending the establishment of farm universities and outlining their basic objectives:

- Institutional autonomy
- Inclusion of agriculture, veterinary/animal husbandry, and home science
- Integration of teaching, research, and extension

Later, the report of the *Second National Education Commission (1964-66)*, headed by Dr. D.S. Kothari, Chairman of the University Grants Commission, emphasized the need for establishing at least one Agricultural University in each Indian state. Consequently, the *Andhra Pradesh Agricultural University (APAU)* was established on June 12, 1964, in Hyderabad, under the APAU Act of 1963. The University was modeled on the US Land-Grant University system in collaboration with Kansas State University, USA, with the **mandate** to:

- Train human resources needed for agriculture, animal husbandry, home science, and allied sectors for the development of the State of Andhra Pradesh (Education)
- Constantly strive to generate technologies for improving the production of crops and livestock, home science, and allied sectors (Research)
- Assist in the transfer of technology through the dissemination of knowledge in collaboration with the Development Departments of the Government (Extension).

In accordance with the provisions of the Andhra Pradesh Agricultural University Act of 1963, several existing Colleges of Agriculture and Veterinary Science were transferred from the universities to which they had been affiliated to the Andhra Pradesh Agricultural University in June 1964. These colleges included the College of Agriculture and Veterinary Science, Hyderabad

Sri. Lal Bahadur Shastry, the then Prime Minster of India inaugurating University on March 20, 1965

(established in 1961, formerly affiliated with Osmania University), Agricultural College, Bapatla (established in 1945, formerly affiliated with Andhra University), Sri Venkateswara Agricultural College, Tirupati (established in 1961, formerly affiliated with Sri Venkateswara University), and Andhra Veterinary College, Tirupati (established in 1961, also formerly affiliated with Sri Venkateswara University).

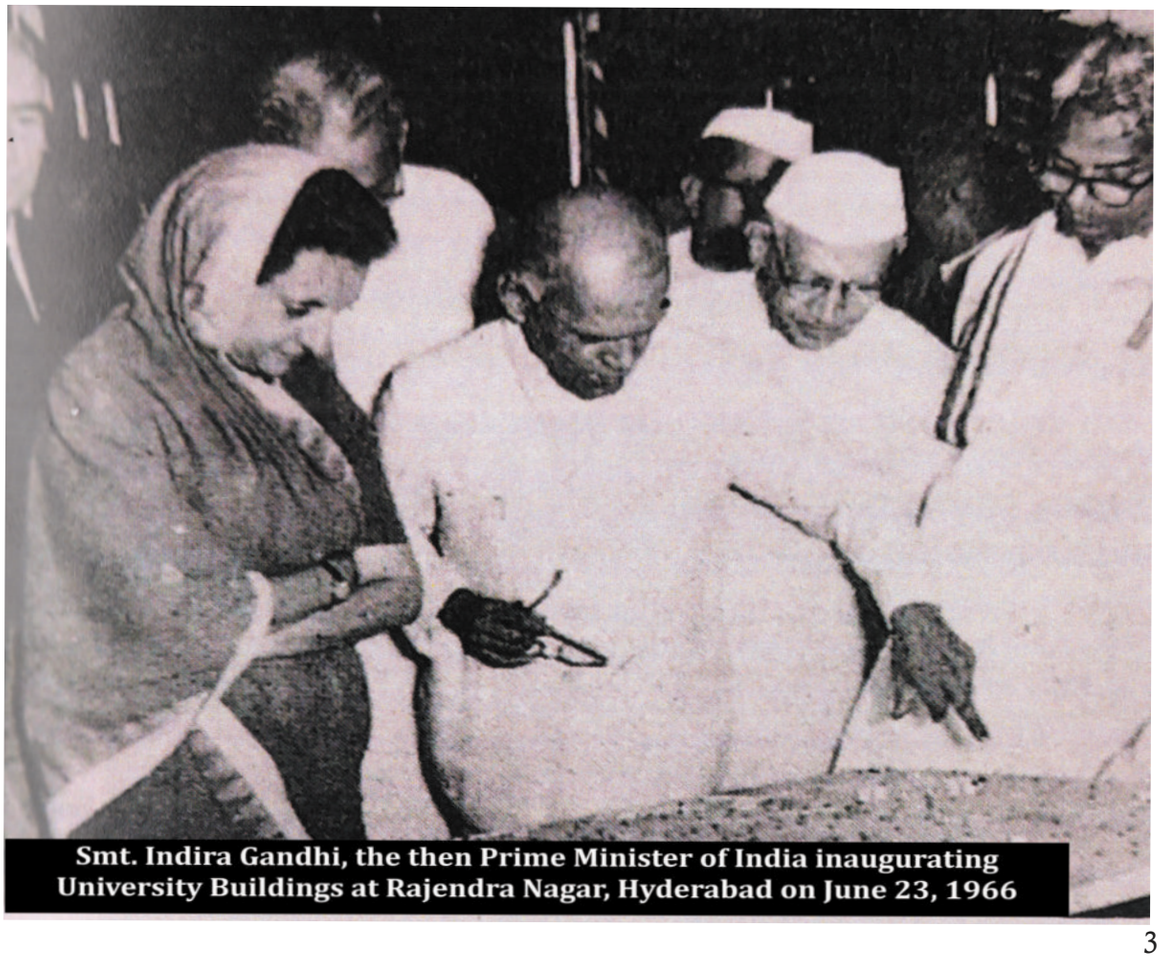
Additionally, 41 Agricultural Research Stations under the Department of Agriculture and four Research Stations under the Animal Husbandry Department were transferred to the University in July 1966 and May 1967, respectively.

The University was formally inaugurated on March 20, 1965, by the late Shri Lal Bahadur Shastri, the then Hon'ble Prime Minister of India. The University's building at Rajendranagar, Hyderabad, was inaugurated by Smt. Indira Gandhi, the then Hon'ble Prime Minister of India, on June 23, 1966.

The University underwent a significant renaming ceremony on November 7, 1996, becoming Acharya N.G. Ranga Agricultural University (ANGRAU) as a tribute to the legacy of Acharya N.G. Ranga. Renowned as an exceptional Parliamentarian, Acharya N.G. Ranga dedicated himself to the service of farmers, leaving an indelible mark on the agricultural landscape. He is revered not only for his political contributions but also for his role as an esteemed educationist, Kisan leader, and freedom fighter.To commemorate his enduring impact, a life-sized bronze statue of Acharya N.G. Ranga was unveiled on November 7, 1998, at the University's main campus by His Excellency, Dr. C. Rangarajan, the Governor of Andhra Pradesh.

Institutional Growth during 1964-2004 (40 years)

- The growth and development of the University in terms of expanding teaching,



Smt. Indira Gandhi, the then Prime Minister of India inaugurating University Buildings at Rajendra Nagar, Hyderabad on June 23, 1966

research and extension activities have been exemplary.

- The University, which started with three campuses in 1964, has expanded to eight campuses by 2004 and increased the number of constituent colleges from six to thirteen. The eight campuses are located in Rajendranagar, Bapatla, Tirupati, Aswaraopet, Naira, Nandyal, Muthukur, and Gannavaram. Six of these campuses have an Agricultural College; the exceptions are Muthukur, which houses a College of Fishery Science, and Gannavaram, where a College of Veterinary Science is located. There are two Veterinary Colleges at the Rajendranagar and Tirupati campuses. Additionally, there are two Home Science Colleges in Hyderabad and Bapatla and a College of Agricultural Engineering in Bapatla. Besides these, 17 Agricultural and Veterinary Polytechnics have been established at various locations throughout the state.
- Initially, undergraduate programs were offered at all teaching campuses, with postgraduate programs available only at the Rajendranagar campus. Over time, postgraduate programs were introduced at Bapatla and Tirupati campuses. Subsequently, new degree programs leading to B.Sc. (Horticulture), B.Tech. (Dairying), B.F.Sc., and B.Tech. (Agricultural Engineering) were introduced at the College of Agriculture, Rajendranagar, the College of Veterinary Science, Tirupati, the College of Fishery Science, Muthukur, and the College of Agricultural Engineering, Bapatla, in 1983, 1990, 1992, and 1993, respectively. In 2003, new undergraduate courses like B.Tech. (Food Science) and B.Sc. (Commercial Agriculture & Business Management) were started. A postgraduate program leading to a Master of Agriculture Business Management began in 1999 at Rajendranagar. Inter-faculty postgraduate programs such as M.Sc. (Food Science and Technology), M.Sc. (Agricultural Biotechnology), M.V.Sc. (Veterinary Biotechnology) were introduced in 2001, and M.Sc. (Environmental Science and Technology) in 2003.
- Academic activities have thus expanded to all thirteen colleges across the eight campuses, as well as to the 17 Agricultural and Animal Husbandry Polytechnics.
- With the acquisition of 41 Agricultural Research Stations and four Veterinary Research Stations at its inception, the University has diversified its research activities to address ongoing agricultural issues. To achieve these objectives, the University established several new research stations focusing on specific crops and local areas across the state. By 2004, the number of research stations had increased to 66, with over 250 additional research schemes. The implementation of the National Agricultural Research Project (NARP) in 1979 also helped to develop the infrastructure for research programs

His excellency Sri Krishan Kant, Governor of Andhra Pradesh, Dr. M.V. Rao, Vice-Chancellor, Dr. Norman E. Borlaug, Nobel Laureate and Dr. V. Kurien, Chairman, NDDB at XXVIII Annual Convocation, 1996

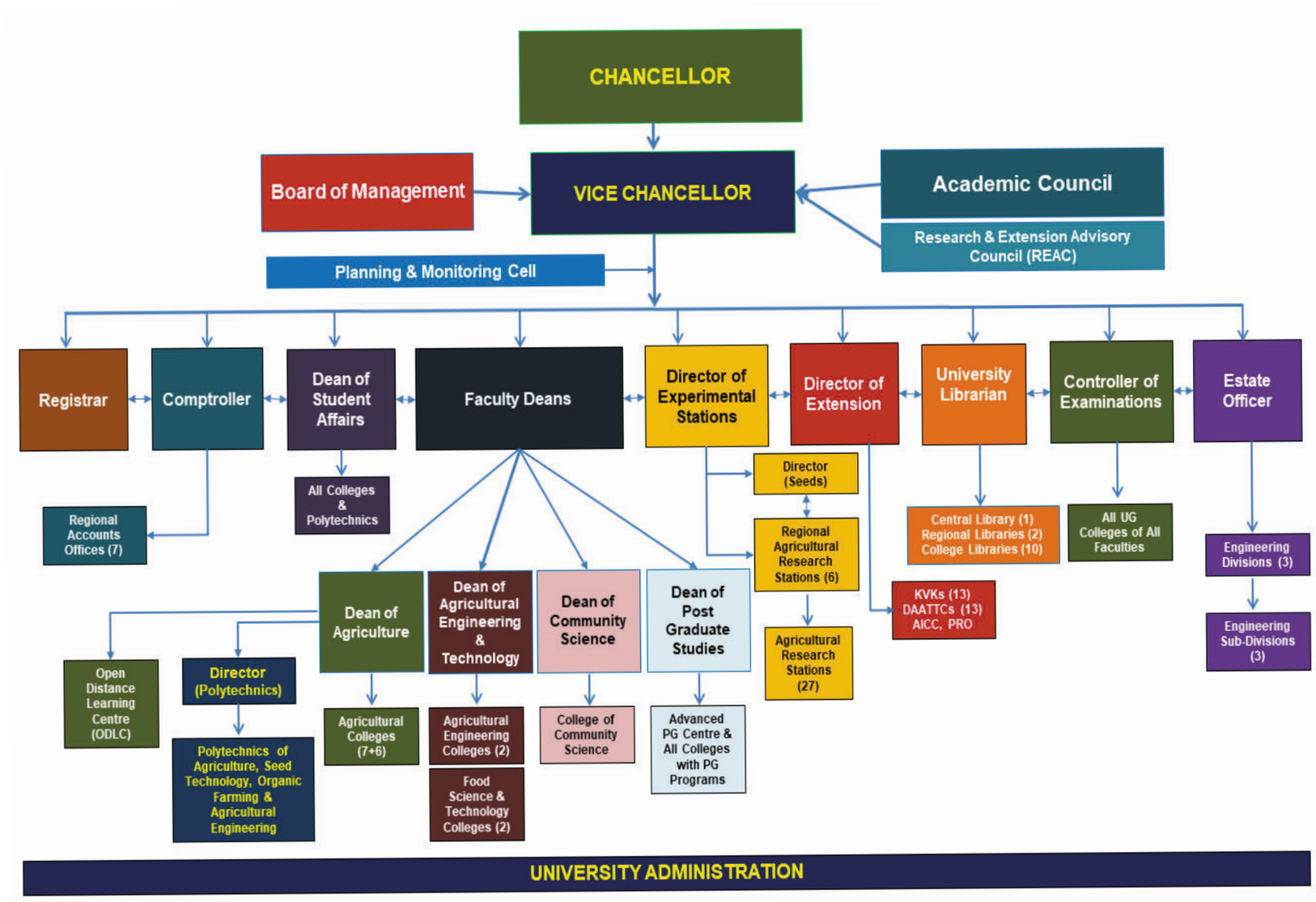
- The number of research stations increased from 45 to 66 by 2004, alongside the growth of faculty, scientists, supporting, and administrative staff.
- The University's extension wing supports the State Government in disseminating agricultural technologies. Initially, extension activities were carried out through subject matter specialists in the late sixties and early seventies. Over the years, various methods such as demonstrations, farmer training, print media (including bulletins and agricultural almanacs), AIR, electronic media, and information centers with modern communication tools have been extensively used to disseminate information to the farming community. To bridge the gap between potential and actual crop yields, new initiatives such as establishing District Agricultural Advisory and Transfer of Technology Centres (DAATTCs) have been undertaken in 1998.
- By 2004, there were 12 Krishi Vigyan Kendras, an Extension Education Institute (EEI), an Agricultural Information and Communication Centre, 22 District Agricultural Advisory and Transfer of Technology Centres operating across the state, an Agricultural Technology Information Centre, Crop Expert and Crop Escort Teams, a Toll-Free Call Centre (Parishkaram), and an Electronic Media Wing (Rythu Mitra and Annadata-Velugubata).
- By 2004, the University comprised eight teaching campuses with 13 constituent colleges, 17 polytechnics, and 66 research stations across the state, including seven Regional Agricultural Research Stations located in each of the seven Agro-climatic Zones of the state.

Milestones during 2005-2024 (20 years):

Sri Venkateswara Veterinary University (SVVU) was established in 2005 by bifurcating ANGRAU under Act 18 of 2005. In 2007, Andhra Pradesh Horticultural University (APHU) was established by bifurcating ANGRAU under Act 30 of 2007.

Following the bifurcation of Andhra Pradesh State into two states—residual Andhra Pradesh and Telangana—on *June 2, 2014,* as per the Andhra Pradesh Reorganization Act of 2014, ANGRAU was also bifurcated 'on order to serve basis'. Acharya N G Ranga Agricultural University now serves the state of residual Andhra Pradesh, with its headquarters at Lam, Guntur. The foundation stone of new head quarter at Lam, Guntur

Sir Radha Mohan Singh, Minister for Agriculture, Govt. of India in the presence of Sri Nara Chandrababu Naidu, Chief Minister of Andhra Pradesh and Sri M. Venkaiah Naidu, Minister of Urban Development, GoI, laid Foundation Stone of New Head Quarters of ANGRAU at Lam, Guntur on 16-11-2015


CHANCELLOR
Board of Management
VICE CHANCELLOR
Academic Council
Research & Extension Advisory Council (REAC)
Planning & Monitoring Cell
Registrar
Comptroller
Dean of Student Affairs
Faculty Deans
Director of Experimental Stations
Director of Extension
University Librarian
Controller of Examinations
Estate Officer
Regional Accounts Offices (7)
All Colleges & Polytechnics
Director (Seeds)
Regional Agricultural Research Stations (6)
Agricultural Research Stations (27)
Central Library (1) Regional Libraries (2) College Libraries (10)
All UG Colleges of All Faculties
KVKs (13) DAATTCs (13) AICC, PRO
Engineering Divisions (3)
Engineering Sub-Divisions (3)
Dean of Agriculture
Dean of Agricultural Engineering & Technology
Dean of Community Science
Dean of Post Graduate Studies
Open Distance Learning Centre (ODLC)
Director (Polytechnics)
Polytechnics of Agriculture, Seed Technology, Organic Farming & Agricultural Engineering
Agricultural Colleges (7+6)
Agricultural Engineering Colleges (2)
Food Science & Technology Colleges (2)
College of Community Science
Advanced PG Centre & All Colleges with PG Programs
UNIVERSITY ADMINISTRATION

was laid down on 16th November 2015 by Sri Radha Mohan Singh, Minister for Agriculture, Government of India in the presence of Sri. Nara Chandrababu Naidu, Chief Minister of Andhra Pradesh and Sri. M. Venkaiah Naidu, Minister of Urban Development, Housing and Urban Poverty Alleviation and Parliamentary Affairs, Government of India.

ANGRAU at Lam, Guntur, continues to serve the students and farmers of the 26 districts of Andhra Pradesh with renewed interest and dedication.

ANGRAU is one of the leading agricultural universities in the country, accredited by the Indian Council of Agricultural Research (ICAR) and the University Grants Commission (UGC). As one of the largest universities in India, it caters to the needs of millions of farmers and thousands of scholars not only in Andhra Pradesh but also across India.

THE MANDATE

THE VISION

- To provide opportunities for citizens of the state and country to receive education in the broad field of agriculture, and to promote research and extension programs in agriculture and allied sciences.
- To strengthen undergraduate and postgraduate teaching by periodically revising syllabi to meet the challenges in the rapidly changing agricultural landscape.
- To generate technologies aimed at improving farm production and farmers' income through location-specific research in agriculture and allied sciences.
- To assist in testing and disseminating developed technologies to government departments, ensuring the sustainability and profitability of agriculture.
- To provide opportunities for rural youth and women to learn and adopt improved agro-technologies.
- To revitalize extension activities by creating specific infrastructure in each district.

ADMINISTRATIVE SETUP

His/Her Excellency, the Governor of Andhra Pradesh, serves as the Chancellor of the University. The Vice-Chancellor acts as the Chief Executive of Acharya N.G. Ranga Agricultural University.

The administration of ANGRAU is governed by three authoritative bodies:

- The Board of Management (BoM)
- The Academic Council (AC) and the Faculty Boards (FB)
- The Research and Extension Advisory Council (REAC)

The organogram of the University is presented in the page.6

Board of Management (BoM)

The Board of Management (BoM) of ANGRAU acts as the apex body responsible for making policy decisions. The BoM consists of 21 members nominated from various categories. The Vice-Chancellor is an ex-officio member and serves as the Chairman of the BoM. The Registrar serves as the Secretary to the BoM. The term of office for the BoM members, excluding ex-officio members, is three years.

The BoM includes Secretaries to the Government from the Departments of Panchayat Raj and Finance; Directors of the State Departments of Agriculture and Animal Husbandry as ex-officio members. Other members of the BoM include representatives from the State Legislature and Parliament (4); representatives from the agro-industry (2); the State Chamber of Panchayat Raj (1); a distinguished agricultural scientist (1); an ICAR representative (1); members of the Academic Council of ANGRAU (3); and progressive agriculturalists (4).

Academic Council and Faculty Boards

On the academic front, the University comprises three Faculties: Agriculture, Agricultural Engineering & Technology, and Community Science.

The Academic Council and Faculty Boards hold authority for the implementation and monitoring of all academic programs.

The Honorable Vice-Chancellor serves as the Chief Executive, while the Registrar acts as the Ex-officio Secretary of the Academic Council. The Faculty Deans serve as Chairpersons of their respective Faculty Boards, with the Joint Registrar acting as the Secretary. The Academic Council includes representatives from other Universities, representatives from the Board of Management (BoM), the Commissioner & Director of Agriculture, Government of Andhra Pradesh, Deans, Directors, Controller of Examinations, Co-opted members, Associate Deans, University Heads of Departments, Professors, Special Invitees, and other nominated members.

The members of the Faculty Board of Agriculture consist of Deans, Directors, and the Controller of Examinations, Associate Deans, Professors, University Heads of Agriculture faculty, HoDs of Agriculture departments and other nominated members.

The Faculty Board of Agricultural Engineering and Technology includes Deans, Directors, the Controller of Examinations, Associate Deans of the faculty of AE&T, Professors, University Heads, HoDs of Agricultural Engineering and Technology departments and other nominated members.

The Faculty Board of Community Science comprises Deans, Directors, the Controller

of Examinations, Associate Dean of the College of Community Science, Professors, University Heads, HoDs of Community Science departments and other nominated members.

The Faculty Board of Post Graduate Studies includes University Heads of all faculties, Heads of Departments in Colleges offering PG courses, Associate Deans of the Colleges, Heads of Departments offering minor courses to postgraduate students located at Agricultural College, Naira / Mahanandi, two eminent scientists from outside the University invited by the Dean of Post Graduate Studies, three representatives from each faculty nominated by the Vice-Chancellor, and Officers-in-charge of PG Academic activities in the Colleges.

Research and Extension Advisory Council (REAC)

The responsibilities of overseeing research and extension activities lie with the Director of Experimental Stations and the Director of Extension, respectively. The Research and Extension Advisory Council (REAC) serves as the University's apex body, tasked with evaluating the previous year's research and extension achievements and providing guidance for future strategies. Chaired by the Hon'ble Vice-Chancellor, the REAC comprises the Director of Experimental Stations as the Convener and Secretary, along with the Director of Extension, Associate Directors of Research, innovative farmers, representatives from Agri Business Consortium, three delegates from KVKs operated by NGOs, Special Invitees, Eminent Scientists of Agriculture, Farmer Representatives, Women Farmers, Deans of Faculties, Principal Scientists of Crops, University Heads, Coordinators of DAATTCs, and Programme Coordinators of KVKs.

General Administration

The Vice-Chancellor serves as the Chief Executive and oversees the University administration. They are supported by the Registrar, who manages general administration, and by the Comptroller, who oversees financial management.

In terms of academic administration, the Vice-Chancellor receives guidance from the Academic Council and Faculty Boards. Similarly, the Research and Extension Advisory Council provides direction for research and extension activities.

The teaching programs within the faculties of Agriculture, Agricultural Engineering & Technology, Community Science, and Post Graduate Studies are overseen by their respective Deans. The Associate Deans serve as both academic and administrative heads of the Colleges, reporting to the Dean. Additionally, the Dean of Student Affairs is responsible for student welfare and activities.

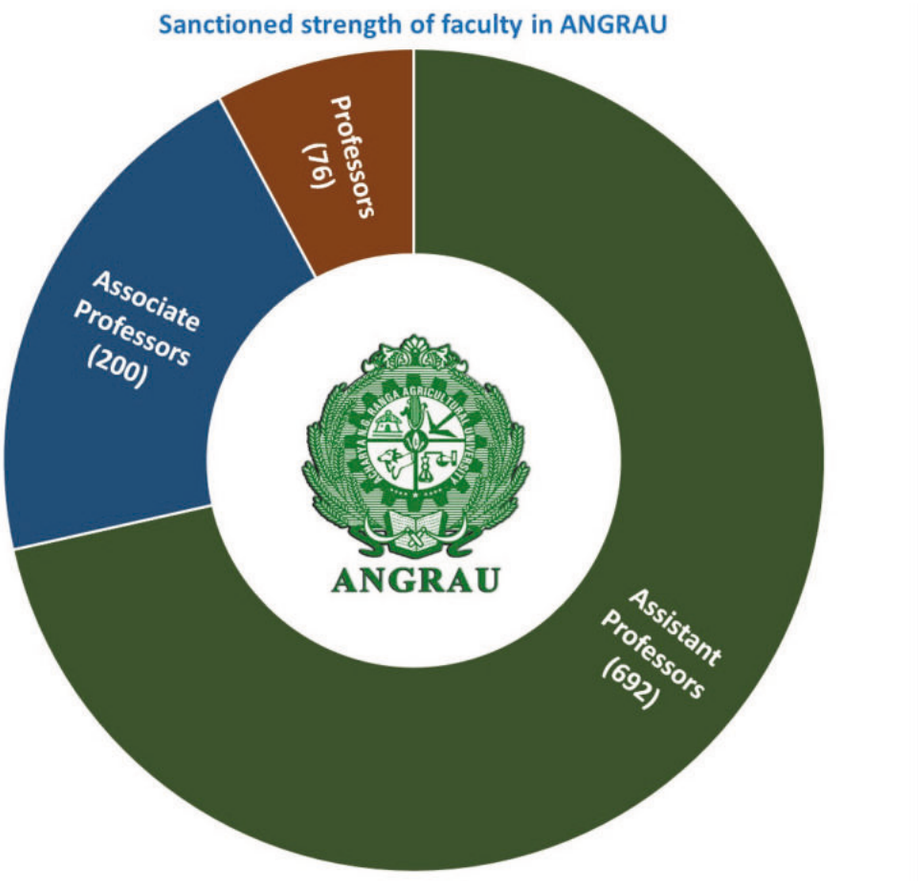
Research activities across all faculties are managed by the Director of Research. Associate Directors of Research are tasked with planning and implementing research and extension activities within their designated agro-climatic zones. The Heads of research stations, reporting to their respective zonal Associate Directors of Research, lead individual research stations with in that agro-climatic zone.

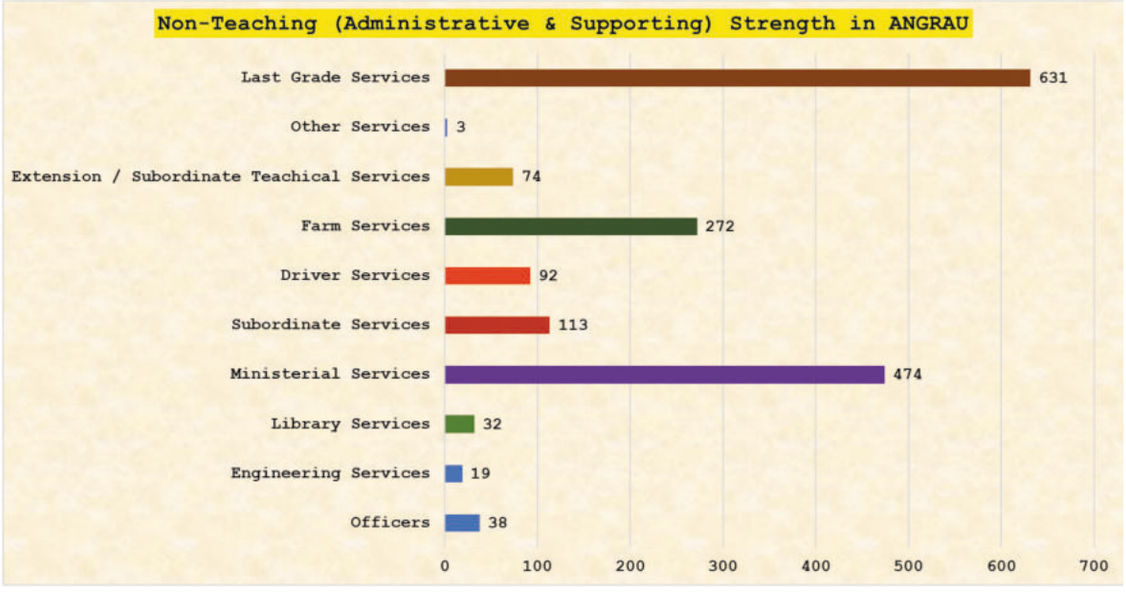
The Director of Extension heads the University Extension wing, overseeing entities such as Krishi Vigyan Kendras, DAATTCs, ATIC, Electronic Media, and Al&CC.

The Engineering Division is headed by the Estate Officer, who is responsible for the construction and maintenance of civil works within the University.

PERSONNEL & CADRE STRENGTH

The cadre-wise sanctioned strength of teaching and non-teaching staff at ANGRAU, as of June 12, 2024, across three wings — teaching, research, extension, and administration is provided in the graphs below. University has sanction strength of 968 scientific staff and 1748 administrative and supporting staff due to which the University is spearheading in all fronts in the service of human kind.





FINANCIAL PROFILE

The University receives major financial grants from the Andhra Pradesh State Government through both Plan and Non-Plan Schemes. Non-Plan assistance is provided in the form of Block Grants to sustain the University's operations. The approved Block Grant allocation for the fiscal year 2015-16 and onwards is outlined below:

Additionally, substantial support is provided by ICAR and the Government of India through various schemes.

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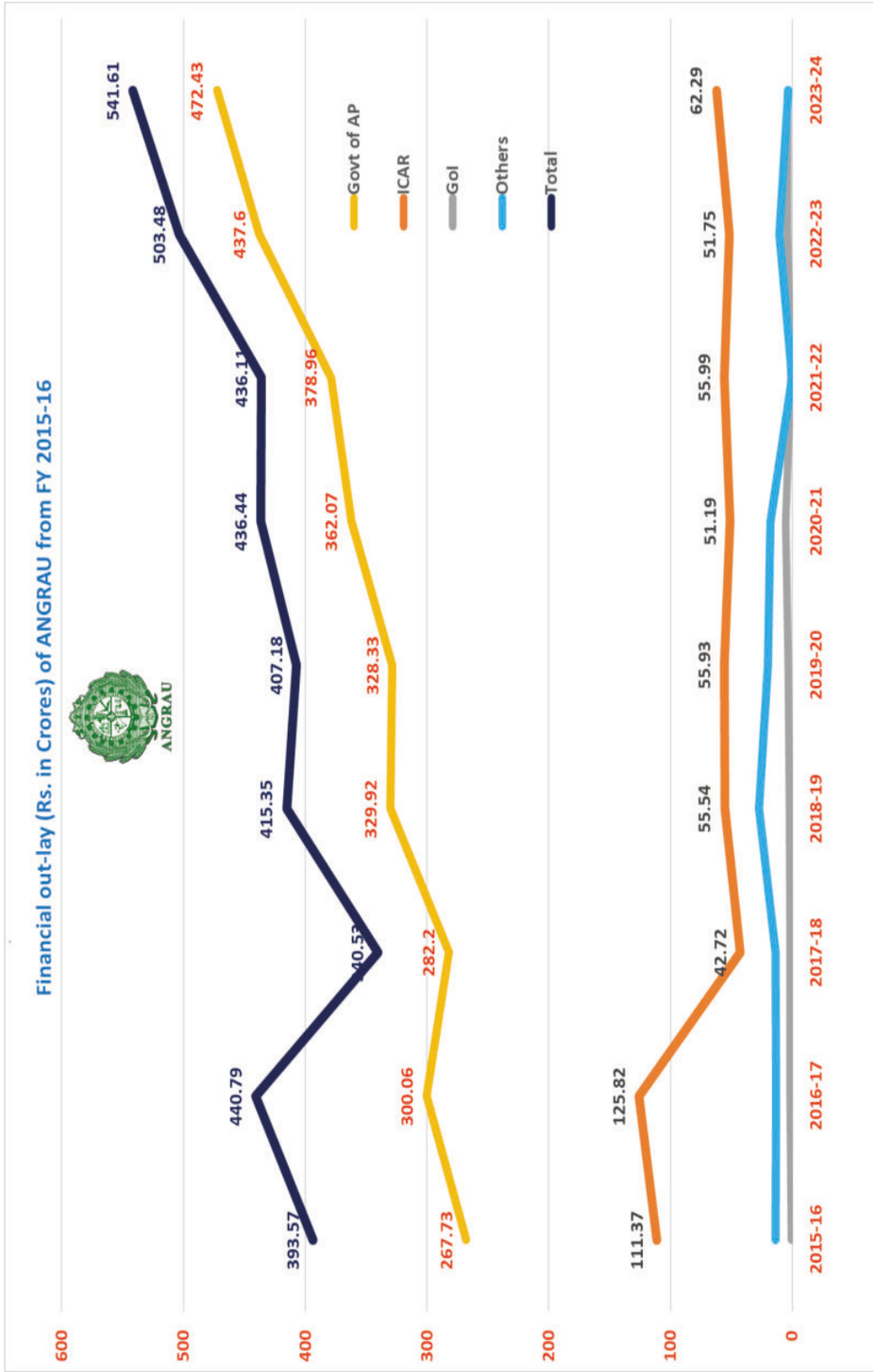


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93rd Indian Science Congress
January 3-7, 2006, Hyderabad
Integrated Rural Development :
Science and Technology
Hosted by
Indian Science Congress Association

VICE CHANCELLORS

1. Sri. O. Pulla Reddi, ICS (Retd.)
(12-06-1964 to 31-05-1972)

2. Sri. M. R. Pai, IAS
(01-06-1972 to 31-08-1974)

3. Dr. K. Krishna Rao, MS, Ph.D
(01-09-1974 to 06-11-1978)

4. Sri. J. Raghotham Reddy
(07-11-1978 to 06-11-1981)

5. Sri. B. Pratap Reddy, IAS (Retd.)
(30-01-1982 to 29-01-1985)

6. Dr. A. Appa Rao
(14-03-1985 to 13-03-1991)

7. Dr. M. V. Rao
(10-04-1991 to 09-04-1997)

8. Dr. I. V. Subba Rao
(11-04-1997 to 10-04-2000)

9. Dr. I. V. Subba Rao
(11-06-2000 to 10-06-2003)

10. Dr. S. Raghu Vardhan Reddy
(04-11-2004 to 03-11-2007)

11. Dr. P. Raghava Reddy
(08-02-2008 to 07-02-2011)

12. Dr. A. Padma Raju
(14-02-2013 to 13-02-2016)

13. Dr. V. Damodara Naidu
(05-06-2017 to 05-06-2020)

14. Dr. A. Vishnuvardhan Reddy
(14-08-2020 to 14-08-2023)

15. Dr. R. Sarada Jayalakshmi Devi
(16-08-2023 to Till Date)

MOST SIGNIFICANT NATIONAL AWARDS

- Dr. M V Rao, Vice Chancellor, received Norman E Borlaug Award in 1991 & India's fourth highest civilian award, Padma Sri, in 1999.
-
- Dr. I V Subba Rao, Vice Chancellor, received India's fourth highest civilian award, Padma Sri, in 2002, Norman E Borlaug Award in 2004 and Ashutosh Mukherjee Memorial Award in 2007.
- ICAR Best Institute Award for 1999.
- Sardar Patel Outstanding ICAR Institutional Award in 2007.
- National Youth Parliament Awards 1999-2000 & 2002-03.
- ICAR Excellent Performance JRF Award (first place) for 1999-2000.
- ICAR JRF Award (Second Place) for 2004.
- ICAR JRF Award (first place) for 2011.
- ICAR JRF Award (first place) for 2018.
- ICAR PG Scholarship Award (first place) for 2019 for securing highest ICAR-PG Scholarships under the category of Agricultural Sciences in AIEEA-PG-2018.
- ICAR PG Scholarship Award (second place) for 2020, for securing second highest ICAR-PG Scholarships under the category of Agricultural Sciences in AIEEA-PG-2019.
- ICAR PG Scholarship Award (second place) for 2021, for securing second highest ICAR-PG Scholarships under the category of Agricultural Sciences in AIEEA-PG-2020.
- ICAR PG Scholarship Award (first place) for 2022, for securing highest ICAR-PG Scholarships under the category of Agricultural Sciences in AIEEA-PG-2021.
- ICAR PG Scholarship Award (first place) for 2022, for securing highest ICAR-PG Scholarships under the category of Engineering and Technology in AIEEA-PG-2021.
- ARS, Vizianagaram won ICAR Award - Fakhruddin Ali Ahmed Award for Outstanding Research in Tribal Farming Systems for the year 2020.
- ARS, Anantapuramu, won ICAR Vasantrao Naik Award for 2004, 2015 and 2017 for promoting outstanding research and application in priority aspects of dry land farming systems & water conservation.

ICAR- Sardar Patel Outstanding Award-2007

ICAR- All India Entrance Examination
JRF Award-2004

ICAR- PG Scholarship Award - 2019

ICAR- PG Scholarship Award - 2020 (Agricultural Sci.)

ICAR- PG Scholarship Award - 2021 (Agricultural Sci.)

ICAR- PG Scholarship Award - 2021 (Engineering & Technology)

ICAR- Fakhruddin Ali Ahmed Award - 2020

PATENTS LIST

Year of grant	Name of Machinery/ Process Technology/Technology	Patent No / Publication Date
2007	Process of Pneumatic Pressure Paddy Parboiling	210736
2018	Applications of nanoscale ZnO in peanut crop	304588
2021	Machinery and Process of Manufacturing of cane jaggery in crystal form	361025
2021	Process for preparing dehydrated fruit bar from prickly pear fruits *(Opuntia ficus indica)*	367043
2021	Mechanized jaggery granulator for preparing jaggery granules	382165
2022	Production of alcohol (Naturohol) from *Agave albomarginata*	395370
2022	Mechanized system for preparing paper sweet (pootharekulu) films	406007
2022	A process for manufacturing of blended fruit squash with prickly pear (*Opuntia ficus indica & Opuntia dillenii)* fruit juice and lemon juice	411468
2024	Chilli compaction-cum-bagging unit	170165
2024	An *in vitro* method for determination of glycemic index and kit there off	536180
2024	A method for preparing Nano bio char and its application	537907
2025	Diabetic Smart Rice Cooker	403517


ACHARYA N.G.RANGA AGRICULTURAL UNIVERSITY
48th ANNUAL CONVOCATION
26th SEPTEMBER 2016


02-05-2017


26-09-2016

EDUCATION

HISTORY:

In 1964, under the provisions of the Andhra Pradesh Agricultural University Act of 1963, a significant restructuring took place in the educational landscape of the region. Prior to this act, the Colleges of Agriculture and Veterinary Science were affiliated with various universities. The College of Agriculture and Veterinary Science in Hyderabad had its affiliation with Osmania University, while the Agricultural College in Bapatla was affiliated with Andhra University. Similarly, the Sri Venkateswara Agricultural College and the Andhra Veterinary College in Tirupati were affiliated with Sri Venkateswara University.

With the establishment the Andhra Pradesh Agricultural University, these institutions underwent a crucial transformation. By June 1964, they were transferred from their respective affiliations to join the newly formed Andhra Pradesh Agricultural University. This reorganization aimed to consolidate and enhance the focus on agricultural education and veterinary sciences under a unified administrative framework. It marked a significant milestone in the development of agricultural education in the state, centralizing resources and expertise to better serve the needs of agriculture and veterinary science in Andhra Pradesh.

Growth of Educational Institutions during 1964-2004:

The three campuses of the University at the time of its establishment in 1964 have grown into eight and the number of constituent colleges has increased from 6 to 14 by 2004.

1. Agricultural College, Bapatla (1945)
2. College of Veterinary Science, Rajendranagar (1946)
3. College of Veterinary Science, Tirupati (1955) (The Andhra Veterinary College was started in 1955 at Bapatla under administrative control of Department of Animal Husbandry under affiliation to Andhra University, then shifted to Tirupati in 1957, brought under APAU in 1964)
4. Agricultural College, Rajendranagar (1961)
5. SV Agricultural College, Tirupati (1961)
6. College of Home Science (1964) (Transformation of College of Domestic Science of Department of Technical Education, A.P. into College of Home Science) Andhra Pradesh Agricultural University (APAU)
7. College of Home Science, Bapatla (1983-1999)
8. College of Agricultural Engineering, Bapatla (1983) (Started at Agricultural College campus, later shifted to separate campus in 1994)
9. Agricultural College, Aswaraopet (1989)
10. Agricultural College, Naira (1989)
11. Agricultural College, Mahanandi (1991)
12. College of Fisheries Science, Muthukur (1991)
13. College of Veterinary Science, Gannavaram (1997)
14. College of Food Science & Technology, Bapatla (2003)

Agricultural College, Bapatla (Estd. 1945)

Besides these, 17 Agricultural and Veterinary Polytechnics have been established at various locations in the State.

The University (APAU) was renamed as Acharya N.G. Ranga Agricultural University (ANGRAU) on November 7, 1996.

Bifurcation of University after 2004:

Bifurcating ANGRAU in 2005, Sri Venkateswara Veterinary University (SVVU) was established by Act 18 of 2005 and in 2007, Andhra Pradesh Horticultural University (APHU) was established by the Act 30 of 2007, thus all teaching & research institutions of veterinary and horticulture have been shifted from ANGRAU to SVVU and APHU.

Growth of Educational Institutions during 2004-2014:

In 2008, Agricultural Colleges at Rajamundry and Jagtial, College of Agricultural Engineering at Madakasira and College of Food Science & Technology at Pulivendula were started, expanding the network of educational institutions under ANGRAU. Later, College of Agricultural Engineering was established at Sangareddy in 2011. The College of Home Science is shifted to Guntur in 2013.

Bifurcation of state in 2014 and developments:

Consequent to bifurcation of Andhra Pradesh State as per the Andhra Pradesh Reorganization Act 2014, into two states of residual Andhra Pradesh and Telangana on the 2nd of June 2014, the ANGRAU has been bifurcated 'on order to serve basis' into the Acharya N G Ranga Agricultural University for the State of the Residual Andhra Pradesh, with Head Quarters at Lam, Guntur.

The professional educational institutions are located in all the Agro-Climatic Zones of the state empowering the youth with skill based Agricultural & allied education with experiential learning in the following colleges.

1. Agricultural College, Bapatla (1945)
2. SV Agricultural College, Tirupati (1961)
3. College of Home Science, Bapatla (1983-1999) Reinitiated at Guntur (2013), Rechristened as college of Community Science (2016)
4. Dr. NTR College of Agricultural Engineering, Bapatla (1983) (renamed in 2018)
5. Agricultural College, Naira (1989)
6. Agricultural College, Mahanandi (1991)
7. Dr. NTR College of Food Science & Technology, Bapatla (2003) (renamed in 2018)
8. Agricultural College, Rajamahendravaramu (2008)
9. College of Agricultural Engineering, Madakasira (2008)
10. College of Food Science & Technology, Pulivendula (2008)
11. Advanced Post Graduate Centre (2015)
12. Sri Mekapati Goutham Reddy Agricultural College, Udayagiri (2022)
13. Agricultural College, Pulivendula (2023)

MOST SIGNIFICANT INITIATIVES IN AGRICULTURAL EDUCATION:

Introduced Participatory Experiential Learning Curriculum way back in 1979:

"Education is not the learning of facts, but the training of the minds to think". Learning experience outside the classroom leads to high level of motivation, understanding, analytical attitude, improved academic performance and most importantly get closer to nature and realities.

University focus more on training students through Experiential and Participatory approaches to recognize, realize and understand

16th July 1945: Sir S V Ramamurthy ICS, Inaugurated Agricultural College, Bapatla, in the presence of Sri. P. V. Krishnayya Choudary-District Board President, Dr. BV Nath-Director of Agriculture, Madras, Sri. S. Patrudu and others, in the Board High School, Bapatla.

the Science of Agriculture to see the change in students for better India. In this direction, ANGRAU introduced Rural Agricultural Work Experience Program (RAWEP) – an experiential learning from farmers' fields with 6 months apprenticeship in villages, for the first time in India from 1979-80 for UG students.

The RAWE Programme was later implemented by ICAR in all State Agricultural Universities as per the recommendation of Randhawa Committee (1992). This concept was later adopted by all Agricultural Universities in India. Consequently, the ICAR had designed "Student READY" program which is being implemented by all State and Central Agricultural Universities as mandatory for the final year students of all professional degrees in agriculture, and allied sciences under ICAR. The program makes the students to understand the rural life, acquaint with socio-economic conditions of farmers, train while learn the farmer practices, develop skills in communication, develop competency and confidence in addressing the farmer issues.

ANGRAU implemented Student READY (Rural Entrepreneurship Awareness Development Yojana) programme, a new initiative of ICAR to reorient graduates of Agriculture and allied subjects for ensuring and assuring employability and develop entrepreneurs for emerging knowledge intensive agriculture.

Five components i.e. Experiential Learning, Rural Awareness Works Experience, In-Plant Training / Industrial attachment, Hands-on training (HOT) / Skill development training and Students Projects are part of the programme. All these components are interactive and are conceptualized for building skills in project development and execution, decision-making, individual and team coordination, approach to problem solving, accounting, quality control, marketing and resolving conflicts, etc. with end to end approach.

The curriculum includes visits by students to various research stations, institutions, universities, agri-industries, and farms within and outside the state. These visits give students

the chance to interact with experts in a range of agricultural and allied sciences and gain a better understanding of Indian culture and agriculture.

Introduced Post matriculate Diploma in Agricultural Sciences in 1989

University is the first in India to introduce induction courses for high school students on science of Agriculture through Agricultural Polytechnics located in research stations to impart skill development in youth on agriculture and allied sciences, through two-year Diploma in Agriculture, Organic Farming and Seed Technology and three-year diploma in Agricultural Engineering. University has made significant impact in developing interest in the field of Agriculture and allied sciences among SSC (10th Standard) passed students through Agricultural Polytechnic Colleges spread over across the state.

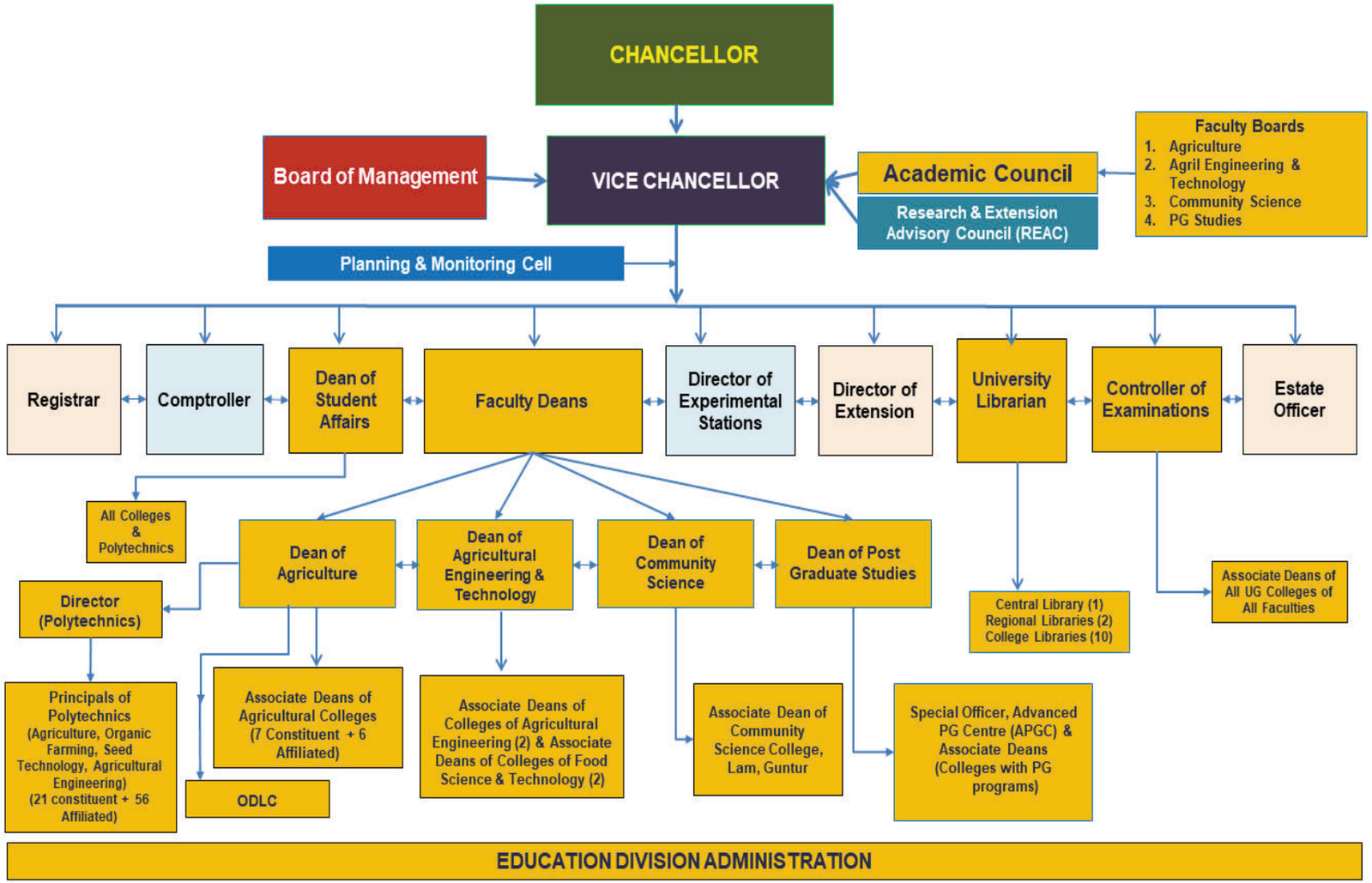
Acharya N G Ranga Agricultural University has established the first ever Agricultural Polytechnic in the state at Regional Agricultural Research Station, Palem during the year 1989 offering a post matriculate diploma in Agriculture with an objective to train the rural youth as gross root level workers catering to the needs of the agriculture and allied sectors. Seed Technology and Agricultural Engineering Polytechnics were also established by the University throughout the State keeping in view the demand for skilled man power in seed and Agro-based industries. The 2-year diploma course in Organic Farming was introduced by the University from academic year 2016-17 onwards due to more emphasis given by the Government on organic agriculture, besides provides grater employment opportunity in this field.

At present, the University has 21 constituent polytechnics and 60 affiliated polytechnics offering various diploma courses. The duration for the diploma in Agriculture, Seed Technology and Organic farming is two years (four semesters), while the duration for diploma in Agricultural Engineering is three years (six semesters) and the medium of instruction is English for all the diploma courses.

Evolution of Curriculum / Syllabus revisions as per ICAR:

Development of curricula is an on-going process, with the ICAR (Indian Council of Agricultural Research) tirelessly working to implement necessary changes to ensure the quality of agricultural education. Regularly convening drafting committees, the ICAR collaborates with all relevant stakeholders to revise and restructure postgraduate and doctoral syllabi. This collaborative effort aims to address emerging challenges and capitalize on opportunities across various agricultural and related sciences fields. Consequently, Universities implement and revise their curricula based on ICAR recommendations

In the frequent changing scenario and current demands of Higher Agricultural Education


CHANCELLOR
Board of Management
VICE CHANCELLOR
Academic Council
Research & Extension Advisory Council (REAC)
Faculty Boards
1. Agriculture
2. Agril Engineering & Technology
3. Community Science
4. PG Studies
Planning & Monitoring Cell
Registrar
Comptroller
Dean of Student Affairs
Faculty Deans
Director of Experimental Stations
Director of Extension
University Librarian
Controller of Examinations
Estate Officer
All Colleges & Polytechnics
Dean of Agriculture
Dean of Agricultural Engineering & Technology
Dean of Community Science
Dean of Post Graduate Studies
Director (Polytechnics)
Central Library (1) Regional Libraries (2) College Libraries (10)
Associate Deans of All UG Colleges of All Faculties
Principals of Polytechnics (Agriculture, Organic Farming, Seed Technology, Agricultural Engineering) (21 constituent + 56 Affiliated)
Associate Deans of Agricultural Colleges (7 Constituent + 6 Affiliated)
ODLC
Associate Deans of Colleges of Agricultural Engineering (2) & Associate Deans of Colleges of Food Science & Technology (2)
Associate Dean of Community Science College, Lam, Guntur
Special Officer, Advanced PG Centre (APGC) & Associate Deans (Colleges with PG programs)
EDUCATION DIVISION ADMINISTRATION

system of the country, periodic exercise has been conducted by ICAR to address the issues on agricultural education including revision of courses and curricula in Agriculture and allied sciences. In pursuance of this goal, ICAR from time-to-time constituted Deans' Committee consisting of Senior faculty members representing diverse disciplines. The first Deans' Committee, established by the Indian Council of Agricultural Research (ICAR) in 1966, was a landmark initiative aimed at standardizing and improving the agricultural education curriculum across India. The First Dean's Committee developed detailed guidelines for undergraduate and post-graduate education in 1965. This was progressed further by the Second Dean's Committee in 1981. The Third Dean's Committee (1995) recommended new curricula for the undergraduate courses. The aim was to produce agricultural graduates with a strong background in modern science, biology of pests, principles and techniques of IPM and macro/micro-economics pertaining to pest management, so as to assure greater sustainability in agricultural production and to protect the environment. Further, Fourth Deans Committee (2005); Fifth Deans' Committee (2013) and sixth Deans Committee (2021) were constituted with mandate to restructure UG programmes of Agricultural Universities

incorporating entrepreneurship for students. The aim of the sixth Deans committee was to produce graduates who were not only knowledgeable and skilled but also capable of addressing contemporary agricultural challenges and contributing to the overall development and modernization of the agricultural sector in India. ANGRAU changed the curriculum time-to-time and follow the syllabus of various courses as per the recommendations of ICAR Deans Committee.

ANGRAU implemented ICAR- VI Deans Committee corriculum in line with NEP-2020 from Academic Year 2024-25

To facilitate PG curriculum / syllabus revisions, the ICAR has established National Core Groups and BSMA Committees dedicated to the revision and restructuring of syllabi. Recognizing the need for a paradigm shift, these bodies work to align academic regulations with the provisions of the National Education Policy-2020. It's encouraging to note that these Committees have adopted a flexible, multi-disciplinary, and holistic approach in developing the syllabus and academic regulations. The curriculum has been thoughtfully updated to equip students with the necessary tools for learning, enhancing employability and skill sets, fostering entrepreneurship, and preparing them for global competitiveness. This comprehensive approach ensures that the education system evolves to meet contemporary demands and future challenges in the agricultural sector.

Unique Student Advisory System:

The university has implemented a special advisory system for mentoring and guiding UG students, with one faculty advisor for every 30 students, dedicated to leading weekly advisory classes where they can interact and talk with students one-on-one to motivate them, and also holding once-a-semester student-parent-teacher sessions for feedback. The advisers serve as the students on-campus counsellors and guardians.

Skill development & Capacity Building

The ICAR National Agricultural Higher Education Project has sanctioned Institutional Development Plan (IDP) ANGRAU during FY 2018-19, towards capacity building, infrastructure development and governance reforms leading to greater autonomy and sustained accreditation of the University.

The IDP has facilitated student international programs for 140 UG students at Kansas State University, USA; Oklahoma State University, USA; International Center for Biosaline Agriculture (ICBA), Dubai; Mahidol University, Thailand; Queen Sirikit Botanic Garden, Chiang Mai, Thailand; Tampere University, Finland; University of Massachusetts, Amherst, USA; Universiti Malaysia Kelantan, Malaysia; World Vegetable Center, Taiwan; Bangladesh Agricultural University, Bangladesh during the period 2018-2023, in which UG students have attended skill development & capacity building programs at overseas institutions.

Skill development & Capacity Building training programs for students under NAHEP-IDP Project

The IDP in collaboration with reputable national training institutions, worked fiercely to improve the skills of the students through personality development programs on college campuses, english and foreign language classes, entrepreneurship programs, and skill development programs on cutting-edge technologies like drones, blockchain, IoT, robotics and artificial intelligence. In addition to overseas & inland training for UG students, the University has conducted 81 programmes including entrepreneurship programmes, soft skills and skill development programmes at national level in collaboration with reputed institutions, resulting in 9724 student beneficiaries across the colleges during the period 2018-2023.

The project provided best opportunities to students facilitating long lasting benefits through programs focusing on improving non-academic soft skills of the students.

The IDP played a key role in the creation of central instrumentation facilities at different colleges for better teaching, learning, and research experiences for faculty and undergraduate and post graduate students, leading to overall excellence in academics and research at the University. All the activities including infrastructure development, skill-based programmes, overseas training to students and faculty created a difference and magnificence in the lives of the beneficiaries.

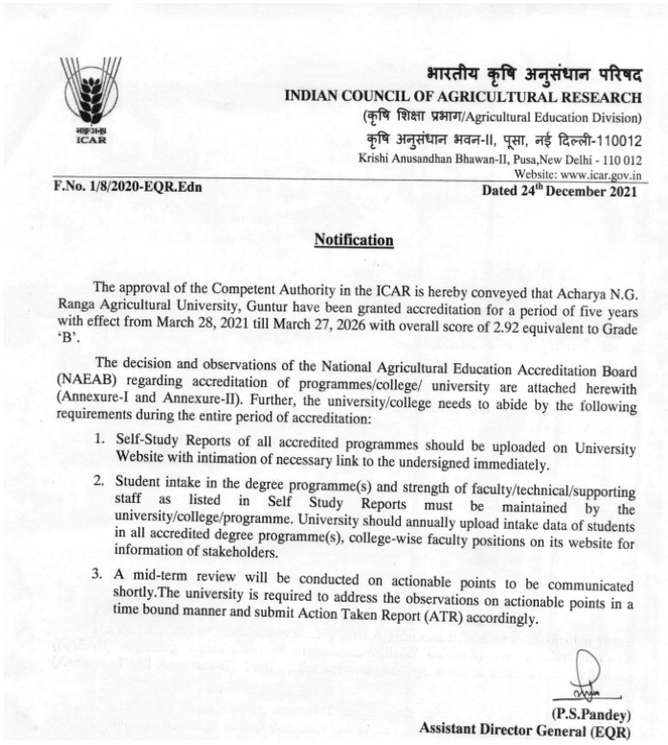
Under IDP, 24 faculty participated in international trainings for a period of two weeks to two months at reputed foreign academic/ research institutions and gained exposure to new technologies, possibilities of future research collaboration and most importantly a holistic ecosystem of up skilling.

Affiliated Colleges:

In view of the massive and diverse nature of the system of human capital utilization in agriculture, there is a great demand for agricultural graduates. Government of AP aiming to build up dynamic and skill-oriented manpower having knowledge on agricultural science, permitted private colleges fulfilling standard requirements, affiliated to ANGRAU from AY 2016-17. Presently, six agricultural colleges with UG courses are under the affiliation with ANGRAU.

ACCREDITATION

ICAR accreditation is done to ensure the quality of higher agricultural education in



भारतीय कृषि अनुसंधान परिषद
INDIAN COUNCIL OF AGRICULTURAL RESEARCH
(कृषि शिक्षा प्रभाग/Agricultural Education Division)
कृषि अनुसंधान भवन-II, पूसा, नई दिल्ली-110012
Krishi Anusandhan Bhawan-II, Pusa,New Delhi - 110 012
Website: www.icar.gov.in

F.No. 1/8/2020-EQR.Edn
Dated 24th December 2021

Notification

The approval of the Competent Authority in the ICAR is hereby conveyed that Acharya N.G. Ranga Agricultural University, Guntur have been granted accreditation for a period of five years with effect from March 28, 2021 till March 27, 2026 with overall score of 2.92 equivalent to Grade 'B'.

The decision and observations of the National Agricultural Education Accreditation Board (NAEAB) regarding accreditation of programmes/college/ university are attached herewith (Annexure-I and Annexure-II). Further, the university/college needs to abide by the following requirements during the entire period of accreditation:

1. Self-Study Reports of all accredited programmes should be uploaded on University Website with intimation of necessary link to the undersigned immediately.
2. Student intake in the degree programme(s) and strength of faculty/technical/supporting staff as listed in Self Study Reports must be maintained by the university/college/programme. University should annually upload intake data of students in all accredited degree programme(s), college-wise faculty positions on its website for information of stakeholders.
3. A mid-term review will be conducted on actionable points to be communicated shortly.The university is required to address the observations on actionable points in a time bound manner and submit Action Taken Report (ATR) accordingly.

(P.S.Pandey)
Assistant Director General (EQR)

INDIAN COUNCIL OF AGRICULTURAL RESEARCH
NEW DELHI

NATIONAL AGRICULTURAL EDUCATION ACCREDITATION BOARD

CERTIFICATE OF ACCREDITATION

On the recommendations of the ICAR Peer Review Team, the National Agricultural Education Accreditation Board, ICAR, New Delhi hereby grants accreditation to the **Acharya N.G. Ranga Agricultural University, Guntur (Andhra Pradesh)** and its following constituent colleges upto March 27, 2021.

- Agriculture College, Bapatla
- Agriculture College, Naira
- College of Agricultural Engineering, Bapatla
- S.V. Agricultural College, Tirupati
- Agriculture College, Mahanandi

The accredited academic programmes are listed overleaf.

March, 2017
New Delhi

(Narendra Singh Rathore)
Deputy Director General (Agril. Edn.), ICAR
and Vice-Chairman, NAEAB

(Trilochan Mohapatra)
Secretary, DARE & Director General, ICAR
and Chairman, NAEAB

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Indian Council of Agricultural Research

Accreditation Board

Certificate of Accreditation

Upon the recommendations of the ICAR Peer Review Team and Education Division, and on meeting the minimum accreditation criteria, the Accreditation Board hereby extends the accreditation of the **Acharya N.G. Ranga Agricultural University, Hyderabad** upto August 20, 2011.

The accreditation is for the programmes and with the conditions specified by the Accreditation Board.

New Delhi
06 August 2008

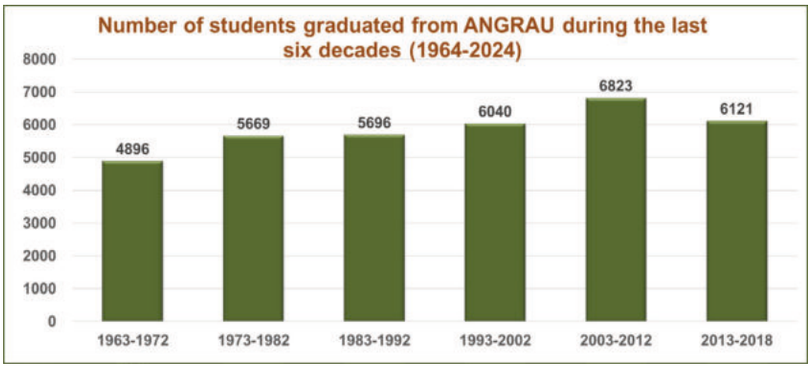
(S.P. Tiwari)
Dy. Director General (Edn.), ICAR
& Vice Chairman, Accreditation Board

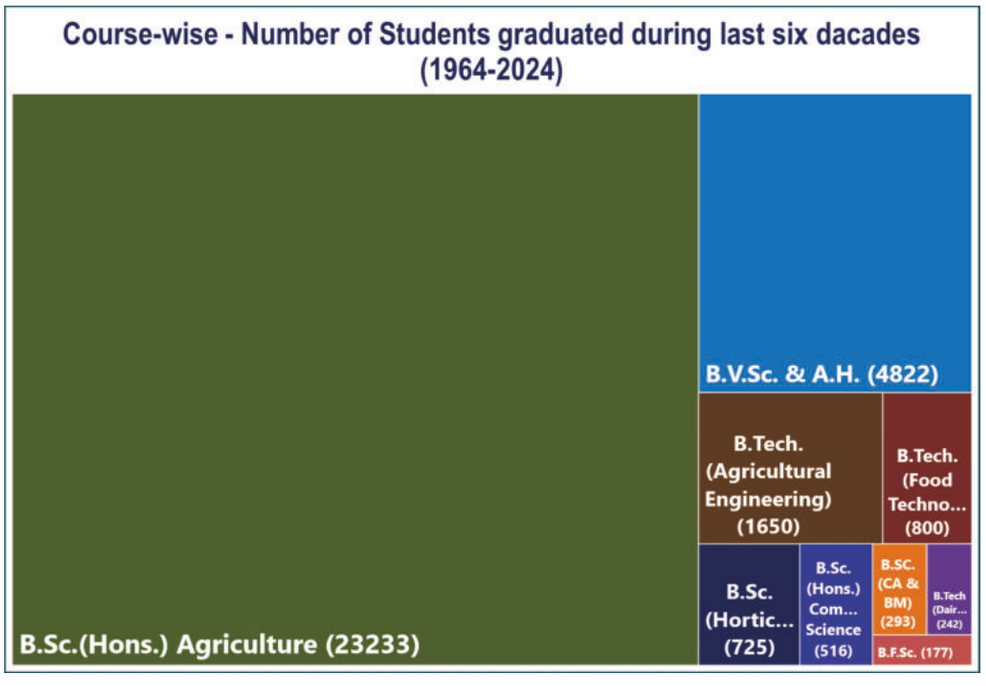
(Mangala Rai)
Director General, ICAR &
Chairman, Accreditation Board

Agricultural Universities and its constituent colleges. The University/institution/programme are critically evaluated by a group of experts as per approved guidelines of the Council. The National Agricultural Education Accreditation Board (NAEAB) undertakes the accreditation programme to assist people, prospective students, educational institutions, professional societies, government and other concerned agencies in identifying institutions and programmes which meet the minimum norms and standards as prescribed by the Council, to provide guidance for the improvement of existing agricultural education institutions/programmes, and to develop new institutions/programmes. In order to infuse better accountability and intense monitoring for educational quality improvement in Agricultural Universities, the Government of India has taken a decision to link accreditation of agricultural universities by NAEAB with the Grant-in- Aid from ICAR, New Delhi. Accreditation of Agricultural Universities is a continuous process, and since the constitution of the Board in 1996, ANGRAU has been accredited continuously for all the programs, colleges and University. The Peer Review Team of ICAR-NAEAB visited the University and colleges in 2021, and all the programs, colleges and University is accredited for a period of 5 years, till March 26, 2026.

GENERATING SKILLED HUMAN RESOURCE

After establishment of the University (ANGRAU) in 1964, so far 56 convocations were conducted for awarding degrees to undergraduates across different faculties.





During the last six decades from 1964 to 2024, a total number of 35,245 students were graduated from ANGRAU across the faculties viz., Agriculture, Veterinary, Fisheries, Dairying, Horticulture, Agril. Engineering, Food Technology and Community Science.

Out of total number of 35,245 students graduated, 23233 students graduated from B.Sc. (Hons.) Agriculture, 4822 from B.V.Sc. & A.H., 3107 from B.Sc. (Hons.) Community Science, 1650 from B.Tech. (Agril. Engg.) and the remaining from B.F.Sc, B.Tech. (Dairying), B.Sc. (CA & BM), B.Sc. (Horticulture) and B.Tech. (Food Technology), where as 10,424 degrees was awarded to UG students after bifurcation of State (2015).

The professionals from ANGRAU are known for their knowledge, skill, as well as their hard work, and are successful in their chosen places of work all over the world.

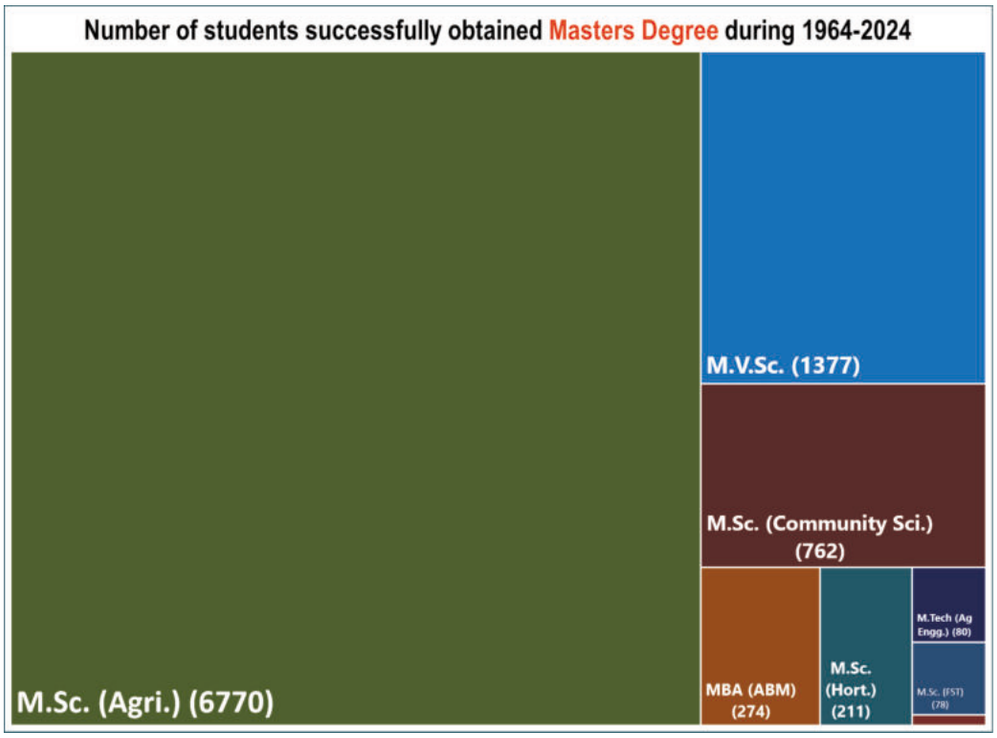
POST GRADUATE EDUCATION – PIONEERING GROWTH & INNOVATION

At the time of establishment in 1964, only under graduate programmes were offered in all the teaching campuses, and PG programme being offered only at the Agricultural College, Rajendranagar. APAU embarked on postgraduate education in 1964-65 following recommendations by a high-level commission led by Dr. B. P. Paul, Director General of ICAR. This marked a significant leap in agricultural education, establishing ANGRAU as a pioneer in the field.

Over a period of time, post-graduate programmes were introduced (1964-Masters; 1968-Doctoral) in the Agricultural Colleges located at Bapatla and Tirupati and later in Home Science College, Hyderabad (1968-Masters; 1978-Doctoral). In the faculty of Agricultural Engineering and Technology, Masters (2006) and Doctoral (2012) programs introduced at Dr. NTR College of Agricultural Engineering, Bapatla.

A post-graduate programme leading to Master of Agriculture Business Management was started in 1998 at Rajendranagar campus, and later at Tirupati (2008) establishing Institute of Agri Business Management in SV Agricultural College. Inter faculty PG programmes like M.Sc. (Food Science and Technology), M.Sc. (Ag. Biotechnology), M.V.Sc. (Vet. Biotechnology) were started in 2001 and M.Sc. (Environmental Science and Technology) in 2003. During 2006, Masters programs in the faculty of Agricultural Engineering & Technology was started at Bapatla.

M. Sc. (Ag.) Programmes in Acharya N.G.



Ranga Agricultural University (ANGRAU) has significantly expanded, particularly with the inclusion of second-generation colleges. Since 2010, the Agricultural College, Naira and Agricultural College, Mahanandi have been offering this program, further broadening the reach and impact of ANGRAU's agricultural education.

These colleges serve as vibrant centres of academic excellence, driving innovation and sustainable practices in agriculture. They significantly contribute to ANGRAU's mission of advancing agricultural education, research, and outreach for the betterment of society and the agricultural sector at large.

Advanced Post Graduate Centre (APGC) at Lam, Guntur initiated on August 5, 2015 vide G.O. M.S. No.4 dated 04-01-2016 of the Department of Agriculture and Co-operation, Govt. of Andhra Pradesh. The post graduate degree programs in APGC in Agronomy (Water Management), Environmental Sciences, Microbiology, Seed Science & Technology started from AY 2015-16 whereas Molecular Biology and Biotechnology started from AY 2016-17. The post-graduate degree programs in faculty of home science in Apparel & Textiles, Family Resource Management, Foods and Nutrition, Human Development and Family Studies and Home Science Extension & Communication Management started from AY 2016-17.

The Ph.D. degree programs under Faculty of Agriculture in Agricultural Microbiology

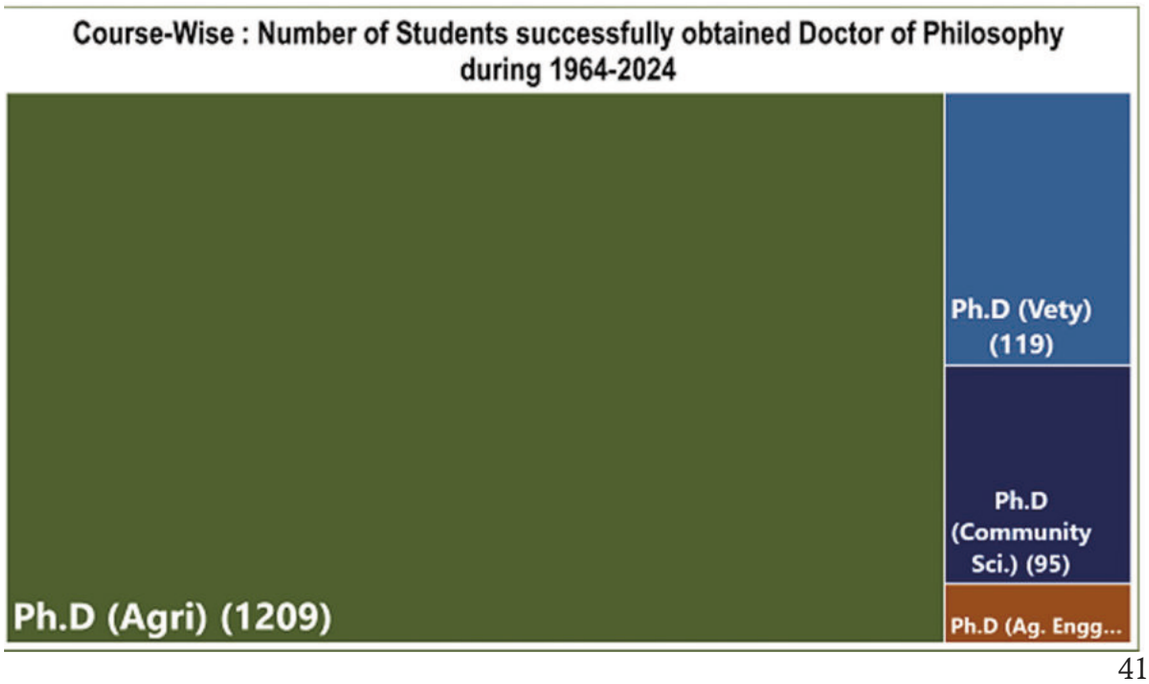
started in AY 2015-16 and Molecular Biology & Biotechnology started in AY 2016-17. The Ph.D. degree programs under Faculty of Home Science in Apparels & Textiles, Human Development & Family Studies started from AY 2016-17.

The following reforms were brought into the system for improvement of PG research across all faculties.

- Implementation of revised PG guidelines in 2016
- Revised thesis presentation guidelines in 2018
- Introduction of anti-plagiarism policy 2019
- Increase of stipends for PG students from 2019
- Annual publication of PG research highlights from 2015
- Common comprehensive exam paper for all Colleges from 2019
- Consideration of ICAR- AIEEA/AICE marks for PG admissions from 2019
- Organizing Annual National Conference for PG Students from 2019
- Coaching cell for JRF/SRF/ARS competitions
- Scholarships for merit students in collaboration with private organizations
- Discipline-specific SLTP discussions to enhance PG Research Quality
- Establishment of Central Instrumentation Cells in all PG colleges
- Initiation of M. Tech Programmes in Food Process Technology
- Requirement for Doctoral students to publish an article before submitting their thesis
- Introduction of NRI/ in lieu of NRI seats in M.Sc. and Ph.D. programs
- Accreditation of all PG programs in all colleges
- Regular updation of curriculum based on ICAR recommendations

Significant achievements through PG research include, development of BPT-5204 (Samba Mashuri) a popular rice variety through PG research, numerous Jawaharlal Nehru Awards for outstanding Doctoral Thesis Research, multiple ICAR-JRF Awards for PG scholarships.

Through PG programs, ANGRAU generated well trained and adequately skilled human resources to the tune of 9572 Masters Degrees (6770 M.Sc. (Ag.); 1377 M.V.Sc; 762 M.Sc (Community Science); 274 MBA (ABM); 211 M.Sc. (Hort.); 80 M.Tech. (Ag.Engg.); 78 M.Sc. (FST); 11 M.Sc. (Dairy Science) till 2022. A total of 1449 scholars (1209 Ph.D. (Agri.); 119 Ph.D. (Vety.); 95 Ph.D. (Community Science); 26 Ph.D. (Agril. Engg.) successfully completed Ph.D. by the end of 2022.




BAPATLA
LEGIATE
MES, CULTURAL AND LITERARY MEET, 2018-19
UGURA FU
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RAL AND LITERARY MEET 20

STUDENT DEVELOPMENT & WELFARE:

ANGRAU established strong policies for students' development & welfare in all the campuses, including sports & games, amenities in hostels, health care, nutrient & safe food in hostels, promotion of social activities such as NSS, character building through NCC, capacity building trainings, language labs, encourage to participate in seminars / symposia / conferences, in addition to SC/ST welfare, Women Protection Cell, and Anti-Ragging Committees. The unique "*student advisory system*" is being implemented in the University.

Co-Curricular activities:

ANGRAU gives emphasis to the co-curricular activities of the students along with the curricular activities. University built sports and games infrastructural facilities created in all campuses as it plays a very vital role in inculcating a culture of sports in young students, displaying tenacity and persistence of the human spirit. Taking into consideration of sports, an important enabler for sustainable development: as identified by United Nations, and to build the self-confidence, self-esteem, discipline, managing emotions, team spirit, leadership, perseverance, patience and social skills among students of ANGRAU, dedicated sports activity under the guidance and training of skilled professional is scheduled as a part of the curriculum.

- As a part of routine calendar events, college level and University Inter-Collegiate competitions are conducted every year, to promote friendship, fellowship and social responsibility.
- Regular training programs are being organized to improve skills and motivate the students to participate in various sports, games, literary and cultural events at state and national levels.
- All campuses are having ample space for open sports and games, while the major campuses are strengthened with in-door sports complex.
- Open Gyms near hostels, both for boys and girls, are available in all colleges for promoting good physical and mental health among students.
- The students of ANGRAU are supported to take active part in all national and state level programs.

Community Activities:

- ANGRAU promotes and encourage the students to take active part in various activities for community and society building through "shramadaan".
- NSS is compulsory for all students, and the students in all campuses actively take part in NSS programs which provide opportunity in understanding the community, themselves in relation to community, identify the needs and problems, develop social responsibility, gain skills in leadership development, practice national integration to inculcate the theme of "Not me, but You" reflecting democratic living and upholding the need for selfless service. The students will

undergo special 10 days NSS camp every year in a village in addition to routine programmes, where the NSS volunteers will study the structure of the community and their needs, and accordingly make plans and execute for making rural connect and building confidence.

- 26 NSS units are actively involving in the NSS activities under the guidance of NSS Programme Officers in the colleges
- ANGRAU students design and implement concepts such as Agricos Carnival, Ideas Engines, I support, Clubs, Forums etc. in various campuses for regular group discussions and rationale thinking for the betterment of society.
- University established NCC Units in major campuses for developing character, comradeship, discipline and secular outlook among the students of the University.
- Kisan Melas will be organized by the students, in addition to conduct of special meetings with crop scientists of the area of study.
- Students of the colleges of ANGRAU are rendering their services through participation in community development programs, emergency services, natural disaster management, preparing educational videos etc.
- "Agricos Green Program" is another unique initiative of ANGRAU to promote the environmental awareness and participation in various programs to promote environmental health.

Placement Cells:

- Campus Placement Cells (CPCs) are established in all campuses, with strong linkages with all stake holders, conduct capacity building trainings in improving soft skills and leadership qualities.

Special Coaching Centres (SCCs):

- All campuses have Special Coaching Centres (SCCs) to help students get ready for PG admissions and other competitive tests.
- The students of ANGRAU have excelled in ICAR JRF, SRF and other national level examinations. The University has bagged ICAR awards during 2021 for securing highest ICAR scholarships in India among SAUs in the category of Agricultural Sciences and Agricultural Engineering & Technology, and 2nd position in Agricultural Sciences during 2019 and 2020.

Health Centres:

- Integrated Health Centres (IHCs) are established in each campus with resident doctor, 24X7 ambulance, pharmacy, and conduct regular primary health check-ups and health awareness camps for students.

Hostels:

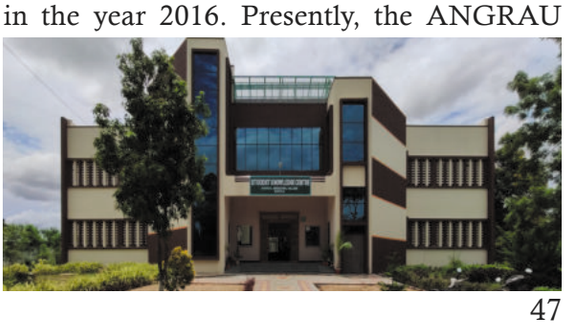
- University has separate hostels for boys and girls. A total of 21 Boys and 19 Girls hostels having capacity to accommodate 3220 students are available in the colleges of the University. Every effort has been made for happy, healthy and comfortable stay of the students in the hostels. The hostels are provided with all basic facilities, T.V room, reading room, water purifiers, indoor and outdoor games facilities, medical facilities, wifi facilities etc. The general management of the hostels is vested with the Chief Warden assisted by Warden and Additional Wardens.
- Hostels are covered by the CC Cameras and full-time security and vigil is maintained by the security persons. Adequate dining facilities are available for all the boarders. Messes are run on no-profit and no-loss basis by the students. All the messes run under the guidelines of Food Safety Standards Authority of India Act.

Scholarships:

- University / colleges guide the students for availing the scholarships / stipends from the state, central and sponsors for UG, PG and Ph.D. students.

LIBRARY & KNOWLEDGE CENTRES:

The libraries of the constituent Colleges caters to the needs of students and teachers, and in 1980, the APAU Library system has been reorganized forming the Central Library at Rajendranagar and Regional Libraries at Tirupati and Bapatla. The University Library has a collection of over 81,000 books and subscribes to over 500 periodicals before bifurcation of the state i.e. June 2014. After bifurcation the State, the Acharya NG Ranga Agricultural University established the University Library at Lam Guntur in the year 2016. Presently, the ANGRAU



Library System is having 13 Libraries in its fold including the University Library located at the Head-Quarters in Lam, Guntur. The main motto of the libraries is to accomplish the task of reaching to wider user community, comprising of teachers, scientists, extension specialists and students. The ANGRAU Libraries function under the overall supervision of the University Librarian. All the library e-Resources are being made available through remote access to various colleges, Research stations, Polytechnic colleges, DAATT centres and KVKs of ANGRAU for the benefit of Students, Scientists, Teachers and Research staff.

The University library system has facilities such as, access to a diverse collection, reference and research assistance, interlibrary loan services, digital resources and online access, institutional repository, empowered learning and research, enhanced accessibility, books and periodicals, book bank scheme, reprographic services, reference section, newspaper section, competitive examination cell, digital repository etc. The University Library network also offers PGS-501 Library Service course, besides conducting regular sessions on orientation and awareness on e-resources.

The Knowledge Centres and libraries in various campuses have technology and network facilities such as Integrated Library Management Systems (ILMS), Library Automation with KOHA, RFID Technology and Open Access Initiatives, Digital Library Service and Resources / Online Resources.

Significant Initiatives:

- Theses belonging to various colleges of ANGRAU from 2014 to till date are being maintained under Institutional Repository and uploaded in the KrishiKosh Digital Repository under DKMA of ICAR.
- Library Management System (LMS) KOHA has been implemented in all colleges of ANGRAU and WEB-OPAC for Centralized server is established for the first time in University Library, Lam, Guntur.
- The University Library has completed digitization of rare Documents, Thesis, Institutional repositories and other documents related to university is about 4.80 lakh pages.
- RFID Technology with security gates, bio-metric, work station, self-service kiosk is integrated with Library Management System (LMS) KOHA at Regional Library (Student Knowledge Centre), Agricultural College, Bapatla and S.V. Agricultural College, Tirupati
- The ANGRAU University Library has got CeRA Best Usage award by the ICAR for the years 2021 and 2022.

ALUMNI-ANGRAU

Acharya N G Ranga Agricultural University in its 60 years of fruitful journey has a big strength of Alumni and has a remarkable impact on the society at national and at the global level. Alumni is the backbone for any educational institution and so as with this university. It is the biggest strength for the development of this university, providing opportunities for the students on roll, striving for farmers sustainability and finally helping in the overall development of the society.

Alumni in the current scenario are the brand building ambassadors for the University which means endowment of research facilities, helping with better corporate relations and spreading the message of the tremendous pace of development that ANGRAU is going through. In this context, the development of the alumni database for the university is the most important and immediate need which will be taken care of by the development of this alumni portal. Measures are taken to keep the alumni of ANGRAU remain intact and become active in getting registrations so that alumni database will be developed. A total of 1400 members have been registered in ANGRAU ALUMNI portal till date.

In addition to ANGRAU Alumni Network, all colleges have Alumni Associations. The University and Colleges work closely in association with Alumni in preparing the programs, strengthening the infrastructural facilities, building network for industrial trainings, and also placements.

Alumni House at Agricultural College, Bapatla

AGRICULTURAL COLLEGE, BAPATLA

E-Mail ID: ad.agcbpt@angrau.ac.in

Establishment: 16th July, 1945

Second Agricultural College in South India

Historical Milestones:

- 1945-16th July, 1945 : Sir S V Ramamurthy ICS, Inaugurated in the presence of Sri. P. V. Krishnayya Choudary-District Board President, Dr. BV Nath-Director of Agriculture, Madras, Sri. S. Patrudu and others, in the Board High School, Bapatla.
- 1945-B.Sc. (Agriculture) course started
- 1968-M.Sc. (Ag.) program started
- 1971-Silver Jubilee Celebrations
- 1980-Dr. M.V. Reddy, developed Rice variety BPT-5204 and release in 1980 as "Samba Mashuri" The rice rains not grains, but coins.
- 1989-Dr. B.V. Nath Auditorium inaugurated by Dr. M.S. Swaminathan
- 1993-Ph.D program started
- 1994-Golden Jubilee Celebrations on 11th July, 1994
- 2005-Diamond Jubilee Celebrations on 2nd Jan, 2005
- 2022-ANNEX building inaugurated
- 2023-Platinum Jubilee Valedictory Function on 21st January, 2023

Infrastructural facilities

- State-of-the-art class rooms and laboratories
- Large instructional and research farm consisting of 116 hectares
- BPT-5204 Breeder Seed & BPT-2270, BPT-2595 & BPT-2782 Foundation Seed
- Central Instrumentation Cell
- Virtual Reality Experience Lab (AR/VR)
- Student Knowledge Centre with RSID Technology
- National Services Scheme (5 Units)
- National Cadet Corps
- New Guest House
- Alumni House with 20 Double Bedded A/c rooms and dormitory facility
- Sports Pavilion, Indoor Stadium & Outdoor Gym facility at Boys & Girls hostels
- Health Centre
- Hostels for UG and PG students with all amenities.
- 1000 Seating Capacity A/c Auditorium.
- Complete Wi-Fi facility to the campus
- Students' cafeteria facility
- Solar Street Light & RESCO Roof Top Solar System to Hostels

S.V. AGRICULTURAL COLLEGE, TIRUPATI

E-Mail ID: ad.svagctpt@angrau.ac.in

Establishment: 27th October, 1961

Historical Milestones:

- 27.10.1961 –laid foundation stone
- 10.09.1966 –Inaugurated Hostel Buildings
- 28.12.1968 –Sri V.V. Giri, Vice President of India Inaugurated Main Building.
- 1968 – Introduction of M.Sc. Programme in different disciplines
- 1982 –Opening of Priyadarshini Girls Hostel
- 1982–Opening of Regional Library
- 1987 –Silver Jubilee Celebrations on 16th April 1987
- 1992 – Introduction of Ph.D programme
- 07.09.2000 –Inauguration of Agricultural Information Centre.
- 21.06.2002 – Inaugurating the Second Floor
- 2008 – Introduction of MBA (ABM) programme
- 2020 – Introduction of PG programme in Department of Molecular Biology and Biotechnology
- 2021 – Introduction of PG programme in Department of Seed Science and Technology
- 2022 – Diamond Jubilee Celebrations on 19th and 20th December, 2022

Infrastructural facilities

- State-of-the-art Class rooms and laboratories.
- Large instructional and research farm (Dry land block, Wetland block and Horticulture block).
- Central Instrumentation Cell
- Virtual Class room with latest AV aids with seating capacity of 96.
- Student Knowledge Centre with RFID Technology.
- Swarnamukhi Guest House
- Separate Hostels for Boys and Girls with dining facility, 24 hours WI-FI, Mineral Drinking water facility, Hot and Cold water facility.
- Webinar Rooms with Computer and UPS facility in Boys and Girls Hostels.
- Sports Pavilion with all sports facilities, open air gymnasium at all Hostels.
- Health Centre
- Student Canteen
- Sales Counter for ELP products.
- Solar Electricity generation facility in Girls hostel.
- 1000 Seating Capacity A/c Auditorium.
- Complete Wi-Fi facility to the campus
- Students' cafeteria facility
- Solar Street Light & RESCO Roof Top Solar System to Hostels

AGRICULTURAL COLLEGE, NAIRA

E-Mail ID:ad.agcnaira@angrau.ac.in

Establishment :07th August,1989

Historical Milestones:

- 07.08.1989 : Started at ARS, Amadalavalasa as a make shift arrangement.
- 22.08.1992 : Foundation stone laid
- September 1995 : shifted to Naira from ARS, Amadalavalasa.
- 2010-11 : M.Sc.(Ag.) programme started in two disciplines (Agronomy and GPBR).
- 2014 : Silver Jubilee celebrations
- 2016-17 : M.Sc.(Ag.) programme started in the discipline of Entomology
- March, 2017 : ICAR Accreditation from 2017 - 2021
- 2018-19 : Establishment of Central Instrumentation Cell
- 24.12.2021 : ICAR Accreditation from 2021-2026
- 2022 : Inaugurated Girls Hostel, Boys Hostel and AELP buildings
- 2019-2022: Students benefitted from IDP International (23 nos.) & National (158 nos.) trainings.

Infrastructural facilities

- State-of-the-art Class rooms and laboratories
- College attached large Instructional and Research farm
- Central Instrumentation Cell
- Virtual Class Room, Conference Hall, Seminar Hall
- Play ground with Indoor & Outdoor Gym facility at Boys & Girls hostels
- Health Centre
- 3 Hostels for Boys and 2 Hostels for Girls with all amenities.
- Solar Street Lights, RESCO Roof Top Solar System and Waste Decomposer for hostels.
- Staff Quarters
- Well laid internal C.C and B.T.Roads
- Digital Library.

AGRICULTURAL COLLEGE, MAHANANDI

E-Mail ID: ad.agcudayagiri@angrau.ac.in

Establishment : 28th November, 1991

Historical Milestones:

- 1993 Laid foundation stone for the College building on 21-01-1993.
- 2010 – Initiated M.Sc. (Agriculture) Programme
- 2016- Silver Jubilee Celebrations.
- 2016 – Establishment of Acoustic Studio
- 2019 – New Girls Hostel, Boys hostel, ELP buildings were inaugurated

Infrastructural facilities

- State-of-the-art Class rooms and laboratories
- IDP Class Room
- Large instructional and research farm
- Central Instrumentation Cell
- National Services Scheme (2 Units)
- Sports Pavilion, Outdoor Gym facility at Boys & Girls hostels
- Health Centre
- Hostels for UG and PG students with all amenities
- Solar Street Light & Roof Top Solar System to College

AGRICULTURAL COLLEGE, RAJAMAHENDRAVARAM

E-Mail ID: ad.agcrjy@angrau.ac.in

Establishment: 05th November, 2008

Historical Milestones:

- 2008 - Established on 5th November, 2008 in the premises of Government Arts College, Rajamahendravaram.
- 2009 - Shifted to Sri Kandukuri Veeresalingam Theistic Degree College, Rajamahendravaram.
- 2016 - An extent of 21.93 acres belonging to ICAR – CTRI was transferred to ANGRAU – Agricultural College, Rajamahendravaram.
- 2023 - Since July 1st operating successfully from its newly constructed campus in Katheru.

Infrastructural facilities

- Smart class rooms with projectors installed with new wi-fi internet facility.
- "Reverse Osmosis" drinking water facility.
- Well-furnished class rooms and laboratories.
- Instructional research farm at Nidigatla (10 km from Katheru campus) and College farm at Katheru for Experiential Learning Programme
- Students demo plots and Seed Production
- Closed circuit cameras.
- Indoor sports/games facilities.
- National Service Scheme (2 units)
- Sophisticated library with an access to latest books

SRI MEKAPATI GOUTHAM REDDY AGRICULTURAL COLLEGE, UDAYAGIRI

E-Mail ID: ad.agcudayagiri@angrau.ac.in

Establishment : 28th November, 2022

Infrastructural facilities

- Campus Area: 106.77 acres.
- Class rooms equipped with LCD Projectors
- Laboratory Facilities
- Examinations Halls: Four
- Library Facilities
- 176 Rooms in Boys Hostel and 148 Rooms in Girls Hostel. The Hostels are having the provision of dining hall, TV room, reading room, clean drinking water and indoor games, three RO plants.
- Sports Facilities - Pavilion with courts developed for outdoor and indoor games
- Gymnasium
- Open Air Auditorium
- Conference Hall and Seminar Hall
- Guest House
- Transport Facility: Two Buses for Student Trips one Ambulance for Medical Emergency.
- Farm with Crop Cafeteria and Vegetable Cafeteria.
- Agro - Meteorological Observatory

AGRICULTURAL COLLEGE, PULIVENDULA

E-Mail ID: ad.agcpvdl@angrau.ac.in

Establishment: 09th November, 2023

Infrastructural facilities

- State-of-the-art Class rooms and laboratories
- Instructional farm
- Health Centre
- Hostels for UG students with all amenities
- Solar Street Light.

NTR COLLEGE OF AGRICULTURAL ENGINEERING, BAPATLA

E-Mail ID: ad.caebpt@angrau.ac.in

Establishment : 1983

Historical Milestones:

- 1983-B.Tech. (Agril. Engg.) Degree Programme was started
- 1988 - The foundation stone was laid by Dr.N.T.Rama Rao, the then Hon'ble Chief Minister of Andhra Pradesh
- 1994 - Shifted to new campus Inaugurated by Sri K. Jana Reddy, the then Hon'ble Minister for Agriculture of Andhra Pradesh
- 1999 - Accredited by ICAR in the I Phase
- 2006- M.Tech. (Agril.Engg.) started
- 2008 – Silver Jubilee Building added
- 2010 – under Faculty of Agricultural Engineering & Technology created
- 2012 - Ph.D. (Agil.Engg.) started
- 2018 - Experiential Learning Building inaugurated
- 2018 – Renamed as Dr NTR College of Agricultural Engineering
- 2019 - New Boys & Girls Hostels
- 2021 - Established ANGRAU farm implements production center

Infrastructural facilities

- State-of-the-art Class rooms and laboratories
- Hydroponics Technology
- Robotics Lab
- Library with reprography
- Large instructional and research farm
- Virtual Class Room
- Sports - grounds, Outdoor Gym facility to Boys & Girls
- Health Centre
- Hostels for UG and PG students with all amenities and wi-fi.
- Solar Street Light and Roof Top Solar System

COLLEGE OF AGRICULTURAL ENGINEERING, MADAKASIRA

E-Mail ID: ad.caemdks@angrau.ac.in

Establishment : 08th November, 2008

Historical Milestones:

- 2009 - Foundation stone laid
- 2012 - College Building inaugurated
- 2014 - Two poly houses
- 2015 - Farm pond
- 2019 - Construction of new boys and new girls hostels
- 2020 - Virtual Class rooms with interactive panel.
- 2021 - College main building and workshop roof terraces were installed with 65 kw solar panels
- 2021 - ICAR Accreditation

Infrastructural facilities

- State of art class rooms and laboratories as per the fifth deans committee.
- Instructional and research farm
- Central computer lab
- Virtual class room
- NSS 2 units
- Sports Grounds, outdoor and indoor gyms
- Health Centre
- Hostels for students with amenities
- Solar roof top panels for electricity generation in the campus
- Solar panels for water heating in the hostels.

DR.NTR COLLEGE OF FOOD SCIENCE AND TECHNOLOGY, BAPATLA

E-Mail ID:ad.cfstbpt@angrau.ac.in

Establishment : 2003

Historical Milestones:

- 2013-14: An experiential learning unit of ice-cream plant was established
- 2018 - Inaugurated hostel buildings and ELP unit
- 2018 - Renamed as Dr.NTR College of Food Science and Technology
- College was identified as State Level Technical Institution (SLTI) for implementation of PM Formalization of Micro Food Processing Enterprises (PMFME) scheme by APFPS

Infrastructural facilities

- Well furnished digital class rooms and well equipped laboratories
- Milk and Milk products processing Experiential Learning Program (ELP) unit
- Library
- Two hostels for boys and 2 hostels for girls
- Multi-stage RO water purification system
- Indoor and outdoor courts
- Open gymnasium and Health clinic
- College bus and van

COLLEGE OF FOOD SCIENCE AND TECHNOLOGY, PULIVENDULA

E-Mail ID:ad.cfstpvdl@angrau.ac.in

Establishment : 16th August, 2008

Historical Milestones:

- 2008- Foundation stone laid
- 2019 – First College in ANGRAU to Implement FSSAI License, Govt of India in students mess.
- 2021 - ICAR Accreditation.
- 2021 - First floor inaugurated
- 2021 - Received 1st Patent on 19.05.2021 for "A process for preparing dehydrated fruit bar from prickly pear fruits (*Opuntiaficus indica*) and product thereof"
- 2022 - Establishment of Livelihood Business Incubation centre in collaboration with Indian Institute of Plantation Management (IIPM), Bangalore.
- 2022 - Received 2nd Patent on 25.04.2022 for "Production of alcohol (Naturo-Hol) from *Agave albomarginata*"
- 2022 - Received 3rd Patent on 15.11.2022 for "A process for manufacturing of blended fruit squash with prickly pear (Opuntiaficus indica and Oputia Dillenii) fruit juice and lemon juice" from Government of India.
- The success story of two of the past students got place in the ICAR compilation 'Success story of 75 entrepreneurs' during the year 2022.

Infrastructural facilities

- State-of-the-art Class rooms and laboratories
- Livelihood Business Incubation (LBI) Centre
- Student Knowledge Centre with 4000 volume and Wi-Fi.
- National Services Scheme (2 Units)
- SC- ST Cell
- Cultural Cell
- Women Protection Cell
- Sports, Indoor games & Outdoor Gym facility to Boys & Girls
- Health Centre
- Entrepreneurship Innovation and Start – Ups Centre
- Hostels for UG (Girls & Boys) with all amenities and Roof Top Solar System
- State – of – Art Equipment like U. V Spectrophotometer, Fully automatic Autoclave, Trinocular microscope, Freezer Dryer, Texture Analyser, Hunter Colour lab etc,.

COLLEGE OF COMMUNITY SCIENCE LAM, GUNTUR

E-Mail ID: ad.ccslam@angrau.ac.in

Establishment : 2013

Historical Milestones:

- 2013 – Re-initiated at Guntur
- 2014 – Organised State Level Millet fest
- 2015 – Established Millet Processing Unit
- 2016 – Rechristened as Community Science
- 2016 – Started M.Sc & Ph.D programmes
- 2019 – Admission to Male students
- 2019 – Inaugurated college & hostel
- 2021- College got accredited by ICAR
- 2023 – Organised G20 and Women Led development activities
- 2024 – Registration of Community Science

Infrastructural facilities:

- Classrooms – 4 no.
- Laboratories – 6 no.
- Staff rooms – 6 no.
- Library – 1 no.
- Seminar hall – 1 no.
- Administrative office – 1 no.
- Associate Dean's office– 1 no.
- No. of Rooms – 33 no.
- No of Hostels - 2 no
- Study rooms – 5 no.
- Entertainment room – 2 no.
- Kitchen – 2 no.
- Dining hall – 2 no.
- Storage unit – 1 no.
- Processing unit – 1 no.

Capacity Building Training Programees for UG Students Under NAHEP- IDP


STUDY IN
INDIA


ACHARYA N.G. RANGA AGRICULTURAL UNIVERSITY
AGRICULTURAL COLLEGE , BAPATLA
ANGRAU
DEEKSHARAMBH - 2024
INAUGURAL PROGRAMME
23 - 10 - 2024
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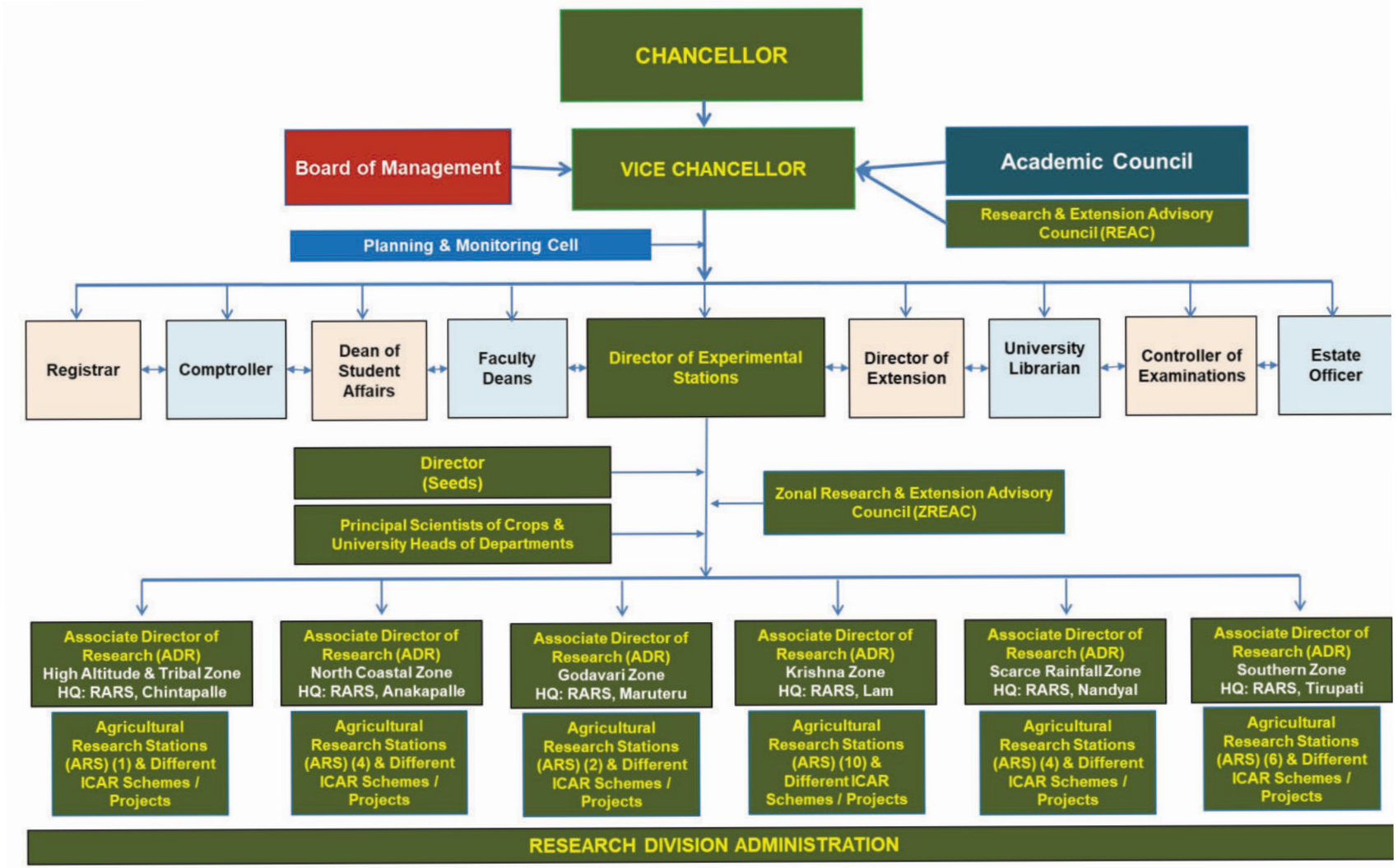
RESEARCH


CHANCELLOR
Board of Management
VICE CHANCELLOR
Academic Council
Research & Extension Advisory Council (REAC)
Planning & Monitoring Cell
Registrar
Comptroller
Dean of Student Affairs
Faculty Deans
Director of Experimental Stations
Director of Extension
University Librarian
Controller of Examinations
Estate Officer
Director (Seeds)
Principal Scientists of Crops & University Heads of Departments
Zonal Research & Extension Advisory Council (ZREAC)
Associate Director of Research (ADR) High Altitude & Tribal Zone HQ: RARS, Chintapalle
Agricultural Research Stations (ARS) (1) & Different ICAR Schemes / Projects
Associate Director of Research (ADR) North Coastal Zone HQ: RARS, Anakapalle
Agricultural Research Stations (ARS) (4) & Different ICAR Schemes / Projects
Associate Director of Research (ADR) Godavari Zone HQ: RARS, Maruteru
Agricultural Research Stations (ARS) (2) & Different ICAR Schemes / Projects
Associate Director of Research (ADR) Krishna Zone HQ: RARS, Lam
Agricultural Research Stations (ARS) (10) & Different ICAR Schemes / Projects
Associate Director of Research (ADR) Scarce Rainfall Zone HQ: RARS, Nandyal
Agricultural Research Stations (ARS) (4) & Different ICAR Schemes / Projects
Associate Director of Research (ADR) Southern Zone HQ: RARS, Tirupati
Agricultural Research Stations (ARS) (6) & Different ICAR Schemes / Projects
RESEARCH DIVISION ADMINISTRATION

The research for innovations in crop management and production to address the contemporary challenges was initiated before independence at research stations in lam, nandyal, anakapalle, rudrur, and after the formation of APAU in 1964, 41 Agricultural Research Stations under the Department of Agriculture and four Research Stations under the Animal Husbandry Department were transferred to the university in July 1966 and May 1967, respectively. With the acquisition of 41 Agricultural Research Stations and four Veterinary Research Stations at its inception, the University has diversified its research activities to address ongoing agricultural issues. To achieve these objectives, the University established

several new research stations focusing on specific crops and local areas across the state. By 2004, the number of research stations had increased to 66, with over 250 additional research schemes. The implementation of the National Agricultural Research Project (NARP) in 1979 also helped develop the infrastructure for research programs. The number of research stations increased from 45 to 66 by 2004, alongside the growth of faculty, scientists, supporting, and administrative staff.

Presently, from 2015, after bifurcation of the state, ANGRAU research is being carried out in 33 research stations including six Regional Agricultural Research Stations, spread over 26 districts of Andhra Pradesh.

The research activities of the University are mainly focused on crop improvement, crop production, crop protection, post-harvest management, farm mechanization, rainfed research, water management, soil health management, socio economic aspects, farmer centric extension studies etc. aiming at overall increase in agricultural production and reducing cost of cultivation besides solving location specific problems. In view of frequent occurrence of weather extremes such as droughts, floods and heat waves, the research efforts are intensified on millets and climate resilient agricultural production in the state.

Development of eco-friendly technologies for pest and disease management, addressing the biotic and abioticstresses in crops through frontier technologies like biotechnology, nanotechnology and through other innovations are remarkable. Research is also being carried out in basic sciences of agriculture, as a support to applied research. On-farm research is also conducted for evaluation and refinement of newly developed technologies in farmers' field conditions.

The 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.

CROP-WISE SALIENT RESEARCH CONTRIBUTIONS

RICE

Andhra Pradesh stands as one of the most significant rice-growing states in India. The newly formed state of Andhra Pradesh comprises 26 districts, with a current population of 496 lakhs, predicted to reach 591 lakhs by 2025, with a decadal growth rate of 9.21%. Rice cultivation in AP spans across 24.12 lakh hectares, yielding a production of 82.89 lakh tonnes of milled rice, with an average yield of 5.12 tonnes per hectare.

Acharya N.G. Ranga Agricultural University (ANGRAU), located in Guntur, Andhra Pradesh, has been steadfastly serving and meeting the needs of paddy farmers across the country and the state. Presently, rice research is conducted with a multi-disciplinary approach within the university, with the Regional Agricultural Research Station (RARS) at Maruteru leading in rice research. Other research stations dedicated to rice include Agricultural Research Stations (ARS) at Nellore, Bapatla, Ragolu, Machilipatnam, Jangamaheswarapuram, and Utukuru, along with the Regional Agricultural Research Station in Nandyal.

Rice Varieties developed and their Impact:

In the last 60 years, ANGRAU has developed 129 rice varieties, including two hybrids, released at the state and national levels. These varieties encompass 30 pure line selections from the pre-green revolution era, 91 high-yielding rice varieties, and two hybrids developed by different rice research stations located at Maruteru, Nellore, Bapatla, Ragolu, Nandyal, and Machilipatnam through crop improvement programs. ANGRAU also takes credit for the development and release of the first Brown Plant Hopper resistant variety, Vajram, in 1986 in the country. Additionally, it was the pioneer in developing and releasing rice hybrids in the country, namely, APHR-1 and APHR-2, in 1993.

Three prominent varieties, Swarna (MTU 7029), Samba Mahsuri (BPT 5204), and Cotton Dora Sannalu (MTU 1010), receive more than 100 quintals GOI breeder seed indent each year and are in high demand. These varieties also account for 60 percent of the total ANGRAU

rice varieties breeder seed indent. Cotton Dora Sannalu (MTU 1010) and Samba Mahsuri (BPT 5204) have the highest average annual cultivation area in the country (3.24 and 2.79 Mha, respectively), contributing significantly to the country's rice production economy with annual contributions of Rs. 13,705 and Rs. 8,587 crores, respectively, generating an average additional income of Rs. 652.6 and Rs. 587.5 crores annually. Similarly, Swarna (MTU 7029), Vijetha (MTu 1001), and Nellore Mahsuri (NLR 34449) contribute a share of 3.32, 2.89, and 1.84 percent, respectively, to the country's total rice revenue.

Other varieties released in recent years and in increasing demand at the national level are Chandra (MTU 1153) and Tarangini (MTU 1156), with more than 70 quintals GOI breeder seed indent over the years. These varieties are mostly cultivated in the states of Chattisgarh, Madhya Pradesh, Odisha, and West Bengal for export purposes under the Non-Basmati

category due to their long slender grain with a kernel length exceeding 6 mm and convenient duration of 120-125 days. MTU 1153, with its long slender grain and kernel length of 6.38 mm, around 50,000 ha in Odisha due to its high yield potential and resistance to Brown Plant Hopper (BPH). Similarly, Bheema (MTU 1140) is popularly grown for its submergence

L/B ratio of 2.95, coupled with a test weight of 23.5 g and high yield potential of 7 t/ha with BPH and blast tolerance, in addition to low grain shattering, has been rapidly replacing the traditional strongholds of MTU1010, the Mega rice variety, across the country and is preferred for export under the non-basmati category to African countries. MTU 1153 has achieved a milestone of Rs. 200 crore in public bred excellence and has proven to be a game-changer in generating increased returns and profits for farmers across the country, regardless of the agro-climatic and ecological situations.

The variety Pushyami (MTU 1075) is cultivated in more than 30,000 ha in West Bengal and tolerance in West Bengal in over 40,000 ha, while MTU Rice 1223 is grown in rainfed uplands of Chattisgarh in more than 1 lakh ha. Maruteru Samba (MTU 1224) and Maruteru Mahsuri (MTU 1262) are grown for their fine grain in Odisha and Telangana in an area of about 1.20 lakh hectares. Indra (MTU 1061), another predominant rice variety in Andhra Pradesh state after Swarna (MTU 7029) and Samba Mahsuri (BPT 5204), is popular in the state of Telangana for its salinity tolerance, high head rice recovery, and suitability for raw rice. Nellore Dhanyarasi (NLR 3354) and Nellore Mahsuri (NLR 34449) are popular in Tamil Nadu and are being grown in about 70,000 ha for their grain quality and tolerance to pests and diseases. Sravani (MTU

1239) is grown in Chattisgarh in about 1.30 lakh ha, while Sujatha (MTU 1210) is popular in the states of Odisha (50,000 ha), Telangana (10,000 ha), and West Bengal (20,000 ha). ANGRAU rice varieties occupy the lion's share in the state of Andhra Pradesh, with 15.57 lakh ha out of 17.42 lakh ha of Kharif rice grown area and 6.21 lakh ha out of 7.62 lakh ha of Rabi rice area under ANGRAU varieties. An output of 123.14 lakh tons was produced by cultivating ANGRAU rice varieties, accounting for 88 percent of the state's total rice production. The ANGRAU varieties, Sri Druthi (MTU 1121), Swarna (MTU 7029), and Samba Mahsuri (BPT 5204), are the most commonly grown, with 5.03, 3.5, and 3.34 lakh ha, respectively, during 2021-22. Other important ANGRAU rice varieties occupying more than 1.0 lakh ha in the state are Indra (MTU 1061) and Nellore Mahsuri (NLR 34449). The GOI breeder seed indents for 2022-23 reveal a maximum indent of 799.25 quintals for 33 ANGRAU rice varieties, accounting for 23.41 percent of the total GOI paddy breeder seed indent. ANGRAU has consistently ranked first compared to the country's other Rice Research Institutes and State Agricultural Universities regarding GOI breeder seed indent since 2015. Furthermore, 26.8 percent of ANGRAU's rice varieties receive regular indents from the GOI. Apart from the Central Indents received for Breeder Seed, ANGRAU also receives indents from Seeds Men Associations, Seed Production Societies, Agencies, and Progressive Seed Growers, accounting for more than 2000 quintals of Breeder Seed every year pertaining to more than 35 ANGRAU rice varieties, resulting in the generation of 2.5-3.0 crores of revolving funds.

In 2022, ANGRAU released four rice varieties through the Central Variety Release Committee

(CVRC) and three rice varieties through the State Variety Release Committee (SVRC). The CVRC varieties, namely MTU Rice 1273 and MTU Rice 1293, are short-duration introgressed lines of the Mega Rice Variety, MTU 1010, with a duration of 115-120 days, characterized by non-shattering nature and tolerance for BPH and blast. MTU 1293 is also tolerant to salinity. These varieties feature long slender grains with a kernel length exceeding 6mm and are highly suitable for export under the Non-Basmati category from Kakinada port to African countries. Additionally, MTU Rice 1310 and MTU Rice 1321 are high-yielding medium-duration, medium-slender grain type varieties with a duration of 140 days, boasting high head rice recovery and suitability for raw rice. These varieties received appreciation and acceptance from farmers in the Krishna zone during the Karif 2023 season. MTU Rice 1321 was reported to be preferred by consumers in the OFTs conducted by IRRI during 2023.

The SVRC varieties include MTU Rice 1318, highly non-lodging and popularly known as non-lodging Swarna, due to its high yield potential, non-ratooning nature, tolerance to submergence, and mild salinity, despite its slightly longer duration of 5-7 days compared to Swarna. It has replaced more than 2.0 lakh ha. of Swarna, MTU 1061, and MTU 1064 areas, particularly in the Godavari, Krishna, and North coastal zones of Andhra Pradesh, poised to become a mega rice variety in the coming years. Furthermore, MTU Rice 1232 is highly tolerant to submergence and flash floods for up to one month, even after 15 days of age in the nursery, while MCM Rice 103 meets the long-standing demand for a 140-day duration, fine grain, and salinity-tolerant variety.

In 2023, two rice varieties, namely, MTU Rice 1275 and BPT 3050, were released under CVRC, while MTU Rice 1271 and BPT 2846, fine grain, high-yielding alternatives with high HRR and good cooking quality, were released as alternatives to BPT 5204. The first low glycemic index, high antioxidant activity black rice variety BPT 2841, along with the first Zinc biofortified rice variety, NLR Rice 3238, were released under SVRC and are in high demand from farmers in Telangana, Tamil Nadu, and Karnataka.

It is estimated that 14 million hectares of rice area in the country are under ANGRAU rice varieties,

resulting in an average annual production of about 38 million tonnes, accounting for approximately Rs. 62,317 crores of revenue generation annually, equivalent to 33.15 per cent of the total revenue generated from rice production, and contributing about 2.22 per cent to the country's Agriculture GVA. ANGRAU rice varieties also account for 33 per cent of the total non-basmati rice exports from the country, resulting in an annual export revenue of Rs. 8,073 crores. ANGRAU rice varieties are consumed by one out of every three Indian families with rice as their staple food and by nine out of every ten families in the state of Andhra Pradesh. State rice farmers are estimated to have earned Rs. 20,243 crores through the cultivation of ANGRAU rice varieties.

Genetic Stocks and Other Technologies:

MTU IJ 206-7-4-1 (BM 71) and MTU 1184, along with BPT 2848 and MCM 109, have been registered as trait-specific genetic stocks with NBPGR, New Delhi. These registrations cover traits such as BPH resistance, submergence tolerance, high protein content, and salinity tolerance, providing valuable resources for Rice Research Scientists.

Way Ahead :

- Development of climate-resilient rice varieties, market-aligned breeding, biofortified rice, and varieties for organic farming.
- Sustaining rice productivity under changing climates, improving nutrient use efficiency, conducting carbon sequestration studies, and managing crop residues.
- Research on rice host plant resistance, early warning systems, and integrated pest and disease management.
- Redesigning rice plant types to enhance photosynthetic efficiency and productivity under elevated CO2 levels. Research includes studies on photoperiod and thermosensitivity, dormancy, grain shattering, and lodging of varieties.
- Mechanization of seed-to-seed processes and the development of AI-controlled irrigation, fertilization, weeding, and plant protection equipment.

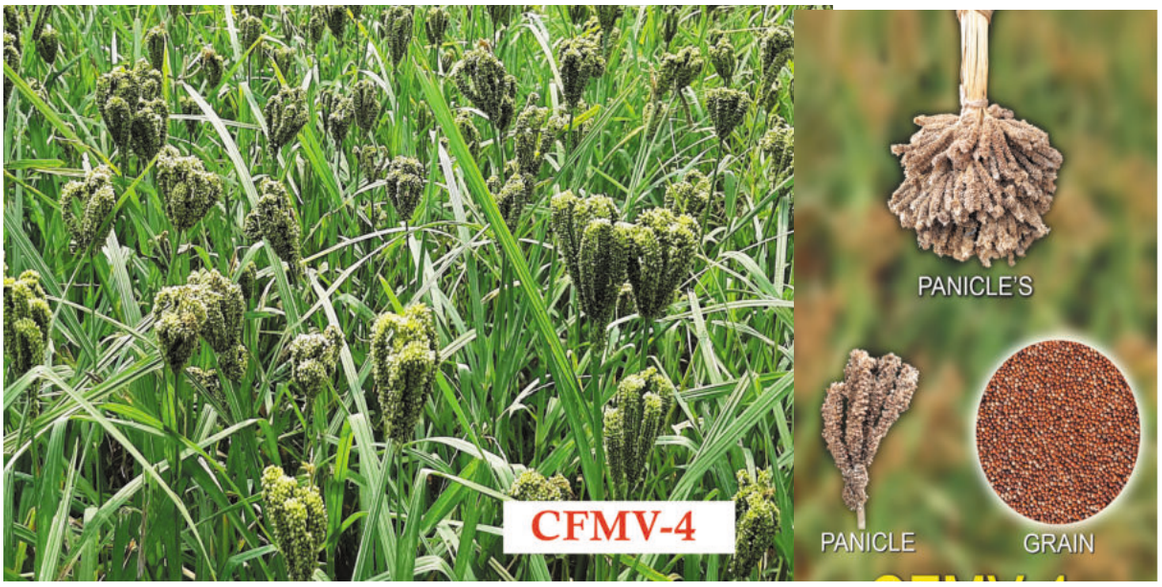
MILLETS

Millets have been an integral part of agriculture and food systems for centuries, offering unique nutritional benefits and resilience in diverse agro-climatic conditions. In the context of Andhra Pradesh, the pioneering efforts of Acharya N.G. Ranga Agricultural University (ANGRAU) have significantly contributed to the research and development of millets. ANGRAU, a premier institution in agricultural research and education, has played a pivotal role in advancing sustainable farming practices and ensuring food security in the region. As the world celebrates the International Year of Millets in 2023, it is essential to recognize the critical role of millets in addressing global challenges such as malnutrition, climate change, and biodiversity loss. Millets are not only nutritious and environmentally sustainable but also contribute to the livelihoods of millions of smallholder farmers worldwide.

Historical Overview of Millets Research Network at ANGRAU

The journey of millet research at ANGRAU spans several decades, marked by significant milestones and achievements. Established with the vision of promoting agricultural innovation and rural development, ANGRAU has been a pioneering force in millet research for over 60 years. During this period, the university has made remarkable strides in enhancing the productivity, resilience, and nutritional value of millet crops. Key research centres such as Regional Agricultural Research Station (RARS), Nandyal, Agricultural Research Station (ARS), Vizianagaram, and ARS, Perumallapalle have been instrumental in conducting ground-breaking research and disseminating knowledge to farmers across the state. Furthermore, other affiliated centres have contributed significantly to advancing millet research, solidifying the university's position as a leader in agricultural innovation.

For maize, primary centres include ARS Peddapuram, established in 2016, and RARS Lam, Guntur, which recently assumed responsibilities from ARS Vijayarai, a verification centre initiated in 2018. Regarding sorghum, main research activities are centred at RARS Nandyal, a significant centre since 1906, which recently integrated the AICRP on Sorghum in 2017. Sub-centres encompass the Agricultural College Farm in Bapatla, relocated in 2017, and ARS Podalakur, reinitiated to focus on varieties suitable for coastal areas. Pearl millet research is anchored at ARS Ananthapuramu,



a sub-centre for the AICPMIP since 1972, with additional contributions from the original centres at Dharmavaram and Peddapuram, both of which have since shifted. Verification centres for pearl millet are located at ARS, Podalakuru and ARS, Perumallapalle, with the latter also playing a pivotal role in finger millet research since 1967 and becoming a voluntary centre for AICRP on small millets in 2000. Finger millet research is further supported by ARS, Vizianagaram, active since 1986 under the AICRP on small millets. Foxtail millet research is concentrated at RARS, Nandyal, a primary centre since 1978 under the AICRP on Small Millets. Additional efforts for other millets include research on proso millet at RARS, Lam, Guntur, since 2015, and work on little millet and barnyard millet at ARS, Vizianagaram and RARS, Nandyal, respectively. ARS, Perumallapalle also contributes to research on little millet. This comprehensive network of research stations ensures a robust and coordinated approach to developing high-yielding, disease-resistant varieties of these critical crops, tailored to the diverse agro-climatic zones of Andhra Pradesh.

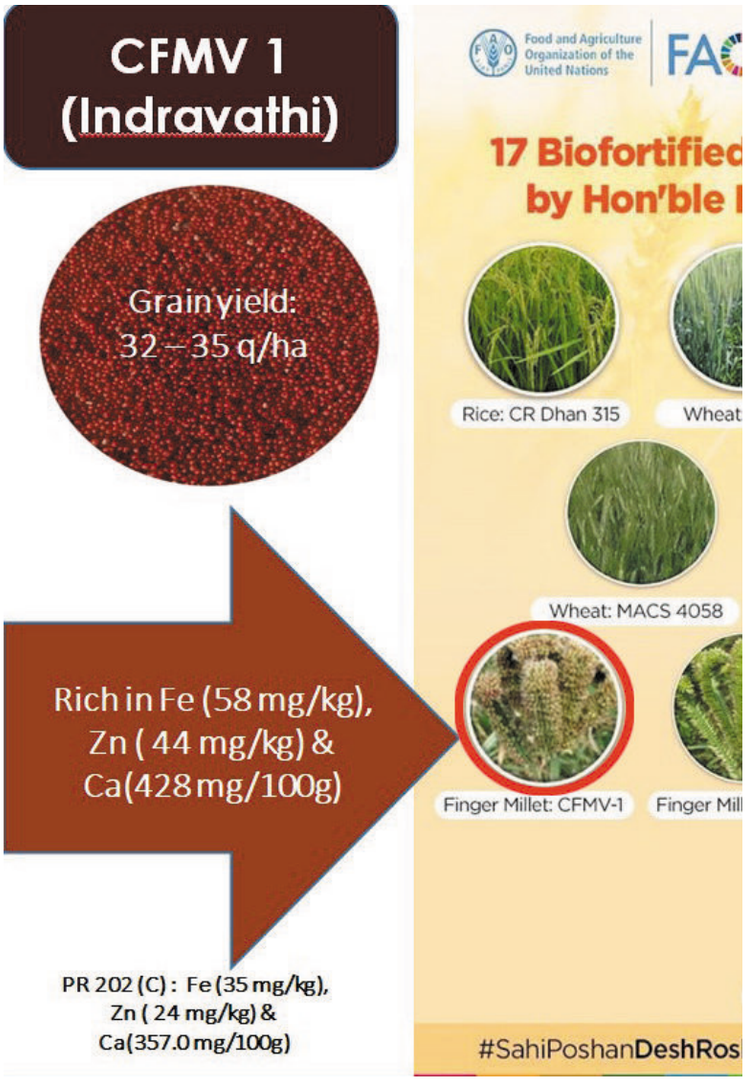
Development of High-Yielding, Disease-Resistant Millet Varieties

ANGRAU has been at the forefront of breeding programs aimed at developing millet varieties with superior traits. Through meticulous selection and cross-breeding, researchers have succeeded in creating high-yielding varieties that are resilient to prevalent diseases and pests. These varieties not only ensure a more robust harvest but also contribute to the overall resilience of agricultural ecosystems.

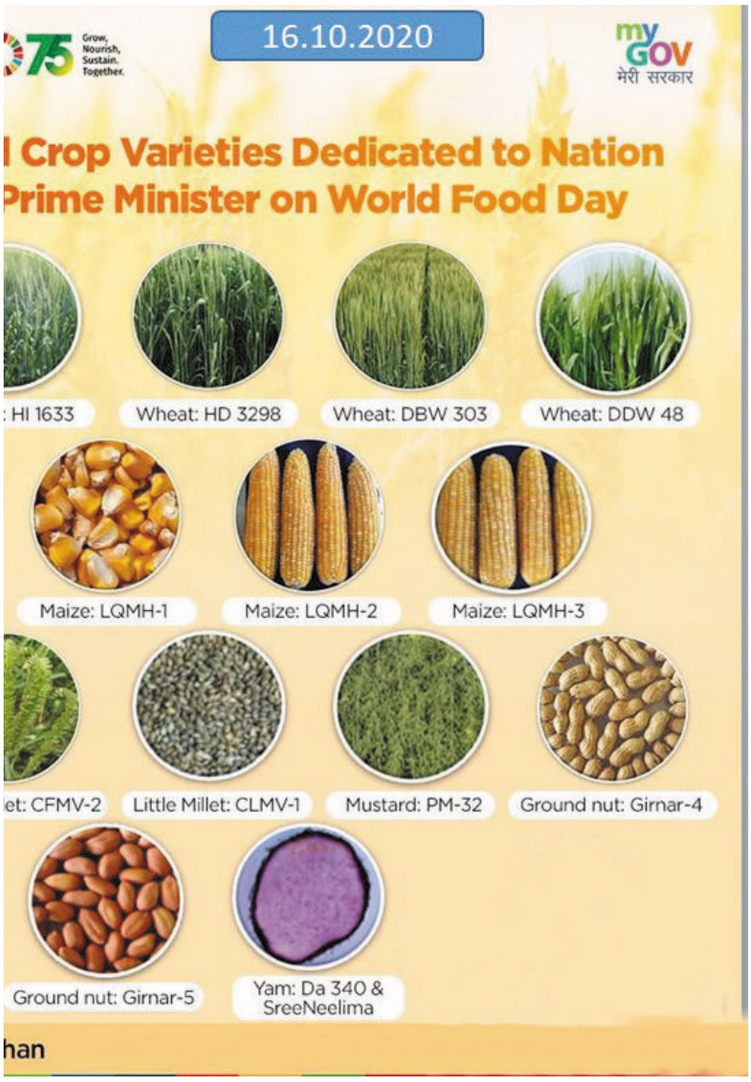
Sorghum: Over the years, the Research Stations of ANGRAU in Andhra Pradesh have diligently introduced numerous sorghum varieties tailored precisely to the region's agricultural requirements, encompassing both white and yellow sorghum types. Each variety, meticulously developed and released, possesses distinctive traits and is adeptly suited to specific soil types and climates. NTJ 1 (Nandyala Tella Jonna-1), debuted in 1988 from the RARS in Nandyal, emerges as a standout white sorghum variant, boasting higher grain yield, a short duration of 105 days, and resilience to drought and lodging. Following suit, NTJ 2, introduced in 1989, maintains the trend of high yield with a slightly shorter duration. Meanwhile, NTJ 3, released in 1995, shines as another high-yielding white sorghum, boasting extended dual-purpose capabilities and non-lodging characteristics. The introduction of NTJ 4 in 2002 highlights advancements in resilience to specific pests and diseases. Moreover, NTJ 5, a recent addition in 2018, revolutionizes with its high yield and suitability for mechanical harvesting. The yellow sorghum varieties, dating back to 1933, exhibit diverse traits catering to varying soil fertility levels and climatic conditions. From N-1 to N-15, these varieties offer improved yields

and tolerance to adverse conditions, ensuring sustained agricultural productivity. Furthermore, contributions from ARS stations outside Nandyal, such as Podalakur Jonna (PJ-890) and Teepi Jonna (AJ 140), underscore the collaborative efforts to enhance agricultural diversity and resilience. Altogether, these sorghum varieties reflect a continuous commitment to innovation and improvement, significantly enriching the agricultural landscape of Andhra Pradesh.

Pearl Millet: Pearl Millet variety Vijaya, released in 1971 from ARS Vizianagaram, is notable for its 75-85 days duration and 15-16 q/ha yield, recommended for all bajra growing areas in A.P. Following in 1976, Visaka, also from ARS Vizianagaram, offers a similar duration with enhanced yield, suitable for North Coastal districts. Balaji, released in the same year from ARS Perumallapalle, exhibits downy mildew resistance and suits the southern zone with its compact ear heads and bold grain. Nagarjuna, from RARS Lam, released in 1976, is tailored for Prakasam, Anantapur, Nalgonda, and Mahaboobnagar districts. Ananta, a synthetic variety released in 1996 from ARS Anantapur, boasts tolerance to downy mildew and caters to Kurnool and Anantapur districts. Lastly, ABV-04, a biofortified variety released in 2019 from ARS Ananthapuramu, stands out with its high iron and zinc content, along with impressive grain and fodder yields, making it a promising addition to pearl millet cultivation in the region.



Finger Millet: The evolution of Finger Millet varieties released from ANGRAU of Andhra Pradesh spans several decades, revealing a concerted effort towards refining traits such as duration, yield potential, and disease resistance. Commencing in 1958 with VZM 1 and VZM 2, which catered to late kharif and late rabi irrigated conditions respectively, the varieties evolved over the years to address diverse agricultural contexts. Simhadri (VR 256-6) emerged in 1985, boasting increased yield potential and adaptability to late rabi irrigated conditions. Subsequent varieties like Suraj (VR 520) in 1992 and Champavathi (VR 708) in 1997 offered specific advantages, such as early kharif suitability and short duration growth, respectively. The trend continues with later releases like Bharathi (VR 762) in 2006 and SriChaitanya (VR 847) in 2009, which emphasize adaptability to both kharif and rabi seasons, alongside enhanced yield potential and disease resistance. Recent releases, exemplified by Suvarnamukhi (VR 988) and Vegavathi (VR 929) in 2019, prioritize resistance to diseases and nutrient richness, catering to contemporary agricultural challenges. Notably, newer varieties like Indravathi (VR 1101) in 2020 and Gosthani (VR 1099) in 2022 exhibit advanced traits such as purple pigmentation, disease tolerance, and nutrient richness, reflecting a continuous refinement towards sustainability and productivity. Additionally, variants from other research stations, such as PR 202 (Godavari) from ARS Peddapuram in 1974 and Kalyani from ARS Perumallapalle in 1971, underscore collaborative efforts in varietal development, each tailored to specific regional requirements



and agronomic constraints. This chronicle of releases underscores a trajectory of innovation aimed at bolstering agricultural resilience and productivity in Andhra Pradesh.

Foxtail Millet: The foxtail millet variety "Arjuna," released in 1969 at RARS, Lam, boasts a grain yield of 16-20 quintals per hectare (q/ha) with a relatively short growth duration of 80-85 days. It stands tall at 115-120 cm and is particularly suitable for black and red soils in specific districts. Subsequent varieties, such as "Chitra," released in 1982 from ARS, Anantapur, and "Prasad," from RARS, Nandyal in 1985, continue the trend of moderate grain yield and growth duration, each tailored to suit specific soil conditions and regions within Andhra Pradesh. "Lepakshi," introduced in 1989, stands out for its adaptability to shallow soils and low rainfall conditions, emphasizing resilience and suitability for challenging environments. The 1990s saw the release of several varieties, including "Krishnadevaraya" in 1993 and "Narasimharaya" in 1994, both from RARS, Nandyal. These varieties exhibit nuanced differences in plant height, panicle structure, and seed characteristics, reflecting ongoing efforts to refine and diversify foxtail millet cultivars to meet varied agricultural needs. As we move into the 21st century, newer varieties such as "Srilakshmi," released in 2002, and "SiA 3085," in 2011, demonstrate advancements in yield potential, plant height, and disease resistance. "Suryanandi," introduced in 2012, stands out for its suitability for double cropping and impressive grain yield, indicating a focus on enhancing productivity and sustainability in agricultural practices. The most recent additions, "Garuda" and "Renadu," released in 2020, offer unique traits such as extra-early duration and high grain and fodder yield, respectively. These varieties underscore the ongoing research and development efforts aimed at addressing evolving agricultural challenges and maximizing productivity in foxtail millet cultivation. The variety "Mahanandi," released in 2022, is characterized by its medium duration and high protein content, reflecting a concerted effort to enhance nutritional value alongside agronomic performance. Collectively, these foxtail millet varieties represent a continuum of research-driven innovation aimed at bolstering agricultural productivity, resilience, and sustainability in Andhra Pradesh and beyond.

Proso Millet: The first Proso Millet variety, Vaarada, emerged in 1971 from RARS, Lam. It boasts a duration of 80-85 days, with a grain yield ranging from 15-20 q/ha. Standing tall at 90-100 cm, it exhibits profuse tillering, while its bold and grey grains render it suitable for all areas in the state. Following Vaarada, Nagarjuna (L1387) was introduced in 1988, featuring a shorter duration of 60-65 days and a higher grain yield of 20-25 q/ha. Its compact stature of 80-90 cm, coupled with drought tolerance and semi-loose panicles, underscores its adaptability. Sagar (L5224), also released in 1988 from RASR, Lam, showcases a similar duration of 80-85 days but yields 25-30 q/ha. With a taller stance of 100-110 cm and 6-8 effective tillers, its olive-grey grains exemplify resilience in drought-prone

regions. Lastly, Manasa (L 4863), unveiled in 1994, mirrors the characteristics of Sagar with an 80-85 day duration and a yield of 25-30 q/ha. Its suitability for all variga growing areas in the state, coupled with drought tolerance, solidifies its standing in the agricultural landscape. Each variety, delineated by its unique traits and release year, contributes to the agricultural diversity of Andhra Pradesh, catering to varied climatic conditions and farming practices.

Challenges in Millet Production

Soil Health and Fertility Management: Millets thrive in well-drained, fertile soils. However, maintaining soil health and fertility poses a challenge, especially in regions where millet cultivation is prevalent. Soil degradation due to continuous cultivation, erosion, and improper nutrient management can hinder millet productivity.

- **Water Scarcity and Drought Conditions**: Millets are known for their resilience to drought and low water requirements compared to other cereal crops. Nevertheless, extreme weather events, erratic rainfall patterns, and water scarcity pose significant challenges to millet production. Developing drought-tolerant varieties and implementing efficient water management techniques are essential to mitigate these challenges.
- **Pest and Disease Management Issues**: Millets are susceptible to various pests and diseases, including blast, smut, downy mildew, and pests like aphids, stem borers, and shoot flies. Integrated pest management strategies, including resistant varieties, cultural practices, and biological control methods, are crucial to minimize yield losses and ensure sustainable millet production.
- **Market Accessibility and Supply Chain Constraints**: Limited market access and inefficient supply chains pose challenges for millet farmers, particularly smallholders. Inadequate infrastructure, such as storage facilities and transportation networks, contribute to post-harvest losses and reduce farmers' profitability. Strengthening market linkages and improving supply chain infrastructure are vital to enhancing millet farmers' income and market competitiveness.

Future Prospects

1. Research should prioritize traits like drought tolerance, heat resistance, and pest resistance to ensure stable yields in diverse agro-climatic conditions.
2. Future research should prioritize breeding efforts aimed at enhancing the nutritional profile of millets, such as increasing micronutrient content and improving amino acid composition.
3. Research should focus on innovations in planting techniques, water management strategies, intercropping systems, and pest management practices to enhance productivity while minimizing environmental impacts.
4. Establishing joint research projects, technology transfer agreements, and knowledge-sharing platforms can facilitate the co-development of solutions that address the needs of both producers and consumers.
5. Public-private partnerships can play a crucial role in developing market linkages, improving post-harvest handling practices, and promoting value addition through processing technologies.
6. Implementing policies that incentivize millet cultivation through price support mechanisms, input subsidies, and insurance schemes can enhance the economic viability of millet farming.
7. Establishing dedicated research centres or consortia focused on millet research can catalyze innovation and knowledge generation in this neglected crop sector.
8. Participating in collaborative research projects, joint training programs, and scientific exchanges can facilitate cross-border learning and innovation diffusion.

PULSES

In Andhra Pradesh, the primary pulse crops include chickpea, blackgram, greengram, and redgram, with minor pulses such as horsegram, cowpea, and rajmash also being cultivated within various cropping systems across the state. The Pulses Research initiative, established under the All India Coordinated Project at Rajendranagar in 1971-72, was intensified and later relocated to Lam in 1980-81. This initiative focuses on several

key objectives:

- Developing and identifying early-maturing, high-yielding pulse varieties that are resistant to major diseases and pests specific to different years and seasons in the state through a multidisciplinary approach.
- Standardizing various agricultural and plant protection techniques to maximize yields in different pulse crops.
- Disseminating improved production technologies through capacity-building programs and conducting frontline/on-farm demonstrations.

Pulses Research Centers at ANGRAU operates a network of research centres dedicated to pulse crops, categorized into two main types: major research centres and verification/seed production centres. Each type plays a specific role in advancing pulse crop research and development.

Leading the pulse crop research are the major research centres, including RARS, Lam; RARS, Nandyal; and ARS, Ghantasala. Established in 1980, RARS, Lam serves as the primary research hub for Greengram and Blackgram under the All India Coordinated Research Project (AICRP), with an additional focus on Pigeonpea research. Similarly, RARS, Nandyal, designated as the AICRP main centre for Chickpea research since 2015, contributes significantly to the comprehensive study of Chickpea cultivation. ARS, Ghantasala, established in 2015, specializes in research on Rice fallow pulses, exploring pulses suitable for rice fallow areas.

Moreover, voluntary centres such as RARS, Tirupati; ARS, Podalakur; and ARS, Ragole, actively participate in pulse crop research initiatives, further enriching the research landscape within ANGRAU.

Additionally, the text highlights the pivotal role of verification/seed production centers, such as the Regional Agricultural Research Station (RARS) at Chintapalli, Agricultural Research Station (ARS) at Darsi, and ARS at Peddapuram, in verifying research findings and ensuring seed production for various pulse crops across different regions. These centres contribute significantly to disseminating research outcomes and ensuring the availability of high-quality pulse seeds for farmers. This concerted effort by ANGRAU's pulse research centres plays a crucial role in advancing the sustainability and productivity of pulse crop cultivation in the region, ultimately benefiting agricultural communities and promoting food security.

Blackgram:

In blackgram, the initial variety, LBG 17, was released in 1985 and boasts resistance to powdery mildew. Subsequent varieties, such as LBG 402 (1988) and LBG 20 (Teja, 1989), exhibit resistance to wilt and YMV, respectively. Throughout the 1990s, multiple varieties were introduced with resistance to various diseases; notable examples include LBG 611 (1993) and LBG 22 (Lam 22, 1994), both resistant to wilt, and LBG 648 (1996), which offers resistance to multiple diseases. High-yielding varieties like LBG 623 (1997) and LBG 685 (1999) also emerged during this period. In the early 2000s, varieties like LBG 645 and PBG 1 (Podalakur minumu) were introduced, the latter being photo-insensitive with dull seeds. The year 2006 witnessed the release of LBG 709, known for its tolerance to YMV. More recent releases include LBG 752 (2009), tolerant to MYMV and photo-insensitive, along with several MYMV-resistant varieties like TBG 104 (2017) and GBG 1 (2018). The latest

additions, LBG 884 and LBG 904, both released in 2023, exhibit resistance to MYMV, with LBG 904 additionally demonstrating tolerance to leaf curl virus. Another 2023 variety, TBG 129, offers resistance to YMV. This progression of releases underscores ongoing efforts to enhance disease resistance and yield in blackgram cultivation.

Greengram:

The earliest greengram variety, LGG 127 (Kondaveedu), was released in 1980 and is renowned for its early maturation and high yield. In 1993, two additional varieties were introduced: LGG 407 (Lam 407), resistant to Yellow Mosaic Virus (YMV) and Angular Leaf Spot (ABLS), and LGG 450 (Pushkara), resistant to pre-harvest sprouting. The following year, 1994, witnessed the release of LGG 410, another YMV-resistant variety. In 1997, LGG 460 (Lam 460) was introduced, offering YMV resistance and featuring top bearing. TM 96-2 (Trombay pesara), released in 2006, boasts resistance to powdery mildew. Recent releases include LGG 574 in 2022, tolerant to Mungbean Yellow Mosaic Virus (MYMV) and suitable for rabi season cultivation, along with LGG 607, also resistant to MYMV. In 2023, two more varieties, LGG 630 and LGG 600, were introduced, both resistant to MYMV, with LGG 600 also suitable for rabi cultivation. This progression underscores a concerted effort to develop disease-resistant varieties, thereby bolstering crop resilience and yield.

Redgram:

The redgram variety LRG 30, known as Palnadu, was introduced in 1980 and is noted for its regeneration capacity and high yield. In 1989, ICPL 332, or Abhaya, was released with moderate resistance to pod borer. The variety introduced in 1997, ICPL 85063, called Lakshmi, is suitable for the rabi season and has bold seeds. LRG 38, or Ranga Bold, introduced in 2002, is high-yielding and less susceptible to pod borer. Lam 41, also known as LRG 41, released

in 2006, shows tolerance to the Helicoverpa pod borer. TRG 22, referred to as Tirupati Kandi-1, was introduced in 2010 and is tolerant to terminal moisture stress. In 2015, LRG 52, named Amaravathi, was released with moderate tolerance to wilt. Three varieties were released in 2020: LRG 105 (Krishna), which is resistant to wilt and Sterility Mosaic Disease (SMD); LRG 133-33 (Sowbhagya), resistant to wilt; and TRG 59 (Tirupati Kandi-59), which shows tolerance to both wilt and SMD. Each variety was developed to address specific agricultural challenges, contributing to improved redgram cultivation in the region.

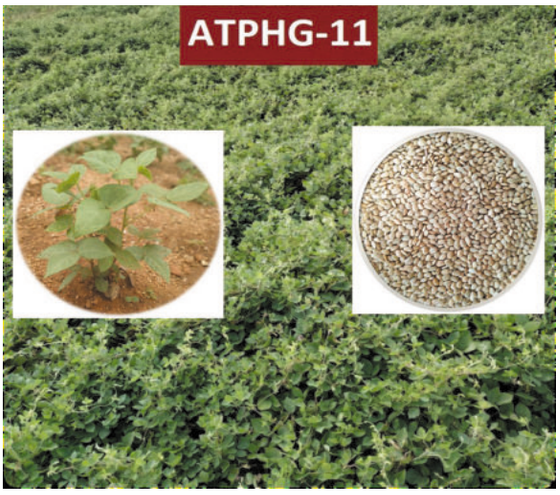
Bengalgram:

In Bengalgram, the earliest variety, Jyothi, was released in 1980, renowned for its high yield. ICCC 37 (Kranthi), introduced in 1989, is notable for its resistance to dry root rot. In 1993, ICCV 2 (Swetha) was released as an early maturing Kabuli type. Lam Shanaga 7 (LBeG 7), released in 2006, offers tolerance to wilt. NBeG 3 (Nandyala Sanaga 1), introduced in 2013, is a Desi type tolerant to both drought and wilt.

Several varieties were released in 2017: NBeG 47 (Dheera), a Desi type suitable for mechanical harvesting, and NBeG 49 (Nandyal Gram 49), which is wilt-tolerant. Subsequent releases include NBeG 119 (Nandyal Gram 119) in 2016, a Kabuli type for the South Zone, and NBeG 452 (Nandyal Gram 452) in 2020, a high-yielding Desi type also tolerant to wilt. In 2021, NBeG 810 (Nandyal Gram 810), a Kabuli variety for the West Central Zone and North Western Plains Zone, and NBeG 857 (Nandyal Gram 857), which is wilt-tolerant, were released. The latest varieties, released in 2023, include NBeG 776 (Nandyal Gram 776), suitable for mechanical harvest, NBeG 924 (Nandyal Gram 924), wilt-tolerant and released for the Eastern Central Zone, and NBeG 1267 (Nandyal Gram 1267), which is wilt-tolerant and released for the South Zone. These releases reflect a continuous effort to enhance disease resistance, yield, and suitability for different agricultural practices and regions.

Horsegram:

The horsegram variety, ATPHG-11 (Anantha Vulava-1), released by ANGRAU in Andhra Pradesh, was officially notified in 2021. One of its notable characteristics is its resistance to dry root rot, a significant disease affecting horsegram crops. Additionally, ATPHG-11 exhibits tolerance to Yellow Mosaic Virus (YMV), which is crucial for maintaining crop health and yield. These specific features make ATPHG-11 a robust and resilient variety, likely to perform well under various agricultural conditions while ensuring better productivity and reducing the risk of disease-related losses.



Cowpea:

The cowpea variety TPTC 29, also known as Tirupati Cowpea-1, was officially notified in the year 2017. This particular variety is versatile and can be cultivated during multiple seasons, including Kharif (monsoon), Rabi (winter), and Summer. Such adaptability across different growing seasons makes TPTC 29 a valuable choice for farmers seeking to optimize their crop production throughout the year. The introduction of this variety likely aims to enhance agricultural productivity and sustainability in the region.

Fieldbean:

The first variety, TFB 1 (Tirupati Field Bean 1), was released in 2006. This variety is characterized by its early maturing trait, making it suitable for cultivation in all seasons, thereby providing flexibility and potentially allowing for multiple cropping cycles within a year. The second variety, TFB 2 (Tirupati Field Bean 2), was released in 2010. Unlike TFB 1, TFB 2 is a long-duration variety, which also adapts well to all seasons. The longer growth period of TFB 2 could imply benefits such as higher yield potential or suitability for specific agricultural practices. The adaptability of both varieties to all seasons indicates their robustness and the potential for widespread cultivation in diverse climatic conditions within the region.

Technologies developed:

1. Standardized agricultural techniques have been developed for all pulse crops, including those unique to rice fallow areas in Andhra Pradesh. These techniques encompass seed rate determination, optimal sowing times, fertilization and weed management strategies, drought mitigation practices, foliar nutrition, and irrigation methods.
2. Sources of resistance to major pests and diseases have been successfully identified across all pulse crops cultivated in Andhra Pradesh.
3. Numerous pulse genotypes have been contributed to All India Coordinated Trials, facilitating broader evaluation and dissemination of promising varieties.
4. Integrated pest and disease management technologies have been developed, focusing on critical areas such as viral and fungal diseases, as well as management strategies for Maruca and Helicoverpa infestations, along with addressing soil-borne diseases.
5. Additionally, pulse varieties have been developed to be amenable to mechanical harvesting, enhancing efficiency and productivity in pulse cultivation practices.

Impact of most prominent varieties:

The development of new high-yielding pulse varieties and technologies has spurred an expansion in pulse cultivation areas and a boost in productivity. Significant shifts in both the area and productivity of various pulse crops have been observed between the crop years 1981-82 and 2023-24. During this timeframe, Bengalgram cultivation area saw a substantial rise from 52,000 to 311,000 acres, accompanied by an impressive surge in productivity from 462 kg/ha to 1421 kg/ha, representing a notable 208% increase. Similarly, Blackgram cultivation area expanded from 225,000 to 308,000 acres, with productivity soaring from 566 kg/ha to 1247 kg/ha, marking a 120% increase. Despite a slight decline in the area from 248,000 to 232,000 acres, Redgram witnessed a marginal uptick in productivity from 243 kg/ha to 321 kg/ha, indicating a 29% productivity rise. Despite a significant decrease in cultivation area from 561,000 to 75,000 acres, Greengram experienced a remarkable surge in productivity from 373 kg/ha to 1027 kg/ha, showcasing a notable 175% increase. These findings underscore the substantial impact of variety selection and agricultural practices on pulse crop cultivation, emphasizing the potential for enhanced productivity and agricultural efficiency over time.

Future plans:

1. Utilization of pre-breeding strategies to incorporate multiple resistances.
2. Development of mapping populations to map genes controlling major biotic and abiotic stresses, as well as nutritional and anti-nutritional factors.
3. Exploitation of genetic resources using biotechnological tools.
4. Identification of new molecules for controlling emerging pests, diseases, and weeds.
5. Development of new Integrated Crop

Management (ICM), Integrated Pest Management (IPM), and Integrated Disease Management (IDM) strategies.

6. Identification of bio-agents for disease and pest control.
7. Implementation of farmer/private seed industries participatory breeding strategies and seed production.
8. Development of early pigeonpea entries (120-140 days) tailored for Ananthapuramu and Prakasam districts, particularly suitable for light soils and low rainfall areas.
9. Development of weather forecast models for forecasting important pests and diseases of pulses.
10. Identification of new post-emergence herbicide molecules suitable for Bengalgram.
11. Development of pulse varieties and technologies specifically tailored for organic farming.

COTTON

Cotton holds a central position in the agricultural landscape of Andhra Pradesh, renowned for its high-quality fibre and boasting the highest productivity of cotton in India. This "white gold" crop significantly impacts the state's economy, social fabric, and industrial development, highlighting its widespread influence and essential role in daily existence. Cotton cultivation serves not only as a source of income for farmers but also as the lifeblood of the textile industry. Additionally, cottonseed, a valuable by-product, provides edible oil and livestock feed, showcasing the crop's multifaceted economic importance. This integrated network of contributions underscores cotton's indispensable role in both rural livelihoods and urban industries within Andhra Pradesh.

With a rich history dating back to the Kakatiya dynasty (1083-1323 CE), cotton cultivation in Andhra Pradesh saw a transformative period with the introduction of American varieties in the 19th century. This innovation propelled the state to become a leading cotton producer in the 20th century. To meet the demands of the textile industry during the Industrial Revolution, the British established Cotton Agriculture Farms in India during 1906. Headquartered in Coimbatore, these farms, along with those in Nandyal, Bellary, and Dharwad, played a pivotal role in producing quality cotton seeds for distribution and large-scale cotton production. Similarly, in 1922, an Agricultural Research Farm was established at Lam to capitalize on the region's fertile black soils.

Overview of ANGRAU's Contributions to Cotton Research and Development

Acharya N.G. Ranga Agricultural University (ANGRAU) stands as a pivotal force in propelling Andhra Pradesh's cotton sector forward, enriching the region's agricultural landscape with its rich heritage of cotton cultivation. Emphasizing the development of

high-yielding extra-long staple (ELS) American cottons post the construction of the Nagarjuna Sagar Project in 1956, research on ELS American cotton commenced in Narasaraopet, Guntur District, in 1958. This endeavour led to the relocation of the research facility to Amaravathi, Guntur District, in 1962, and eventually to the Agricultural Research Station in Lam, Guntur, in 1978. The All-India Coordinated Research Project on Cotton, established in 1971-72 at Amaravathi, later shifted to Lam in 1977-78. This multidisciplinary initiative aimed to conduct comprehensive research, with the Regional Agricultural Research Station in Lam as the main centre and the Regional Agricultural Research Station in Nandyal as the sub-centre. Additionally, cotton research was also conducted at ARS, Adilabad, ARS, Mudhol, and RARS, Warangal, until 2014, in the unified Andhra Pradesh. Post the state's bifurcation in 2014, ongoing research primarily takes place at the RARS, Lam as the main centre, with the RARS, Nandyal serving as the sub-centre, effectively catering to the needs of cotton farmers.

The formative years of cotton research at ANGRAU, spanning from 1964 to 1994, laid the groundwork for future advancements. During

this period, pioneering researchers established the essential infrastructure for cotton research, including breeding stations and germplasm collections. Their initial efforts were focused on understanding the unique agro-climatic conditions of Andhra Pradesh and identifying cotton varieties suitable for the region. Significant achievements included the development of high-yielding varieties tailored to local conditions and the formulation of best practices for sowing, crop management, and pest control.

NANDYAL COTTON -26 (*G.hirsutum*)
(NDLH – 2056- 4)

The Regional Agricultural Research Station (RARS) in Lam played a pivotal role in these early successes. They spearheaded the development of several noteworthy cotton varieties. Among these, AC 122 (Krishna), released in 1968, stands out for its remarkable tolerance to bollworm and its suitability for cultivation in rice fallows and summer seasons across districts like Nellore, Krishna, Prakasam, and Guntur. With a seed cotton yield of 25 q/ha and a ginning out turn (GOT) of 33.0%, it has consistently demonstrated resilience and high productivity. Another significant variety, LPS 141 (Kanchana), introduced in 1987, is notable for its tolerance to whitefly, Alternaria, and Myrothecium leaf spots, rendering it suitable for cultivation across all cotton-growing areas of Andhra Pradesh. Its impressive yield potential of 25 q/ha and GOT of 35.0% underscore its value to cotton farmers. Additionally, the Lam hybrid-1, a cross between *G.hirsutum* varieties, released in 1988, exhibits a yield potential of 30-35 q/ha and a GOT of 36.0%, while also demonstrating tolerance to leaf hoppers and Alternaria leaf spot disease. Its early maturing nature and suitability for rice fallows and cotton-based cropping systems further augment its appeal. Other notable varieties like LK 861 (1993) and L 389 (1993) bring their own set of advantages, including high yield, immunity to pests, and resilience to adverse conditions, thereby contributing to the diversity and adaptability of cotton cultivation in Andhra Pradesh.

Over the subsequent three decades, spanning from 1994 to 2024, ANGRAU witnessed a significant expansion in cotton research activities. During this period, the research scope broadened considerably, incorporating endeavours to enhance fibre quality, develop disease-resistant breeds, and formulate strategies to combat emerging insect pests. Alongside these efforts, new technologies like hybridization and radiation mutagenesis were embraced for breeding purposes. ANGRAU fostered active collaborations with national institutions, notably the Central Institute for Cotton Research (CICR), leveraging their expertise and gaining access to elite germplasm resources.

The Regional Agricultural Research Stations (RARS) at Nandyal and Lam played pivotal roles in tailoring new cotton varieties to meet Andhra Pradesh's agricultural requirements. Notable contributions from Nandyal include NA 1325 (Narasimha) (1994) and NA 2708 (Aravinda) (1996), celebrated for their high yields and drought tolerance. Meanwhile, Lam introduced hybrids like LAHH – 4 (1997) and Lam – 604 (1997), boasting resistance against prevalent diseases and pests. Recent introductions like NDLH-2005-4 (Nandyal Cotton-22) (2021), NDLH-2056-4 (Nandyal Cotton-26), NDLA-3104-1 (Nandyal Cotton-27), and NDLA-3116-3 (Nandyal Cotton-28) (2023) from RARS, Nandyal, continue this legacy, offering high yields, resilience to various pests and diseases, and adaptability to changing environmental conditions.

The last two decades marked a period of remarkable breakthroughs and modern interventions in cotton research at ANGRAU. The advent of biotechnology opened up new avenues, with scientists exploring techniques such as Bt cotton technology for insect resistance and developing transgenic varieties with improved fibre quality and stress tolerance. Precision farming technologies like remote sensing and drip irrigation have been integrated to optimize resource management.

Impact of Technologies

Technological advancements such as seed treatment protocols, foliar nutrition, weed management, and pest management have significantly benefited cotton farmers in Andhra Pradesh. Implementation of these methods has resulted in reduced input costs for pesticides and fertilizers, while increasing yields by 10-15% and improving fibre quality. Consequently, farmers have witnessed a potential earning increase of Rs. 8000-10,000 per hectare. State-wide, these advancements have translated into substantial financial benefits, with seed treatment alone contributing Rs. 50-75 crore and integrated pest management (IPM) providing Rs. 1000-1500 crore in economic gains.

Future Outlook

Looking ahead, the future of cotton research and development at ANGRAU focuses on several key areas. One priority is the development of high-yielding, multiple stress-resistant, long-staple American cotton varieties and hybrids. These varieties will incorporate bollworm resistance and ideotypes suitable for high-density planting and mechanization, particularly those with the BGII trait. Additionally, production strategies for cotton-based cropping systems aim to maximize yield by implementing high-density planting systems (HDPS) and mechanization. Efforts are also underway to improve nutrient use efficiency and sustain cotton production amid changing climate conditions. Furthermore, ANGRAU is committed to eco-friendly approaches for managing pink bollworm and developing Integrated Disease Management (IDM) modules for integrated crop management.

SUGARCANE

Sugarcane is a vital commercial crop in Andhra Pradesh, cultivated across a vast area of 40,000 hectares, adapting to various conditions. The state boasts an impressive production output of 32.70 lakh tonnes, with a remarkable cane productivity rate of 82.00 tonnes per hectare. Research endeavors aimed at enhancing sugarcane quality and yield are actively pursued at multiple centers across the state, including Anakapalle, Vuyyuru, Rudrur, Perumallapalle, and Basanthapur. These centers focus on developing improved sugarcane clones tailored for different maturity groups, characterized by high juice sucrose content and suitability for diverse agro-climatic conditions prevalent in the region.

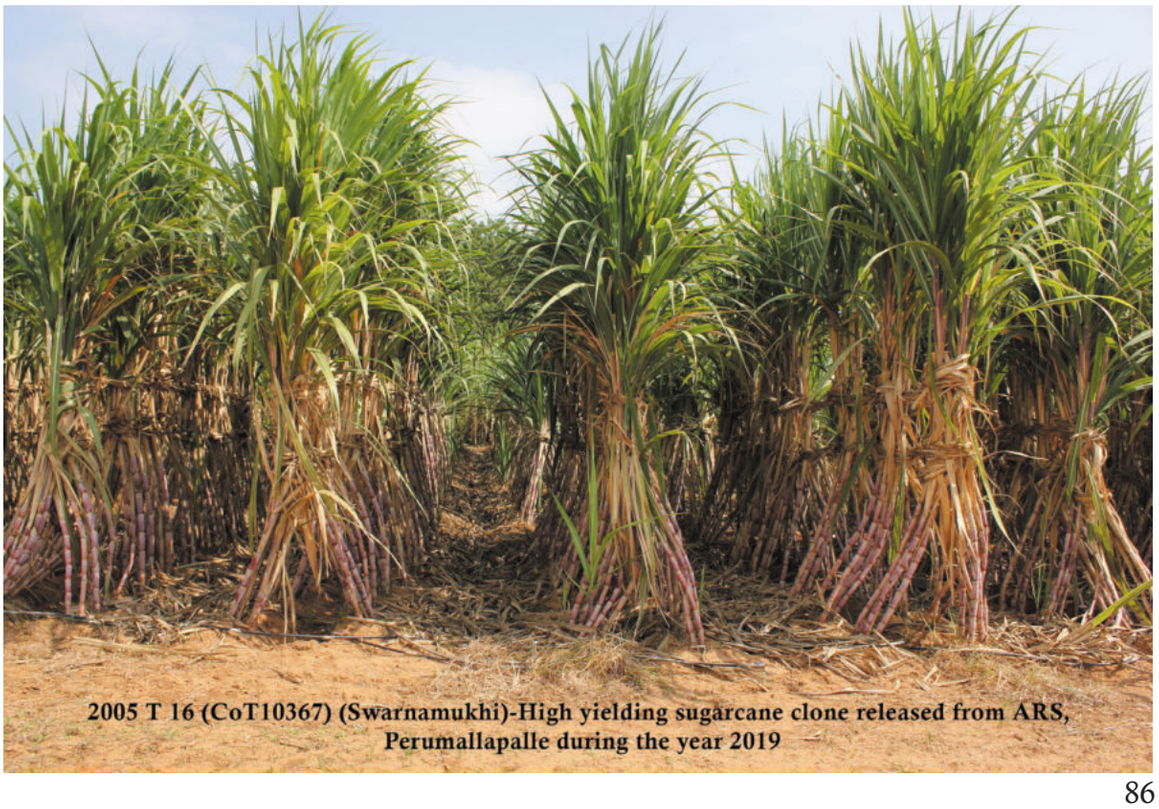
Development of Sugarcane Clones by ANGRAU

The Regional Agricultural Research Station (RARS), Anakapalle, affiliated with ANGRAU, has introduced a variety of sugarcane clones for commercial cultivation, each tailored with unique features to suit different environmental conditions and resist diseases. The timeline of releases is noteworthy: in 1968, the late-maturing Co 62175 was introduced, renowned for its high yield and suitability for jaggery production. This was followed by the release of Co A 71-1, an early-maturing clone favored for jaggery, in 1971. In 1976, Co A 7601, an early-maturing variety with short duration and high nitrogen use efficiency, was introduced alongside Co A 7602, a mid-late clone resistant to red rot and adaptable to waterlogging and moisture stress. In 1978, Co A 7701, an early-maturing clone resistant to red rot, was introduced. Subsequent releases included early-maturing varieties like Co 7508 in 1981 and 85 A 261 in 1996, both rich in juice sucrose, and 87 A 298 in 2002, noted for its good ratooning

ability. Additionally, late-maturing varieties such as Co 7706, released in 1989, and Co A 8401, also from the same year, offered red rot resistance. Notable releases in later years included 93A145 in 2006, suitable for diverse soil conditions, and 97 A 85 in 2010, resistant to both red rot and smut. More recent releases, like 98 A 163 and 2001 A 63 in 2012, and 2000A225 and 2003A255 in 2015, focused on adaptability to irrigated and rainfed conditions with resistance to red rot. Clones such as 2005A128 in 2018 and 2009A107 in 2020 targeted assured irrigated and saline soils, while 2009A252, also released in 2020, and 2012A 319 in 2023, offered robust disease resistance and adaptability to waterlogged and rainfed conditions. At the Agricultural Research Station (ARS) in Vuyyuru, several clones have been released, starting with Co 8013 and 81 V 48 in 1996, both early-maturing and drought-tolerant, with good ratooning capabilities. The early-maturing 91 V 83 and mid-late 83 V 15, released in 2002, were resistant to red rot and smut and tolerant to waterlogging and drought. Clones introduced in 2010, such as 2000 V 59 and 2003 V 46, emphasized high yield and red rot resistance, with 2003 V 46 also suitable for waterlogged conditions. The 2009 V 127, released in 2018, combined high yield with red rot and smut resistance, thriving in saline irrigated areas. The ARS in Perumallapalle introduced Co T 8201 in 1982, a mid-late clone suitable for Rayalaseema districts with high sucrose content and disease resistance. More recently, in 2019, 2005 T 16 (CoT10367), also known as Swarnamukhi, was released, an early-maturing variety with high sucrose content and resistance to red rot and whip smut, responding well to drought management and higher fertilizer doses

Germplasm registration with NBPGR

The sugarcane clone CoA 16321, also known as 2010A 229, has achieved official registration with the National Bureau of Plant Genetic Resources (NBPGR) due to its exceptional resistance to red rot. This registration, categorized under Trait Specific Germplasm, represents a significant milestone in sugarcane breeding. Red rot poses a severe threat to sugarcane yield and quality, making the designation of CoA 16321 as a red rot-resistant variety particularly noteworthy. This recognition underscores its potential to bolster crop resilience and sustainability. By securing germplasm registration, CoA 16321 will be safeguarded and made accessible for future breeding programs. This will facilitate the



2005 T 16 (CoT10367) (Swarnamukhi)-High yielding sugarcane clone released from ARS, Perumallapalle during the year 2019

development of new sugarcane cultivars with enhanced disease resistance, ultimately benefiting farmers and the sugar industry as a whole.

Impact of ANGRAU Varieties and Technologies

In Andhra Pradesh, a significant portion of the sugarcane cultivation area is dedicated to varieties developed by the Acharya N.G. Ranga Agricultural University (ANGRAU). The leading variety, CoV 09356 (Bharani), occupies approximately 33% of the total area, making it the most widely planted clone. Close behind is CoA 92081 (Viswamithra), covering about 32% of the area. CoA 14321 (Vasista) is planted on 14% of the land, followed by CoA 14323 (Naveen) with a 5% share. Varieties CoA 05323 (Revathi), CoT 10367 (Swarnamukhi), and CoA 08323 (Simhadri) each cover about 3% of the area, respectively. CoA 11321 (Srimukhi) and CoV 15356 (Ranga) have minimal presence, each occupying 1% of the sugarcane fields. Additionally, other varieties such as Co 7219, Co 7508, CoT 8201, 81A 99, and 83A30 collectively account for the remaining 5% of the cultivated area.

Several sugarcane clones developed by ANGRAU have been adopted across various states in India, reflecting their agronomic performance and adaptability to different regions over the years. The clone CoA 92081, known as Viswamithra, has spread to Odisha, Tamil Nadu, Telangana, and Karnataka, each cultivating it in approximately 5% of their sugarcane-growing areas, with Telangana utilizing it in 10% of its area. Bharani, released as CoV 09356, is significantly adopted in Telangana and Tamil Nadu, covering 12% of their cultivation zones.

The variety CoA 14321, named Vasista, is grown in Odisha (2%) and Telangana, indicating a preference for this clone in these regions. CoA 05323, or Revathi, has found its place in Odisha, being cultivated in 2% of its sugarcane fields. Similarly, CoA 08323, known as Simhadri, is grown in 3% of Odisha's sugarcane area.

The clone CoA 14323, or Naveen, is distributed in both Odisha and Telangana, showcasing its versatility. Notably, CoA 12323, designated as 2006A 223, is extensively planted in Telangana, covering an area of 2,539 hectares. Another prominent variety, 93A145 or Sarada, spans 2,240 hectares in Odisha. Lastly, CoA 89085 is the most widespread among these clones in Odisha, with a substantial cultivation area of 3,400 hectares.

This dissemination of ANGRAU's varieties highlights their impact on sugarcane agriculture beyond the primary state of release.

The widespread adoption of ANGRAU varieties underscores their adaptability, productivity, and acceptance among sugarcane growers across different regions, thereby solidifying ANGRAU's contribution to the sugarcane industry's advancement and sustainability.

Future line of work

- Development of trait-based varieties with specific attributes, alongside high cane and sugar yield.
- Breeding for improved nutrient use efficiency.
- Breeding varieties for thermo-insensitivity to facilitate early harvesting by sucrose accumulation.
- Evaluation of promising clones and breeding stocks to enhance photosynthetic efficiency.
- Development of varieties suitable for mechanized harvesting, as well as for biofuel and ethanol production.

GROUNDNUT

Groundnut, a vital crop in Andhra Pradesh, ranks second only to rice in acreage and economic significance. It serves multiple purposes, from oil extraction to food, fodder, and export, augmenting the agricultural economy and farmers' livelihoods. Cultivated across 5.94 lakh hectares annually, groundnut production stands at approximately 6.00 lakh tonnes. However, with an average productivity of 1,011 kg/ha, significantly below the national average of 1,926 kg/ha, challenges persist. Predominantly rainfed, groundnut cultivation faces moisture stress, erratic rainfall distribution, and soil fertility issues. Excess moisture during pod filling phases and inadequate management exacerbates these challenges. Moreover, pest and disease pressure further threaten yields and quality. Addressing these challenges requires improved agricultural practices, enhanced soil management, and effective pest and disease control measures to elevate groundnut farming's economic viability and sustainability in the state.

Evolution of Groundnut Cultivation

The evolution of groundnut cultivation in Andhra Pradesh is closely intertwined with the development of agricultural research stations. Initially established in 1954 as the Regional Oil Seeds Research Station in Anantapur, the Agricultural Research Station (ARS) moved to Kadiri in 1959. Renamed ARS, Kadiri in 1982 and reinforced with additional staff in 1985, it became a leading centre for groundnut research under the All-India Coordinated Research Project (AICRP) on Groundnut in 1993. Collaboration with the Regional Agricultural Research Station (RARS) in Tirupati, established in 2015, further amplified its impact.

Technological Innovations and Achievements

Significant technological innovations, including biotechnology and disease screening techniques, have marked this journey. Kadiri 6's dominance in cultivation and exports underscores the research's contribution to the national economy, with profits reinvested in infrastructure to enhance research capabilities and support farmers. Key achievements include the introduction of high-yielding varieties like Kadiri-7 Bold and drought-tolerant varieties like Kadiri-9, along with advances in disease resistance and integrated pest management. The Farmers Participatory Seed Production Programme has enhanced seed quality and farmer income. Together, ARS, Kadiri, and RARS, Tirupati, significantly enhance groundnut cultivation through high-yielding varieties and improved management practices, fostering productivity, profitability, and sustainability in Andhra Pradesh.

Varietal Development

Varietal development in groundnut cultivation has been a cornerstone of agricultural progress in Andhra Pradesh, spearheaded by the Agricultural Research Station (ARS), Kadiri and the Regional Agricultural Research Station (RARS), Tirupati. Aimed at enhancing productivity and resilience, research efforts focused on creating high-yield, drought-tolerant, and disease-resistant varieties tailored to local farming needs. Notable varieties like Kadiri-7 Bold, Kadiri-8 Bold, and Bheema excel in yield and seed size, catering to domestic and export demands. Varieties such as

Kadiri-9, Anantha, Rohini, and Dharani are prized for their drought tolerance, ensuring stability in rainfed regions. Kadiri Harithandhra and Kadiri Amaravathi exhibit multiple resistance, bolstering productivity in Karnataka and Maharashtra. Kadiri Chithravathi and Kadiri Lepakshi address specific challenges in leaf spot and yield, respectively. Visishta, a recent addition, boasts superior yield and quality, gaining rapid adoption. These varieties have significantly boosted yields, reduced losses, and increased economic returns for farmers, emphasizing the importance of ongoing research to meet evolving agricultural needs.

Pest and Disease Management

Groundnut cultivation in Andhra Pradesh confronts various pest and disease challenges, including foliar diseases like early and late leaf spot, soil-borne diseases such as stem rot and dry root rot, and viral diseases transmitted by thrips, such as peanut stem necrosis and peanut bud necrosis. Integrated Pest Management (IPM) and Integrated Disease Management (IDM) strategies have been developed and implemented to combat these issues. Cultural practices like crop rotation and intercropping, biological control using agents like Trichoderma viride, and chemical control through seed treatments and timely application of insecticides have been pivotal. Breeding resistant varieties like Kadiri Harithandhra

and Kadiri Amaravathi has been successful, alongside innovative approaches like utilizing native Trichoderma isolates. Collaborative efforts with institutions like ICRISAT have also contributed to effective management strategies. Field implementation and farmer engagement initiatives have facilitated the widespread adoption of these practices, leading to improved productivity and sustainability in groundnut cultivation.

Advanced Agronomic Practices

Groundnut cultivation in Andhra Pradesh relies heavily on advanced agronomic practices and effective crop management strategies to enhance productivity, especially in rainfed areas. These practices include deep ploughing to improve soil aeration, soil testing for nutrient deficiencies, and using certified seeds for better germination. Optimal spacing and timely thinning ensure vigorous plant growth, while balanced fertilization and micronutrient application address nutrient deficiencies. To manage moisture stress, efficient irrigation techniques like drip and sprinkler irrigation are employed, along with mulching and water harvesting methods. Cultivating drought-tolerant varieties like Kadiri-9 and Anantha and adopting groundnut-based intercropping, crop rotation, and relay cropping systems further enhance productivity and sustainability. Integration of groundnut cultivation with agroforestry systems offers additional benefits such as soil erosion control and improved microclimatic conditions. These comprehensive approaches contribute to the resilience and competitiveness of groundnut farming in Andhra Pradesh.

Breeder Seed Production

Breeder seed production is vital for maintaining groundnut crop quality and yield. These seeds, crucial for producing foundation and certified seeds, ensure genetic purity and desirable traits, enhancing productivity, pest resistance, and drought tolerance. They provide consistency in seed quality and form the basis for seed multiplication programs. Farmer participatory seed production, initiated in 2008, empowers farmers and boosts seed production. Through training and support, farmers produce high-quality seeds, gaining financial stability and ensuring seed quality. This program has led to infrastructure development at research stations, reinforcing ongoing research and extension efforts. The breeding programs at ARS Kadiri and RARS Tirupati have made notable national contributions. Varieties like Kadiri-6 have earned national recognition, dominating cultivation and exports. These stations fulfil a significant portion of the national breeder seed indent, ensuring a steady supply of quality seeds across states. This distribution, coupled with employment generation and infrastructure development, underscores the programs' impact on groundnut farming and the agricultural sector's growth.

Technological Transfer and Farmer Engagement

Technological transfer and farmer engagement are crucial for translating groundnut research

advancements into practical benefits. Methods include on-farm trials, training programs, field days, media dissemination, and farmer field schools. Frontline demonstrations validate research, encourage adoption, build confidence, and generate feedback. Krishi Vigyan Kendras and Agricultural Colleges play vital roles in extension services, capacity building, collaborative research, farmer empowerment, and feedback mechanisms. Their contributions bridge the gap between research and farmers, ensuring timely dissemination of technologies, educating future agricultural professionals, conducting joint research projects, empowering farmers, and facilitating feedback loops for continuous improvement. Through these efforts, groundnut cultivation in Andhra Pradesh can further enhance productivity, sustainability, and socioeconomic development.

Future Opportunities

Groundnut in Andhra Pradesh presents opportunities in various sectors. In food and nutrition, it can be utilized in diverse products for local and global markets. Investigating its potential as feed for livestock contributes to animal husbandry growth. Exploring international markets can enhance export earnings. Research focuses on developing varieties with higher yield, disease resistance, and tolerance to stress. Innovative cultivation techniques mitigate moisture stress and soil degradation. Biotechnological interventions aim to enhance resilience and nutrient uptake. Climate-smart agriculture develops varieties adaptable to changing conditions. Strategies include market diversification, value chain integration, capacity building, policy advocacy, and collaborative research. Despite challenges, groundnut's future in Andhra Pradesh looks promising, driven by research, innovation, and farmer engagement. Its potential to contribute to food security, economic prosperity, and sustainable agriculture is substantial. With emerging opportunities and strategic efforts, groundnut cultivation in Andhra Pradesh is set for growth and resilience.

OILSEEDS

Andhra Pradesh, a significant agricultural state, has a rich tradition of cultivating oilseed crops like groundnut, sunflower, castor, sesame, and niger, crucial for the state's economy, industry, and export. Groundnut and sunflower are particularly vital, contributing significantly to oilseed production, with the region's diverse climate supporting their growth, sustaining many small farmers. Oilseed cultivation boosts the state's agricultural GDP, offers essential oils and protein-rich by-products, and supports various industries like cosmetics and biofuels, while also aiding soil fertility and risk management, promoting sustainable farming. ANGRAU's focused research on oilseeds aims to increase productivity, ensure food security, and uplift farmers' socio-economic status by developing high-yield, high-quality varieties and addressing pest, disease, and climate challenges. Groundnut, sunflower, castor, sesame, and niger have deep roots in Andhra Pradesh's agricultural heritage, each playing unique roles in the landscape. ANGRAU's six-decade journey has transformed oilseed farming, overcoming historical challenges and innovating to empower farmers and advance the sector. Founded with a mission to modernize agriculture, ANGRAU's dedicated research endeavours aim to enhance the productivity and profitability of oilseed crops, recognizing their significance in Andhra Pradesh's economy.

Research Milestones and Achievements

In its early years, ANGRAU focused on varietal improvement, agronomic practices, pest and disease management, post-harvest technology, and extension services tailored to the needs of oilseed farmers. This comprehensive approach yielded significant milestones from the 1960s to the 1980s. The establishment of research stations across agro-climatic zones facilitated the evaluation and enhancement of indigenous germplasm, leading to the development of high-yielding varieties like TMV 2, JL 24, K-6, Narayani, Kalahasthi, K-1812, and TCGS 1694 in groundnut, and hybrids such as APSH 11 and NDSH-1 in sunflower. Additionally, ANGRAU's breeding programs produced resistant varieties like Aruna and Kranthi in castor, addressing pest and drought challenges. Implementation of integrated pest management techniques and agronomic advancements further improved productivity and resource efficiency. Research efforts extended to sesame and released varieties Gauri (1976), Madhavi, YLM-17, YLM-66 resulting in varieties with enhanced oil content and disease resistance.

Scientific Progress

Research progress at ANGRAU over the past six decades has significantly advanced the cultivation of various oilseed crops, including groundnut, sunflower, castor, sesame, and niger. Groundnut research has focused on breeding high-yield varieties resilient to environmental challenges. Varieties like Kadiri-1 (1971), Vemana (1993), Narayani (2002), Kalahasthi (2002), K-6 (2002), K-9 (2009), K 1812 (Kadiri Lepakshi) (2021), TCGS 1694 (Visishta) (2022), TCGS 1707 (ICAR-Konark) (2023), and TCGS 1522 (Himani) (2023) have notably increased groundnut yields in Andhra Pradesh. Pest and disease management strategies, employing integrated pest management (IPM) and biological control agents, have minimized yield loss. Agronomic practices, precision farming tools, and soil health management techniques have enhanced groundnut productivity.

Sunflower, introduced by ANGRAU in the 1980s, has undergone adaptation to local conditions and hybrid development, resulting in varieties like DRSH-1, NDSH-1 (2002), and NDSH-1012 (2016) with higher yields and oil quality. Integrated pest management and sustainable farming practices have been crucial in maintaining sunflower crop health.

Castor research has led to the development of high-yielding hybrids like PCH 222, GCH-4, and GCH-7 resilient to environmental stresses. Advancements in cultivation techniques and stress management practices have further improved castor productivity and quality.

Sesame breeding programs have focused on enhancing genetic diversity and oil quality, with varieties like Gauri, Madhavi, Varaha, YLM-17, and YLM-66 offering improved performance and disease resistance. Disease management strategies and crop management practices have been vital in sustaining sesame crop health.

Niger, though less prominent, has received attention for its adaptability to marginal

environments. Prominent varieties JNS 28 and Utkal Niger 150 have been identified. Exotic niger lines, IIOR 3409, IIOR 3410, IIOR 3411, and IIOR 3412, suitable for longer flower duration, large flower size, and high seed yield, were identified and maintained. Research has aimed at improving yield stability and quality through breeding programs and agronomic interventions. Pest and disease control innovations, coupled with training programs, have supported niger cultivation in resource-poor settings. Overall, ANGRAU's research has contributed significantly to the development and sustainability of oilseed production in Andhra Pradesh.

Over the past six decades, ANGRAU's dedicated research efforts have brought significant improvements to oilseed production and yield in Andhra Pradesh. Introduction of disease-resistant and high-yielding varieties has revolutionized farming practices, resulting in substantial increases in crop output, particularly for groundnut, sunflower, and sesame. These enhancements are reflected in expanded cultivation areas and overall production statistics. Economically, ANGRAU's research has had profound effects, elevating farmers' incomes, reducing risks, and contributing to improved livelihoods. The heightened agricultural productivity has also boosted the state's GDP, with high-oil content sesame varieties opening new markets and enhancing economic stability in rural communities.

The remarkable adoption rates of new varieties and practices underscore ANGRAU's effectiveness in disseminating knowledge through field trials, demonstration plots, and educational programs. Success stories, such as the introduction of new groundnut varieties and hybrid sunflowers, showcase significant increases in yield and profitability across various regions, highlighting the transformative impact of scientific advancements.

Future Directions

Looking ahead, ANGRAU acknowledges new challenges in oilseed cultivation due to climate change, pest pressures, soil degradation, and water scarcity. Their future research will prioritize climate-resilient crop varieties, advanced breeding techniques, and sustainable practices like integrated pest management and organic farming. ANGRAU envisions a sustainable, resilient, and profitable oilseed sector in Andhra Pradesh, achieved through empowering farmers with innovative technologies and fostering collaborations with global research institutions. This approach aims to integrate scientific advancements with traditional knowledge, ensuring a robust and resilient oilseed sector that contributes to the socio-economic development of the region.

TECHNOLOGIES DEVELOPED

RICE:

- Direct sown paddy with seed drill - ANGRAU has introduced and promoted the use of seed drills for direct sowing of paddy to address challenges like labour scarcity and high cultivation costs. A comparative analysis between direct-seeded rice using the seed drill and the traditional transplanting method reveals significant differences. The seed drill method requires less seed (15 kg compared to 25-30 kg) and reduces nursery maintenance costs (Rs. 830 compared to Rs. 2680 with the traditional method), resulting in lower total input costs (Rs. 15,520 versus Rs. 20,620 for the traditional method). Additionally, direct seeding with the seed drill yields more (30.4 q ha-1 compared to 25.9 q ha-1 with transplanting), leading to increased gross and net incomes of Rs. 47,600 and Rs. 32,080, respectively. In contrast, those using the traditional method earn Rs. 40,760 and Rs. 20,140, respectively. The cost-benefit ratio for seed drill cultivation indicates a favourable return on investment (1:3.06), highlighting its economic viability compared to transplanting (1:1.97).
- Use of liquid bio fertilizers in paddy - The excessive application of nitrogen (N) and phosphorus (P) fertilizers by farmers in paddy cultivation has led to increased cultivation expenses and soil health degradation. However, the introduction and adoption of Azospirillum and PSB liquid biofertilizers, when applied with 50% of the recommended dose of fertilizers (RDF), have shown promising results. Through the development, evaluation, and utilization of these biofertilizers, farmers have managed to decrease their reliance on chemical fertilizers by 50% in paddy fields, resulting in a substantial reduction in fertilizer costs amounting to Rs. 3800 per hectare.
- Weed management in aerobic rice - Effective weed management in aerobic rice can be achieved by applying Pendimethalin at 2.5 L ha-1 within two days after sowing, followed by a post-emergence application of Rinskor (Florpyrauxifen-benzyl) 2.5% EC at 1500 ml ha-1 during the 4-7 leaf stage of weeds. This method targets grasses, sedges, and broad-leaved weeds, resulting in a substantial increase in grain yield to 5369 kg ha-1, while maintaining a weed control efficiency of 92.3%. These results are comparable to those obtained under weed-free conditions, where a grain yield of 5723 kg ha-1 was achieved.
- Nutrient management in direct-sown rice - The application of nitrogen to direct-sown paddy in four splits—¼ as a basal dose, ¼ at 30 days after sowing (DAS), ¼ at maximum tillering, and ¼ at panicle initiation (PI) stages—resulted in the highest grain yield of 6028 kg ha-1. This method was significantly superior to three other methods: the split application of nitrogen three times, with1/3 at 30 DAS, 1/3 at maximum tillering, and 1/3 at PI stages (yielding 5717 kg ha-1); ¼ at 30 DAS, ½ at maximum tillering, and ¼ at PI stages (yielding 5690 kg ha-1); and ½ at 30 DAS, ¼ at maximum tillering, and ¼ at PI stages (yielding 5747 kg ha-1). Organic farming package for Kharif rice - ANGRAU advocates several recommended practices for fertility management to optimize agricultural productivity. These include the application of green manure at 10 tons per hectare in conjunction with farmyard manure (FYM) at 10 tons per hectare as a basal application. During the tillering and panicle initiation (PI) stages, the application of neem cake at 500 kg per hectare or vermicompost at 1250 kg per hectare is advised. Weed control strategies involve utilizing Azolla as live mulch followed by hand weeding at 25 and 50 days after transplanting (DAT). Pest and disease management tactics encompass measures such as clipping leaf tips, maintaining clean cultivation, and stubble destruction. Installing pheromone traps at 10 traps per hectare and bird perches at 15-20 per hectare is recommended. Additionally, spraying 5% NSKE (neem seed kernel extract), neem oil, or neem formulations (1500 ppm) at 5 ml per litre of water at 20 and 30 DAT is advised. Implementing alleyways and alternate wetting and drying techniques are also suggested practices. To combat blast disease, treating seeds or dipping seedlings in a solution of Pseudomonas fluorescens at 10 g per kg of seed or 20 g per litre of water for 20 minutes is recommended. Despite

yield reductions ranging from 16.4% to 40% compared to chemical farming after 12-14 years of experimentation, organic farming has demonstrated higher organic carbon levels, measuring 0.60% compared to 0.36% in inorganic plots.

- Development of wetland IFS model suitable for delta alluvial soils - The Wetland Integrated Farming System (IFS) model demonstrated that the Rice-Maize-Pulses cropping system yielded the highest average net returns (Rs. 23,298), followed by value addition (Rs. 18,192). Among the IFS components, the fishery component showed the highest average net returns (Rs. 16,706), with horticulture following closely behind (Rs. 11,383). Additionally, value addition exhibited the highest B:C ratio (1:8.23), highlighting its profitability, particularly in brown rice production, followed by the fishery component (1:4.48), poultry rearing (1:3.52), and horticulture (1:3.17). These findings emphasize the economic benefits of incorporating diverse components in IFS.
- Sustained baiting of bromadiolone through PVC pipe bait stations for rodent control in rice - Baiting with a 0.005% bromadiolone mixture (96 parts broken rice, 2 parts bromadiolone powder, and 2 parts edible oil) in 3-inch diameter, 1.5-foot length PVC pipe bait stations is effective for rodent control in rice fields. For optimal rodent control, it is recommended to place 10 PVC pipe bait stations along the field bunds per acre.
- Integrated management of stem rot in rice - The soil application of enriched Trichoderma asperellum (5 kg ha-^{1}) combined with FYM (225 kg ha-^{1}) and Neem cake (25 kg ha-^{1}), along with the application of FYM at 10 tonnes ha-^{1}, the growing and incorporation of Dhaincha (25 kg ha-^{1}), and two sprays of propiconazole 25 EC at 1.0 ml L-^{1} of water from booting to panicle emergence, was found to be effective against stem rot in rice. This treatment resulted in an 83.51% reduction in stem rot incidence compared to the control, and it also led to a 51.9% increase in grain yield (8359 kg ha-^{1}) compared to the control (4022 kg ha-^{1}), achieving a benefit-cost ratio of 1.93.
- New anticoagulant rodenticide 'flocoumafen' for rat control in rice - The application of 'flocoumafen 0.005% RB' at one pellet (8g) per burrow is effective in reducing live burrow counts (LBC) per hectare by 71.3% and tiller damage by 62.8% in rice, compared to bromadiolone 0.005% loose bait at 10g per burrow, which resulted in a comparatively lower reduction of LBC per hectare by 57.2% and tiller damage by only 51.1%.
- Use of Trap Barrier System (TBS) for controlling rats in rice - This technique employs ecologically based methods for managing rodent behaviour. By erecting a plastic fence measuring 2.0 feet in height and made of 40 GSM material around the rice crop, and placing 10-12 multiple catch traps per acre near and behind the holes in the fence, complete protection against rodents in nurseries and 90% protection in the main field can be achieved. The estimated cost is approximately Rs. 3500 per acre.

- Alternate seed treatment fungicide in rice - Wet seed treatment with Tebuconazole 25% EC @ 2.0 ml/lit of water or Isoprothiolane 40 EC @ 1.5 ml/lit of water is found effective in rice, resulting in a 31.7% reduction in leaf blast severity. Additionally, there was a 3.8% and 1.04% reduction in seed vigour index, coupled with an increase in grain yield by 6.3% (2987 kg/ha) and 5.4% (2963 kg/ha) over carbendazim (2810 kg/ha) seed treatment.
- Integrated Pest Management (IPM) in rice - In ANGRAU's guidelines for rice cultivation, precise application methods are outlined to optimize yield and combat pests effectively. Carbofuran 3 G is recommended pre-transplantation, while meticulous clipping during transplanting ensures healthy growth. Adequate alleyway width and fertilizer application align with local recommendations. Pheromone traps are strategically placed post-transplantation for stem borer monitoring, with clear action thresholds for pesticide intervention. At 60 DAT, cartap hydrochloride is suggested for pest outbreaks, complemented by targeted treatments for planthoppers and blast disease. Notably, adopting Integrated Pest Management (IPM) practices showcases substantial cost savings and improved benefits, reinforcing the sustainable approach to rice farming endorsed by ANGRAU.
- Vishnu Puddler - The Vishnu Puddler, also

known as the ANGRAU Puddler, is a self-activated passive tool specifically designed for puddling in lowland transplanted rice systems. In comparison to conventional methods involving cage wheels and cultivators, this innovative tool offers significant water savings of up to 40%. A notable advantage of the Vishnu Puddler is its passive operation, eliminating the need for fuel consumption during operation. It saves 2 litres of fuel per hour compared to traditional rotovator puddling methods while achieving the same level of effectiveness in forming a semi-impervious layer in the soil.

- Remote controlled weeding machine for paddy crop - Weed management presents a formidable hurdle in paddy cultivation,

with weeds vying for sunlight, space, and nutrients alongside the main crop, thereby causing yield reductions ranging from 10 to 25%. Through meticulous experimentation utilizing a custom test rig within a rectangular soil bin, the requisite force for the locomotion of the triangular track wheel and weeding rotor movement was determined. In the trials, conducted 40 days post-transplantation in loamy soil, the weeder exhibited its highest fuel consumption at 2.2 liters per hour, accompanied by a wheel slip of 23% and an energy consumption of 598.74 MJ/ha. Conversely, in sandy soils 20 days post-transplantation, the weeder showcased its lowest metrics, consuming merely 1.2 liters per hour, with a wheel slip of 12% and an energy consumption of 452.4 MJ/ha. Additionally, optimal field efficiency, field machine index, and mixing index were attained at 81.66%, 82.5%, and 87.5%, respectively, in sandy soil 20 days post-transplantation, contrasting starkly with the least favorable figures of 63.33%, 70.5%, and 67.2%, respectively, observed in loamy soils 40 days post-transplantation. The cost analysis revealed that employing this developed machine amounted to Rs. 3836.2 per hectare for weeding operations.

- Stubble manager cum crop planter for rice fallows - After the harvest of the kharif paddy crop, farmers can sow the next rabi pulse crop (black gram/green gram) in the rice fallow field, utilizing residual soil moisture conditions with the aid of a specially developed machine. This machine is capable of performing three operations—mulching, strip tillage, and sowing—in a single pass, suitable for combined harvested fields following the kharif paddy crop. The machine features both Y-type flail blades and L-type strip-till blades mounted on the same rotor, rotating at a high-speed of 1500 rpm. Power is transmitted to the rotor shaft from the tractor's PTO shaft via a gearbox and V-type belt drive. The flail blades efficiently shred stubbles and loose straw in the combined harvested paddy field, laying the shredded straw as mulch on the soil surface. This mulch serves to prevent the evaporation of residual soil moisture crucial for the growth of the next pulse crop, sown in the rabi season immediately

after harvesting the kharif paddy crop. Strip tillage is facilitated by the strip-till blades, clearing rows for sowing pulse crop seeds (black gram/green gram) in strip furrows using the crop planting unit of the machine. Before sowing the next season's kharif crop, farmers can incorporate paddy straw mulch into the soil using a rotavator, thereby improving soil health. A tractor with 41 kW power is sufficient to operate this machine.

Observations recorded seed rate and seed-to-seed spacing as 52.25 kg/ha and 6.32 cm, respectively. The theoretical and actual field capacities of the developed machine were determined as 0.30 and 0.20 ha/h, with a field efficiency of 65.45%. Fuel consumption was measured at 6.11 L/h and 30.55 L/ha. The draft of the developed machine was found to be 7.36 kN, with wheel slip recorded at 12.89%. The width and depth of furrow strips were measured as 9.94 and 3.15 cm, respectively, with a sowing depth of 2.17 cm.

Maize

- Weed management in rice fallow maize - The application of atrazine 50% WP at a concentration of 2 g per liter, combined with paraquat 24% EC at a concentration of 1.2 ml per liter immediately after sowing, followed by topramezone 33.6 SC at a rate of 0.05 g per liter, resulted in a 72.2% increase in grain yield, reaching 10,400 kg per hectare compared to the unweeded check yielding 6,038 kg per hectare. This approach also yielded a benefit-cost ratio of 2.13.
- Irrigation and fertigation on growth and yield of maize - Irrigating maize crops with a 10 mm depth of irrigation at 3-day intervals, and providing either 100% of the recommended dose (180 – 60 – 50 kg ha-1) of water-soluble fertilizers or 75% of the recommended dose (135 – 45 – 37.5 kg ha-1) was found to be effective in achieving higher grain yields of 5044 kg ha-1 and 4966 kg ha-1, respectively. This resulted in net returns of Rs 51,247 ha-1 and Rs 51,456 ha-1, as well as higher water use efficiency of 16.1 kg/ha mm and 15.9 kg/ha mm, respectively. The benefit-cost ratio was highest (2.2) when maize was irrigated with a 10 mm depth of irrigation at 3-day intervals and provided with 75% of the recommended dose of fertilizers through fertigation.
- Management of fall armyworm in maize using biocontrol agents and biopesticides - In managing fall armyworm in maize, ANGRAU employs a comprehensive approach blending biocontrol agents and biopesticides. Field releases of Trichogramma pretiosum or T. chilonis, coupled with applications of Bacillus thuringiensis (NBAIR Bt 25) or Metarhizium anisopliae (NBAIR Ma 35), proved effective. These interventions, initiated 7 days post-seedling emergence and repeated at 10-day intervals, significantly reduced fall armyworm damage. Comparatively, the insecticidal check, comprising Azadirachtin, chlorantraniliprole, and emamectin benzoate sprays, showed a similar reduction in damage. Notably, egg parasitoid releases with NBAIR Bt25 and NBAIR Ma 35 sprays demonstrated comparable cob yields to the insecticidal check. Moreover, the benefit-cost ratio was notably higher with egg parasitoid releases utilizing NBAIR Ma 35, underlining the economic viability of this integrated pest management strategy.
- IPM module for fall armyworm, Spodoptera frugiperda - The Integrated Pest Management (IPM) Module for Fall Armyworm, Spodoptera Frugiperda includes the following strategies:
- Seed treatment with cyantraniliprole 19.8% + thiamethoxam 19.8% at a rate of 6 ml per kg of seed. Spraying of azadirachtin 1500 ppm at 5 ml per liter or NSKE at 50 ml per liter at 25 days after sowing (DAS) to suppress egg masses and first instar larvae. Ensure direct application into the whorls. Utilize poison bait by mixing 10 kg of rice bran with 2 kg of jaggery in 2 liters of water, fermenting for 24 hours. The following day, add thiodicarb 75 SP at 100 g, form pellets, and distribute them into the whorls at a rate of 50 kg per hectare at 35 DAS. Apply chlorantraniliprole 18.5 SC at 0.4 ml per liter or spinetoram 11.7 SC at 0.5 ml per liter at 50 DAS. The IPM module resulted in the highest yield of 7833 kg per hectare compared to the control (5836 kg

per hectare), with a benefit-cost ratio of 3.0.

- Mini tractor operated punch planter for maize - The developed punch planter offers superior seeding performance compared to conventional planters in no-till conditions. It minimizes soil and residue disturbance while providing precise seed spacing. The unit is compatible with mini tractors ranging from 16 to 21 hp capacity. With an effective field capacity of 3 acres per day, the operating cost of the punch planter is Rs. 848 per acre.
- Modelling water and nitrogen distribution in drip-fertigated maize crops - At ANGRAU, the efficacy of drip irrigation and fertigation in high-density planting settings was explored through the implementation of a finite element model, Hydrus-2D. Within an axi-symmetrical polar coordinate system measuring 30 cm in radius and 90 cm in depth, water and nitrogen dynamics were meticulously simulated. Results unveiled a trend of elevated soil moisture content in upper layers and around emitters post-irrigation, with a subsequent decrease as distance from the emitter increased horizontally. Moreover, nitrogen concentration peaked within the top 30 cm of the soil profile across all fertigation levels, mirroring field experiment data with commendable accuracy. Notably, Treatment IF emerged as particularly lucrative, boasting the highest benefit-cost ratios and shortest payback periods during both seasons, thus underscoring its appeal for farmers. Further simulations targeting maize crops delineated optimal irrigation strategies, emphasizing the suitability of a discharge rate of 2.0 Iph on an alternate-day basis for maximizing water use efficiency in sandy clay loam soil. This comprehensive assessment underscores the utility of the Hydrus model in formulating precise irrigation and fertigation regimens to enhance agricultural productivity.

Millets

- Foxtail millet (Korra) - Bengalgram cropping sequence for resource conservation under rainfed medium black soils of Kadapa district - In rainfed conditions during the Rabi season, Bengalgram faces challenges such as moisture stress and pest infestations, resulting in low yields. ANGRAU conducted evaluations and demonstrations of a technology involving the introduction of the short-duration (75 days) korra variety Suryanandi as a preceding crop to Bengalgram. This initiative resulted in significantly higher net returns of Rs. 24,625 per hectare in the successive cropping of Korra-Bengalgram compared to sole Bengalgram, which yielded net returns of Rs. 9,325 per hectare. Moreover, there was a notable increase in cropping intensity from 100% to 200% for rainfed chickpea cultivation in black soils, with the area allocated to the Korra-Bengalgram cropping sequence expanding substantially.
- Weed management in direct seeded finger millet - For effective weed management in directly seeded finger millet under rainfed conditions, it is recommended to utilize one of the following chemical treatments: Pre-emergence application of Isoproturon at a rate of 0.5 kg active ingredient per hectare, coupled with an intercultivation performed at 25-30 days after sowing (DAS). Alternatively, a pre-emergence application of Bensulfuron methyl + pretilachlor at a rate of 0.198 kg per hectare, followed by an intercultivation at 30 DAS, can be employed. Both of these chemical weed management strategies have demonstrated efficacy in controlling weeds in direct-seeded finger millet, leading to improved crop performance and yield outcomes.
- Rescheduled fertilizer doses of finger millet - The fertilizer application schedule for finger millet has been adjusted to optimize yields. Applying 150% of nitrogen (N), 100% of phosphorus (P), and 100% of potassium (K) at rates of 90-40-30 kg/ha respectively, with two split doses of nitrogen, has resulted in a notable increase in grain yields (2954 kg/ha) compared to the conventional 100% recommended dose of fertilizer (60-40-30 kg/ha of N, P2O5, K2O), which yielded 2598 kg/ha. This modified regimen produced yields that were 13.7% higher during the kharif season. Additionally, the benefit-cost ratio improved from 2.16 to 2.40, underscoring the economic viability of the rescheduled fertilizer application strategy.
- Validation of "Guli Method of Finger Millet Cultivation" - Guli planting with a spacing of 30 x 30 cm, using 20-day-old seedlings,

involves planting two seedlings per hill. Apply 10 tons of farmyard manure (FYM) per hectare 15-20 days before the final ploughing as a basal dose, along with 100% of the recommended dose of fertilizers (RDF). Apply the total phosphorus (P) and potassium (K) as a basal dose, and split the nitrogen (N) application, with 50% as a basal dose and 50% at 30-40 days after transplanting (DAT). Drag a wooden log over the crop 2-3 times at 5-day intervals between 15-45 DAT. Follow this with intercultivation using a cycle weeder 2-3 times after dragging the wooden log. This method yielded 2479 kg per hectare with a benefit-cost ratio of 1.58, compared to broadcasting, which yielded 1430 kg per hectare and had a benefit-cost ratio of 1.52.

- Nutrient management in foxtail millet - In foxtail millet cultivation, optimizing nutrient management proved pivotal. Applying potassium at a rate of 20 kg per hectare, alongside nitrogen and phosphorus at 20 kg per hectare each, resulted in an increase in grain yield to 2158 kg per hectare, with a benefit-cost ratio of 1.55. This approach showcased a significant 28% yield improvement compared to scenarios with zero potassium application, where the grain yield was 1690 kg per hectare with a benefit-cost ratio of 1.44.
- Finger millet cleaner-cum-peeler - The Finger Millet Cleaner-cum-Pearler was developed at Dr. NTR College of Agricultural Engineering, Bapatla. Priced at Rs. 50,000/-, the machine has a capacity of 250 kg/h. Through experimentation, an optimum pearling efficiency of 80.1% was achieved at 900 rpm, with a feeding rate of 150 kg/h over two passes, resulting in a broken grain percentage of 4.3%. The highest percentage of broken grain, 9.5%, was recorded at 1400 rpm with a feeding rate of 90 kg/h. The operating cost of the machine is Rs. 0.326/- per kg.
- Ferti – Fortification in Pearl Millet - The application of RDF + ZnSO4 at 50 kg per hectare, along with foliar application of zinc and ferrous sulphate at 0.2% at 45 days after sowing (DAS), in Bajra significantly enhanced test weight, grain yield, and protein content, comparable to using ZnSO4 at 25 kg per hectare along with 0.2% foliar application. Yield increased by 1.4 times compared to the control. Both iron and zinc concentrations increased by 2.3 times over the recommended fertilizer dose. Therefore, applying zinc sulphate at 50 kg per hectare with foliar application of zinc and ferrous sulphate at 0.2% effectively fortifies grains in Bajra.

Pulses

- IPM module in pigeonpea - The Integrated Pest Management (IPM) module in Pigeonpea includes the following practices: Seed treatment with Trichoderma viride at 10 g per kg and vitavax at 2 g per kg. Intercropping with green gram at a ratio of 1:7. Monitoring through pheromone traps at 10 traps per hectare. Erecting bird perches at 50 per hectare and spraying NSKE 5% or azadirachtin 1500 ppm at 5 ml per liter at flower bud initiation. Need-based spraying of chlorantraniliprole at 0.3 ml per liter at 50% flowering, and indoxacarb at 0.75 ml per liter, flubendiamide at 0.2 ml per liter, or emamectin benzoate at 0.4 g per liter, followed by dimethoate at 2.0 ml per liter at 10-day intervals. The IPM module achieved a benefit-cost (BC) ratio of 3.2 compared to 2.1 in non-IPM practices.
- Improving the productivity of groundnut and pigeonpea intercropping system by deep tillage practice under rainfed conditions - Sub-soiling with a chisel plough effectively breaks soil compaction and crust formation, improving soil infiltration and reducing runoff losses, thereby enhancing crop yield. Implemented across 180 hectares in adopted villages and approximately 98,500 hectares in collaboration with the Department of Agriculture and the university in the district, this technology has resulted in improved seed yields, reduced cultivation costs, and increased net returns. Compared to traditional practices, chisel ploughing yielded higher seed yields (728 kg/ha), generating greater net returns (Rs. 49,000/-) with a benefit-cost ratio of 3.6. Water use efficiency stood at 3.6 kg/ha-mm. In contrast, farmers' traditional practices yielded a slightly lower seed yield of 676 kg/ha, generating a net return of Rs. 35,700/ha, with a benefit-cost ratio of 3.38 and water use efficiency at 3.4 kg/ha-mm. The

widespread adoption of this technology by the Department of Agriculture, along with the distribution of chisel ploughs to villages, highlights its success and scalability in enhancing agricultural productivity.

- Weed management in rice fallow blackgram - The application of pendimethalin at 5 ml per liter (sand mix application) as a pre-emergence treatment and fomesafen at 220 g plus fluazifop-butyl at 2 ml per liter as a post-emergence treatment at 20 days after sowing (DAS) significantly reduced weed density (9.1 m^2) and dry weight (7.6 g m^2). This resulted in a higher seed yield (1056 kg ha^{-1}), net returns (Rs. 30,711 ha^{-1}), and a benefit-cost (BC) ratio of 2.08. There was a 38.60% improvement in yield compared to the control plot (weedy check), which had the highest weed density (36.2 m^2) and dry weight (14.8 g m^2), along with the lowest seed yield (762 kg ha^{-1}), net returns (Rs. 18,572 ha^{-1}), and a BC ratio of 1.77.
- Integrated Pest Management module against viral diseases in blackgram & greengram - The Integrated Pest Management (IPM) module for combating viral diseases in blackgram and greengram includes the following measures: Seed treatment with imidacloprid 600 FS at 5.0 ml per kg. Growing four rows of sorghum around the field as a barrier crop. Monitoring with yellow and blue sticky traps at a rate of 50 traps per hectare. Monitoring Helicoverpa from the flower initiation stage with pheromone traps at a rate of 10 traps per hectare. Foliar spray of fipronil at 1.5 ml per liter or azadirachtin 10000 ppm at 1.0 ml per liter at 20-25 days after sowing (DAS). Foliar spray of difenthiuron at 1.2 g per liter or spinosad at 0.3 ml per liter at 30-35 DAS. The IPM module resulted in the lowest mean PDI of MYMV (15.15), leaf curl/bud necrosis (5.23%), and leaf crinkle (4.41%), with the highest mean grain yield (1313 kg per hectare) compared to the unprotected control (393 kg per hectare), which had YMV severity (31.49%), leaf curl (14.71%), and leaf crinkle incidence (30.9%).
- Technology for low pod set in chickpea (Mogili in chickpea) - In chickpea, the adverse effect of fog and low temperatures (mogili) on pod set was mitigated by spraying KNO_3 (2%), sodium nitroprusside at 150 µM (17 mg per liter), or boron at 2 g per liter of water at weekly intervals during the flowering period. This treatment increased pod set by 51% and pod yield by 17%, resulting in a yield of 1544 kg per hectare compared to the control yield of 1286 kg per hectare.
- Integrated Pest Management module in chickpea - Integrated Pest Management (IPM) module in Chickpea includes the following practices: Sowing four thick rows of tall-growing millets like jowar around the field and intercropping with coriander (16:4 ratio). Erecting bird perches at a rate of 50 per hectare. Spraying NSKE at 5% concentration 15 days after germination. Conducting need-based spraying of indoxacarb 14.5 SC at 1 ml per liter or chlorantraniliprole 18.5% SC at 0.2 ml per liter against H. armigera and S. exigua. The IPM module resulted in a seed yield of 1300 kg per hectare, which is 18.2% higher than the yield from farmers' practice (1098 kg per hectare), with a benefit-cost ratio of 1.8. Farmers' practice recorded a benefit-cost ratio of 0.9.

Groundnut

- Improving the productivity of groundnut and pigeonpea intercropping system by deep tillage practice under rainfed conditions - Sub-soiling with a chisel plough effectively breaks soil compaction and crust formation, improving soil infiltration and reducing runoff losses, thereby enhancing crop yield. Implemented across 180 hectares in adopted villages and approximately 98,500 hectares in collaboration with the Department of Agriculture and the university in the district, this technology has resulted in improved seed yields, reduced cultivation costs, and increased net returns. Compared to traditional practices, chisel ploughing yielded higher seed yields (728 kg/ha), generating greater net returns (Rs. 49,000/-) with a benefit-cost ratio of 3.6. Water use efficiency stood at 3.6 kg/ha-mm. In contrast, farmers' traditional practices yielded a slightly lower seed yield of 676 kg/ha, generating a net return of Rs. 35,700/ha, with a benefit-cost ratio of 3.38 and water use efficiency at 3.4 kg/ha-mm. The widespread adoption of this technology by the Department of Agriculture, along with

the distribution of chisel ploughs to villages, highlights its success and scalability in enhancing agricultural productivity.

- Weed management in groundnut - Pre-emergence application of a pre-mix herbicide containing Pendimethalin 30% + Imazethapyr 2% E.C. at a rate of 750 + 50 g active ingredient (a.i.) per hectare effectively managed grasses and broadleaf weeds in groundnut. This treatment resulted in a pod yield of 3066 kg per hectare, which was significantly comparable to the yield achieved with hand weeding twice (3250 kg per hectare). Additionally, it led to a higher benefit-cost ratio of 3.96 and reduced the per-hectare cost of cultivation by Rs. 22,500. The pre-emergence application of Diclosulam at a rate of 25 g per hectare, followed by Quizalofop at a rate of 50 g per hectare, effectively controlled weeds and resulted in comparatively lower weed dry matter. Diclosulam was particularly effective in controlling sedges, achieving control rates of up to 70-80%.
- Nano-based fertilization strategies in groundnut - In groundnut cultivation, foliar fertilization with nano CaO, nano ZnO, and nano SiO2 individually at a concentration of 200 ppm (applied twice) alongside Recommended Doses of NP and K (RDF) resulted in significant increases in pod yield. Specifically, nano CaO led to an 18% increase, nano ZnO showed a 31% increase, and nano SiO2 exhibited a 5% increase in pod yield compared to foliar application of their bulk counterparts (Zinc sulphate at 2000 ppm, TEOS at 1000 ppm, and Calcium nitrate at 1000 ppm), respectively. Furthermore, when these nano oxides (ZnO, SiO2, and CaO) were combined and applied foliarly at a concentration of 350 ppm each, along with RDF in groundnut cultivation, a significantly higher yield increase of 37% was observed compared to the application of their bulk counterparts.
- Integrated Disease Management for soil borne diseases in groundnut - Integrated Disease Management for Soil-Borne Diseases in groundnut involves the following steps: Deep summer ploughing with a mouldboard plough. Soil application of Trichoderma asperellum at a rate of 4 kg per hectare, enriched with 250 kg of FYM per hectare. Seed treatment with Tebuconazole 2DS at 1.5 g per kg of seed, followed by seed treatment with Pseudomonas fluorescens at 625 g per hectare of seed. Soil application of Trichoderma asperellum at a rate of 4 kg per hectare, enriched with 250 kg of FYM per hectare, at 35 and 70 days after sowing (DAS). This integrated approach has significantly reduced the incidence of dry root rot (4.4%) and stem rot (5.7%), while increasing pod yield (1613 kg per hectare) and haulm yield (2330 kg per hectare). The resulting Incremental Cost-Benefit Ratio (ICBR) stands at an impressive 1:3.9.
- Tractor drawn Ananta groundnut, redgram, and castor planter - In regions afflicted by scant rainfall, farmers rely on traditional methods such as the four-row bullock-drawn "gorru" for sowing groundnut and castor. However, this manual approach through the "Jaddigam" hopper often results in irregular seed distribution and suboptimal plant density. Contrastingly, the eight-row tractor-drawn Ananta groundnut planter revolutionizes this process with mechanical precision. Equipped with a seed metering mechanism, it ensures uniform spacing and accurate seed rates, vital for crop success. Operating at a swift pace of 6 to 7 hectares per day, this planter not only enhances efficiency but also promotes better seed germination by covering seeds with soil and adapts flexibly for various crops like pigeonpea and castor. With minimal seed damage and impeccable placement, it emerges as a game-changer for farmers striving to maximize yields amidst challenging climatic conditions.
- Tractor drawn - ANGRAU blade Guntaka for harvesting groundnut - In the conventional method of harvesting groundnuts, farmers typically resort to hand-pulling when plants reach maturity, a task made easier with sufficient moisture. However, compact and hardened soil often complicates this process, leading to harvesting challenges and losses of up to 20%. To mitigate this issue, ANGRAU has introduced a tractor-drawn blade guntaka designed to streamline harvesting operations economically. This innovative tool can cover four rows at once, minimizing field losses significantly. Priced

at Rs.20,000/-, the guntaka features easily replaceable blades fixed to a 6" pipe frame, each capable of operating for 20 to 25 hours in hardpan soil, with an extended lifespan of 10 to 15 hours in moist conditions. With a field capacity of 4 to 5 hectares per day and an operational cost of Rs.750/ha, compared to Rs.1000/- with traditional methods, timely utilization of this technology not only reduces losses but also ensures a higher market price for groundnuts.

- Tractor operated groundnut combine for harvested crop - The traditional method of manual harvesting and threshing of groundnut requires a substantial amount of labor, approximately 175 to 200 women per hectare. Upon testing the performance of the developed combine for harvested crops, it was observed that the efficiency of the lateral and vertical conveyors stood at 92.40% and 92.56% respectively, achieving an effective field capacity of 0.122 hectares per hour with an average fuel consumption of 4.67 liters per hour. The threshing efficiency of the developed groundnut combine reached 82.54%, surpassing that of the wet pod thresher due to the slow feeding of the crop into the thresher from the trough. The operation of the groundnut combine resulted in a significant cost-saving of 74.92% compared to the conventional method of manual collection and hand stripping. Additionally, the developed combine harvester required only 6.67 machine hours for operation, marking a remarkable 92% reduction in man-hours compared to the conventional method. With an output capacity of 216.6 kg per hour and a broken pod loss of 1.27%, the thresher demonstrated a threshing capacity of 83.58% and a cleaning efficiency of 81.68%. Field testing revealed a field efficiency of 76.72% with optimized design parameters at a forward speed of 1.59 km/h.

Cotton

- Weed management in cotton - The pre-emergence application of pendimethalin 30% EC at a rate of 5 ml per liter, followed by post-emergence application of quizalofopethyl 5% EC at 2 ml per liter + pyrithiobac sodium 10% EC at 1.25 ml per liter at the 2-4 leaf stage, along with one inter-cultivation, resulted in a significant increase in seed cotton yield by 58.1% (3582 kg per hectare) compared to the weedy check (2266 kg per hectare). The yield was comparable to the weed-free check (4411 kg per hectare).
- Management of pink bollworm in cotton - To mitigate pest damage, the following measures are recommended: erect pheromone traps at a density of 10-15 traps per hectare for monitoring purposes and 25-40 traps per hectare for mass trapping at 45 days after sowing (DAS). Additionally, release Trichogramma bactrae at a rate of 1,50,000 per hectare, thrice at weekly intervals starting from 50 DAS. Implement spraying of neem oil at 1500 ppm at a rate of 5 ml per liter, chlorantraniliprole 18.5% SC at a rate of 0.3 ml per liter, followed by bifenthrin 10% EC at a rate of 1 ml per liter of water at weekly intervals after pink bollworm infestation surpasses Economic Threshold Levels (ETL). These measures resulted in the lowest rates of green boll damage (24.56%) and open boll damage (13.18%), as well as the lowest number of pink bollworm larvae per twenty green bolls (4.7), alongside the highest seed cotton yield recorded at 2635 kg per hectare.
- Refined IPM package for sucking pests on Bt cotton - A refined Integrated Pest Management (IPM) Package for Sucking Pests on Bt Cotton includes the following measures: Deployment of yellow and blue sticky traps at 30 days after sowing (DAS) at a rate of 25 traps per hectare. Stem application of monocrotophos 36 SL at a 1:4 dilution at 30 and 45 DAS, and imidacloprid 17.8 SL at a 1:20 dilution at 60 DAS. Limit the use of neonicotinoids during the first 60 days. Employ ETL (Economic Threshold Level) based spraying of flonicamide 50 WG at 0.3 g per liter and diafenthiuron 50% WP at 1.25 g per liter of water. Avoid repeated use of the same insecticide.
- Self-propelled single-row cotton picker - In recent years, cotton cultivation and production have seen a quantitative increase in the country. The developed unit boasts an overall working volume of 1 m3, featuring 8 picking rollers with adjustable converging angles between 4-8 degrees. The final prototype comprises a gearbox, picking rollers, main frame, hydraulic drive system,

crop guiding unit, and inspection system. A maximum field capacity of 0.30 hectares per hour was observed at a traveling speed of 2.5 km/h, with a peak field efficiency of 85.4% achieved at a forward speed of 1.0 km/h. The highest picking capacity recorded was 379.10 kg per hour at a forward speed of 2.5 km/h and a roller speed of 177 rpm. Optimal cotton output of 1459.09 kg per hectare was achieved with a forward speed of 1.7 km/h matched with a picking roller speed of 177 rpm. Increasing the forward speed from 1.0 to 2.5 km/h resulted in a 50% increase in picking capacity but significantly affected the unpicked and trash content. To enhance collection efficiency and reduce ground loss, the trough capacity was augmented, and a blower assembly was added. Compared to a fixed trough, an adjustable collection trough demonstrated 17.5% higher efficiency, leading to reduced ground loss. The cost of the self-propelled single-row cotton picker was calculated to be Rs. 8,50,000, while the operational cost using the developed prototype was determined to be Rs. 789 per hour and Rs. 5,175 per hectare, resulting in a 70% saving compared to manual picking. Additionally, a 90% reduction in labor hours spent on harvesting was observed.

Sugarcane

- Sugarcane node seedling and paired row planting technology - The combination of single-node seedling technology and paired-row planting (60/120 cm) in sugarcane cultivation has emerged as a superior alternative to the conventional method of planting (90 cm) using three-budded setts. This innovative approach not only delivers a remarkable yield increase of 7.95% compared to the conventional method but also offers additional advantages. By integrating single-node seedling technology, farmers can reduce the seed rate per unit area and benefit from early maturity, leading to substantial additional returns of nearly Rs. 12,500 per hectare. Additionally, paired-row planting facilitates the cultivation of intercrops, thereby offering additional income opportunities for farmers. This dual technology approach presents a promising pathway for enhancing sugarcane productivity and profitability.
- Weed management in sugarcane - Weed management in sugarcane has been tackled through several effective strategies. One approach involves the post-emergence application of 2,4-D at 4.5 kg per hectare combined with Gramoxone at 2.5 L per hectare, administered at 20 and 60 days after planting. Alternatively, pre-emergence application of atrazine at 2.0 kg active ingredient per hectare along with hoeing at 60 days after planting (DAP) has shown to be effective in weed control, resulting in significant yield increases of 19.35% and 16.97%, respectively. Despite their non-selectivity to sugarcane, these chemical treatments have proven highly effective and are gaining popularity among farmers. In addition, post-emergence application of Metribuzin at 1.0 kg combined with 2,4-D at 2.0 kg per hectare at 20 DAP and 90 DAP has demonstrated effectiveness in controlling weeds while offering selectivity to the crop, resulting in an 8.8% increase in cane yields. For managing creeper weeds in sugarcane, a pre-emergence spraying of metribuzin at 1.50 kg per hectare followed by post-emergence application of almix at 20 g per hectare at 75 days after planting has proven to be an effective and economical method. This approach yields a remarkable 28.2% increase over control while efficiently managing creeper weeds in sugarcane.
- Rapid composting technique for sugarcane - A rapid composting technique has been developed and standardized for managing sugarcane crop residues, including cane trash, bagasse, and press mud. This integrated approach initially utilizes a microbial consortium, followed by the introduction of earthworms at a rate of 1 kg per 1 ton of organic waste to accelerate the composting process. With a significantly reduced composting time of 15-20 days, enriched compost with a favorable carbon-to-nitrogen ratio ranging from 12.80 to 16.50 is produced within 75 days. This innovative method offers an efficient solution for managing sugarcane crop residues while yielding high-quality compost in a short

timeframe.

- Organic farming package in sugarcane - A comprehensive package of practices has been developed for organic cultivation of sugarcane, incorporating various organic inputs and management strategies. The package includes the application of farmyard manure at 25 t/ha as basal dressing, in-situ green manuring using Sunhemp between the crop rows with subsequent incorporation, and the application of biofertilizers such as Azospirillum, PSB, and KRB at 10 kg/ha at basal and 45 days after planting. Additionally, vermicompost is applied at 3 t/ha in three equal splits at 60, 90, and 120 days after transplanting, along with need-based sprayings of vermiwash at a concentration of 10 ml/L at critical crop stages. At the cessation of monsoon, trash compost is applied at 5 t/ha. After five years of experimentation, cane and sugar yields stabilized, with superior yields observed from the seventh year onwards. In the thirteenth year, organic farming recorded additional cane and sugar yields of 8.25 and 1.00 t/ha, respectively, along with superior juice quality. Soil organic carbon levels also showed a gradual increase, with organic farming demonstrating higher levels (0.80%) compared to inorganic farming (0.71%). This organic farming package not only contributes to soil health improvement but also encourages sustainable agricultural practices.
- Eco-friendly technique for cane trash in-situ decomposition - A sustainable method has been developed for the in-situ decomposition of cane trash following sugarcane harvesting. This technique begins with shredding the entire cane trash, typically amounting to 7.5 to 8.0 tons per hectare, using a specialized trash shredder. Subsequently, a blend of dung slurry (5%), molasses (0.1%), and decomposing culture, applied at a rate of 5 kg per hectare, is spread over the shredded debris. After a span of 20-25 days, the partially decomposed cane trash is integrated into the soil using a rotavator. This innovative approach offers a sustainable alternative to the traditional practice of open burning, aiming to enhance soil organic carbon levels while curbing environmental pollution.

Mesta

- Retting technology in mesta - A significant advancement in retting technology has been achieved through the development of micro pond retting, which has reduced the retting duration from the conventional 21-25 days to just 12-14 days. This novel approach further expedites the retting process by 13 days compared to the conventional 22-day method. It involves dipping mesta sticks in a 1.25% urea solution up to 50 cm from the base, followed by overnight retention before retting.

Tobacco

- Planting methods, topping and foliar sprays in tobacco - Cultivation of tobacco using the ridges and furrow method yielded a significantly higher cured leaf output of 1550 kg per hectare compared to the flatbed method, which produced 1359 kg per hectare. Topping tobacco at the early flowering stage, specifically at the 15th leaf, resulted in a cured leaf yield of 1938 kg per hectare with excellent quality. Furthermore, foliar application of potassium nitrate (KNO3) at a concentration of 2.5%, conducted twice at 45 and 60 days after sowing (DAS), led to a substantial increase in cured leaf production, reaching 1713 kg per hectare.

GENERAL AGRICULTURAL PRACTICES

- Conservation furrows across the slope - The implementation of conservation furrows, established either manually with bullock-drawn tools or with tractor-drawn implements, is becoming widespread across slopes during sowing in crops such as groundnut, castor, and redgram. This practice serves a dual purpose: conserving soil and moisture while also enhancing productivity by 10 to 14 percent. Furthermore, the integration of rainwater management techniques, which includes subsoiling alongside conservation furrows,

has demonstrated significant potential in augmenting yields of rainfed crops like groundnut, pigeonpea, and castor by 20-25 percent compared to conventional farming methods. Given its effectiveness, the Department of Agriculture, Government of Andhra Pradesh, has embraced and subsidized the adoption of this in-situ moisture conservation technology since the fiscal year 2014-15.

- Farm pond technology - Utilizing farm ponds for supplemental irrigation in Rayalaseema's predominantly rainfed groundnut cultivation has gained popularity. These ponds, with a capacity of 250 m3 (10 x 10 m in size with a depth of 2.5 m) and side slopes of 1.5:1 for a catchment area of 2 ha, are lined with soil and cement in a 6:1 ratio to minimize seepage losses. They effectively mitigate dry spells during critical crop growth stages. Providing one supplemental irrigation of 20 mm during dry spells increases groundnut pod yield by 25 to 30 percent, offering relief during drought years. The farm pond, costing around Rs. 50,000, is equipped with a 4 to 5 HP diesel motor (costing Rs. 15,000) for water lifting, facilitating the use of 15 to 20 sprinklers covering 3000 m2 at a time. Similar benefits are observed in crops like Redgram and castor, with significant yield increases (68% in redgram and 82.7% in castor) and improved benefit-cost ratios compared to rainfed conditions. Government programs like "Panta Sanjeevini" promote this technology, fostering double-digit growth in rainfed crops across Andhra Pradesh's vulnerable districts. This climate-resilient approach to rainwater harvesting, implemented in convergence with various departments, aims to reduce farmer distress and promote agricultural sustainability.
- Foliar sprays for drought mitigation - Foliar spray of potassium nitrate (13-0-45) at a concentration of 0.5% during peg penetration and pod development stages is demonstrated to enhance groundnut cultivation significantly. This approach fosters robust plant growth and helps mitigate drought stress. The result is a notable increase in pod yield, reaching 630 kg/ha, compared to the farmer's practice yielding 441 kg/ha. Consequently, adopting this method leads to higher net returns of Rs 4200/- per hectare. The commendable benefit-cost ratio of 1.14, in contrast to the farmer's practice of 0.62, underscores the effectiveness of this technology in improving both yield quantity and quality.
- Mechanized strip cropping/rainbow cropping - Rainbow cropping, an innovative system developed for the drylands of Ananthapuramu district, ensures assured yields, income, and sustainability through mechanized farming. Seven crops, representing the colors of the rainbow, are hierarchically arranged in strips, providing income security during dry spells and crop failures. Diversifying crops to include oilseeds, millets, and pulses not only ensures a complete food basket but also boosts income. Compared to the traditional Navadhanya system of poly cropping (464 kg/ha) and monocropping groundnut (530 kg/ha), rainbow cropping has demonstrated higher seed yields (709 kg/ha), a 35% increase, resulting in higher net returns and benefit-cost ratios due to reduced seed costs and wider spacing. Millets, occupying significant areas in the rainbow cropping system, exhibit resilience to adverse conditions, ensuring income sustainability even during extreme dry spells. Foxtail millet yields 360 kg/ha, pearl millet yields 390 kg/ha, and jowar yields 240 kg/ha under extreme dry spell conditions, ensuring income sustainability even when other crops fail.
- Rainfed integrated farming systems - In the arid region of Anantapur, unproductive Class IV lands, characterized by red sandy loam soils and shallow depth, present challenges for cultivation. To render these lands viable, integration with pasture (Stylosanthes) and sheep rearing, or an Agri-Horti system combining groundnut and Amla cultivation alongside sheep rearing (10 rams), is recommended. This horti-pastoral approach, integrating groundnut cultivation with sheep rearing (10 rams) for 4 months (November to February), suitable for sloped terrain, has been demonstrated to double net returns compared to crop-alone

systems for a 1-hectare farm. Additionally, it provides 65 man-days of employment opportunities post-harvest. Incorporated into the Revitalising Rainfed Agriculture (RRA) scheme in Anantapuramu district, this integrated approach holds significant promise for enhancing farmer livelihoods.

- Duplex poultry unit for backyard poultry in tribal hilly tracts - The Duplex Poultry Unit presents a portable and secure solution for backyard poultry rearing. With dimensions of 4x8x4.5 feet, it is constructed from rust-proof Zinc material, capable of accommodating 15-20 birds. Birds housed in the Duplex Poultry Unit are completely protected from predators, unlike those in free-range conditions, which face threats from dogs and jackals, resulting in a 46.67% reduction in bird population. Moreover, birds in the controlled environment exhibit significantly higher egg (54.45%) and meat (57.33%) production, leading to a 56.51% increase in gross returns compared to free-range rearing.
- Low cost solar fencing against macaques and wild boar - The setup requires bamboo or wooden poles, GI wire, and a basic solar unit, which costs Rs. 15,000. The solar unit discharges a 12 V pulsating current that emits a jerky shock upon touch, but it is non-lethal. Each solar unit covers an area of 5-8 acres, offering 70-80% protection with a benefit-to-cost ratio of 1:3 in field crops.
- Double trench former - The Double Trench Former was developed as a solution to mitigate sugarcane lodging by introducing a modified trench-forming method. Field testing has demonstrated that this innovation can reduce lodging by up to 50% compared to conventional plantation methods.
- Development of raised bed former cum planter - The equipment is capable of forming beds that are 100 cm wide and 25 cm high, while also integrating a seed planting mechanism. It facilitates groundnut cultivation on these beds, maximizing yields.
- Fabrication of farm implements matching for mini-tractor - Implement attachments tailored for mini-tractors (15-21 hp) have been developed, including a 2-bottom M.B. plough, a 6-tyne cultivator, a 6-row seed cum fertilizer drill, multi-crop intercultural equipment, a 40-feet swath sprayer, a rotavator, a thresher, a high ground clearance mechanism for dryland crops, a granular fertilizer broadcaster, a 10 kv generator, and a mini-tractor-operated rain gun for smallhold use.
- Agricultural drone technology for spraying, seeding, and granular fertilizer dispensing - The PUSHPAK-01 and PUSHPAK-02 drones are designed for pesticide spraying and seeding/granular fertilizer dispensing, respectively. Crop-specific Standard Operating Procedures (SOPs) have been developed for ten major crops including paddy, maize, blackgram, redgram, chickpea, sugarcane, cotton, chilli, groundnut, and sorghum. Each drone is capable of covering one acre in just 6 minutes, traveling at a speed of 16.2 kmph, with a 10-liter capacity. Adoption of these drones can result in a 25-30% reduction in pesticide consumption, while saving 95% of the time and energy typically required for spraying and spreading tasks. Furthermore, there is a 90% reduction in water usage for spraying.
- Process technology and machinery for granular jaggery - A groundbreaking technology has been developed for producing granular jaggery with exceptionally low moisture content (1-2% d.b), offering extended shelf life, convenient handling, and a chemical-free formulation. Accompanying this innovation is a suite of meticulously designed machinery, including a granular jaggery making machine, a siever, and batch-type dryers. Specialized packaging methods ensure preservation for up to two years, enhancing market viability. Acknowledging the ingenuity of these developments, patents have been secured for two pivotal inventions: "MACHINERY & PROCESS OF MANUFACTURING OF CANE JAGGERY IN CRYSTAL FORM," granted on 12-03-2021 (Grant No. 361025), and "MECHANIZED JAGGERY GRANULATOR FOR PREPARING JAGGERY GRANULES," granted on 22-11-2021 (Grant No. 382165). Commercialization efforts include Memorandums of Understanding

(MOUs) with eight individuals to expand its entrepreneurial impact.

- Semi-mechanized edible films making machine for preparing pootharekulu sweet - The introduction of a semi-mechanized machine has revolutionized the production of Pootharekulu, a delicate sweet resembling folded paper. Traditionally laborious and prone to yielding inconsistent results, this innovative machine is capable of producing 1200 films per day, effectively tripling the output compared to manual methods. Priced at Rs. 32,000, it offers a significant economic advantage, with daily net profits amounting to Rs. 1629/-, which surpasses the Rs. 450 net profit generated from traditional methods. This invention has been recognized with a patent, titled "MECHANIZED SYSTEM FOR PREPARING PAPER SWEET (pootharekulu)" (Grant No. 406007, Dt: 07-09-2022), highlighting its uniqueness and innovation. Not only does it enhance economic prospects, but it also elevates hygiene standards in production, marking a significant step forward in the industry.
- Mechanized system for production of solid or liquid or granular jaggery - The modern jaggery plant has been engineered to produce either 1 tonne of solid jaggery, 1500 liters of liquid jaggery, or 800 kg of granular jaggery daily. Traditionally labor-intensive and time-consuming, the production process has been revolutionized with automated operations, which replace manual processes. This innovative facility streamlines production, ensures hygiene standards, and significantly reduces processing time, marking a significant advancement in the jaggery production landscape.
- Process technology for production of sugarcane juice powder - A groundbreaking process technology has been developed for producing sugarcane juice powder, addressing challenges associated with the limited shelf life of fresh sugarcane juice. By employing spray drying technology, fresh sugarcane juice is transformed into an easily reconstituted powder form, thereby extending its shelf life at ambient temperatures and reducing logistics costs. This innovation offers convenience and accessibility compared to traditional methods, mitigating issues of perishability and enhancing the usability of sugarcane juice.
- Pneumatic pressure parboiler for parboiling of paddy - The revolutionary Pneumatic Pressure Parboiler, boasting a one-tonne capacity, has been meticulously designed and developed exclusively for paddy parboiling. This innovative system dramatically slashes parboiling time from 8 hours, as stipulated by the CFTRI method, to a mere 2.5 hours. Beyond its exceptional efficiency, this parboiler yields white-colored, soft-textured parboiled rice. Notably, a patent grant was issued for this groundbreaking invention under the title "PNEUMATIC PRESSURE PADDY PARBOILING SYSTEM" on 08-10-2007 (Grant No. 210736).
- Mole drainage - Mole drainage is a subsurface method utilized in clay soils prone to waterlogging. This technique involves the creation of unlined circular soil channels resembling pipe drains, achieved with a mole plough. By breaking the subsurface hard pan, mole drainage enhances soil conditions and improves drainage efficiency. Its cost-effectiveness allows for close spacing installation, with optimal performance typically observed at 3m intervals and depths ranging from 0.4m to 0.5m. When coupled with soil oxygenation agents such as Calcium peroxide granular powder, mole drainage efficiently reclaims temporarily waterlogged soils, promoting better aeration, particularly during the monsoon season. Consequently, this approach has resulted in significant yield increases of 25-38% in sugarcane production.
- Multipurpose polyhouse solar dryer - The Multipurpose Polyhouse Solar Dryer has been developed to address diverse needs, such as drying chillies, nurseries, and leafy coriander during their off-seasons. This innovative dryer offers a batch capacity ranging from 3.0 to 12.0 tons, with a drying period lasting between 4 to 8 days. Furthermore, its adaptable design facilitates potential expansion to meet increasing demands and varied agricultural requirements.
- Rapid testing kit for detection of aflatoxin in agricultural produce - Rapid testing

using Lateral Flow Immunoassay (LFIA) is designed for the detection of aflatoxin B1 in agricultural produce. The extraction process takes approximately 20 minutes, and the test itself can be conducted within 10 minutes. Results can be interpreted through visual observation. The limit of detection is set at 10 parts per billion (ppb), which is crucial for meeting the export requirements of most countries.

- An in-vitro method for determination of glycemic index and kit - Protocols have been developed for determining the glycemic index (GI) of various agricultural products. This breakthrough enables the precise measurement of how different foods impact blood sugar levels, offering crucial insights for individuals managing conditions such as diabetes or aiming to optimize their dietary choices for overall health. The patented protocols, registered under number 536180 on April 30th, 2024, signify a significant advancement in scientific methodology. This achievement not only enriches our understanding of the nutritional properties of agricultural products but also paves the way for developing healthier food formulations and personalized dietary recommendations tailored to specific health needs.
- Enhancing crop water use efficiency with geomatics - A case study in Krishna Central Delta - Developed water-yield response models for major crops in the Krishna Central Delta (KCD) to enhance water use efficiency using geomatics. The methodology utilizes freely downloadable Landsat 8 OLI data along with the latest remote sensing techniques and neural network models for yield estimation. The decision tree model, based on NDVI profiles derived from zonal means, provides highly accurate crop classification compared to previous methods such as supervised and unsupervised classification, as well as NDVI classification. This, in turn, can be utilized for crop classification in any irrigated command area with a high level of confidence. The high prediction accuracy of the SEBAL algorithm makes it applicable for successful ET estimation in other canal commands as well.
- Hydrological sustainability through SWAT: Gundlakamma sub-basin - The Soil and Water Assessment Tool (SWAT) effectively applied to simulate the flow in Gundlakamma Sub-Basin for Hydrological Sustainability. Based on the simulated average annual surface runoff and actual evapotranspiration in the Gundlakamma sub basin, check dams and percolation tanks were proposed for augmenting the ground water resources to achieve hydrological sustainability of the basin. Suitable sites were identified for conservation structures in agricultural, forest and wasteland zones. The impact of climate change on water resources can be mitigated by adopting water management technologies and augmenting ground water resources through soil and water conservation structures.
- Groundwater dynamics and rainwater harvesting recommendations - Groundwater dynamics were simulated using Visual MODFLOW in the Nagarjuna Sagar Right Canal (NSRC) command area, revealing a negative net groundwater recharge during the study period from 2008 to 2017. Visual MODFLOW was employed to simulate groundwater levels in the NSRC command area. Calibration and validation of Visual MODFLOW were conducted using observed groundwater levels for the periods 2008-09 to 2012-13 and 2013-14 to 2016-17, respectively. Sensitivity analysis was performed during calibration. Deeper groundwater tables are expected in the future in Chimakurthy and Thalluru villages of Prakasam district, as well as Karempudi and Piduguralla villages of Guntur district in the study area. To address the depletion of groundwater resources, it is imperative to establish rainwater harvesting structures in these villages. It is strongly recommended to expedite the construction of these structures to mitigate the issue of groundwater depletion.

IMPLEMENTS:

- Burrow smoker - The burrow smoker is a small, compact unit that utilizes paddy straw to smoke burrows, aided by a blower. It proves to be more effective, safe, and economical for field rodent management, particularly during the crop's reproductive

phase when rodent pests show poor acceptance of bait.

- Tractor drawn Ananta interculture implement - Weeding in rainfed groundnut fields is typically carried out using 'metla guntaka' and 'danti guntaka', which are driven by a pair of bullocks between rows at 20 and 40 days after sowing, or manually with the assistance of a hand hoe. Pneumatic tires, sized 8.3" X 32", are installed on the rear wheels of the tractor. With these smaller tires, the tractor can navigate rows spaced 30cm apart in groundnut fields. An interculture implement with 8 tines, featuring T-shape and V-shape sweeps fitted to the tines, has been developed. This tractor-drawn interculture implement mechanizes the intercultivation process in groundnut cultivation, ensuring timely operations and reducing labor costs. The approximate cost of pneumatic tires and

the interculture implement with sweeps is Rs. 50,000. This interculture implement can be adapted for various crops by changing the sweeps according to row spacing. Additionally, besides weed removal, the V-shaped channels formed between rows serve as micro-catchments, conserving rainwater and reducing erosion.

- Castor capsule threshers/shellers/ decorticators - At ANGRAU, farmers often sell their capsules at only half of their potential value. By employing mechanized threshing, these capsules can be transformed into seeds, which fetch a significantly higher price and save approximately Rs. 2000 in manual labor costs. Farmers have three threshing options available to meet their varying operational needs. The coolant engine-operated sheller boasts a capacity of 500 kg per hour, making it ideal for large-scale operations. For medium-scale tasks, the power-operated mini sheller offers a 50 kg per hour capacity. Finally, the hand-operated sheller, with a 10 kg per hour capacity, suits smaller-scale or more manual operations. Each of these options provides an efficient solution to enhance productivity and profitability for farmers.
- Small farmer-friendly mini/small tractor drawn implements (Ananta planter and intercultivator) - ANGRAU's design and development of matching implements for small tractors (15 – 18 hp) has ushered in a new era of agricultural mechanization, particularly beneficial for small-scale farmers. These compact tractors offer the versatility of larger models but at a more accessible cost, presenting an ideal solution for modest farming operations. To further streamline mechanization, ANGRAU has introduced a range of mini tractor-drawn implements, meticulously tested for efficacy. Among these innovations are a 2-bottom M.B. plough capable of deep ploughing at a rate of 4-5 acres per day, a 6-tyne cultivator for secondary tillage covering 6-7 acres daily, and a 6-row multi-seed cum fertilizer drill facilitating efficient sowing over 7-8 acres per day. Intercultural equipment with a 20 cm tire width enables precise operations without crop damage across 8-9 acres daily, while a boom sprayer for chemical applications spans an impressive 30-35 acres per day. For further tillage and seedbed preparation, a rotavator is deployed, complemented by a thresher processing sorghum and Bengal gram at a rate of 2-2.5 quintals per hour. Notably, the high ground clearance mechanism supports intercultural and spraying tasks up to 75-80 days post-sowing or for crops reaching heights of 85-90 cm. Additional features include granular fertilizer broadcasting equipment ensuring uniform distribution and a mini-tractor

PTO-operated rain gun for supplemental irrigation from farm ponds, alongside a reliable 10 KV generator for power during outages. These innovations collectively elevate the efficiency and productivity of small-scale farming, illustrating the transformative impact of ANGRAU's contributions to agricultural mechanization.

- Custom hiring service centre – boon for rainfed farmer - In the rainfed areas with limited rainfall in Andhra Pradesh, small and marginal farmers often struggle to afford high-cost machinery. To alleviate this challenge, establishing custom hiring centres offers a viable solution by enabling farmers to rent machinery. Groundnut cultivation is a predominant activity in these rainfed regions, particularly in Anantapur district, which covers approximately 5.0 lakh hectares. Timely field operations, including preparation, sowing within a narrow window, intercultivation, spraying, harvesting, and threshing, are crucial for maximizing productivity. To meet these needs, a custom hiring centre was established at AICRPDA, Agricultural Research Station, Anantapur, in 2011-12 with financial assistance from RKVY. This centre provides a range of farm implements for rental, such as subsoilers, duck-foot cultivators, planters, intercultivation equipment, and multi-crop threshers. The custom hiring charges and deposit amounts are overseen by a committee chaired by the Head of Farm Machinery and Power Engineering University. Among the available equipment, demand is highest for planters (66%) and threshers (10%). From its inception until 2023, the centre has served farmers across 23 mandals and 200 villages in Anantapur district, generating revenue of Rs. 20.63 lakhs. Building on the success of these custom hiring centres, the Government of Andhra Pradesh, under RKVY, has established similar centres at Krishi Vigyan Kendras (KVKs) and crop-specific custom hiring centres at Rythu Bharosa Kendras (RBKs) across the entire state of Andhra Pradesh.
- High clearance self-propelled chilli harvester - ANGRAU has introduced an innovative solution to the challenges posed by the increased cost of cultivating chillies and the labor scarcity for hand harvesting.

This solution involves a high clearance self-propelled chilli harvester, ingeniously designed by integrating the harvester unit and prime mover onto a high clearance frame. This configuration places the setup between the frame columns, utilizing the

tractor's power take-off (PTO) to drive double helical rollers at the optimal speed for efficiently harvesting ripe chilli pods. Field tests conducted at forward speeds of 1 km/h and 2 km/h demonstrated the harvester's capacity to cover 0.18 hectares per hour. In traditional methods, harvesting one hectare of chilli crop necessitates the labor of 100 workers, amounting to approximately 800 man-hours at a cost of Rs. 25,000. In stark contrast, the newly developed chilli harvester boasts a field capacity of 0.18 hectares per hour, requiring only 5 machine hours and 9 man-hours to harvest the same area. This results in a mechanical harvesting cost of Rs. 4458 per hectare, effectively reducing man-hours by 97% and lowering harvesting expenses by Rs. 20,542 per hectare.

- Mini-tractor drawn single row transplanter for vegetable crops - The ANGRAU-developed machine represents a significant advancement in transplanting technology, boasting a sturdy main frame and a sophisticated revolving magazine-type metering system. Its seedling delivery tube, featuring a parabolic cut at the lower end, ensures precise placement. Equipped with double disc-type furrow openers and revolving press wheels for optimal soil compaction, this machine promises efficiency. Evaluation across forward speeds of 1.0, 1.5, and 2.5 km/h revealed impressive results. For tomatoes, seedling-to-seedling spacing ranged from 44.26 cm to 41.46 cm, while for brinjal, it varied from 44.71 cm to 40.26 cm. Transplanting efficiency, crucial for yield, reached rates between 88% to 61% for tomatoes and 90% to 68% for brinjal, depending on speed. With a field capacity of 0.05, 0.089, and 0.11 ha/h, and field efficiency rates peaking at 83.3%, this machine demonstrates promising prospects for enhancing agricultural productivity.
- Automatic dibble transplanter for paper pot vegetable seedlings - Mechanization in vegetable transplanting is essential for easing the burden of labor and minimizing physical strain. ANGRAU's innovative dibbling unit, employing a four-bar linkage mechanism with inner and outer rotors, revolutionizes the process. Through meticulous testing, various parameters such as forward speed, conveyor inclination, and speed ratio were scrutinized to optimize efficiency. Field assessments showcased precise depth of planting, spacing consistency, and remarkable verticalness of seedlings. Calculations unveiled the machine's theoretical and actual field capacity, alongside its commendable efficiency. Contrasting mechanical and manual methods revealed stark differentials in plant mortality, labor demands, and cost efficiencies, with the mechanical method boasting significant advantages across the board. ANGRAU's breakthrough offers not only enhanced productivity but also substantial savings in labor, time, and expenses, heralding a new era in agricultural mechanization.
- Oscillating intercultural equipment for rice - In the realm of agriculture, particularly in paddy cultivation, the utilization of hand or power-operated weeders such as the conoweeder, star weeder, and power weeder poses a significant challenge. The demanding physical exertion needed to push or operate these tools in the muddy terrain of paddy fields often results in diminished field coverage. To address this issue, a novel unit has been developed, capable of functioning with a mini tractor possessing 21–27 horsepower. This innovative unit boasts a remarkable field capacity of 6 acres per day,

while maintaining an operational cost of Rs. 680 per acre. By alleviating the burden of manual labor and optimizing efficiency, this advancement holds promise for enhancing productivity and sustainability in paddy farming practices.

- Mini tractor operated seed planter for direct sowing of paddy - The ANGRAU mini-tractor-drawn seed planter marks a significant advancement in agricultural technology, boasting a mechatronic-controlled seed metering mechanism designed to enhance precision and efficiency. This innovation allows for flexible power sources, utilizing either battery or direct ground wheel connection to minimize seed rate variation caused by slippage. Compatible with tractors ranging from 16 to 21 HP, it offers a commendable field capacity of 6 acres per day. Moreover, its economical fuel consumption rate of 1.9 liters per hour translates to an operational cost of Rs. 380/- per acre, making it a cost-effective solution for modern farming practices.
- Tractor operated two-row semi-automatic vegetable transplanter - At ANGRAU, a groundbreaking semi-automatic transplanter has been engineered to streamline the process of transplanting on both bare fields and plastic mulch. This innovative design boasts a linear dibbling mechanism, incorporating a Scotch yoke mechanism for the inversion of a double slider crank chain. With dibble cups affixed to the dibble tube, the transplanter efficiently creates cavities and releases seedlings. Precise control is achieved through a cam-lever arrangement and brake cable, ensuring optimal timing for the opening and closing of the dibble cups. Plant-to-plant spacing, averaging around 55.86 cm, demonstrates the transplanter's consistency across different crops and growth stages. Operational evaluations reveal varying degrees of plant damage, with tomatoes registering a maximum of 8.69% at 45 days. Under specific operating conditions, such as S1 and S2, seedling spacings closely match the designed parameters, showcasing the transplanter's accuracy. Theoretical and effective field capacities further underscore its efficiency, with operational costs estimated at 745.61 □ per hour and a commendable payback period of 3.51 years. This two-row semi-automatic transplanter stands as a testament to ANGRAU's commitment to advancing

PRODUCTION NETWORK - IMPACT ON AGRICULTURAL PROSPERITY

- Acharya N.G. Ranga Agricultural University (ANGRAU) has established a comprehensive seed production infrastructure that significantly contributes to agricultural innovation and prosperity in Andhra Pradesh. With six Regional Agricultural Research Stations and 33 Research Stations across six diverse agro-climatic zones, ANGRAU conducts demand-driven research to develop and promote new seed varieties and technologies. Under the Director (Seeds) and six Zonal Seed Production Officers, ANGRAU meticulously coordinates the seed production process, ensuring high standards and efficiency.
- ANGRAU's dedicated team of scientists and researchers work on developing and releasing new seed varieties that meet the evolving needs of farmers. The university has achieved notable successes, such as breeding over 497 varieties and hybrids across various crops, including pioneering achievements like the first gall midge resistant rice variety 'Kakatiya' and the striga-resistant yellow sorghum variety 'N-13.' ANGRAU's leadership in hybrid rice technology is highlighted by the development of APHR 1 and APHR 2 rice hybrids.

Collaborative Efforts and Public-Private Partnerships

- The university plays a vital role in promoting

quality seeds through initiatives like Seed Day events, fostering direct engagement between scientists, extension officers, and farmers. These events facilitate knowledge transfer and adoption of improved seed varieties, enhancing agricultural productivity. Collaborations with Rythu Bharosa Kendras (RBKs) and Farmer Producer Organizations (FPOs) ensure participatory seed production, empowering farmers and fostering self-sufficiency. ANGRAU's Mega Varietal Display event serves as a significant platform for collaboration, promoting innovation and superior seed varieties. By encouraging dialogue and collaboration, ANGRAU accelerates agricultural development and fosters sustainable growth, enhancing seed quality, farmer empowerment, and sustainable agricultural practices.

Zonal Seed Production System of ANGRAU

- The Zonal Seed Production System (ZSPS) of ANGRAU operates under the Director (Seeds) and the Director of Research, coordinating seed activities across various agro-climatic zones. Six Zonal Seed Production Officers (ZSPOs) oversee seed production in their areas, setting targets, supervising production, ensuring quality standards, and facilitating efficient seed distribution. Beyond supervision, ZSPOs engage in strategic planning, resource allocation, and capacity building, enhancing agricultural productivity and sustainability. By providing quality seeds suited to local conditions, the system increases crop yields, resilience, and reduces production risks. Collaboration between research institutions, seed producers, and farmers fosters knowledge exchange and the adoption of best practices, driving positive transformation in farming communities.

Spread and Adoption of Rice Varieties

- University has significantly influenced agricultural practices in Andhra Pradesh and beyond. ANGRAU's varieties dominate the state's agricultural landscape, with paddy covering 90.04% of the rice area, groundnut 95.06%, black gram 50.16%, and greengram 37.82%. This widespread adoption reflects farmers' trust in ANGRAU's breeding programs. Additionally, the varieties are well-regarded in other states, including Chhattisgarh, West Bengal, Telangana, and Odisha, enhancing agricultural productivity nationwide. Popular ANGRAU rice varieties like BPT 5204 (Samba Mahsuri) and MTU 1121 are extensively cultivated, covering 18.46% and 17.62% of the rice area in Andhra Pradesh, respectively. Other significant varieties, such as MTU 7029, MTU 1061, and NLR 34449, also contribute to the diversity and resilience of rice farming. These varieties have revolutionized agriculture within the state and across India, ensuring food security and supporting farmer livelihoods. ANGRAU's impact on India's food basket and agricultural economy is profound. With over 123 rice varieties developed in six decades, ANGRAU has shaped India's rice production. Mega varieties like Swarna, Cottondora Sannalu, Vijetha, and Samba Mahsuri cover substantial rice cultivation areas, producing millions of tons annually. Economically, these varieties add billions of rupees to the rice production economy, enhancing farmer incomes and contributing significantly to the national agricultural gross value added (GVA). ANGRAU varieties are also prominent in India's non-basmati rice exports, favoured for their high yield and quality, making them crucial to both domestic and international markets.

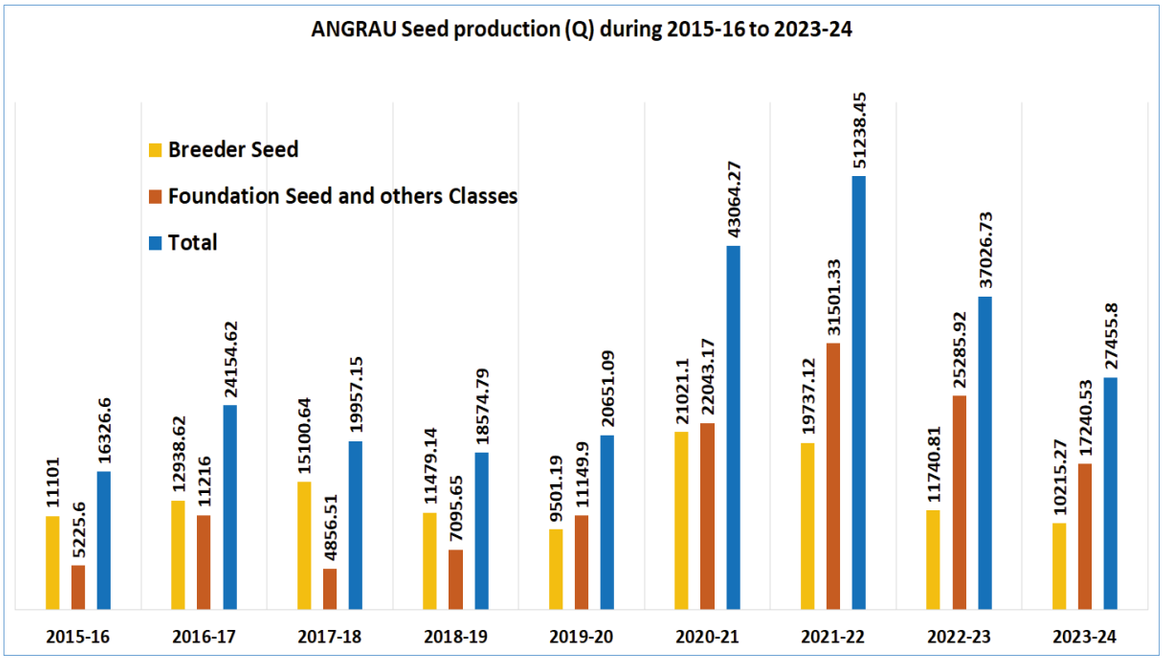
Impact on Pulses and Groundnut Cultivation

- ANGRAU has significantly contributed to pulse crop improvement programs in India, enhancing agricultural productivity and farmer incomes. Through extensive research in pulse breeding, ANGRAU has developed and released superior varieties of blackgram, greengram, and redgram. These new varieties are designed to overcome major production challenges such as pests, diseases, and environmental stresses, thereby improving crop yields. The university's impact is evident in the widespread adoption of its pulse varieties across several Indian states. ANGRAU-released blackgram varieties, like LBG-752, TBG 104, and LBG 645, are

extensively cultivated in Andhra Pradesh, occupying a large portion of the blackgram farming area. Greengram varieties, such as LGG 460, LGG 462, and LGG 407, have also gained significant traction, becoming popular in Andhra Pradesh and other regions. Similarly, redgram varieties like LRG-41 and LRG-52 have been well-received by farmers, highlighting ANGRAU's influence on pulse cultivation. In groundnut cultivation, ANGRAU's contributions are equally noteworthy. The K-6 variety has become a dominant force in Andhra Pradesh, covering the majority of the state's groundnut farming area. Nationwide, ANGRAU-released groundnut varieties have achieved substantial success, being widely adopted across various states. These efforts have significantly boosted groundnut productivity and profitability, enhanced food security and improving the livelihoods of farmers. Overall, ANGRAU's dedication to crop improvement has had a profound and positive impact on India's agricultural landscape.

Seed Production Trends and Outlook

- ANGRAU has shown significant growth in seed production from 2015-16 to 2023-24, focusing on Breeder Seed Production (BSP) and Foundation Seed Production (FSP). Starting with 16,326.60 quintals in 2015-16, production peaked at 51,238.45 quintals in 2021-22, reflecting efforts to meet rising seed demand. The production saw fluctuations, such as a decline in 2017-18 and another drop to 27,455.80 quintals in 2023-24. BSP and FSP trends highlight the university's strategic emphasis on quality seed development and market adaptability. Moving forward, it aims to boost efficiency by adopting technology, enhancing capacity, and embracing sustainable practices. It plans to tackle challenges by forming partnerships, staying adaptable in market dynamics, and fostering innovation to sustain agricultural productivity.
- ANGRAU's significant strides in agricultural research and seed development have transformed farming, enhancing farmers' lives. Its adaptable and economically viable seed programs have boosted productivity across regions. Continuous support and investment are crucial to maintain this progress. Prioritizing research, infrastructure, and collaboration will solidify its position as a leader in agricultural innovation, ensuring a prosperous and resilient future



IMPROVED VARIETIES / HYBRIDS / CULTIVARS RELEASED FROM ANGRAU IN DIFFERENT CROPS

Improved PADDY varieties / cultivars developed and released from ANGRAU				
S.No	PADDY Variety	Year of Release	Name of the Research Station	Most significant character (s)
1	MTU 1 (Bontha Akkullu)	1932-33	RARS, Maruteru	Tolerant to drought and salinity
2	MTU 2 (Potti Akkullu)	1932-33	RARS, Maruteru	Tolerant to flood and salinity
3	MTU 3 (Potti Basangi)	1932-33	RARS, Maruteru	Suitable for early planted conditions
4	MTU 4 (Pedda Basangi)	1932-33	RARS, Maruteru	Suitable for late planted conditions and tolerant to drought, non-lodging
5	MTU 5 (Botha Krishna Kaatukalu)	1932-33	RARS, Maruteru	Tolerant to flood and lodging
6	MTU 6 (Potti Atragada)	1932-33	RARS, Maruteru	Tolerant to flood
7	MTU 8 (Vanki Sannam)	1932-33	RARS, Maruteru	Compact panicle with good cooking quality
8	MTU 7 (Gutti Kusuma)	1934-35	RARS, Maruteru	Tolerant to drought and lodging
9	MTU 9 (Garika Sannam Vari)	1934-35	RARS, Maruteru	Suitable for saline soils
10	MTU 10 (Sanna Krishna Kaatukalu)	1934-35	RARS, Maruteru	Suitable for uplands
11	MTU 11 (Pedda Konamani)	1934-35	RARS, Maruteru	Withstands deep water condition
12	MTU 12 (Pedda Atragada)	1935-36	RARS, Maruteru	Suitable for low lying and ill-drained areas
13	MTU 13 (Delhi Bhogam)	1937-38	RARS, Maruteru	Suitable for well drained soils
14	MTU 14 (Bontha Atragada)	1939-40	RARS, Maruteru	Tolerant to flood and drought
15	MTU 15 (Daalva Sannam)	1940-41	RARS, Maruteru	Tolerant to drought and salinity
16	MTU 16 (Badava Kusuma	1940-41	RARS, Maruteru	Suitable for low lying areas
17	MTU 17 (Kodi Budama)	1942-43	RARS, Maruteru	Tolerant to drought and lodging
18	MTU 18 (Kodi Jilama)	1942-43	RARS, Maruteru	Tolerant to drought and lodging
19	MTU 19 (Sannam Kusuma)	1942-43	RARS, Maruteru	Suitable for both heavy and light soils
20	BCP 1	1948	ARS, Nellore	Pureline Selected from Sanna Molagolokulu, Tolerant to blast
21	BCP 2	1948	ARS, Nellore	Pureline Selected from budda Molagolokulu, Tolerant to blast and drought
22	BCP 3	1950	ARS, Nellore	Pureline Selectedfrom Atragada, Tolerant to blast
23	BCP 4	1950	ARS, Nellore	Pureline Selected from Pishanam, Tolerant to blast and drought
24	MTU 20 (Panasa Basangi)	1950-51	RARS, Maruteru	Tolerant to flood and lodging
25	MTU 21 (Prayaga)	1950-51	RARS, Maruteru	Tolerant to lodging and moderately tolerant to salinity
26	MTU 22 (Pedda Kusuma)	1952-53	RARS, Maruteru	Tolerant to lodging and flood
27	BCP 5	1951	ARS, Nellore	Pureline Selected from Potti vadlu, Tolerant to blast and drought
28	BCP 6	1965	ARS, Nellore	Pureline Sel from Molagolokulu, Tolerant to blast and drought
29	Bulk H 9	1965	ARS, Nellore	Pureline Selected from Molagolokulu, Tolerant to blast and drought

30	MTU 23 (Gutti Akkullu)	1967-68	RARS, Maruteru	Tolerant to slight salinity
31	RGL-1 (Gutti krishna katukalu)	1967	ARS, Ragolu	Suitable for early and late planted conditions, withstands over aging in nursery, drought tolerant and resistant to lodging, LS,Sg grain type
32	AKP 70-73 (Kotha Bayahunda)	1972	RARS, Anakapalle	Suitable for Kharif Season, 160-165 days duration, With stands moisture stress and late planting, Fine grain variety
33	MTU 8002 (Gowthami)	1976	RARS, Maruteru	Suitable for shallow submergence
34	MTU 8089 (Vasista)	1976	RARS, Maruteru	Non-lodging with good cooking quality
35	MTU 3626 (Prabhat)	1976	RARS, Maruteru	Blast tolerant, coarse grain suitable for parboiling
36	NLR 9674 (Kotha molagolukulu)	1977	ARS, Nellore	First cross derivative molagolukulu rice variety with blast resistance
37	(RGL-52) Nagavalli	1979	ARS, Ragolu	Semi-dwarf, non-lodging & fertilizer responsive, drought tolerant, withstands moderate salinity and non-shattering, LB,Sg grain type
38	NLR 9672 (Kotha molagolukulu)	1979	ARS, Nellore	First cross derivative molagolukulu rice variety with blast resistance
39	MTU 4569 (Sowbhagya)	1982	RARS, Maruteru	Non-lodging with good cooking quality
40	MTU 6024 (Lakshmi)	1982	RARS, Maruteru	Tolerant to BPH
41	MTU 4407 (Vijaya Mahsuri)	1982	RARS, Maruteru	Nonlodging
42	MTU 7029 (Swarna)	1982	RARS, Maruteru	High adaptability, low nitrogen responsive and BLB tolerant
43	PLA 1000	1982	RARS, Maruteru	Kharif, 155 days duration, Medium slender Brown glume grain, non-lodging, suitable for stagnant flooding and possess good cooking quality
44	Sona Mahsuri	1982	ARS, Bapatla	Resistant to neck blast and tolerant to gall midge, non-lodging and non-shattering and 2 weeks dormancy
45	Dhanya Laxmi	1982	ARS, Bapatla	Tolerant to gall midge and stem borer and awned variety, non-lodging and non-shattering
46	RGL-1746 (Vamshi)	1985	ARS, Ragolu	Semi-dwarf, non-lodging & fertilizer responsive, drought tolerant & non-shattering, Kharif and Rabi, late sown conditions, LS,Sg grain type
47	RGL-1750 (Mahendra)	1985	ARS, Ragolu	Semi-dwarf, non-lodging& fertilizer responsive, drought tolerant & non-shattering and tolerant to over-ageing, LS,Dg grain type
48	RGL-2624 (Pushkala)	1985	ARS, Ragolu	Kharif, Rabi and Shasticum season, non-lodging, drought tolerant, fertilizer responsive and non-shattering; also suitable for rainfed conditions in addition to assured irrigated areas, LB,Sg grain type
49	MTU 5293 (Pratibha)	1986	RARS, Maruteru	BPH tolerant with good grain quality
50	MTU 5249 (Vajram)	1986	RARS, Maruteru	High yielding, non-lodging and first BPH resistant variety
51	BPT 5204 (Samba Mahsuri)	1986	ARS, Bapatla	Non-lodging and non-shattering, non-dormant, excellent cooking quality
52	NLR 9672-96 (Pinakini)	1987	ARS, Nellore	Non lodging, fertilizer responsive, blast tolerant suitable for kharif
53	MTU 2067 (Chaitanya)	1988	RARS, Maruteru	High yielding, BPH tolerant variety
54	NLR 27999 (Tikkana)	1988	ARS, Nellore	Resistant to neck blast, suitable for late planting situations upto October
55	MTU 2077 (Krishnaveni)	1989	RARS, Maruteru	High yielding, BPH tolerant variety

56	MTU 5182 (Nandi)	1991	RARS, Maruteru	Non-lodging and BPH tolerant variety
57	NLR 145 (Swarnamukhi)	1991	ARS, Nellore	Resistant to blast, tolerant to moisture stress
58	NLR 28600 (Simhapuri)	1991	ARS, Nellore	Suitable for kharif season, Blast resistant
59	NLR 28523 (Sriranga)	1991	ARS, Nellore	Adopted to blast endemic areas of southern zone of Andhra Pradesh
60	MTU 9993	1993	RARS, Maruteru	Non-lodging variety suitable for upland situations
61	APHR1	1993	RARS, Maruteru	First rice hybrid in India with fine grain
62	APHR2	1993	RARS, Maruteru	Short duration, medium slender grain hybrid
63	RGL- 2537 (Srikakulam sannalu)	1996	ARS, Ragolu	Fine grain, non-lodging, resistant to gallmidge biotype 4 and blast; suitable for planting with aged seedlings, tolerant to flash floods, LS,Sg grain type
64	RGL-2538 (Vasundhara)	1996	ARS, Ragolu	Resistant to gallmidge biotype 4, suitable for late sown and late planting conditions & non-lodging, LBSg grain type
65	MTU 1001 (Vijetha)	1997	RARS, Maruteru	High yielding, BPH and blast tolerant variety
66	MTU 4870 (Deepthi)	1997	RARS, Maruteru	Non-lodging and tolerant to BLB and BPH
67	MTU 1006 (Maruteru Sannalu)	1997	RARS, Maruteru	Short duration super fine variety for rainfed condition
68	NLR 30491 (Bharani)	1997	ARS, Nellore	Field tolerant to RTV and susceptible to blast disease
69	NLR 33359 (Sravani)	1997	ARS, Nellore	Under field conditions resistant to blast disease.
70	NLR 33365 (Penna)	1997	ARS, Nellore	Resistant to blast
71	NLR 33057 (Swathi)	1997	ARS, Nellore	Non lodging, resistant to blast, tolerant to BLB, fertilizer responsive
72	MTU 1010 (Cottondora sannalu)	1999	RARS, Maruteru	Short duration variety tolerant to BPH and blast
73	NLR 33358 (Somasila)	1999	ARS, Nellore	Resistant to blast and suitable for early kharif and rabi seasons
74	NLR 33641 (Vedagiri)	1999	ARS, Nellore	Adopted to blast endemic areas of southern zone of Andhra Pradesh. Suitable for kharif season
75	BPT 2411 (Surya)	2000	ARS, Bapatla	Resistant to BPH and WBPH, one week seed dormancy, non-lodging and non-shattering,
76	NLR 33654 (Apoorva)	2001	ARS, Nellore	Suitable for rabi season. Under field conditions resistant to blast disease.
77	NDLR 8 (Nandyal Sannalu)	2001	RARS, Nandyal	Non-Lodging, fertilizer responsive, suitable to late sown conditions. Tolerant to blast and BPH
78	MTU 1031 (Tolakari)	2002	RARS, Maruteru	Non-lodging, long duration variety tolerant to BPH and BLB
79	MTU 1032 (Godavari)	2002	RARS, Maruteru	Non-lodging, long duration variety tolerant to BPH and BLB
80	BPT 1768 (Bapatla sannalu)	2002	ARS, Bapatla	Tolerant to BLB, Blast and BPH with stand complete submergence up to 7 days, one week dormancy
81	RGL-2332 (Sreekurma)	2006	ARS, Ragolu	Withstands aged seedlings, tolerant to gallmidge biotype 4 and blast; non-lodging, MS,Sg grain type
82	MTU 1061 (Indra)	2006	RARS, Maruteru	Tolerant to BPH and salinity
83	NLR 33892 (Parthiva)	2006	ARS, Nellore	Suitable for late planting areas in kharif season.
84	MTU 1075 (Pushyami)	2008	RARS, Maruteru	First CVRC released variety with tolerance to BPH
85	RGL-1880 (SriSatya)	2009	ARS, Ragolu	Non-lodging, non-shattering, tolerant to gall midge biotype 4 and drought; suitable for direct sown conditions, LS,Sg grain type

86	MTU 1064 (Amara)	2009	RARS, Maruteru	Tolerant to BPH, BLB and submergence
87	NLR 34449 (Nellore Mashuri)	2009	ARS, Nellore	Tolerant to salinity, Resistant to leaf blast, non-lodging, non-shattering, Fertilizer responsive, photo insensitive, suitable throughout the year.
88	RGL-11414 (Vamsadhara)	2010	ARS, Ragolu	Field tolerant to gall midge biotype 4 and leaf blast. Non-lodging and suitable for transplanting of over aged seedlings in nursery.
89	BPT 2270 (Bhavapuri Sannalu)	2010	ARS, Bapatla	Tolerance to BPH and blast and submergence up to one-week, non-dormant, non-lodging and non-shattering, excellent cooking quality with high head rice recovery
90	BPT 2231 (Akshaya)	2010	ARS, Bapatla	Tolerant to BPH and blast, non-dormant, non-lodging
91	NLR 3041 (Nellore Sona)	2012	ARS, Nellore	Tolerant to leaf and neck blast, non-lodging, non-shattering
92	NLR 40024 (Swetha)	2012	ARS, Nellore	Non lodging, heat and blast tolerant variety.
93	MTU 1121 (Sri Dhruthi)	2015	RARS, Maruteru	Tolerant to BPH, blast and photo insensitive
94	MTU 1153 (Chandra)	2015	RARS, Maruteru	Non-lodging, tolerant to BPH and blast
95	MTU 1140 (Bheema)	2016	RARS, Maruteru	Tolerant to flashfloods and stagnant flooding and anaerobic germination
96	MTU 1156 (Tarangini)	2016	RARS, Maruteru	Tolerant to BPH and blast
97	NDLR 7 (Nandyal Sona)	2016	RARS, Nandyal	Suitable to late sown conditions, fertilizer responsive, non-lodging, non-shattering. Highly tolerant to leaf folder, brown plant hopper and tolerant to blast
98	MTU 1155 (Samvruddhi)	2017	RARS, Maruteru	Non-lodging and nitrogen responsive
99	MTU 1172 (Ksheera)	2018	RARS, Maruteru	Flood tolerant variety with moderate tolerance to BLB, blast
100	MTU 1190 (Varam)	2018	RARS, Maruteru	Non-lodging, moderately tolerant to blast and BLB
101	MCM 100 (Panduranga)	2018	ARS, Machilipatnam	Medium duration (140 days) salt tolerant rice variety, moderately tolerant to BPH, medium slender grain type, dormancy for 2 weeks
102	BPT 2295 (Bapatla Mahsuri)	2018	ARS, Bapatla	Tolerant to BPH and blast, tolerant to salinity and flash flood conditions for about 7-10 days,
103	MTU 1210 (Sujatha)	2019	RARS, Maruteru	Non-lodging, moderately tolerant to BPH and BLB
104	MTU 1223 (Varsha)	2019	RARS, Maruteru	Suitable for rainfed shallow lowlands and moderately tolerant to BLB, blast
105	MTU 1224 (Maruteru Samba)	2019	RARS, Maruteru	Non-lodging, tolerant to BPH
106	MTU 1239 (Sravani)	2019	RARS, Maruteru	Non-lodging, tolerant to BPH and BLB
107	MTU 1262 (Maruteru Mahsuri)	2019	RARS, Maruteru	Non-lodging, fine grain variety, tolerant to BPH and BLB
108	BPT 2595 (Teja)	2019	ARS, Bapatla	Tolerant to BPH and blast, non-dormant, non-lodging and non-shattering, excellent cooking quality
109	NLR 3354 (Nellore Dhanyarasi)	2019	ARS, Nellore	Fine grain, blast and heat tolerant, non-lodging, dwarf, photo insensitive, suitable for summer and rabi seasons.
110	BPT 2782 (Bhavathi)	2020	ARS, Bapatla	Tolerant to BPH and blast, one week dormancy, non-lodging and non-shattering and excellent cooking quality
111	BPT 2411 (Sasya)	2020	ARS, Bapatla	
112	NLR 40054 (Nellore Sugandha)	2020	ARS, Nellore	Blast and gall midge tolerant rice culture. First aromatic rice variety from ANGRAU
113	NLR 4001 (Nellore siri)	2020	ARS, Nellore	Fine grain rice culture suitable for kharif and early rabi seasons, tolerant to BPH and neck blast.
114	MTU Rice 1212	2021	RARS, Maruteru	Moderately resistant to leaf blast, neck blast, sheath blight, sheath rot and BLB

115	MTU Rice 1280	2021	RARS, Maruteru	Moderately resistant to neck blast, rice tungro, stemborer and leaf folder
116	MTU Rice 1281	2021	RARS, Maruteru	Moderately resistant to leaf blast, neck blast and BPH
117	MTU Rice 1273	2022	RARS, Maruteru	Moderately resistant to blast, brown spot and suitable for exports
118	MTU Rice 1293	2022	RARS, Maruteru	Salinity tolerant variety released through marker assisted breeding and moderately resistant to blast and stem rot
119	MTU Rice 1310	2022	RARS, Maruteru	Moderately resistant to leaf and neck blast
120	MTU Rice 1321	2022	RARS, Maruteru	Moderately resistant to leaf blast, neck blast, sheath blight, stem rot and rice tungro
121	MTU Rice 1232	2022	RARS, Maruteru	Tolerant to flash and stagnant flooding, developed through marker assisted breeding, tolerant to BPH, blast
122	MTU Rice 1318	2022	RARS, Maruteru	Low nitrogen responsive variety and highly non-lodging
123	MCM Rice 103	2022	ARS, Machilipatnam	Medium duration (140 days), fine grain salt tolerant variety, non-lodging, moderately tolerant to WBPH, translucent kernel with good cooking quality
124	MTU Rice 1275	2023	RARS, Maruteru	Moderately resistant to blast, neck blast, BLB and brown spot
125	MTU Rice 1271	2023	RARS, Maruteru	Moderately resistant to BPH, BLB with high grain number
126	BPT Rice 2846	2023	ARS, Bapatla	Moderately resistant to Blast and BPH, good cooking quality.
127	BPT Rice 2841	2023	ARS, Bapatla	Black rice, cooks soft and flaky and suitable for raw rice. Besides high yield potential, it is moderately resistant to Blast and BPH.
128	BPT Rice 3050	2023	ARS, Bapatla	Tolerance to leaf blast, neck blast and brown spot, high HRR and desirable grain quality parameters.
129	NLR Rice 3238	2023	ARS, Nellore	First zinc biofortified rice variety from ANGRAU possess 24.7 ppm zinc in polished rice
130	NLR Rice 3684	2024	ARS, Nellore	Short duration, Medium slender grain type with high head rice recovery (62%) identified for release through CVRC

Improved SORGHUM (JOWAR) varieties / cultivars developed and released from ANGRAU

S.No	**SORGHUM (JOWAR)** Variety	Year of Release	Name of the Research Station	Most significant character (s)
WHITE JOWAR				
1	NTJ 1 (Nandyala Tella Jonna-1)	1988	RARS, Nandyal	Higher grain yield 30-35 q/ha, 105 days duration, Plant height of 170-180 cm with large semi compact panicles, non-lodging and drought tolerant
2	NTJ 2	1989	RARS, Nandyal	High yielding variety 30-35 q/ha,100 days duration
3	NTJ 3	1995	RARS, Nandyal	High yielding variety 28-30 q/ha,110 days duration, dual purpose non lodging variety with conical & compact panicles
4	NTJ 4	2002	RARS, Nandyal	Grain yield is 30-35 q/ha,105 days duration, tolerant to shoot fly and charcoal rot
5	NTJ 5	2018	RARS, Nandyal	Grain yield is 45-60 q/ha ,100 days duration, a high yielding, semi dwarf, non-lodging sorghum entry suitable for mechanical harvesting.

YELLOW JOWAR				
6	N-1 (Cheruku patcha Jonna)	1935	RARS, Nandyal	Yield is 14-16 q/ha having juicy sweet stem, compact cylindrical ear head with lustrous yellow bold grain with reddish purple glume. Fine straw quality. Suitable to the soils of rich and medium fertility.
7	N- 2	1942	RARS, Nandyal	Yield is 15-17 q/ha having juicy sweet stem, compact and oval head with good yellow bold grain with reddish purple glume. Fine straw quality. Suitable to the soils of rich fertility.
8	N -3	1933-34	RARS, Nandyal	Yield is 15-17 q/ha having pithy stem, compact cylindrical ear head with good yellow bold grain with reddish purple glume. Fine straw quality. Suitable to the soils of medium and poor fertility
9	N -4	1939-40	RARS, Nandyal	Yield is 15-17 q/ha having pithy stem, very compact oval ear head with yellow bold grain with reddish purple glume. Suitable to the soils of rich and medium fertility.
10	N-5	1939-41	RARS, Nandyal	Yield is 15-17 q/ha having pithy stem, compact oval ear head with yellow bold grain with reddish purple glume. Suitable to red, black and mixed soils of varying fertility.
11	N-6	1938-39	RARS, Nandyal	Yield is 15-17 q/ha,105 days duration having pithy stem, compact oval ear head with yellow bold grain with reddish purple glume. Suitable to red, black and mixed soils of varying fertility.
12	N-7	1940-41	RARS, Nandyal	Yield is 15-18 q/ha having pithy stem, very compact oval ear head with yellow bold grain with reddish purple glume. Suitable to the soils of rich fertility.
13	N-8	1940-41	RARS, Nandyal	Yield is 15-18 q/ha having pithy stem, very compact oval ear head with yellow bold grain with reddish purple glume. Suitable to the soils of rich fertility.
14	N-9(Cheruku patcha Jonna)	1940-41	RARS, Nandyal	Yield is 15-18 q/ha having juicy sweet stem, compact and long ear head, good yellow bold grain with reddish purple glume. Suitable to the soils of rich fertility.
15	N-10	1943-44	RARS, Nandyal	Yield is 15-18 q/ha having pithy stem, medium compact long ear head, light yellow bold grain with reddish purple glume. Suitable to shallow gravelly soils.
16	N-11	1943-44	RARS, Nandyal	Yield is 15-18 q/ha having juicy sweet stem, medium compact cylindrical tapering ear head, yellow bold grain with reddish purple glume. Suitable to red and mixed soils of light nature.
17	N-12	1943-44	RARS, Nandyal	Yield is 15-18 q/ha having pithy stem, compact and tapering ear head, yellow bold grain with reddish purple glume. Suitable to red and mixed soils of good fertility.
18	N-13 (Cheruku patcha Jonna)	1966	RARS, Nandyal	Yield is 18-20 q/ha,120 days duration having semi compact elliptical ear head with yellow bold grain. Recommended for places wherever striga incidence is endemic. Highly tolerant to striga and drought
19	N-14	1989	RARS, Nandyal	Yield is 20-22 q/ha,120 days duration having non juicy stem, compact and oval panicles with medium bold yellow grains. High grain and fodder yielding drought tolerant variety
20	N-15	2018	RARS, Nandyal	Yield is 30-33 q/ha,100-110 days duration, high yielding sorghum entry tolerant to drought and also resistant to striga, parasitic weed.
21	PJ-890 (Podalakur Jonna)	1992	ARS, Podalakur	A dual purpose, high yielding, tan grain type jowar variety suitable for *rabi.*
22	AJ 140 (Teepi jonna)	1996	ARS, Anantapur	105-110 days duration Sweet stalked; dual purpose variety suitable for Kharif and maghi areas of Rayalase Sema.

Improved FINGER MILLET varieties / cultivars developed and released from ANGRAU				
S.No	**FINGER MILLET** Variety	Year of Release	Name of the Research Station	Most significant character (s)
1	VZM 1	1958	ARS, Vizianagaram	Suitable for late kharif, 105 days duration with a yield potential of 25 q/ha.
2	VZM2	1958	ARS, Vizianagaram	Suitable for late rabi irrigated conditions, 105-110 days duration with yield potential of 31 q/ha. .
3	VR 256-6 (Simhadri)	1985	ARS, Vizianagaram	Suitable for late rabi irrigated conditions, 105-110 days duration, with yield potential of 39 q/ha.
4	VR 520 (Suraj)	1992	ARS, Vizianagaram	Suitable for early kharif and contingent cropping system, 85-90 days duration Yield potential 23 q/ha. Resistant to blast and tolerant to drought.
5	VR 708 (Champavathi)	1997	ARS, Vizianagaram	Short duration suitable for growing in all the seasons with 80-85 days duration. Yield potential 26 q/ha.
6	VR 762 (Bharathi)	2006	ARS, Vizianagaram	Suitable for both in kharif and rabi. Grain yield potential 26-30q/ha, 110-115 days duration. Moderately resistant to blast.
7	VR 847 (Sri Chaitanya)	2009	ARS, Vizianagaram	Medium duration with 115-120 days duration. Suitable for growing both in kharif and rabi. Grain yield potential 30-35q/ha, moderately resistant to blast.
8	VR 936 (Hima)	2012	ARS, Vizianagaram	White grain and moderately resistant to all the forms of Blast, BLB & Brown spot. Medium duration of 115-120 days to maturity. Grain yield potential 28-30q/ha. Responsive to nitrogenous fertilizers.
9	VR 988 (Suvarnamukhi)	2019	ARS, Vizianagaram	It is resistant to all types of blast and banded blight. It can withstand terminal moisture stress hence suitable for rice-fallow-ragi cultivation. The grain yield potential is 35-38 q/ha and matures in 105-110 days.
10	VR 929 (Vegavathi)	2019	ARS, Vizianagaram	Highly resistant to Brown spot, Banded blight and all types of blast. Rich in Zn, Fe, Ca , protein and grain yield of 38 to 40 q/ha and matures within 115-120 days
11	VR 1101 (Indravathi)	2020	ARS, Vizianagaram	Purple pigmented compact ears. It is resistant to all types of blast and banded blight. It is rich in Ca, Fe and Zn with grain yield of 32-34 q/ha.
12	VR 1099 (Gosthani)	2022	ARS, Vizianagaram	Suitable for kharif and rabi. Tolerant to leaf, neck and finger blast and banded blight diseases. Rich in iron and zinc. Grain yield potential is 35-38 q/ha with 110-115 days duration
13	PR 202 (Godavari)	1974	ARS, Peddapuram	High yield, tolerant to blast, long duration, National check
14	PR 1044 (Ratnagiri)	1985	ARS, Peddapuram	Medium duration with rich in protein (14%).
15	PR 10-45 (Gowthami)	2020	ARS, Peddapuram	Tolerant to lodging
16	CFMV 4	2022	ARS, Peddapuram	High yielding and tolerant to lodging
17	Kalyani	1971	ARS, Perumallapalle	Good tillering, suitable for Chittoor, Anantapur and Nellore districts.
18	PPR 2350 (Padmavathi)	1993	ARS, Perumallapalle	Suitable for all ragi areas in the state
19	PPR 2614 (Saptagiri)	1995	ARS, Perumallapalle	Suitable for early planting situation; tolerant to water logging as well as drought situations.
20	PPR 2700 (Vakula)	2012	ARS, Perumallapalle	Suitable to all three seasons. Medium in duration (105 days). Tolerant to blast.non-lodging

21	PPR 1012 (Tirumala)	2019	ARS, Perumallapalle	Suitable to all three seasons. Medium duration high yielding variety. Highly tolerant to blast. High fodder yield. (120 days).
22	Arjuna	1969	RARS, Lam	Grain yield 16-20 q /ha, 80-85 days duration, Plant height 115-120 cm, effective tillers 1-2, ear head long & semicompact, suitable for black and red soils in Prakasam, Kurnool and Mahaboobnagar districts.

Improved FOXTAIL MILLET varieties / cultivars developed and released from ANGRAU				
S.No	**FOXTAIL MILLET** Variety	Year of Release	Name of the Research Station	Most significant character (s)
1	Chitra	1982	ARS, Anantapur	Grain yield 16-20 q /ha, 80-85 days duration, Height 110 cm, tillers 3-4, ear head long & compact, suitable for red soils in Rayalaseema.
2	Prasad	1985	RARS, Nandyal	Plant height is 120 - 130 cm. panicle is long cylindrical and compact and densely packed, small to medium size bristled. Seeds bold and light yellow in colour. Tolerant to Blast and Downy mildew, Terminal drought
3	Lepakshi (AK 132-1)	1989	ARS, Anantapur	Grain yield 18-22 q /ha, Height 95 cm, tillers 4-6, earhead long, thin & compact, suitable for shallow soils & low rainfall conditions.
4	Krishnadevaraya	1993	RARS, Nandyal	Grows to a height of 110 - 120 cm. These are thin stemmed green plants with 4-6 productive tillers. Panicles are 15 - 20 cm long, slender, semi-compact, tip slightly tapering. Panicles profusely covered by medium sized bristles and they are medium in size. medium size,light yellow colour Seeds,. Tolerant to Blast and Downy mildew
5	Narasimharaya	1994	RARS, Nandyal	It grows to a height of 120 - 130 cm. Tall, thin stemmed plants having purple pigmentation at the base with 4-6 tillers. Panicles are 18-20 cm long, semi compact, covered with medium sized bristles. Seeds medium sized, light yellow colour seeds and densely packed. Tolerant to Blast and Downy mildew.
6	Srilakshmi	2002	RARS, Nandyal	Grows to a height of 115 - 120 cm. panicles are semi-compact, purple and drooping having a tuft of pink hairs at the tip. Seeds have a clean appearance with golden yellow colour. Tolerant to Blast and Downy mildew and terminal drought.
7	SiA 3085	2011	RARS, Nandyal	It grows to a height of 145-160 cm. Panicle is long cylindrical and compact and densely packed, small to medium sized bristles. The seeds are medium bold and yellow in colour. Tolerant to Blast and Downy mildew.
8	Suryanandi	2012	RARS, Nandyal	Plant height is 120-130 cm. Panicle is compact, bristles are sparse and green. Suitable for double cropping, 70-75 days duration and non-lodging variety. It gives an average grain yield of 2600 kg/ ha. Grain size is medium and colour is golden yellow. Tolerant to Blast and Downy mildew, Terminal drought.
9	SiA 3156	2013	RARS, Nandyal	Plant height is 130- 150 cm. 85 days duration. Panicle is semi compact, presence of pigmented bristles. highly responsive to nitrogenous fertilizers. Tolerant to Blast and Downy mildew.
10	Garuda	2020	RARS, Nandyal	Extra early duration (62 days), non-lodging, mono-culm type. Suitable for mechanical harvesting. The panicle is compact, with compactly packed lobes that lack bristles. The grains are medium bold and orange in colour. Tolerant to Blast and Downy mildew, Terminal drought.

11	Renadu	2020	RARS, Nandyal	80-85 days duration. The panicle is compact, with compactly packed lobes and having dense bristles. The grains are medium bold and cream white in colour. High grain and fodder yield. Tolerant to Blast and Downy mildew, Terminal drought.
12	Mahanandi	2022	RARS, Nandyal	Medium duration variety (85 days) with erect plant type and it has 3-4 tillers with synchronized maturity. The panicle is semi-compact with creamy brown colour grains. Grain contains high protein (12.8 g/100g grain) than popular check SiA 3156. Moderately resistance to leaf blast, downy mildew and tolerant to shoofly.

Improved OTHER MILLET varieties / cultivars developed and released from ANGRAU

S.No	**OTHER MILLET** Variety	Year of Release	Name of the Research Station	Most significant character (s)
1	PEARL MILLET- Vijaya	1971	ARS, Vizianagaram	75-85 days duration, 15-16 q/ha. Suitable for all bajra growing areas in A.P.
2	PEARL MILLET - Visaka	1976	ARS, Vizianagaram	80-85 days duration, 15-20 q/ha, Suitable for North Coastal districts
3	PEARL MILLET - Balaji	1976	ARS, Perumallapalle	75-80 days duration, 15-20 q/ha. It grows to a height of 150-200 cm. The ear heads are long cylindrical and compact with light grey bold grain Downy mildew resistant, suitable for southern zone.
4	PEARL MILLET - Nagarjuna	1976	RARS, Lam	70-75 days duration, 15-20 q/ha, Suitable for Prakasam, Anantapur, Nalgonda and Mahaboobnagar districts.
5	PEARL MILLET - Ananta	1996	ARS, Anantapur	80-85 days duration, 20-25 q/ha, Tolerant to downy mildew, Suitable for Kurnool and Anantapur Districts.
6	PEARL MILLET - ABV-04	2019	ARS, Ananthapuramu	Biofortified variety (Fe-70ppm & Zn-63 ppm) with 82-85 days duration, grain yield :1500-2500 kg/ha and fodder yield: 5500-6000 kg/ha.
7	PROSO MILLET - Vaarada	1971	RARS, Lam	80-85 days duration, Grain yield 15-20 q/ha, Plant height 90-100 cm, profuse tillering, grain bold and grey in colour, suitable for all areas in the State.
8	PROSO MILLET -L1387 (Nagarjuna)	1988	RARS, Lam	60-65 days duration, Grain yield 20-25 q/ha, Height 80-90 cm, drought tolerant, effective tillers 5-6, panicle semi loose, grain bold, creamy yellow and shinin.
9	PROSO MILLET - L5224 (Sagar)	1988	RASR, Lam	80-85 days duration, 25-30 q/ha, Height 100-110 cm, drought tolerant, effective tillers 6-8, grain olive grey.
10	PROSO MILLET - L 4863 (Manasa)	1994	RARS, Lam	80-85 days duration, 25-30 q/ha, Height 95-100 cm, drought tolerant, suitable for all variga growing areas of the state.

Improved BLACKGRAM varieties / cultivars developed and released from ANGRAU

S.No	**BLACKGRAM** Variety	Year of Release	Name of the Research Station	Most significant character (s)
1	PDM-1	1971	ARS, Peddapuram	High yielding variety
2	LBG 17 (Krishnaiah)	1985	RARS, Lam	Resistant to powdery mildew
3	LBG 402 (Prabhava)	1988	RARS, Lam	Resistant to wilt
4	LBG 20 (Teja)	1989	RARS, Lam	Photo insensitive and Resistant to MYMV
5	LBG 611 (Kotha Butta Minumu)	1993	RARS, Lam	Resistant to wilt
6	LBG 22	1994	RARS, Lam	Resistant to wilt

7	LBG 648	1996	RARS, Lam	Multiple disease Resistant
8	LBG 623	1997	RARS, Lam	Photo insensitive and high yield
9	LBG 685	1999	RARS, Lam	Resistant to wilt and main stem bearing
10	LBG 645	2002	RARS, Lam	Resistant to wilt and Bold shining seed
11	PBG-1 (Podalakur minumu)	2002	ARS, Podalakur	Photo insensitive, high yielding (10-15 q/ha), dull grain type.
12	PBG -107 (Penusila)	2002	ARS, Podalakur	Photosensitive, high yielding (16-20 q/ha) variety possessing dull grain type and suitable for late sowing.
13	LBG 709	2006	RARS, Lam	Resistant to wilt, Suitable for late sowing
14	LBG 752	2009	RARS, Lam	Resistant to wilt, Tolerant to MYMV, Suitable for late sowing
15	LBG 787	2015	RARS, Lam	Tolerant to MYMV and main stem bearing
16	TBG 104 (Tirupati Minumu 1)	2017	RARS, Tirupati	Medium duration (75-80 days) with erect plant type, Shining black seed medium sized, tolerant to YMV disease
17	GBG 1 (Ghantasala Minumu 1)	2018	ARS, Ghanatasala	YMV tolerant, short duration (70-75 days), photo - insensitive, erect variety with suitability for all seasons. Suitable for Rice fallows after Kharif Paddy (Rabi) and after Rabi Paddy (Summer).
18	LBG 884	2022	RARS, Lam	Resistant to MYMV and Photo insensitive
19	LBG 904	2023	RARS, Lam	Resistant to MYMV and Photo insensitive
20	TBG 129 (Tirupati Minumu 2)	2023	RARS, Tirupati	Matures in 75-80 days, Suitable for Kharif, rabi and rice-fallow conditions, Resistant to YMV, Pods are smooth with shiny bold seed

Improved GREENGRAM varieties / cultivars developed and released from ANGRAU

S.No	GREENGRAM Variety	Year of Release	Name of the Research Station	Most significant character (s)
1	PDM-1	1971	ARS, Peddapuram	High yielding variety
2	LGG 127(Kondaveedu)	1980	RARS, Lam	High yielding
3	LGG 407(Lam 407)	1993	RARS, Lam	Resistant to MYMV and ABLS
4	LGG 450(Pushkara)	1993	RARS, Lam	Resistant to pre harvesting
5	LGG 410(Lam 410)	1994	RARS, Lam	Resistant to MYMV and suitable to rice fallows
6	LGG 460(Lam 460)	1997	RARS, Lam	Resistant to MYMV and top bearing
7	TM 96-2	2006	RARS, Lam	Resistant to powdery mildew
8	LGG 574	2022	RARS, Lam	Resistant to MYMV
9	LGG 607	2022	RARS, Lam	Resistant to MYMV,Photo insensitive
10	LGG 630	2023	RARS, Lam	Resistant to MYMV,Photo insensitive
11	LGG 600	2023	RARS, Lam	Resistant to MYMV,Suitable for rabi season

Improved REDGRAM varieties / cultivars developed and released from ANGRAU

S.No	REDGRAM Variety	Year of Release	Name of the Research Station	Most significant character (s)
1	PDM-1	1971	ARS, Peddapuram	High yielding variety
2	LRG 30 (Palnadu)	1980	RARS, Lam	More regeneration capacity and high yield
3	LRG 332 (Abhaya)	1989	RARS, Lam	Moderately Resistant to pod borer
4	ICPL 85063 (Lahshmi)	1997	RARS, Lam	Suitable to rabi and bold seed
5	LRG 38 (Ranga bold)	2002	RARS, Lam	Tolerant to pod borer
6	LRG 41(Lam 41)	2006	RARS, Lam	Tolerant to *Helicoverpa* pod borer

7	TRG 22 (Tirupati Kandi-1)	2010	RARS, Tirupati	Medium duration variety (165 days), Tolerant to terminal moisture stress, Suitable for light shallow red soils of Rayalaseema
8	LRG 52 (Amaravathi)	2015	RARS, Lam	Tolerant to wilt
9	LRG 105 (Krishna)	2020	RARS, Lam	Resistant to wilt and SMD
10	LRG 133-33 (Sowbhagya)	2020	RARS, Lam	Resistant to wilt
11	TRG 59 (Tirupati Kandi-59)	2020	RARS, Tirupati	Medium duration variety (160-180 days), Tolerance to wilt and SMD, Indeterminate plant type, seeds are medium bold and brownish orange in colour, pods are green in colour with brown stripes

Improved BENGAL GRAM varieties / cultivars developed and released from ANGRAU

S.No	BENGAL GRAM Variety	Year of Release	Name of the Research Station	Most significant character (s)
1	Jyothi	1978	RARS, Lam	High yielding
2	ICCC 37 (Kranthi)	1989	RARS, Lam	Resistant to dry root rot
3	ICCV 2 (Swetha)	1993	RARS, Lam	Early Kabuli
4	LBeG 7 (Lam Shanaga 7)	2006	RARS, Lam	Tolerant to wilt
5	NBeG 3 (Nandyala Sanaga 1)	2013	RARS, Nandyal	Desi, tolerant to drought, and wilt
6	NBeG 119 (Nandyal Gram 119)	2016	RARS, Nandyal	Kabuli, early, large seeded
7	NBeG 47 (Dheera)	2017	RARS, Nandyal	Desi, suitable for mechanical harvest
8	NBeG 49 (Nandyal Gram 49)	2017	RARS, Nandyal	High yielding desi, tolerant to wilt with attractive seeds
9	NBeG 452 (Nandyal Gram 452)	2020	RARS, Nandyal	High yielding desi, tolerant to wilt
10	NBeG 810 (Nandyal Gram 810)	2021	RARS, Nandyal	Large seeded kabuli
11	NBeG 857 (Nandyal Gram 857)	2021	RARS, Nandyal	High yielding desi, tolerant to wilt, suitable for irrigated conditions.
12	NBeG 776 (Nandyal Gram 776)	2023	RARS, Nandyal	High yielding desi with tolerance to wilt, suitable for mechanical harvest
13	NBeG 924 (Nandyal Gram 924)	2023	RARS, Nandyal	High yielding desi, tolerant to wilt, Released for East Central Zone
14	NBeG 1267 (Nandyal Gram 1267)	2023	RARS, Nandyal	High yielding desi, tolerant to wilt, suitable for mechanical harvest

Improved OTHER PULSES varieties / cultivars developed and released from ANGRAU

S.No	PULSE Variety	Year of Release	Name of the Research Station	Most significant character (s)
1	HORSEGRAM: PDM-1	1971	ARS, Peddapuram	High yielding variety
2	HORSEGRAM: ATPHG-11 (Anantha Vulava-1)	2021	ARS, Ananthapuramu	Light greyish brown seed, 100 seed weight: 3.6-4.2 g; Seed yield 800-1100 kg/ha; Highly resistant to dry root rot and moderately tolerant to yellow mosaic virus
3	COWPEA: TPTC 29 (Tirupati Cowpea-1)	2017	RARS, Tirupati	Bushy plant type with bold seed, Matures in 75-85 days, Suitable for Kharif, Rabi and Summer
4	FIELD BEAN: TFB 1 (Tirupati Field Bean 1)	2006	RARS, Tirupati	Early maturing variety (90-110 days), Suitable to all seasons
5	FIELD BEAN: TFB 2 (Tirupati Field Bean 2)	2010	RARS, Tirupati	Long duration variety (160-180 days), Bushy type variety, Suitable to kharif and rabi

Improved GROUNDNUT varieties / cultivars developed and released from ANGRAU				
S.No	GROUNDNUT Variety	Year of Release	Name of the Research Station	Most significant character (s)
1	Kadiri 1	1971	ARS, Kadiri	Virginia runner, with alternate branching habit matures in 135 days
2	Kadiri 2	1978	ARS, Kadiri	Virginia Bunch, matures in 120 days efficient in Nitrogen fixation. Shelling out-turn is 78%.
3	Kadiri 3	1978	ARS, Kadiri	Virginia Bunch, long duration type with rose testa and shelling out-turn is 75%.
4	TCG 1704 (Tirupati-1)	1989	RARS, Tirupati	Early maturing and drought tolerant Spanish bunch groundnut variety, leaf lets narrow with ashy coating.
5	TCG 1706 (Tirupati-2)	1989	RARS, Tirupati	Strong pegs and recommended for cultivation in black soils, moderately tolerant to kalahasti malady
6	TCG 1518 (Tirupati-3)	1991	RARS, Tirupati	Virginia bunch variety with red testa, Resistant to kalahasti malady, tolerant to foliar diseases, seeds dormant up to 40 days after harvest.
7	Vemana	1993	ARS, Kadiri	Spanish bunch, medium duration variety with medium green foliage and attractive light rose testa and smooth testa. Resistant to prolonged drought (25-30days)
8	TCGS 30 (Tirupati-4)	1995	RARS, Tirupati	High yielding, mid-season moisture stress tolerant, early maturing variety, attractive light rose testa
9	Kadiri 4	1997	ARS, Kadiri	Spanish bunch, early duration, short stature variety with light green foliage, smaller sized pods and attractive light rose testa & smooth testa. Resistant to prolonged drought (25-30days)
10	TCGS 29 (Narayani)	2002	RARS, Tirupati	Early maturing(100days) drought tolerant, red testa, highly stable in different types of soils and situations
11	TCGS320 (Kalahasti)	2002	RARS, Tirupati	A short duration (105-110days) kalahasti malady resistant variety suitable for cultivation all over the state during rabi season
12	Kadiri 5	2002	ARS, Kadiri	Spanish bunch, early duration variety with light green foliage and attractive light rose testa and smooth testa.
13	Kadiri 6	2002	ARS, Kadiri	Spanish bunch, early duration, popular Variety with light green foliage and attractive light rose testa & smooth testa. Bolder size kernels cultivated for both table and oil purpose
14	TCGS 341 (Prasuna)	2006	RARS, Tirupati	Tolerant Kalahasti malady, medium bold seed with light rose testa. Suitable for irrigated dry situation.
15	TPT 25 (Abhaya)	2006	RARS, Tirupati	Drought tolerant, LLS tolerant with fresh seed dormancy, short compact plant type, suitable for high rainfall areas
16	TCGS-APNL-888 (Greeshma)	2009	RARS, Tirupati	Early (95-100days), water use efficient, short compact plant type, LLS tolerant
17	Kadiri 7 Bold	2009	ARS, Kadiri	Virginia bunch, high yielding (50 q per ha) dark foliage, resistant to sucking pest and foliar fungal diseases, Bold size kernels suitable for confectionery purpose suitable for kharif & rabi 100 Kernel weight 75g.
18	Kadiri 8 Bold	2009	ARS, Kadiri	Virginia bunch, high yielding (50 q per ha) dark foliage, resistant to sucking pest and foliar fungal diseases, Bold size kernels suitable for confectionery purpose
19	Kadiri 9	2009	ARS, Kadiri	Spanish Bunch, medium duration variety, dark medium size foliage, resistant to sucking pest, foliar fungal and viral diseases, good shelling 80%. Suitable for drought prone areas.
20	TCGS-APNL- 913 (Rohini)	2010	RARS, Tirupati	Ultra-early (90-95 days), water use efficient, short compact plant type, LLS tolerant

21	TG 47 (Bheema)	2010	RARS, Tirupati	Early Spanish bunch variety with low oil and high sucrose
22	Kadiri Anantha	2010	ARS, Kadiri	Spanish bunch, Early duration variety with light green foliage and attractive light rose testa and smooth testa.
23	Kadiri Harithandhra	2010	ARS, Kadiri	Spanish bunch, high yielding variety, medium green foliage, with pointed tip, tolerant to thrips and foliar fungal diseases.
24	ICGV-00350	2011	RARS, Tirupati	High yield, tolerant to LLS, rust and stem rot diseases
25	TCGS 043 (Dharani)	2012	RARS, Tirupati	Drought tolerant – withstands up to 35 days dry spell, uniform maturity, high SMK%, attractive pods, moderate stature and tolerant to low light conditions
26	Kadiri Amaravathi	2016	ARS, Kadiri	Virginia bunch, high yielding variety with broad and dark green foliage, resistant to sucking pest and foliar fungal diseases with a pod yield potential of 30-40q per ha. Attractive light rose testa colour
27	Kadiri Chithravathi	2017	ARS, Kadiri	Spanish Bunch, Medium duration 115-120 days variety suitable for rabi cultivation. Tolerant to foliar fungal diseases LLS and Rust.
28	TCGS 1073 (Dheeraj)	2018	RARS, Tirupati	Water-use efficient Spanish bunch culture with high yield potential suitable for cultivation in irrigated situation both in kharif and rabi seasons
29	TCGS 1157 (Nithya Haritha)	2018	RARS, Tirupati	Short statured Spanish bunch culture with high yield potential, fresh seed dormant, bears higher frequency of three seeded pods
30	TCGS 894 (Central Pragathi)	2018	RARS, Tirupati	Early, water use efficient, attractive pod and kernels.
31	K 1812 (Kadiri Lepakshi)	2021	ARS, Kadiri	High yielding variety resistant to sucking pest and foliar fungal diseases with a pod yield potential of 35-40 q per ha. Shelling % is ranged from 65% to 70% with smooth testa.
32	TCGS 1694 (Visishta)	2022	RARS, Tirupati	Early, Short statured, FDR, drought and heat tolerant with uniform maturity and quality kernel features like Kadiri 6
33	TCGS 1707 (ICAR-Konark)	2023	RARS, Tirupati	Medium duration, medium statured, moderate resistance to foliar diseases (LLS and rust), water use efficient culture, possess uniform maturity and attractive rose testa colour
34	TCGS 1522 (Himani)	2023	RARS, Tirupati	Medium plant stature, synchronous maturity of pods, attractive pods and kernels (light rose testa colour), high water use efficient culture

Improved OILSEED varieties / cultivars developed and released from ANGRAU

S.No	OILSEED Variety	Year of Release	Name of the Research Station	Most significant character (s)
1	SESAME C1036 (Gouri)	1976	ARS,Yellamanchili	Dark brown seed with 50% oil content and 90 days duration with a yield ptentil of 6.5 q/ha
2	SESAME SP1181 (Madhavi)	1978	ARS,Yellamanchili	Light brown seed with 51% oil content and 70-75 days duration.Suitable in crop sequences with a yield potential of 5 q/ha
3	SESAME YLM-11(Varaha)	1993	ARS,Yellamanchili	Dark brown seed with 50% oil content and 80-85 days duration with a yield potential of 9 to 9.5 q/ha
4	SESAME YLM-17(Goutham)	1993	ARS,Yellamanchili	Light brown seed with 52% oil content and 75 days duration.Suitable in crop sequences with a yield potental of 9.0 q/ha. Moderately tolerant to alternaria leaf disesae.
5	SESAME YLM-66(Sarada)	2009	ARS,Yellamanchili	Light brown seed with 51% oil content and 80-85 days duration with a yield potential of 11-12 q/ha. Moderately tolerant to alternaria leaf disesae.

6	SUNFLOWER APSH 11	1987	RARS, Nandyal	Seed yield is 6-8 q/acre under rainfed and 8-10 q/acre under irrigated condition and resistant to Alternaria and moderately resistant to rust
7	SUNFLOWER NDSH 1	2002	RARS, Nandyal	Seed yield is 14 to 16 q/ha with oil content of 40% and resistant to downy mildew and tolerant to rust diseases with compact seed filling
8	SUNFLOWER NDSH 1012	2016	RARS, Nandyal	Seed yield is 15-20 q/ha under rainfed and 20 to 25 q/ha under irrigated conditions with oil content of 40-41% and moderately resistant to downy mildew

Improved COTTON varieties / hybrids developed and released from ANGRAU

S.No	COTTON Variety / hybrid	Year of Release	Name of the Research Station	Most significant character (s)
1	AC 122 (Krishna)	1968	RARS, Lam	Tolerant to boll worm. suitable for rice fallows/ summer cultivation in Nellore, Krishna, Prakasam and Guntur districts, with seed cotton yield of 25 q/ ha and ginning out turn (GOT) of 33.0 %.
2	LPS 141 (Kanchana)	1987	RARS, Lam	Tolerant to whitefly, Alternaria and Myrothecium leaf spots. Suitable for cultivation in all the cotton growing areas of Andhra Pradesh with an yield potential of 25 q/ha and GOT of 35.0 %.
3	Lam hybrid-1	1988	RARS, Lam	An intra-*hirsutum* cotton hybrid with yield potential of 30-35 q/ha and GOT 36.0%. Tolerant to leaf hoppers and Alternaria leaf spot disease. Early maturing and suitable for rice fallows cultivation/ cotton-based cropping systems in A.P.
4	LK 861	1993	RARS, Lam	High yielding with seed cotton yield of 32 q/ha and GOT of 34.0 %. Immune to whitefly and tolerant to drought with good fiber qualities and possess wider adaptability. Recommended for cultivation for all the cotton growing areas of Andhra Pradesh.
5	L 389	1993	RARS, Lam	Resistant to black arm with good fiber qualities. Recommended for cultivation under NSP areas of Andhra Pradesh.
6	NA 1325 (Narasimha)	1994	RARS, Nandyal	High yielding with drought tolerance, tolerant to sucking pests. Best combiner to develop high yielding varieties.
7	NA 2708 (Aravinda)	1996	RARS, Nandyal	High yielding with drought tolerance.
8	LAHH – 4	1997	RARS, Lam	An intra-*hirsutum* cotton hybrid with yield potential of 35 q/ha and GOT 34.0%. Tolerant to leaf hoppers with wider adoptability. Recommended for cultivation under rainfed / irrigated areas of Andhra Pradesh.
9	Lam – 604	1997	RARS, Lam	High yield with yield potential of 25-30 q/ha and GOT 35.0 %. Resistant to black arm and BLB. Moderately resistant to leaf hopper. Suitable for all the cotton growing areas of Andhra Pradesh including rice fallow conditions.
10	Lam – 603	1997	RARS, Lam	High yielding with yield potential of 25-30 q/ha and GOT of 35.0%. Resistant to black arm and leaf hoppers. Recommended for cultivation for rice fallows of Andhra Pradesh.
11	LAHH-5	2002	RARS, Lam	An intra-*hirsutum* cotton hybrid with seed cotton yield of 35.0 q/ha and GOT 35.2 %. Moderately tolerant to leaf hoppers and resistant to BLB and Cercospora leaf spot. Suitable for all the cotton growing areas of Andhra Pradesh under both rain fed and irrigated conditions.
12	Srinandi (NA 2463)	2006	RARS, Nandyal	High yielding with drought tolerance.
13	LAHH 7 (Lam Cotton Hybrid 7)	2006	RARS, Lam	Resistant to leaf hoppers, wide adoptability with seed cotton yield of 34-35 q/ha and GOT 36.0% and good fiber qualities. Recommended for all the cotton growing areas of Andhra Pradesh under both rainfed / irrigated conditions.

14	NDLH 1755 (Sivanandi)	2009	RARS, Nandyal	High yielding, drought tolerant, possess high boll weight and high halo length.
15	NA 2933 (Yaganti)	2010	RARS, Nandyal	High yielding, drought tolerant, suitable for cultivation under both irrigated and rain fed conditions
16	NDLH 1938 (Srirama)	2015	RARS, Nandyal	High yielding, drought tolerant, possess high boll weight and halo length, stay green at harvest with tolerance to sucking pests.
17	LHDP Cotton 1	2018	RARS, Lam	High yielding variety with seed cotton yield of 28-30 q/ha and GOT of 37.0 % - 38.0%. Compact plant type with medium tolerance to leaf hoppers, wider adaptability with good fiber qualities.
18	LAHB Cotton 1	2019	RARS, Lam	Inter-specific cotton hybrid with yield potential of 20-22 q/ha , having a ginning out turn of 30.1% with fine fiber quality of 3.2 µg / inch and tenacity of 35.9 g/tex.
19	NDLH-2005-4 (Nandyal Cotton-22)	2021	RARS, Nandyal	High yielding with high halo length, tolerant to sucking pests.
20	NDLH-2028-2 (Nandyal Cotton-23)	2021	RARS, Nandyal	High yielding with high boll weight, tolerant to sucking pests and drought.
21	NDLH-2051-1 (Nandyal Cotton-24)	2021	RARS, Nandyal	High yielding with high boll weight, tolerant to sucking pests and drought.
22	NDLH-2035-5 (Nandyal Cotton-25)	2022	RARS, Nandyal	High yielding with high boll weight, tolerant to sucking pests and drought.
23	LHDP Cotton 5	2022	RARS, Lam	A new plant type developed with yield potential of 28-30 q/ha and GOT of 37.6 %. Suitable for high density planting system with spacing of 90 cm x 15 cm. Semi determinate type, short (100-110 cm), compact with medium duration (150 days) & synchronous maturity. Tolerant to leaf hoppers and bacterial blight.
24	NDLH-2056-4 (Nandyal Cotton-26)	2023	RARS, Nandyal	High yielding, tolerant to sucking pests, tolerant to leaf blight, Alternaria leaf spot and grey mildew.
25	NDLA-3104-1 (Nandyal Cotton-27)	2023	RARS, Nandyal	High yielding *desi* cotton variety, possesses medium tolerance to sucking pests.
26	NDLA-3116-3 (Nandyal Cotton-28)	2023	RARS, Nandyal	High yielding variety, possesses medium tolerance to sucking pests tolerant to leaf blight, Alternaria leaf spot and grey mildew.

Improved MESTA varieties developed and released from ANGRAU

S.No	MESTA Variety	Year of Release	Name of the Research Station	Most significant character (s)
1	AMV -1	1966	ARS, Amadalavalasa	Stem has less bristles, Tolerant to jassids and mealy bugs
2	AMV -2	1982	ARS, Amadalavalasa	Adaptable to the all mesta growing areas, Tolerant to jassids and mealy bugs
3	AMV - 3 (Surya)	1989	ARS, Amadalavalasa	Tolerant to foot and stem rot disease and moderately resistant to jassids and mealy bugs.
4	AMC - 108 (Bheemily)	1989	ARS, Amadalavalasa	Tolerant to foot and stem rot diseases, tolerant to jassids and spiral borer
5	AMV - 4 (Kalinga)	1991	ARS, Amadalavalasa	Stem has less bristles, moderately resistant to jassids and foot and stem rot diseases
6	AMV - 5 (Durga)	2006	ARS, Amadalavalasa	Good fibre quality, higher fibre yield, tolerant to pests and diseases under field conditions
7	AMV - 7 (Janardhan)	2011	ARS, Amadalavalasa	Suitable for mid-May to mid-June sowing, maturity 130-135 days, tolerant to moisture stress, resistant to major pests and diseases
8	AMV -8	2019	ARS, Amadalavalasa	Tolerant to sucking pests like aphids, white flies, leaf hoppers and mealy bugs and better fibre quality.

9	AMV -9 (Aditya)	2019	ARS, Amadalavalasa	Tolerant to foot and stem rot disease. It has better fibre quality parameters like strong fibre (21.03g/tex) with comparable fineness (5.15 tex).
10	AMV-10	2021	ARS, Amadalavalasa	Tolerant to foot and stem rot and sucking pests like aphids, white flies, leaf hoppers and mealy bugs with more fibre strength 20.2 g/tex with comparable fineness (3.6 tex).

Improved SUGARCANE varieties developed and released from ANGRAU

S.No	SUGARCANE Variety	Year of Release	Name of the Research Station	Most significant character (s)
1	Co A 71-1	1071	RARS, Anakapalle	Good jaggery variety
2	Co 62175	1968	RARS, Anakapalle	High yielder, good jaggery variety
3	Co A 7601	1976	RARS, Anakapalle	Short duration, high 'N' use efficiency
4	Co A 7602	1976	RARS, Anakapalle	Suitable for water logging, moisture stress conditions and resistant to red rot.
5	Co A 7701	1978	RARS, Anakapalle	Resistant to red rot
6	Co 7508	1981	RARS, Anakapalle	Rich in juice sucrose
7	Co A 8401	1989	RARS, Anakapalle	Resistant to red rot
8	Co 7706	1989	RARS, Anakapalle	Good jaggery variety
9	CoT8201	1991	ARS, Perumallapalle	High yielder, high sugar variety
10	85 A 261	1996	RARS, Anakapalle	Rich in juice sucrose
11	Co 8013	1996	SRS, Vuyyuru	Drought tolerant, red rot resistant, good ratooner
12	81 V 43	1996	SRS, Vuyyuru	High yielding, high tillering, tolerant to water logging and drought, good ratooner , rich in sucrose, susceptible to Co 419 race of red rot. Resistant to smut
13	87 A 298 (Viswamithra)	2002	RARS, Anakapalle	Good ratooner, higher yielder
14	84 A 125 (Madhu)	2002	RARS, Anakapalle	Suitable for water logging and moisture stress conditions.
15	83 V 15	2002	SRS, Vuyyuru	Hight yielding, high tillering, tolerant to water logging drought tolerant & resistant to red rot & smut
16	91 V 83	2002	SRS, Vuyyuru	Red rot resistant. Rich in sucrose, water logging & drought tolerant
17	93A145 (Sarada)	2006	RARS, Anakapalle	Suitable for water logged, rainfed and saline-alkaline soils.
18	97 A 85 (Visakha)	2010	RARS, Anakapalle	Suitable for late planted rainfed conditions, resistant to red rot and smut
19	2000 V 59	2010	SRS, Vuyyuru	Resistant to red rot & Suspectable to smut, suitable for upland
20	2003 V 46	2010	SRS, Vuyyuru	High yielding resistant to red rot & smut, highly suitable for multiple ratooning, suitable for water logging.
21	98 A 163 (Uttara)	2012	RARS, Anakapalle	Suitable for assured irrigated, limited irrigated late planted rainfed and red rot prone areas.
22	2001 A 63 (Kanakamahalakshmi)	2012	RARS, Anakapalle	Suitable for assured irrigated, limited irrigated late planted rainfed and red rot prone areas
23	2000A225 (Revathi)	2015	RARS, Anakapalle	Suitable for waterlogged and rainfed conditions. Good jaggery variety
24	2003A255 (Simhadri)	2015	RARS, Anakapalle	Suitable for waterlogged and rainfed conditions. Good jaggery variety

25	2005A128 (Srimukhi)	2018	RARS, Anakapalle	Suitable for assured irrigated, limited irrigated late planted and red rot prone areas.
26	2009 V 127	2018	SRS, Vuyyuru	High yielding variety, resistant to red rot & smut rich in sucrose. Also suitable to area with saline irrigated water
27	2005T16	2018	ARS, Perumallapalle	High yielder, high sugar variety, Salinity tolerant, A grade jaggery quality
28	2009A107 (Vasista)	2020	RARS, Anakapalle	Suitable for assured irrigated, limited irrigated, saline soils late planted rainfed and red rot prone areas.
29	2009A252 (Naveen)	2020	RARS, Anakapalle	Suitable for assured irrigated, limited irrigated, saline soils late planted rainfed and red rot prone areas.
30	2012A 319 (Arundhathi)	2023	RARS, Anakapalle	The clone is erect and non-lodging habit. Resistant to red rot, moderately resistant to smut, resistant to YLD under natural conditions and moderately susceptible to Early shoot borer.
Improved TOBACCO varieties developed and released from ANGRAU				
S.No	TOBACCO Variety	Year of Release	Name of the Research Station	Most significant character (s)
1	NBD-119 Nandyal Pogaku-1	2015	RARS, Nandyal	Cured leaf yield is 2150 kg/ha. It is high yielding, drought tolerant variety having good chemical quality.
2	ABD-132 Nandyal Pogaku-2	2023	RARS, Nandyal	It is a high yielding cured leaf yield 2220 kg/ha variety having less harmful smoke constituents (Tar:32.95% to 34.09, Nicotine:1.94 to 3.55% & Carbon monoxide:16.75 to 19.42%) and its seed is having 3.10% of seed oil.

KRISHNA ZONE

REGIONAL AGRICULTURAL RESEARCH STATION (RARS), LAM-GUNTUR (ESTD. 1922)

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The Regional Agricultural Research Station (RARS) in Lam, Guntur, was established in 1922. Initially, it functioned as a combined Agricultural and Buffalo Research Station until 1928, after which the units operated independently. The Agricultural Research Station at Lam was upgraded to the status of Regional Agricultural Research Station in 1980, coinciding with the launch of the National Agricultural Research Project (NARP) in India. As the zonal headquarters for the Krishna-Godavari Zone, RARS Lam oversees 22 Agricultural Research Stations across three entire districts—Guntur, Krishna, and West Godavari—and parts of four other districts: Prakasam, East Godavari, Khammam, and Nalgonda. The station focuses on conducting need-based, problem-oriented, and location-specific research.

Since its inception, RARS, Lam has released 76 varieties of crops. In the 2019-20 period, the station developed and popularized an Integrated Pest Management (IPM) module for managing fall armyworm infestations in maize. It has also released 34 high-yielding and disease-resistant varieties of various pulse crops, including drought-tolerant greengram cultivars such as LGG 407, MGG 295, WGG 37, and LGG 494. Significant contributions to cotton farming include the introduction of whitefly-immune varieties like LPS 141 and LK 861 and the black arm-resistant variety L 389 in 1993, all highly valued for their fiber quality and widely cultivated in Andhra Pradesh. The station has also released notable millet varieties, including sorghum (G1, G2, G3, G4, and Swarna), korra (Arjuna), and variga (Varada, Nagarjuna, Sagar, and Manasa). Moreover, the soils of the Krishna-Godavari zone have been classified and characterized under its supervision.

In terms of technological advancements, RARS Lam has developed two agricultural drones—ANGRAU-PUSHPAK-01 (10 litres) and ANGRAU-PUSHPAK-02 (10 kg)—and standardized spraying protocols for ten major crops. Recognizing this innovation, the Directorate General of Civil Aviation (DGCA) has authorized the APSARA centre for capacity building in agricultural drone use.

The research outputs at RARS Lam have had significant impacts. For instance, adoption rates of improved soil, variety, sowing distance, and timing practices are high among blackgram and greengram farmers, although the adoption of seed treatment, pest management, and fertilizer

management remains low due to reliance on private dealers, lack of awareness, and insufficient demonstrations of recent technologies. Research on cotton began in 1922, focusing on developing desi cotton varieties. Since then, several varieties and hybrids, such as L 389, LK 861, and hybrids like LAHH 4 and LAHH 5, have been released, significantly benefiting cotton farmers in Andhra Pradesh through the development of pest-resistant varieties, seed treatment protocols, foliar nutrition, integrated weed management, and IPM packages for major pests.

Early research on millets began in 1922, aiming to develop high-yielding varieties of Jowar, bajra, and variga. This effort has resulted in the release of several notable varieties, such as G1, G2, G3, G4 (sorghum), Arjuna (korra), and Varada, Nagarjuna, Sagar, and Manasa (variga). These advancements have significantly contributed to the agricultural productivity and sustainability in the region.

Gramin Krishi Mausam Sewa (GKMS) provides district-level weather forecasts and agro-advisories through 175 agromet field units, ensuring that farmers receive timely and accurate weather-related information to make informed decisions about their agricultural practices.

In the realm of agricultural economics, the Agricultural Market Intelligence Centre (AMIC) was established in 2019. It regularly releases bi-monthly price forecast bulletins with high accuracy, providing crucial market intelligence to farmers and helping them make better marketing decisions. Additionally, the Centre for Agricultural and Rural Development Policy Research (CARP), established in 2021, offers decision-based policy advocacy support, further aiding in the development and implementation of effective agricultural policies.

RARS, Lam, boasts a variety of infrastructural facilities that support its extensive research activities. These include the Krishna Auditorium, a Biotechnology Lab Facility, and a Soil Science Lab. The APSARA centre focuses on agricultural drone research, while the Geospatial Centre (GTC) specializes in mapping and spatial analysis. AMIC and CARP provide vital economic and policy research support. The station also has an Information Centre, a Bio-Control Lab, a Seed Processing Unit, and an Agrometeorology Unit. The infrastructure is further enhanced by Bt roads, a farm pond, and a closed threshing floor.

Overall, RARS, Lam, continues to make significant strides in agricultural research. It provides vital solutions to regional agricultural challenges and contributes substantially to the advancement of agricultural practices across multiple districts.

Agricultural Research Station (ARS), Machilipatnam (Estd. 1955)

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Agricultural Research Station (ARS), Machilipatnam, established in 1955, stands as a cornerstone of agricultural innovation. Its founding marked a pivotal moment in the region's agricultural landscape, with a primary objective: the development of medium-duration, salt-tolerant rice varieties tailored to the coastal ecosystem, alongside the formulation of management strategies aimed at bolstering productivity in salt-affected areas. Positioned amidst the characteristic salinity of the coastal region, with parameters ranging from pH 7.74 to 8.3 and EC 16.4 to 24 ds/m at Rudravaram, ARS, Machilipatnam is among six such stations strategically located across India's coastal zones. Spanning 26.20 acres in the Chilakalapudi revenue village of Machilipatnam mandal, the station's establishment was officially sanctioned by the Government of Andhra Pradesh in 1964, a testament to its enduring commitment to agricultural advancement.

Throughout its history, ARS, Machilipatnam has spearheaded pioneering research, addressing the evolving challenges posed by saline environments. From the introduction of salt-tolerant rice varieties like MCM-1 and MCM-2 during the pre-green revolution era to the development of state-of-the-art salt management strategies via subsurface drainage from 1982 to 2002, the station has consistently pushed the boundaries of agricultural science. Noteworthy milestones include the release of MCM 100 (Panduranga), a salt-tolerant variety in 2018, followed by MCM Rice 103 in 2022, and the groundbreaking introduction of MCM 109 as a trait-specific germplasm for salt tolerance in 2023. These achievements underscore the station's steadfast dedication to innovation and its pivotal role in reshaping agricultural practices in salt-affected regions.

In recognition of its significant contributions, ARS, Machilipatnam was honored as an important collaborative center for coastal salinity by the International Rice Research Institute, Philippines, receiving the prestigious NARES IRRI fellowship award on April 5, 2024. Beyond its local impact, the station's research endeavors reverberate globally, epitomizing a commitment to excellence that transcends geographical boundaries. As a beacon of agricultural innovation, ARS, Machilipatnam continues to illuminate the path toward a more sustainable and resilient agricultural future, guided by a legacy of excellence forged over decades of dedicated research and exploration.

Agricultural Research Station (ARS), Baptla (Estd. 1961)

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The Agricultural Research Station at the Agricultural College Farm in Bapatla, originally established as the Rice Research Unit in 1961 in Tenali, was relocated to its current site in 1973. This station focuses on developing improved rice varieties suited for the black soils of the Nagarjuna Sagar Project area and the Krishna Western Delta. In 2017, it was upgraded to the Agricultural Research Station, marking a significant milestone in its history. Among its notable achievements is the release of Samba Mahsuri (BPT 5204) in 1986, a medium slender grain variety with excellent cooking quality, which is highly favored across multiple states and contributes significantly to the country's foreign exchange through non-basmati rice exports. The station also introduced Bhavapuri Sannalu (BPT 2270) in 2010, a fine-grain variety with resistance to pests and diseases, and BPT 2782 in 2020, known for its high yield and submergence tolerance. In 2023, the station released BPT 2841, a black pericarp rice with high nutritional content

and excellent cooking quality. Additionally, BPT 2848 was registered in 2022 for its high protein content. The station boasts essential infrastructural facilities, including an office building, a net house, and a seed godown and processing unit under construction, supported by the Rashtriya Krishi Vikas Yojana (RKVY).

Agricultural Research Station (ARS), Jangamaheswarapuram (Estd. 1966)

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The Agricultural Research Station in Jangamaheswarapuram, Gurazala, Palnadu district, (commonly referred as JM Puram) boasts a distinguished history tracing back to its inception in 1966 as a Seed Production Farm managed by the Department of Agriculture, Andhra Pradesh. Initially tasked with seed multiplication and variety demonstration within the Nagarjuna Sagar Project Right canal area, the station transitioned to the auspices of the Andhra Pradesh Agricultural University in 1978. Since then, it has been steadfast in its commitment to producing Breeder and Foundation seed varieties of paddy, culminating in its transformation into an Agricultural Research Station in 2008. Covering a total area of 388.36 acres, the station predominantly focuses on cultivating wetlands for paddy, relying on irrigation from the Nagarjuna Sagar Right canal. Its objectives are centered on developing high-yielding rice varieties tailored to the region and generating seed varieties for rice and pulses. Research priorities span seed production technologies and standardization across various crops.

Noteworthy achievements include the completion of Minikit trials for JMP-132, a variety nominated for release proposal. The station is actively addressing infrastructure needs, such as office building construction and acquiring new tractors, to bolster farm operations.

The seed production endeavors at the Agricultural Research Station have been meticulously documented from 2007-08 to the present day. In the inaugural year, 145 acres were sown with BPT 5204 (F/S) paddy variety, yielding a production valued at Rs. 18,02,000/-. Subsequent years witnessed an expansion in both crop variety and production output. Notably, in 2008-09, the station diversified its cultivation to include multiple varieties like MTU 1010 and BPT 2270, resulting in a production worth Rs. 55,43,550/-. Over the years, the station has consistently engaged in the production of diverse crops such as paddy, redgram, maize, chickpea, blackgram, and soybean, significantly contributing to the agricultural landscape.

Despite variations in crop varieties and acreage annually, the station has demonstrated remarkable adaptability and unwavering commitment to agricultural research and seed production.

However, in 2023-24, breeder seed production of paddy was halted due to water source constraints. Furthermore, the revolving fund status for seed production in 2024-25 reflects a balance of Rs. 1,98,68,205/-. This comprehensive record underscores the pivotal role of the station in seed production and agricultural advancement within the region.

Sugarcane Research Station (SRS), Vuyyuru (Estd. 1978)

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Sugarcane Research Station, Vuyyuru, established in 1978 across a sprawling 40-acre expanse graciously donated by M/S KCP Sugar and Industries Crop Ltd, embarked on a journey to revolutionize sugarcane cultivation.

Its inception witnessed the deployment of key personnel from Regional Agricultural Research Station, Anakapalle, including a Sugarcane Specialist, two Breeders, an Agronomist, and a Soil Scientist, later supplemented by experts from Regional Agricultural Research Station, Lam farm, Guntur, specializing in plant protection. The station's mandate encompasses an array of activities aimed at enhancing sugarcane production and resilience.

These include the development of high-yielding and sucrose-rich cane varieties, clones with robust ratoonability, and those adaptable to waterlogged conditions. Moreover, it focuses on furnishing the sugar industry with versatile raw materials, producing breeder seeds, and introducing Co-canines through AICRP(S) programs.

Additionally, the station pioneers advancements in agro-techniques, tailoring solutions to zone-specific challenges, optimizing fertilization, tackling soil salinity, and fortifying soil health.

Its endeavors extend to combating diseases like smut and red rot, instituting Integrated Disease Management (IDM) practices, screening for pest-resistant varieties, and pioneering Integrated Pest Management (IPM) strategies. Noteworthy releases from the station, such as Co 8013, 81 V 48, and 83 V 15, have significantly impacted cultivation landscapes, standing the test of time across various factory zones.

Furthermore, the station's research has yielded resilient varieties, including those resistant to red rot and smut, while its vigilant surveillance ensures timely interventions to mitigate pest threats, thereby empowering farmers with effective management practices.

The institution has released a series of landmark varieties and clones, each contributing significantly to the evolution of sugarcane cultivation. Notable among these are the varieties Co 8013, 81 V 48, 83 V 15, 91 V 83, 2000 V 59, and 2003 V 46, alongside esteemed clones like 86 V 96, 88 V 21, and 2002 V 48.

These cultivars have not only graced vast swathes of agricultural land over the years but continue to do so, maintaining their relevance across different factory zones.

Agricultural Research Station (ARS), Darsi (Estd. 1988)

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The Agricultural Research Station, Darsi, was established in 1988 with the objective of developing economically viable and efficient cropping system models, agro-forestry systems, and watershed management technologies suitable for the NSP right canal area to enhance the productivity of rainfed crops. Over the years, the station has made several significant research contributions. Notably, it identified Bengalgram followed by cowpea as the best alternative crops to tobacco (FCV). In the realm of moisture conservation, supplementary irrigation proved superior to other measures like conservation furrow and subsoiling. The foxtail millet-green-gram and foxtail millet-cowpea crop sequences were found to have the highest benefit-cost ratio (1.10), outperforming the sole crop of redgram (0.10). The research also highlighted that paired row planting significantly improved productivity in Eucalyptus and Subabul compared to traditional farming practices. Additionally, introducing sorghum or pearl millet as intercrops in castor (1:2 ratio proportions) was effective in reducing the incidence of various insect pests. The station is well-equipped with infrastructural facilities, including a seed godown, seed processing unit, two threshing floors, and a farm pond, all of which support its extensive research and development activities. For more information, the station can be reached via its official email or phone number.

Agricultural Research Station (ARS), Amaravathi (Estd. 1990)

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The Agricultural Research Station, Amaravathi, was established in 1990 with a primary focus on researching and producing biofertilizers to support the farmers of Andhra Pradesh. Initially operating under the Non-Plan Bacterial Inoculants Scheme (BIS), the station aimed to enhance agricultural productivity through the development and distribution of biofertilizers. In 1994-95, the All India Network Project on Soil Biodiversity and Biofertilizers was transferred to ARS Amaravathi from ARS Ananthapuram, broadening its research scope to include soil microbial biodiversity. The station has significantly contributed to agricultural innovation, producing biofertilizers worth over Rs. 10 crores.

Key milestones in its history include the development of liquid biofertilizer formulations in 2011-12, which offered longer shelf life and greater efficacy than previous powder formulations. That same year, the station developed VAM (Vesicular-Arbuscular Mycorrhiza) biofertilizer powder and established a greenhouse to mass-produce it using plant host-based technology. Further advancements came in 2015-16 with the establishment of new liquid and powder biofertilizer production laboratories funded by the RKVY scheme, enhancing the station's production capacity.

Significant research outputs from ARS Amaravathi include the development of liquid and VAM biofertilizers, Potash Releasing Bacterial biofertilizers, and innovative agricultural waste decomposers known as Decompo A and B for composting and in-situ decomposition of agricultural waste. The station is equipped with advanced infrastructural facilities, including specialized greenhouses and laboratories dedicated to the production of liquid and powder biofertilizers, positioning it as a leading institution in agricultural research and biofertilizer production.

Agricultural Research Station (ARS), Ghantasala (Estd. 1990)

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The establishment of the Agricultural Research Station, Ghantasala, in Krishna District, dates back to August 22, 1990, under the aegis of the National Agricultural Research Project (NARP) Phase II. With a primary objective of enhancing the production of rice fallow pulses during the Rabi season, its inception marked a pivotal advancement in agricultural research and development within the region. Situated on land graciously allocated by the Commissioner, Department of Agriculture, Government of Andhra Pradesh, the station repurposed a portion of the State Seed Production Farm in Ghantasala to pursue its noble objectives. A significant milestone in the station's trajectory occurred on May 7, 2015, with the establishment of the AICRP Sub-Centre, as stipulated by Proc. No.633/Res.II(A2)/2015 under the directive of the esteemed Director of Research, ANGRAU, Hyderabad. This landmark event solidified its standing as a nucleus for cutting-edge agricultural research, further enhancing its stature within the scientific community.

The station's legacy is underpinned by a series of pioneering research endeavors that have translated into tangible benefits for agricultural stakeholders. Noteworthy among these are innovative strategies for weed management,

conservation technology, and optimal sowing techniques. The prudent application of herbicides and the adoption of novel seeding methodologies have not only curtailed weed proliferation but also significantly boosted seed yields, thereby augmenting economic returns for farmers.

Driving its pursuit of excellence are substantial infrastructural investments, emblematic of a steadfast commitment to cultivating an environment conducive to scientific inquiry. From state-of-the-art seed storage facilities to meticulously engineered irrigation and drainage systems, every aspect of the station's infrastructure underscores a dedication to operational efficiency and technological progress. Despite encountering challenges, advancements on pivotal projects, such as the partially funded office building by NABARD, underscore a resolute determination to expand research capabilities.Furthermore, the station's impact transcends laboratory confines, encapsulated in the introduction of novel varieties and hybrids poised to revolutionize agricultural practices. From the acclaimed release of blackgram variety GBG-1, celebrated for its disease tolerance and adaptability across seasonal cycles, to the ongoing development of promising cultivars awaiting commercial dissemination, the station remains at the forefront of agricultural innovation, poised to shape the future trajectory of farming within the region and beyond.

Agricultural Research Station (ARS), Garikapadu (Estd. 1983)

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The National Agriculture Research project (NARP) special center, established during 1981-82 to supplement the research efforts on water management was initially attached to the ICAR Coordinated Project for Research on Water Management, and later on, during 1983, the NARP special center on water management was shifted by establishing an Agricultural Research Station at Garikapadu, with an objective to cater the research needs of the Nagarjuna Sagar Project Left Canal (NSLC) Command Area.

Initially the research station started functioning in an area of 14.13 ha on Pasture Development & Demonstration Farm (PD&DF) of Department of Agriculture, and during 2002, the entire farm land of 44 ha. of PD&DF was handed over to ANGRAU, out of which 50% of the land area (22.0 ha) was transferred to Dr. K.L. Rao Krishi Vigyan Kendra, Garikapadu of ANGRAU.

The total cultivable area in the Research Station is 16.8 ha out of which, 8.0 ha is under paddy and the remaining area is demarcated for ID and rainfed crops. A network center of A. P. Water Management. An Agricultural Polytechnic College was started in the academic year 2007-08 in this campus and now functioning with a student strength of 70 per year.The major activities of the station are : Assessment of irrigation water and fertilizer requirements of various crops and cropping systems grown in light textured soils, Evaluation of the designs for different irrigation methods and practices to reduce water losses and to increase water use efficiency, to develop production functions of different crops for optimum utilization of irrigation, study of the relative performance of surface, sprinkler and drip irrigation systems, evaluation of critical physiological stages for different crops for irrigation, their effect in qualitative aspects and economic yields, studies on soil- water plant relationship especially with reference to effects of moisture stress, uptake studies of major nutrients under different water management practices, and application of smart sensors in irrigation water measurement and management. Majorly foundation seed production is being taken up in paddy-Var BPT 5204 (Sambha Mashuri), redgram, blackgram, greengram and sunnhemp to supply quality seed to farming community.

Saline water scheme, Bapatla (Estd. 1972)

Email: sws.bapatla@angrau.ac.in

Post Harvest Technology centre, Bapatla (Estd. 1981)

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GODAVARI ZONE

REGIONAL AGRICULTURAL RESEARCH STATION (RARS), MARUTERU (Estd. 1925)

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The Regional Agricultural Research Station (RARS), Maruteru, established in 1925 to cater to the agricultural needs of rice growers in the Godavari delta region, has undergone a significant transformation over the years. Formerly known as the Rice Research Station, it attained the status of the Andhra Pradesh Rice Research Institute (APRRI) in 2005, emerging as the primary hub for rice research in Andhra Pradesh (AP). The pivotal moment came with the establishment of the Godavari Zone in 2007, with RARS, Maruteru as its headquarters, marking a significant milestone in its journey.

The institute's research endeavours span a wide array of areas, primarily focusing on rice breeding, crop protection, and crop production technologies. Notably, RARS, Maruteru has played a vital role in the release of 70 varieties, comprising pure line selections, improved varieties through crossing, and rice hybrids. Particularly, the MTU strains have garnered attention, occupying a substantial portion of rice cultivation in AP, thereby significantly augmenting farmers' income. Moreover, the institute's contribution to national rice production and income is underscored by the development of mega varieties such as MTU-7029, MTU-1001, and MTU-1010.

In the realm of crop protection, RARS, Maruteru has spearheaded the development of eco-friendly solutions for rodent control, including innovative burrow fumigators and trap barrier systems. Additionally, advancements in solar fence technology have played a pivotal role in safeguarding crops against wild animals. The institute's endeavors in identifying resistant rice varieties against pests like the brown planthopper have been instrumental in devising effective disease management strategies.

Significant advancements have been witnessed in crop production at RARS, Maruteru, with revised fertilizer doses and the introduction of organic farming packages and wetland integrated farming systems contributing to enhanced productivity and sustainability. The institute boasts well-equipped biotechnology and rice quality laboratories, alongside facilities for greenhouse gas (GHG) monitoring, facilitating comprehensive research and analysis.

The impact of RARS, Maruteru's technologies is palpable through the widespread adoption of weed management and fertilizer optimization techniques, resulting in cost savings and increased

productivity in rice-growing areas. Moreover, the utilization of paddy straw as residue for improving soil health and reducing fertilizer costs underscores the institute's commitment to sustainable agriculture.

Looking ahead, RARS, Maruteru aims to develop rice varieties tailored for constrained environments, climate resilience, and market demands through advanced breeding technologies. The integration of remote sensing, crop modeling, and AI tools is envisioned to further enhance productivity and sustainability. Emphasis will also be placed on pest and disease management, genetic resistance, and the redesigning of rice plant types for improved yield potential. Mechanization, AI-controlled farming practices, and post-harvest technologies are anticipated to play a pivotal role in enhancing efficiency and sustainability.

RARS, Maruteru stands as a pioneering institution in rice research, making significant contributions to the agricultural landscape of Andhra Pradesh and India. With its focus on innovation, sustainability, and farmer-centric approaches, it continues to lead the way in addressing the challenges faced by rice growers and ensuring food security for the nation.

Agricultural Research Station (ARS), Peddapuram (Estd. 1954)

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The Agricultural Research Station, Peddapuram has a rich history dating back to its establishment in 1954 by the Department of Agriculture, Government of Andhra Pradesh, originally as the Millet Research Station. Initially tasked with the objective of developing varieties and technologies in millets and pulses suitable for the Godavari zone, the station evolved over the years. In 1965-66, it became a part of the Andhra Pradesh Agricultural University, marking a shift in research focus to tapioca under the AICRP on tuber crops. Throughout its journey, the station underwent several transitions, including the transfer of research responsibilities to different regional stations and universities. Notably, in 2018, it was identified as a regular AICRP centre for national maize research.

Over the years, the station has made significant contributions to agricultural research, particularly in the development and release of various pulse and millet varieties, such as PR 202 and PR 1044. These varieties have not only enhanced agricultural productivity but have also gained popularity among farming communities across different states.

Looking ahead, the station has ambitious plans for the future, including the development of high-yielding climate-resilient hybrids, enrichment of genetic resource management, and the exploration of maize for industrial uses like bioethanol and starch.

In terms of infrastructure, the station boasts various facilities, including office and laboratory buildings, seed and fertilizer stores, and tractor sheds. With ongoing construction projects and a range of modern equipment, the station is well-equipped to continue its pioneering research in agriculture.

Agricultural Research Station (ARS), Vijayarai (Estd. 1983)

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The Maize Research Centre, part of the Agricultural Research Station, Vijayarai, was

established in 1983, covering an area of 27.12 hectares with a primary focus on horticultural crops. Serving as a pivotal hub for agricultural research, the station hosts two significant All India Coordinated Research Project schemes: the All India Coordinated Research Project on Honeybee Research and Training, initiated in 1984, and the All India Coordinated Research Project on Oil Palm, established in 1987.

Notably, the Honeybee Research and Training project began on January 25, 1984, and following the bifurcation of Acharya N.G. Ranga Agricultural University in 2008, the AICRP on Honey Bees and Pollinators remained with ANGRAU, allocating 6.00 hectares of land to the Agricultural Research Station, Vijayarai.

After the state bifurcation in 2014, necessitating a research station for maize, the Maize Research Centre was inaugurated on November 27, 2027, at ARS, Vijayarai. Its mission includes maintaining a diverse gene pool with varied genetic backgrounds utilized in various breeding programs, along with developing high-yielding maize hybrids/varieties resilient to biotic and abiotic stresses, tailored for the maize-growing regions of Andhra Pradesh.

Noteworthy achievements include the introduction of the western honeybee (*Apis mellifera*) from Haryana Agriculture University, Hisar, in 1991, significantly boosting honey production compared to the Indian Honeybee (*Apis cerana indica*).

Furthermore, the development of an ELISA kit for detecting European foul brood disease in both *Apis mellifera* and *Apis cerana* honeybees at the field level stands as a pioneering accomplishment.

Looking ahead, future endeavors encompass diverse initiatives such as nucleus stock production of *Apis mellifera* through mass queen rearing, mass multiplication, and commercialization of carpenter bees for crop pollination in controlled environments, leveraging stingless bees for pollination in similar settings, dedicated efforts towards pollination of rare and medicinal crops using honeybees, and a restructured approach towards training programs on beekeeping and pollination management.

NORTH COASTAL ZONE REGIONAL AGRICULTURAL RESEARCH STATION (RARS), ANAKAPALLE (Estd. 1902)

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The Regional Agricultural Research Station (RARS), Anakapalle, established in 1902, has evolved into a prominent institution at the forefront of agricultural research in India. Initially focused on sugarcane research, RARS has diversified its scope to address a wide array of agricultural challenges. This report provides a comprehensive overview of RARS, detailing its historical evolution, core mandate, notable achievements, and robust infrastructure.

The journey of RARS commenced in Samalkot with the establishment of the Sugarcane Research Station (SRS) in 1913 at Anakapalle. Generous financial backing from institutions like the Imperial Council of Agricultural Research and the Indian Central Sugarcane Committee propelled its growth into a comprehensive sugarcane research center. By 1963, RARS had redirected its focus exclusively towards sugarcane research and subsequently, in 1966, transitioned its administrative control to the Andhra Pradesh Agricultural University. Over the years, it has emerged as a pivotal hub under national projects like the All India Coordinated Sugarcane Improvement Project, primarily catering to the agricultural needs of the North Coastal Zone.

RARS, Anakapalle, is committed to a broad research mandate covering sugarcane varietal development, cropping systems, organic agriculture, biological control, and post-harvest technology. It endeavors to evolve sustainable agricultural practices, including organic and natural farming methods, while also validating various agricultural techniques for efficacy.

The institution's remarkable journey is punctuated by several pioneering milestones, including the development of innovative machinery such as the double grating jaggery furnace and the pouch piercer. It has contributed significantly to agricultural technology, notably through the discovery of leaf scald disease, formulation of discriminant function equations for disease screening, and the development of techniques to eliminate sett-borne diseases. Moreover, RARS has played a pivotal role in developing resilient sugarcane varieties and modern jaggery production processes.

In terms of research outputs, RARS, Anakapalle, prides itself on releasing 21 sugarcane varieties, widely embraced by the sugar and jaggery industries. Varieties like Var. 87A 298 (Viswamithra) and CoA 16321 (2010A 229) have garnered significant acclaim for their disease resistance and popularity among farmers. Notably, the Ministry of Agriculture and Farmers Welfare has recognized sugarcane Var. Coat 17321 (2012A319) for cultivation. Additionally, RARS has secured patents for various agricultural innovations, particularly in granular jaggery production technology.

RARS, Anakapalle, boasts state-of-the-art infrastructural facilities, including administrative buildings, farm areas, laboratories for tissue culture, biofertilizer production, integrated pest management, and virus indexing. These facilities play a pivotal role in bolstering research endeavors and disseminating technological advancements within the agricultural community.

Agricultural Research Station (ARS), Vizianagaram (Estd. 1954)

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The Agricultural Research Station in Vizianagaram, established in 1954, stands as a cornerstone for agricultural development in Andhra Pradesh. Operating on leased lands in Gajularega Panchayat near Vizianagaram town, this station, spanning 9.07 hectares, with 8.00 hectares dedicated to cultivation, has played a pivotal role in supporting small and marginal upland farmers, boosting agricultural production, and ensuring food security. Notably, it has led the charge in developing twelve finger millet

(ragi) varieties, two pearl millet varieties, and two horsegram varieties, covering more than half of the state's millet cropping area.

With a primary focus on ragi and ragi-based cropping systems, alongside small millets, the station's research priorities revolve around crafting climate-resilient ragi varieties, early duration ragi varieties, and assessing suitable varieties/hybrids in small millets and groundnuts. Furthermore, there's a keen emphasis on biofortification, processing, and value addition in ragi and small millets, coupled with efforts to identify profitable cropping systems and introduce mechanization in millet farming practices.

Historically, the station has achieved remarkable milestones, including the development of biofortified finger millet varieties and effective management of banded blight disease. Recognized with prestigious awards such as the Fakhruddin Ali Ahmed Award for outstanding research in Tribal farming systems and the Best Institution Award for Crop Improvement, it inaugurated the state's first small millet processing unit in 2017-18. Alongside its rich research portfolio, the station boasts modern infrastructure, including value addition and processing units, laboratories, training centers, and seed storage godowns. Through continuous dedication to research, development, and infrastructure enhancement, the Agricultural Research Station, Vizianagaram, continues to lead the charge in agricultural innovation in the region. Various finger millet varieties, tailored to specific regions, along with advancements in plant pathology and innovative practices in agronomy and soil science, further contribute to enhancing crop resilience and maximizing yields while preserving soil health.

Agricultural Research Station (ARS), Ragolu (Estd. 1956)

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Agricultural Research Station, Ragolu, established in 1956 by the Department of Agriculture, Government of Andhra Pradesh, stands as a cornerstone for agricultural innovation and advancement in Srikakulam District. Initially conceived as a seed multiplication farm for rice and pulses, the station's significance has evolved over the years. It has embraced the mandates of the National Agricultural Research Projects (NARP), focusing on rice and rice-fallow pulses. Today, the station's research priorities encompass a broad spectrum, from the development of fine-grain varieties for varied irrigation conditions to climate-resilient short-duration crops for uplands. With an emphasis on sustainable farming practices, the station pioneers research in organic/natural farming, water management, and weed and fertilizer practices.

Its verification and testing functions validate the suitability of groundnut, maize, mustard, and sunflower varieties for the rabi season. Throughout its history, the station has achieved numerous milestones, including the development and release of ten paddy varieties. Among these, Gutti Krishna Katukalu (RGL-1), introduced in 1967, emerges as a resilient variety adaptable to diverse planting conditions, boasting drought tolerance and resistance to lodging.

Nagavalli (RGL-52), unveiled in 1979, presents semi-dwarf characteristics along with fertilizer responsiveness and salinity tolerance. Vamshi (RGL-1746) and Mahendra (RGL-1750), both from 1985, share traits of semi-dwarf stature and resilience against various stresses. Pushkala (RGL-2624), introduced the same year, stands out for its fine grains and adaptability to multiple seasons and conditions.

Srikakulam Sannalu (RGL-2537) and Vasundhara (RGL-2538), dating back to 1996, exhibit resistance to specific pests and suitability for late planting.

Recent additions like Sreesatya (RGL-1880) and Vamsadhara (RGL-11414) continue the trend with enhanced resilience and adaptability. Alongside variety advancements, agricultural research at ARS, Ragolu, has yielded insights into agronomic practices, weed management, and pest control, enriching the toolkit for rice cultivation.

These notable varieties stand as testaments to the station's commitment to agricultural excellence and the welfare of farmers.

Through its relentless pursuit of innovation and dedication to improving agricultural practices, the Agricultural Research Station, Ragolu, remains a beacon of hope for sustainable agriculture in Andhra Pradesh.

Agricultural Research Station (ARS), Amdalavalasa (Estd. 1958)

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The Agricultural Research Station, Amadalavalasa, located in the Srikakulam District, was established in 1958 as a pioneering center for research on the Mesta crop under the All India Network Project on Jute and Allied Fibers (AINPJAF). With a dedicated focus on Mesta and its cropping systems, post-harvest technology, and pulses, the station has made significant contributions to agricultural science. Notably, it has released nine popular roselle varieties—AMV-1, AMV-2, AMV-3 (Surya), AMV-4 (Kalinga), AMV-5 (Durga), AMV-7 (Janardhan), AMV-8, AMV-9, and AMV-10—as well as one kenaf variety, AMC-108 (Bhimili).

The station's innovative achievements include the development of micro pond retting technology, which reduces the retting duration of Mesta from 21-25 days to just 12-14 days. Additionally, a method involving the dipping of Mesta sticks in a 1.25% urea solution before retting significantly shortens the process by 13 days. The station has also identified optimal intercropping systems, such as Mesta with groundnut or black gram at a 5:5 ratio, yielding the highest equivalent fiber output. Disease management strategies developed here, like seed treatment and spraying protocols with Metalaxyl, have successfully mitigated foot and stem rot diseases.

ARS, Amadalavalasa has been instrumental in pest management as well, identifying the green semilooper, Anomis flava, and reporting its parasitizing species, as well as the first incidence of the Spiral Borer, Agrilus acutus, in Andhra Pradesh. The station is well-equipped with facilities including an administrative building, training hall, seed processing unit, and specialized labs for soil science and plant pathology, supporting its extensive research and training programs.

Agricultural Research Station (ARS), Yelamanchili (Estd. 1960)

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Agricultural Research Station, Yelamanchili, established in 1960 and spanning across 6.96 hectares, has been a cornerstone in addressing the needs of sesame growers in the region. Recognized as a sub-centre for sesame under ICAR in 1964, its significance expanded with the implementation of the National Agricultural Research Project (NARP) in November 1981. Evolving into the lead center for sesame, it later became a satellite station for the Regional

Agricultural Research Station, Anakapalle.

The station's pivotal role was underscored in 1986 with the initiation of the "Technology Mission on Oilseeds," tasked with developing sesame varieties characterized by high yield, oil content, and early maturation. Over the years, the station has marked several milestones, including the inauguration of its main building complex by Dr. M.V. Rao, then Vice-Chancellor of ANGRAU, in May 1991.

Among its most notable achievements are the development and release of five sesame varieties: Gouri (C1036) in 1976, Madhavi (SP1181) in 1978, YLM-11 (Varaha) and YLM-17 (Goutham) in 1993, and YLM-66 (Sarada) in 2009. These varieties exhibit distinct characteristics in terms of duration, oil content, and yield, catering to various cropping situations and disease resistances.

The Agricultural Research Station, Yelamanchili, features state-of-the-art infrastructural facilities, including a central automatic weather station, a 5KWP solar roof tap system, UV laminar airflow, and advanced microscopy equipment. Complemented by modern agricultural machinery, the station stands as a beacon of agricultural research and innovation in the region, continually striving to address the evolving needs of farmers and enhance agricultural productivity.

SOUTHERN ZONE

REGIONAL AGRICULTURAL RESEARCH STATION (RARS), TIRUPATI (Estd. 1979)

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The Regional Agricultural Research Station (RARS), Tirupati, was established in 1979 within the S.V. Agricultural College campus. From its inception, RARS has focused on advancing research in groundnut and sustainable groundnut-based cropping systems, pulses, soil and water management, farm mechanization, and post-harvest technology, achieving significant milestones over the decades.

One early success was the development and release of groundnut varieties Tirupati 1 and Tirupati 2 in 1989. In 2010, RARS released the Redgram variety TRG-22, which yielded 16 quintals per hectare and matured in 160 days. The establishment of the Pesticide Residue Analysis Lab between 2014-2015 at the Institute of Frontier Technologies (IFT) was a significant step forward. In 2016, RARS gained national recognition with the release of the cowpea variety TPTC 29. The 2019 establishment of the RKVY RAFTAAR ANGRAU Agri Business Incubator aimed to foster agripreneurship.

In 2020, RARS released the Redgram variety TRG-59, tolerant to wilt and Sterility Mosaic Disease (SMD). By 2023, new groundnut varieties Konark and Himani, along with the blackgram variety TBG129, were introduced. In 2024, a patent was granted for nano biochar-based nitrogen and potassium fertilizers, emphasizing RARS's commitment to cutting-edge research.

RARS's diverse and impactful research includes maximizing groundnut pod yield through gypsum application, benefiting summer groundnut with 2% urea sprays during moisture stress, and controlling weeds with pre-emergence applications of Pendimethalin and Imazethapyr. The Agromet department developed forewarning rules for Spodoptera frugiperda outbreaks based on climatic factors. For organic farming, RARS recommended a comprehensive package for groundnut including farmyard manure, biofertilizers, neem oil sprays, pheromone traps, border crops, and hand weeding. Yield enhancement research showed that foliar application of 13.0.45 at 0.5% twice, along with recommended fertilizers, increased groundnut pod yield by 26.9%.

The biofertilizer unit established in 2014-15 has sold 250 metric tons of solid biofertilizer and 11,000 liters of liquid biofertilizers. Post-harvest technology advancements included standardized peanut butter production with an extended

shelf life. Nano technology research led to the synthesis of ZnO, CaO, and SiO2 nanoparticles. Entomology research identified pheromone components for red hairy caterpillar control, and a GC-MS/MS method was developed to analyze 41 pesticides within 20.5 minutes. Drought tolerance research identified ten drought-tolerant groundnut genotypes, including notable varieties like Abhaya, Greeshma, and Konark. Farm mechanization efforts resulted in the development of vertical tillage, a multi-task toolbar, shredder cum incorporator, and a chili harvester.

RARS, Tirupati, covers 23.47 hectares, with 19.51 hectares under cultivation. Its infrastructure includes office buildings, stores, and vehicles, along with extensive laboratory facilities such as genomics labs, HPLC facilities, tissue culture labs, fluorescence microscopy, nanotechnology labs, incubation and shaking facilities, soil science labs, biocontrol labs, marker-assisted breeding labs, phenotyping labs, a biofertilizer unit, a groundnut crop improvement lab, a seed processing unit, an automatic weather station, a farm machinery hub, a solar tunnel dryer, rainout shelters, an advanced center for agro-climatic research, OTP chambers, and the ANGRAU Agri Business Incubator.

Through comprehensive research outputs, innovative technologies, and advanced infrastructural facilities, RARS, Tirupati, has significantly contributed to agricultural research and development.

These advancements have greatly benefited the farming community and promoted agripreneurship in Andhra Pradesh, making RARS a cornerstone of agricultural progress in the region.

Agricultural Research Station (ARS), Nellore (Estd. 1937)

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The Agricultural Research Station, Nellore has its establishment as the Government Paddy Farm in 1937, located 15 kilometers away from Nellore in the Madras state. Initially focused on enhancing local Molagolukulu paddy varieties, it later evolved into the Rice Research Station and was permanently relocated to Nellore in 1961. Since then, it has played a pivotal role in agricultural research, particularly in rice cultivation. As a sub-center of the National Agricultural Research Project (NARP) since 1985, with its headquarters in Tirupati, Andhra Pradesh, Nellore serves as the lead center for Rice Research in the southern zone of Andhra Pradesh. Over the years, it has achieved significant milestones, including the development and release of numerous rice varieties tailored to diverse environmental conditions and agricultural needs. Notable among these are varieties like NLR 33892 (Parthiva), NLR 34449 (Nellore Mahsuri), NLR 40024 (Swetha), NLR 40054 (Nellore Sugandha), and NLR Rice 3238, each offering unique attributes such as disease resistance, high yield potential, and adaptability to specific growing seasons. Furthermore, the station serves as a prolific producer of breeder and foundation seeds, contributing significantly to the agricultural sector's sustainability and growth. In terms of research output, the station has made substantial contributions in various domains, including optimal nutrient management, cropping systems, organic farming practices, mechanization techniques, and pest and disease management strategies. Equipped with state-of-the-art laboratories in Plant Breeding, Agricultural Entomology, and Plant Pathology, the Agricultural Research Station in Nellore stands as a beacon of innovation and excellence in agricultural research and development, continually striving to address the evolving challenges facing the agricultural community.

Agricultural Research Station (ARS), Utukur (Estd. 1962)

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Agricultural Research Station (ARS), Utukur, Kadapa established in 1962, has been a stalwart in agricultural innovation and development. Specializing in rice and rice-based cropping systems, water management, and STCR research,

its mandate underscores its commitment to addressing crucial agricultural challenges. Over the years, the station has set ambitious research priorities, focusing on areas such as water management, dryland agriculture, biofertilizer multiplication, and soil research. Notably, the station has played a pivotal role in identifying

suitable oilseeds and pulses, contributing significantly to agricultural diversity and sustainability. Through landmark achievements like membership in the Global Soil Laboratory Network and successful seed production activities, ARS Utukur has garnered national and international recognition. Its dedication to technological advancements is evident through the development of high-yielding rice cultures like UTR 181, meticulously tested and tailored for Andhra Pradesh's agricultural landscape. Moreover, the station's contributions extend to agronomy, entomology, pathology, and soil science, with breakthroughs ranging from optimized fertilizer recommendations to effective pest management strategies. One of its most remarkable accomplishments is the Soil Pedonarium, a pioneering initiative showcasing the intricate relationship between rocks, minerals, and soil formation—a first in the Telugu-speaking states. Complemented by robust infrastructural facilities including modern laboratories, seed processing units, and spacious godowns, ARS Utukur stands as a beacon of agricultural excellence, poised to shape the future of farming in Andhra Pradesh and beyond.

Agricultural Research Station (ARS), Podalakur
(Estd. 1964)
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Agricultural Research Station, Podalakur, established in 1964 under the auspices of the Acharya N G Ranga Agricultural University, situated in the Southern Zone of Andhra Pradesh, found its permanent home in Podalakur on October 1st, 1965. Predominantly experiencing a dry climate with an average annual rainfall of 996 mm during the South-West and North-East monsoons, the station has witnessed a transformation in the agricultural landscape over time, transitioning from sorghum to more profitable short-duration crops like Greengram, Blackgram, Redgram, Sesame, Groundnut, Chickpea, and Sunflower.

Throughout its history, the station has achieved significant milestones, releasing notable crop varieties such as PJ-890 and PBG 1 (Podalakurminumu) in 1992 and PBG 107 (Penusila) in 2002. In 2023, PBG 276 and PBG 278 underwent multilocation testing, showcasing the station's commitment to agricultural innovation.

The station's research output has made a substantial impact, identifying and recommending numerous crop varieties tailored to thrive in the local climate and soil conditions of Nellore District, including Redgram, Blackgram, Greengram, Bengalgram, Jowar, Bajra, Sesame, and others. Technological advancements form the cornerstone of the station's work, encompassing optimized cropping systems, intercropping techniques, and effective weed and pest management strategies. Additionally, the station plays a pivotal role in seed production, supplying high-quality seeds to production agencies and local farmers.

Agricultural Research Station (ARS), Perumallapalle
(Estd. 1964)
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The Agricultural Research Station (ARS) in Perumallapalle, established in 1964, stands as a pioneering institution dedicated to advancing agricultural research, with a particular focus on sugarcane cultivation within the southern region. Initially founded to address the research needs of sugarcane cultivation, the station expanded its scope over the years, accommodating the Millet scheme in 1967, thereby initiating research on pearl millet, finger millet, and other millet crops. Throughout its history, ARS Perumallapalle has achieved significant milestones, notably marked by the release of various sugarcane and millet varieties tailored to the region's agricultural demands. Notable sugarcane varieties like Co T 8201, 2005 T 16 (Swarnamukhi), and 2016T7 exhibit resilience to diseases and environmental stressors while boasting high yields. Similarly, in pearl millet, varieties like Balaji, and in finger millet, varieties like Kalyani, Padmavathi, Sapthagiri, Vakula, and Tirumala cater to specific requirements, showcasing robust growth characteristics and impressive yields. Moreover, ARS Perumallapalle has contributed substantially to agricultural research, producing crucial findings in weed management, planting optimization, fertigation techniques, and drought mitigation in sugarcane cultivation. Additionally, the station's endeavours in nutrient management and disease control in millet crops have significantly enhanced productivity and sustainability. Bolstering its research efforts, ARS Perumallapalle boasts modern infrastructural facilities, including a tissue culture laboratory for disease-free seedling production and a jaggery making unit for product evaluation and distribution. Overall, ARS Perumallapalle stands as a cornerstone institution driving agricultural innovation and development in the southern zone, contributing profoundly to the prosperity of farmers and the agricultural sector as a whole.

Agricultural Research Station (ARS), Kavali (Estd. 1978)

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The Agricultural Research Station, Kavali initially established as a Center for Tobacco Research and Sheep Farming, has undergone a significant evolution over the years. In 1978, it transitioned into the CASHEW Research Station under the NARP phase – I, and later transformed into the Agroforestry Research Scheme during the NARP phase-II in 1990. The station reached a notable milestone in 2015, commemorating its silver jubilee and 25 years of dedicated pursuit of agricultural excellence.

In terms of research, the station has been at the forefront of innovation, contributing novel discoveries to the agricultural field. Noteworthy among these are the recommended spacing guidelines for Casuarina and Eucalyptus, aimed at optimizing growth conditions. It has also advocated for the ideal nitrogen dosage for Eucalyptus cultivation. Additionally, the station has identified and promoted promising eucalyptus clones—BCM-2169, BCM-23, and BCM-571—ushering in a new era of genetically superior clonal planting stock for various agricultural projects in the southern region of Andhra Pradesh.Regarding infrastructure, the station is equipped with a comprehensive range of facilities, including a well-appointed office building, a sturdy shadenet house ensuring optimal environmental conditions, and a state-of-the-art vermicompost unit. These facilities are tailored to support cutting-edge agricultural research and development initiatives. Through its steadfast dedication and unwavering commitment to agricultural progress, the Agricultural Research Station in Kavali serves as a testament to the transformative impact of innovation in shaping the future of farming and forestry practices.

Agricultural Research Station (ARS), Chinapavani (Estd. 2021)

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The Agricultural Research Station (ARS) in Chinapavani was established in 2021, following the acquisition of 410.30 acres of land in Chinapavani village. The primary mission of ARS is to provide high-quality, high-yielding variety (HYV) seeds, particularly focusing on pulses and millets. Although research projects are still in the planning stages, the station is primarily dedicated to seed production in these vital crops. Currently, the infrastructure at ARS is under development, with an office building, seed go-down, and threshing floor all under construction. This nascent facility is poised to become a significant contributor to agricultural research and seed quality enhancement in the region.

SCARCE RAINFALL ZONE

REGIONAL AGRICULTURAL RESEARCH STATION (RARS), NANDYAL (Estd. 1906)

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The Regional Agricultural Research Station (RARS), Nandyal, holds a distinguished position in India's agricultural landscape, tracing its roots back to its establishment during the British colonial period in 1906. Over the decades, RARS Nandyal has emerged as a cornerstone of agricultural research and development, serving as the nerve center for the Scarce Rainfall Zone of Andhra Pradesh, encompassing Nandyal, Kurnool, Sri Satyasai, and Anantapuram districts. Initially, its research endeavors were concentrated on enhancing the productivity and resilience of cotton and sorghum crops, reflecting the prevalent agricultural practices and needs of the time.

The evolution of RARS Nandyal has been marked by significant milestones, notably its transition from a specialized cotton research station to a comprehensive Regional Agricultural Research Station in 1980, as part of the National Agricultural Research Project (NARP). This transformation positioned RARS Nandyal as the focal point for addressing the diverse agricultural challenges prevalent in the Scarce Rainfall Zone, thereby expanding its scope and impact across various agricultural domains.

At the heart of RARS Nandyal's research agenda lie its multidisciplinary research projects, epitomized by the six All India Coordinated Research Projects (AICRP) focusing on cotton, small millets, tobacco, sunflower, chickpea, and sorghum. These projects serve as crucibles for innovation, fostering the development of improved crop varieties and agronomic practices tailored to the specific agro-climatic conditions of the region.

The station's research outputs stand as a testament to its commitment to excellence and innovation. RARS Nandyal has been instrumental in breeding and releasing several high-yielding and disease-resistant crop varieties, including the renowned Narasimha (NA 1325) cotton variety along with NA 1325 (Narasimha), NDLH 1755 (Sivanandi), NDLH 1938 (Srirama), NDLH-2005-4 (Nandyal Cotton-22), NDLH-2028-2 (Nandyal Cotton-23), NDLH-2051-1 (Nandyal Cotton-24), NDLH-2035-5 (Nandyal Cotton-25), NDLH-2056-4 (Nandyal Cotton-26) and NDLA-3104-1 hirsutam varieties as well as NA 2708 (Aravinda), NA 2463 (Srinandi), NA 2933 (Yaganti), NDLA-3104-1 (Nandyal Cotton-27)

and NDLA-3116-3 (Nandyal Cotton-28); Foxtail millet varieties- (Prasad, Krishnadevaraya, Narasimharaya, Srilakshmi, SiA 3085, Suryanandi, Renadu, Garuda, Mahanandi); Sorghum varieties, White- NTJ-1, NTJ-2, NTJ-3, NTJ-4 & NTJ-5, Yellow-N-13, N-14, N-15; NDLR 7 rice variety, chickpea varieties-eight desi varieties (Nandyala Sanaga 1, Dheera, Nandyal Gram 49, Nandyal Gram 452, Nandyal Gram 857, Nandyal Gram 776, Nandyal Gram 924 and Nandyal Gram 1267), which have high yield potential and tolerance to wilt. Among them, Dheera, Nandyal Gram 776, and Nandyal Gram 1267 are suitable for mechanical harvesting. Large-seeded Kabuli varieties Nandyal Gram 119 and Nandyal Gram 810 were also released, as well as Nandyal Pogaku tobacco varieties. These varieties not only exhibit superior performance in terms of yield and quality but also demonstrate resilience to biotic and abiotic stresses, thereby bolstering farmers' livelihoods and enhancing food security in the region.

Furthermore, RARS Nandyal's contributions extend beyond varietal development to the realm of cropping systems research. The station has played a pivotal role in elucidating and promoting profitable cropping systems, such as foxtail millet + red gram and sunflower-based cropping systems, which optimize resource utilization and augment farm productivity and profitability.

Regional Agricultural Research Station, Nandyal, stands as a beacon of agricultural research and innovation, driving positive change and sustainable development in the Scarce Rainfall Zone. Its rich legacy, marked by pioneering research outputs and impactful interventions, underscores its pivotal role in addressing the agricultural challenges of the region. As it continues to forge ahead in its quest for excellence, RARS Nandyal remains steadfast in its commitment to advancing agricultural knowledge, empowering farmers, and fostering sustainable agricultural development.

Agricultural Research Station (ARS), Kadiri (Estd. 1954)

Email : ars.kadiri@angrau.ac.in

The Agricultural Research Station (ARS) in Kadiri epitomizes a legacy steeped in agricultural innovation, tracing its roots back to its inception

in 1954 as the Regional Oilseeds Research Station (RORS) in Anantapur. With its relocation to Kadiri in 1959 and subsequent renaming in 1982, this institution swiftly emerged as a frontrunner in groundnut research. By 1993, it had risen to prominence as the primary centre for the All India Coordinated Research Project on Groundnut (AICRP-G) in Andhra Pradesh. Throughout its illustrious journey, ARS Kadiri has introduced a plethora of high-yielding groundnut varieties, including Kadiri 6, Kadiri 7 bold, Kadiri 9, and Kadiri Lepakshi, all of which have garnered widespread acclaim nationwide.

In addition to its pioneering variety development, ARS Kadiri has spearheaded pioneering initiatives such as the Farmers' Participatory Seed Production System, which has revolutionized seed production dynamics.

Moreover, it has devised innovative strategies to combat agricultural threats like peanut stem necrosis disease, exemplified by its ground-breaking module integrating seed treatment, border crop management, and foliar sprays.

Bolstered by state-of-the-art infrastructure comprising laboratories, godowns, and greenhouse facilities, ARS Kadiri stands as an epitome of excellence in agricultural research and development in India.

Its rich tapestry of historical milestones, including recognition as the main centre for AICRP-G in Andhra Pradesh and the release of ground-breaking groundnut varieties, underscores its enduring legacy in advancing agricultural practices. From standardizing field screening techniques to the annual convening of crucial research project meetings, ARS Kadiri continues to shape the agricultural landscape, ensuring sustainable growth and prosperity for farmers nationwide.

Agricultural Research Station (ARS), Reddipalli (Estd. 1963)

Email : ars.reddipalli@angrau.ac.in

The Agricultural Research Station, Reddipalli, traces its roots back to 1963 when it was established as a P.D.D.F. under the Department of Agriculture. It later came under the administration of Acharya N. G. Ranga Agricultural University on July 10, 1989. Spanning across a total area of 56.86 hectares, with 32.61 hectares allocated for I.D. localization and 15.95 hectares for rainfed agriculture, the station focuses primarily on cultivating crops such as groundnut, jowar, bajra, redgram, castor, chillies, and sunflower. Over the years, it has emerged as a central hub for agricultural research and development, collaborating with various institutions and organizations to advance farming practices and enhance crop yields.

Research conducted at the Agricultural Research Station, Reddipalli, has yielded valuable insights into optimizing agricultural practices for various crops. Notable studies encompass experiments on castor performance under diverse irrigation schedules and sowing dates, groundnut cultivation techniques, selection of suitable crops, and irrigation schedules across different seasons, as well as the effectiveness of fertigation methods in augmenting crop yields. These endeavors have resulted in significant advancements in crop productivity and resource management, thereby bolstering the agricultural sustainability of the region. A standout research output includes findings on the impact of irrigation depth and scheduling on crop yields, particularly in groundnut and redgram cultivation, alongside the efficacy of micro-irrigation systems like surface drip irrigation and microjet sprinklers. Furthermore, studies on crop diversification in rice fallows and the feasibility of ratooning in pigeonpea have furnished valuable insights into optimizing land productivity and crop rotations.

In essence, the Agricultural Research Station, Reddipalli, serves as a testament to the dedication and innovation of agricultural scientists in addressing farmers' challenges and promoting sustainable farming practices. Through ongoing research endeavors and collaborations, it continues to play a pivotal role in advancing agricultural productivity and resilience not only in the Anantapuramu district but also beyond its borders.

Agricultural Research Station (ARS), Ananthapuramu (Estd. 1964)

Email : ars.anantapur@angrau.ac.in

The Agricultural Research Station, Ananthapuramu, was established on March 31, 1964, originally as the Soil Conservation Research Centre in Rekulakunta village, Bukkarayasamudram mandal, within Ananthapuramu district. The Indian Council of Agricultural Research sanctioned the All India Coordinated Research Project (AICRP) on Dryland Agriculture on September 29, 1971, to facilitate multi-disciplinary research catering to the dryland farmers of the Rayalaseema region. Subsequent key projects include the AICRP on Pearl Millet in 1972, Agrometeorology in 1983, the Operational Research Project in 1986, Gramin Krishi Mausam Sewa in 1996, National Innovations in Climate Resilient Agriculture in 2010, AICRP on Arid Legumes in 2013, and AICRP on Castor and Rainfed Integrated Farming Systems both in 2018.

The station has made significant contributions to

agricultural practices, including water harvesting through farm ponds and supplemental irrigation, sub-soil chiseling for moisture conservation, and soil test-based fertilizer applications. It introduced innovative practices like rainbow cropping and mechanized strip cropping, and proved the profitability of integrating groundnut cultivation with sheep rearing for small farmers. Other notable advancements include the development of specialized machinery such as the Eenati Gorru automatic seed drill, Anantha Planter, and various equipment for sowing, herbicide application, and harvesting. Integrated pest management strategies, including pheromone traps for groundnut pests, have also been significant.

The station boasts comprehensive infrastructural facilities, including a Custom Hiring Centre, cold storage, a Dryland Technology Park, a cold press groundnut oil expeller unit, a Castor Mechanisation Hub, a two-layer sheep shed, agroforestry systems, an Agricultural Information Centre, seed processing units, vermi compost units, a biochar making kiln, and a small tractor mechanisation hub. These facilities support the station's ongoing mission to innovate and improve dryland farming practices for the benefit of local farmers.

HIGH ALTITUDE & TRIBAL ZONE

REGIONAL AGRICULTURAL RESEARCH STATION (RARS), CHINTAPALLI
(Estd. 1906)

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The Regional Agricultural Research Station (RARS), Chintapalle, established in 1985, serves the agricultural needs of the High Altitude and Tribal (HAT) Zone, encompassing districts like Srikakulam, Parvathipuram Manyam, and Alluri Sitarama Raju. With a focus on enhancing the livelihoods of tribal farmers, RARS Chintapalle prioritizes the development, identification, and popularization of suitable crop varieties and technologies tailored to the region's watershed basis. This mandate underscores the station's pivotal role in agricultural development within the area, addressing the unique challenges faced by tribal communities.

The research priorities of RARS Chintapalle encompass a diverse range of agricultural aspects, including the cultivation of crops like Rajmash and Niger, evaluation of various crop varieties and hybrids, development and assessment of soil and water conservation practices, and promotion of integrated farming systems and organic farming practices. Additionally, the station provides weather-based agro-advisories to farmers and conducts research on socio-economic aspects of farming communities, contributing to holistic agricultural development.

Over the years, RARS Chintapalle has developed numerous technologies and practices to support tribal farmers. These include innovations such as salt treatment technology for weed seed removal, introduction of line sowing and System of Rice Intensification (SRI) methods, evaluation and multiplication of improved crop varieties, and establishment of compost production units. The station has also played a crucial role in promoting awareness and skill development among farmers through various programs and initiatives.

Historical milestones include the successful implementation of organic cultivation of exotic flower crops, the inspiring success story of Mohammad Fasi-Ul-Rehman, an innovative floriculture farmer, and the initiation of agri-tourism activities to promote agricultural education and tourism in the region. Workshops and conferences, such as the National Conference on Hill and Tribal Agriculture, further contribute to knowledge exchange and capacity building within the agricultural community.

Moreover, RARS Chintapalle has made significant research outputs, and established an Agricultural Polytechnic and Diploma in Organic Farming, aimed at providing education and training in agricultural practices. The station is well-equipped with essential infrastructure, including analytical facilities, weather stations, compost units, and irrigation systems, enabling effective research and technology dissemination.

Agricultural Research Station (ARS), Seethampet (Estd. 1986)

Email : ars.seethampeta@angrau.ac.in

Agricultural Research Station, Seethampeta was established on April 1st, 1986, under the National Agricultural Research Project's sub-project for High Altitude and Tribal Areas (Zone-IX), stands as a beacon of agricultural innovation and development at hill and tribal habitat of Andhra Pradesh. Initially spanning an area of 19.22 hectares provided by the Integrated Tribal Development Agency, the station is located in the village of Patha Phanukuvalasa, merely 2 kilometers from the Seethampeta mandal headquarters. The station's terrain primarily comprises black clayey and red sandy loam soils, traversed by small reverlets that coalesce into a stream at its western boundary. Functioning within an operational ambit encompassing 10 tribal mandals in Parvathipuram Manyam district and 5 in Srikakulam District, the station diligently serves the agricultural needs of tribal farmers in both regions. The station was established with a multi-faceted objective, including the evaluation of improved varieties of cereals, millets, pulses, oilseeds, vegetables, and horticultural crops, as well as the development of technologies to supplant podu cultivation among tribal farmers. Over the years, its research mandate has evolved to emphasize the identification and promotion of suitable crops, cropping systems, and watershed-based technologies tailored to enhance the livelihoods of tribal communities. Key research priorities encompass testing improved crop varieties, soil and water conservation, organic farming methodologies, identification of profitable crops, and the implementation of integrated farming systems aimed at uplifting tribal farmers economically. Notable achievements punctuate the station's journey, including the collection and preservation of indigenous plant species, the identification of high-yielding varieties such as RGL 2537, Swarna, and MTU 1001 in paddy cultivation,

and the successful integration of dairy farming into tribal agriculture systems. Additionally, initiatives such as the production of foundation seeds, introduction of value-added agro-processing techniques, and active participation in governmental programs and agricultural advisory boards underscore the station's commitment to holistic agricultural development. The station boasts robust infrastructural facilities, including a soil testing laboratory, farm tractors, seed godowns, power weeders, and paddy reapers, among others, facilitating cutting-edge research and extension activities. Continuously striving to innovate and empower, the Agricultural Research Station at Seethampeta remains a steadfast ally in the journey towards sustainable agricultural prosperity for tribal communities in the region.

LIST OF ICAR FUNDED RESEARCH PROJECTS AND OTHER PROJECTS OPERATED IN ANGRAU

All India Coordinated Research Projects (AICRP)/All India Netwokk Projects (AINP) funded by ICAR

Krishna Zone

- AICRP Seed (Crops)
- AICRP on MULLaRP, RARS, Lam
- AICRP on Cotton (main centre), RARS, Lam
- AICRP on Pigeonpea, RARS, Lam
- AICRP on Salt Affected Soils & Use of Saline Water in Agriculture, SWS, Bapatla
- AICRP on Post Harvest Engineering & Technology, Bapatla
- AICRP on Farm Implements and Machinery (FIM), Bapatla
- AINP on Soil Biodiversity & Biofertilizers, ARS, Amaravathi
- AICRP on MULLaRP (sub centre), ARS, Ghantasala
- AICRP on Dryland Agriculture (voluntary centre), ARS, Darsi

Godavari Zone

- AICRP on Rice, RARS, Maruteru
- AICRP on Integrated Farming Systems (main centre), RARS, Maruteru
- AINP on Vertebrate Pest Management, RARS, Maruteru
- AICRP on Honey Bees & Pollinators, ARS, Vijayarai
- AICRP on Maize, ARS, Peddapuram.

North Coastal Zone

- AICRP on Sugarcane, RARS, Anakapalle
- AICRP on Pest Harvest Engineering & Technology, RARS, Anakapalle
- AICRP on Biological Control of Crop Pests & Diseases, RARS, Anakapalle
- AICRP on Small Millets, ARS, Vizianagaram
- AICRP on Jute and Allied Fibres, ARS, Amadalavalasa
- AICRP on Integrated Farming Systems (sub centre), ARS, Vizianagaram
- AICRP Rice (Voluntary Centre)

Southern Zone

- AICRP on Groundnut (sub centre), RARS, Tirupati
- AICRP on Forage crops (voluntary centre), RARS, Tirupati
- AICRP on Sesamum, RARS, Tirupati
- AICRP on Rice (voluntary Centre), ARS, Nellore
- AICRP on Mushroom (voluntary centre), RARS, Tirupati
- AINP on Pesticide Residues (voluntary centre), RARS, Tirupati

Scarce Rainfall Zone

- AICRP on Cotton (sub centre), RARS, Nandyal
- AICRP on Small Millets (sub centre), RARS, Nandyal
- AINP on Tobacco, RARS, Nandyal
- AICRP on Sunflower, RARS, Nandyal
- AICRP on Chickpea, RARS, Nandyal
- AICRP on Sorghum, RARS, Nandyal
- AICRP on Dryland Agriculture, ARS, Anantapuramu
- AICRP on Pearl Millet Improvement, ARS, Anantapuramu
- AICRP on Agrometeorology, ARS, Anantapuramu
- AICRP on Castor, ARS, Anantapuramu
- AICRP on Groundnut, ARS, Kadiri

High Altitude and Tribal Zone

- AICRP on Niger, RARS, Chintapalle
- AICRP on MULLaRP (Rajmash) (voluntary centre), RARS, Chintapalle

Other Projects

- Rashtriya Krishi Vikas Yojana-Remunerative Approaches For Agriculture And Allied Sector Rejuvenation (RKVY-RAFTAAR) (ANGRAU-Poshan Incubator), RARS, Tirupati
- DAC-GOI funded Central Sector Scheme "Monitoring of Pesticide Residues at National Level" (Sample Collection Centre), Lam, Guntur
- Large Scale Seed Production of all classes of seeds in ANGRAU at ARS, Chinapavani under RKVY-RAFTAAR.
- Organic farming – Input supply and Training at RARS, Lam, Guntur under RKVY-RAFTAAR.

- Drone Applications in Agriculture at RARS, Lam, Guntur under RKVY-RAFTAAR.
- Development of DUS test guidelines for Mesta (*H. Cannabinus*) and Roselle (*H. sabdariffa*) at ARS, Amadalavalasa.
- Consortia Research Platform - Agrobiodiversity project on small millets at ARS, Vizianagaram.
- Govt of India, NFSM (Commercial crops) IRM: Dissemination of Pink bollworm management strategies at RARS, Lam, Guntur.
- Molecular breeding for the improvement of Swarna sub1 for major abiotic stresses of coastal rice areas at RARS, Maruteru funded by CRIDA under NICRA.
- Consortium Research Platform on Hybrid Technology at RARS, Maruteru funded by ICAR-IARI, New Delhi.
- Mainstreaming rice landraces diversity in varietal development through genome-wide accession studies -Network rice project with IARI at RARS, Maruteru funded by DBT.
- Accelerated Genetic gain in rice Aliance (AGRI Alliance): Irrigated low land Breeding at RARS, Maruteru funded by IRRI.
- Accelerated Genetic gain in rice Aliance (AGRI Alliance): Marginal environment – Salinity stress at ARS, Machilipatnam funded by IRRI.
- Causes and consequences of e-NAM on the economic development of India- A case study at SVAC, Tirupati funded by ICAR – NASF.
- Chitosan based nanoparticulate delivery system for the effective delivery of calcium and its impact on productivity of groundnut at RARS Tirupati funded by DBT.
- Effective delivery of nutrients, insecticides and fungicides through nanoparticulate and its effect on uptake and yields in groundnut and chilli at RARS Tirupati funded by ICAR – NASF.
- Identification of genomic regions and genes for drought and heat tolerance in Groundnut at RARS Tirupati funded by ICAR – NASF.
- Preparation, characterization and evaluation of the efficacy of nanobiochar based nitrogen and potassium fertilizers on maize productivity under rainfed Agro ecosystem of North Western Himalaya Groundnut at RARS Tirupati funded by DST.
- Exploitation of genetic and genome resources for improvement of niger through breeding and biotechnological tools at RARS, Chintapalli funded by DBT.
- GOI- India Meteorological Department, New Delhi funded project on Gramina Krishi Mousam Seva (GKMS) executed at RARS, Anakapalli, Chintapalli, Lam, Tirupati and ARS, Anantapuramu.
- GOI- India Meteorological Department, New Delhi funded project on Forecasting Agricultural output using Space, Agro-meteorology and Land based observations (FASAL) at RARS, Tirupati and ARS, Anantapuramu.

EXTENSION

ADMINISTRATIVE SET-UP & EXTENSION NETWORK.

Technological empowerment of farmers and extension functionaries through extension activities is one of the key factors to achieve higher production, productivity, net income and thereby the food security. The motto of the University Extension is "*Reach the Unreached*". One out of the three mandates of the University are to deliver effective University Front Line Extension Support to the state of Andhra Pradesh and it reads, "Assist in the process of Transfer of Technology (ToT) through the dissemination of knowledge in collaboration with Development Departments of the Government"

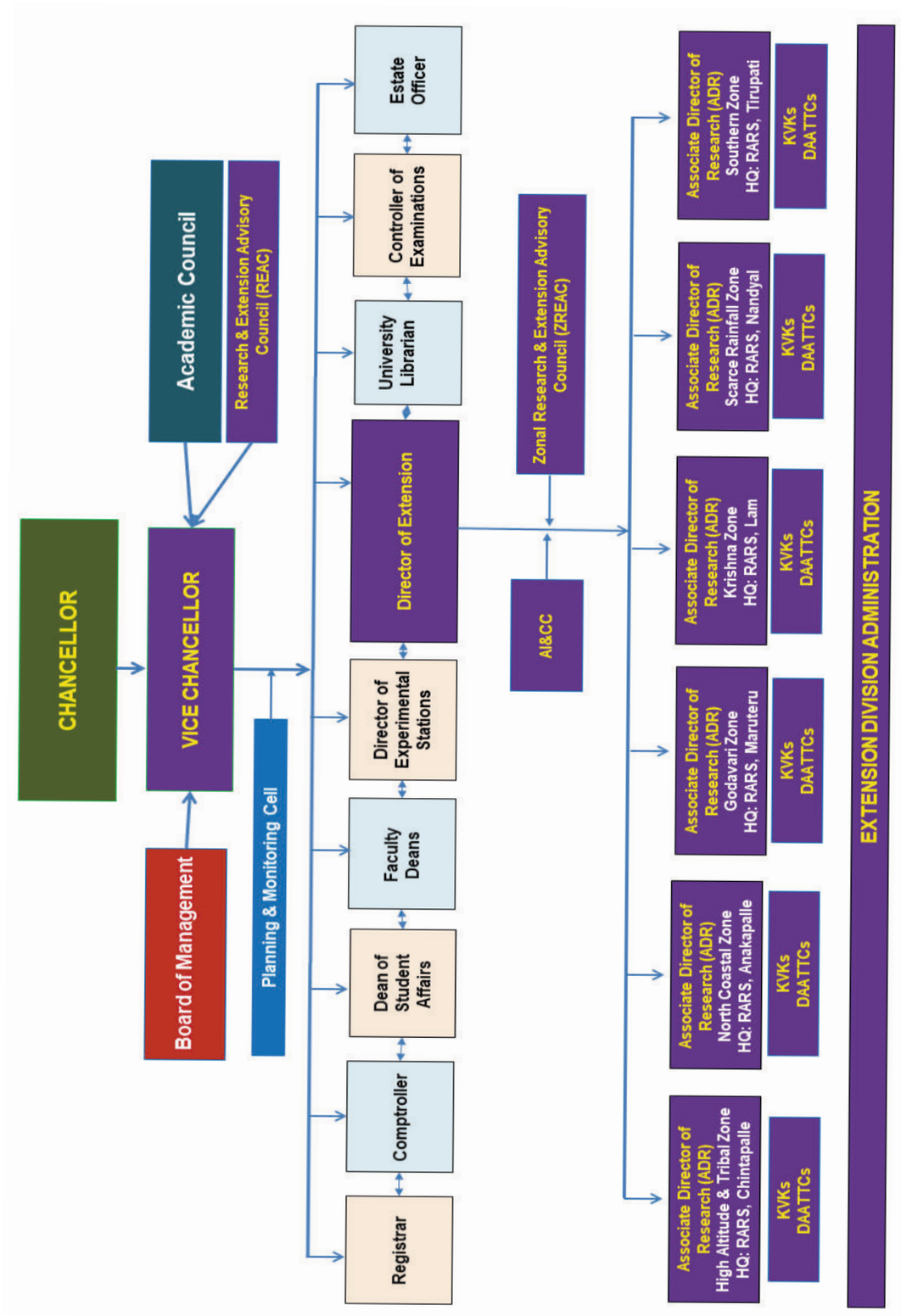
In order to accomplish this mandate, the University has a Directorate of Extension headed by the Director of Extension with the overall responsibilities conducting extension programmes of the University with the following objectives

- Technology assessment to promote location specific profitable technologies through On-Farm Trials and Adaptive Trials.
- Training of development department personnel, non-officials and farmers in the latest technologies/ skills in agriculture and allied enterprises and organizing periodic Research – Farmer – Extension interactions.
- Organizing diagnostic surveys and suggesting onsite remedial measures.
- Processing and dissemination of production technologies related to agriculture and allied aspects through print & electronic media like press, radio, television, publications, ICTs and mobiles.

HISTORICAL MILESTONES IN EXTENSION SYSTEM IN UNIVERSITY

The objective of the University, as per section 4 of the Act of 1963, include promotion of field and extension programmes in agriculture and agricultural production in rural areas of the State. The mandate of the University under section 30 of the Act of 1963 is for establishment of Extension services for the purposes of under taking extension programmes, dissemination of information for solving the problems relating to agriculture and domestic fields, developing the interests of youth in agriculture etc.,

- 1967: The first extension service of APAU popularly known as *District Extension Education Programmes* were introduced in 1967 in Hyderabad district and were subsequently extended to Chittoor (1968) and Guntur (1970) districts.
- 1969: University established *Agricultural Information &Communication Centre (AI&CC),* on a modest way with financial assistance from KSU-USAID initially and later from ICAR and State Government.
- 1969: Started publication of the farmer's almanac "*Vyavasaya Panchangam*" with comprehensive information on package of practices of major crops and technologies recommended by the University. This magazine is released every year on the day of Telugu new year "Ugadi".
- 1970: National Demonstrations Scheme (NDS) was established during 1970-71 in the University in four locations. In commemoration of the Golden Jubilee Year of ICAR, a *Lab to Land Programme* was launched by the APAU in June,1979.


CHANCELLOR
VICE CHANCELLOR
Board of Management
Academic Council
Research & Extension Advisory Council (REAC)
Planning & Monitoring Cell
Registrar
Comptroller
Dean of Student Affairs
Faculty Deans
Director of Experimental Stations
Director of Extension
University Librarian
Controller of Examinations
Estate Officer
AI&CC
Zonal Research & Extension Advisory Council (ZREAC)
Associate Director of Research (ADR) High Altitude & Tribal Zone HQ: RARS, Chintapalle
Associate Director of Research (ADR) North Coastal Zone HQ: RARS, Anakapalle
Associate Director of Research (ADR) Godavari Zone HQ: RARS, Maruteru
Associate Director of Research (ADR) Krishna Zone HQ: RARS, Lam
Associate Director of Research (ADR) Scarce Rainfall Zone HQ: RARS, Nandyal
Associate Director of Research (ADR) Southern Zone HQ: RARS, Tirupati
KVKs DAATTCs
EXTENSION DIVISION ADMINISTRATION

- 1973: University started publication of the "*Journal of Research-APAU*" (now, Journal of Research-ANGRAU), a quarterly journal with peer reviewed publications.
- 1980: In order to improve the productivity of pulses and oilseeds in different regions of the state, two extension education centres were sanctioned by the ICAR at Ananthapur and Rastakuntubai which started functioning from December,1980 and December,1981, respectively.
- 1982: Reorganization of the University Extension work followed the reorganization of extension activities of the APAU and implementation of *Training and Visit System* by the Department of Agriculture to streamline the set up of the field extension

programme of the University during 1982.

- 1983: The first KVK was established in 1983 at Rastakuntubai of Visakhpatnam District.'
- To optimize the utilization of the available extension resources, integration of all available human resources in different projects / stations was done and established six *Extension Education Units (EEU)* in the state, under the administrative control of the Associate Directors of Research.
- The Extension Education Units conduct extension activities such as conducting feasibility assessment studies (field trials) for testing new technologies including mini-kit trials of pre-released varieties to get feedback to the scientists, introduction of new cropping patterns, demonstration of latest technologies, organization of Kisan Melas, training programmes for the developmental personnel and the farmers, supervision of Rural Agricultural Work Experience Programme (RAWEP) for final year UG students of B.Sc. in Agriculture.
- 1998: It was realised that the existing EEUs and T&V system are inadequate to give technological back up and end support & capacity building to the extension personnel of the line departments, and during a high-level meeting, the then Chief Minister N. Chandra Babu Naidu, has put up an idea for establishing University extension centres at district headquarters, and accordingly, Dr IV Subba Rao, the then Vice Chancellor, started the concept of *District Agricultural Advisory and Transfer of Technology Center (DAATTC)* and these centres are popularly called as *"Eruvaka Kendralu"* in Telugu. This kind of initiative is the *first of its kind in the country*, State Agricultural University starting one DAATTC per district located in the District Head Quarter, consisting of multi-disciplinary scientists.
- 2000: University published crop diagnostic bulletins in English and Telugu, a pocket hand book, for each crop, with all the information on pest identification,

symptoms of damage and management strategies with colour pictures.

- 2009: University started monthly magazine in Telugu "Vyavasayam" contains latest technologies in Agriculture, Horticulture, Agricultural Engineering and Veterinary Sciences.
- 2015: After bifurcation of the Andhra Pradesh State from Telangana, 13 DAATTCs were reorganized in a way to distribute one Extension Centre per district to scatter the transfer of technology uniformly.
- In 2016: Farmers Call Centre (FCC) is the first and the foremost of its kind established by ANGRAU in the history of Indian Agriculture with an innovative idea of transferring novel scientific technology in Agriculture to the farming community. FCC is accessible to all the farmers of Andhra Pradesh on toll free number 1800 425 0430.
- 2017: University started "*ANGRAU e-newsletter*", a monthly in-house e-magazine on events in the University for visibility across India, uploaded in University website.
- 2018: Open and Distance Learning Centre (ODLC) established with the major aim to transform ANGRAU from its formal educational system to a dual and convergent mode, by adopting appropriate systems of ODL and ICT (Information & Communication Technology) so as to provide Agricultural knowledge and entrepreneurial skills for self-employment and income generation.

Extension Network of ANGRAU

THE IMPACT

The impact of extension services of ANGRAU in Andhra Pradesh has been significant across various services of the society

Increased Agricultural Productivity

- Extension services have played a crucial role in improving agricultural productivity by disseminating improved agricultural practices, technologies to the farmers through OFTs, FLDs, CFLDs leading to increased crop yields.
- Spread of improved varieties (Minikits, OFTs, FLDs, etc.,)
- Spread of IPM, ICM, organic farming etc. in various crops.
- Farm implements like combine harvester in rice, seed drill, drum seeder, rice transplanter, anantha planter, sugarcane planter, groundnut and maize threshers, harvesters for pulses, weeders, sundriers, drudgery reduction implements.
- Trap barrier system, solar fence, bird scaring implements including ribbons.
- A total of 3130 no.of minikits of all crops mainly rice, jowar, ragi, bajra, redgram, blackgram, greengram, chickpea, cowpea, horsegram, groundnut, castor, cotton, mesta were conducted in 17424 locations and their performance in different agroclimatic zones was assessed, among these till now 479 varieties were successfully released for cultivation at State and Central level.

- Spread of effective insecticides, fungicides, weedicides and rodent management techniques, non-insect pest management techniques etc.,.
- Popularization of different systems of rice cultivation like DDS, WDS, MSRI, Aerobic rice, zero tillage maize, jowar, ragi and sunflower etc.
- Fertilizer schedules of different crops based on agro-climatic zone and cropping system wise.
- A total of 4704 technologies were tested in On Farm Trials in 20541 locations covering field crops, horticultural crops, animal husbandry/fisheries and home science that included varietal evaluation, integrated nutrient management, integrated crop management, integrated pest management, integrated disease management, weed management, cropping systems, integrated farming systems, resource conservation technologies., Farm Machinery andi

implements in agriculture ; Diagnosis and Management, Nutrition management in Animal Husbandry; Aquaculture and Home Science wings.

- A total of 5766 FLDs were organized by KVKs and DAATTCs in 17026 ha covering cereals, millets, pulses, oilseeds, commercial crops, fodder crops, vegetables, fruits, flowers, spices, plantation crops, medicinal plants, farm machinery, animal husbandry, aquaculture and home science.
- A total of 5911 ha area was covered by organizing cluster Front line demonstrations on pulses, *viz.,* redgram, greengram, blackgram and bengalgram and a total of 4548.5 ha area under oil seed crops, *viz.*, groundnut, sunflower, safflower, sesame, castor and niger in cluster approach in interior areas benefiting small, marginal farmers and weaker sections.
- Improved seed varieties released and notified by central varietal release committee within the past 15 years were provided as critical input for conducting demonstrations. Integrated Crop Management practices like bio-fertilizers, bio-pesticides were facilitated for getting higher net returns.

Adoption of modern farming technologies

- Extension programmes like training programmes organized to promote the adoption of improved farming practices such as ICM,INM,IPM leading to enhanced farm profitability. Various capacity building programmes viz., training programmes, skill training programmes, vocational training programmes, field days and Rythusadassus were organized to build the capacity of clientele groups covering crop production and protection technologies of field and horticultural crops, home science and fisheries by DAATTCs, ESs and KVKs. A total of 5112 training programmes were organized with the participation of 278989 Extension functionaries, 26801 trainings to 1064591 farmers/farm women.
- One of the important mandates of Krishi Vigyan Kendra's is to organize vocational training programmes for self-employment. The KVKs of ANGRAU together organized 1424 vocational training programmes for the benefit of 37946 participants in the areas of nursery management in horticultural crops, scientific bee keeping, value addition to millets, scientific rearing of sheep and goats, IFS, preparation of vermicompost etc. A total of 4515 other training programmes with 244468 participants were organized on productivity enhancement of crops, soil health and fertility management, Integrated Pest and Disease Management, Resource Conservation Technologies including Drone technology, Beekeeping, Mushroom production, seed production at farmer level to increase farmer's net income, commercial production of vegetables, processing and value addition of millets, livestock production and management and protective cultivation.

- Periodic diagnostic field visits during the crop season and providing timely advices to overcome the constraints and maladies identified were the most important activity of the DAATTCs, KVKs and Extension Specialists. Till now a total of 57224 diagnostic surveys were undertaken in different districts of Andhra Pradesh.

Poverty alleviation

Extension services of ANGRAU support poverty alleviation efforts by conducting special programmes to SC and ST Communities. Under Scheduled Caste Sub-Plan, with an aim to provide physical and financial security to the members of the Scheduled Caste for upliftment and livelihood,various activities were taken up by KVKs to improve the socio-economic conditions, reducing poverty and unemployment

in the operational area and include technology assessment, FLDs, capacity building programmes to farmers, rural youth and physical assets/ micro-enterprises creation for income generation. Till now 143879 no.of farmers were benefitted though this programme.

Tribal Sub-Plan was implemented with an aim to provide physical and financial security to the members of the tribal areas against any kind of oppression and exploitation. Activities were taken up by KVKs to improve the socio-economic conditions, reducing poverty and unemployment in the operational area and include technology assessment, FLDs, capacity building programmes to farmers, rural youth and physical assets/micro-enterprises creation for income generation. Till now 159511 no.of tribal farmers were benefitted though this programme.

Rural Development

Extension Service of ANGRAU support rural development initiatives by providing technological assistance, training programmes to rural youth etc.,.ARYA project launched by Agricultural Extension Division of ICAR during March, 2015 aims to create interest and confidence among rural youth in agriculture by demonstrating the potential of enterprises based on agriculture and allied sectors to be profitable and reliable sources of livelihood in rural areas. The main objectives of the project 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 the youth. Through this programme 3305 trainings were provided, which led to establishment of 184 own units by rural youth.

Sustainable agriculture

Soil Health Management (SHM) is one of the most important interventions under Nation Mission on Sustainable Agriculture (NMSA) aims at promoting Integrated Nutrient

Management (INM) through judicious use of chemical fertilizers including secondary and micro nutrients in conjunction with organic manures and bio-fertilizers for improving soil health and productivity.

Under the scheme, soil health cards are issued to farmers with crop-wise recommendations of nutrients and fertilizers required for the individual farms to help farmers to improve productivity through judicious use of inputs. All KVKs of ANGRAU had analyzed 91043 soil samples with the Soil Testing Laboratories (STL) and Mini Soil Testing Laboratories. A total of 90627 soil health cards were distributed.

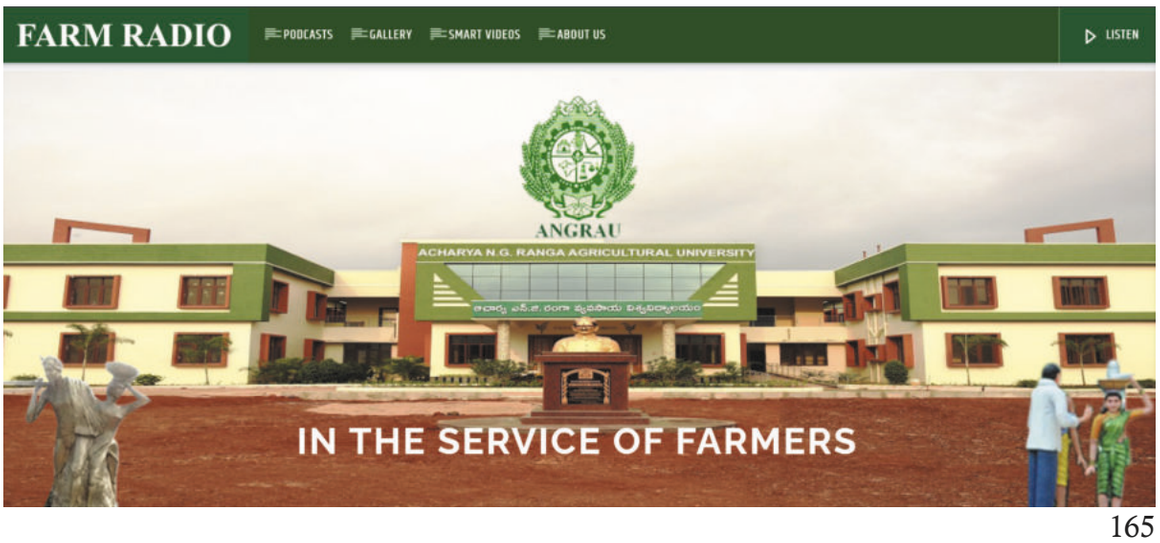
Supply of quality seed and planting material

One of the responsibilities of the KVKs is to act as resource centre for supply of quality inputs required by the farmers. Till date 58,329 quintals of quality seed worth Rs.255061344/- and 7813927 quality planting material worth Rs.10141491/- was produced and supplied to farming community.

Digital Extension

Several web based mobile applications were developed and kept for downloading by the farmers and others interested in agriculture free of cost from Google play store. All the technical information was uploaded in the applications for providing upto date information. The applications developed/ supported from ANGRAU are

- ***ANGRAU Pasuposhan***: App developed by KVK, Banavasi, Kurnool district during 2018. It provides information on livestock covering cattle management, sheep and goat rearing, poultry (Layer & Broiler), strategies that help in doubling framers income, best management practices and technologies along with good quality pictures. With a rating of 4.0/5 and 500+ downloads.
- ***Fertilizer Calculator:*** App developed by KVK, Banavasi, in the year 2019. The app "Fertilizer Calculator" application was developed for the benefit of the farming community as well as for academicians, scientists, extension personnel, students of undergraduate and postgraduate and input dealers in agriculture and other stake holders engaged in agriculture sector. Currently it has a rating of 4.0/5 and 5000+ downloads.
- ***ANGRAU KVK Banavasi CFLDs:*** App developed by KVK, Banavasi in 2018 to cater the information needs of CFLD farmers on crop production, varieties, plant protection and marketing information pertaining to pulses and oilseeds with pictures. Currently, it has a rating of 4.9/5 with 1000+ downloads.
- ***Krishi Vigyan:*** Developed at KVK, Amadalavalasa in 2016 to provide information on complete package of practices for rice, blackgram, greengram, coconut and maize in telugu with photographs, video clips with additional feature of telephone directory of research & extension centres of ANGRAU and call centre. Currently, it has a rating of 4.2/5 with 10000+ downloads.
- ***Farm Radio*** – www.farmradio.in: Farm radio is the first of its kind online radio initiated by DAATTC, Anakapalle of ANGRAU.



Farm radio gives freedom to pod cast what you want and when you want it, with better sound quality to listeners. The services of farm radio to the farmers include ready availability of audio files (podcast) of ICM in groundnut, pests and diseases of rice, maize, sugarcane, cotton and apiary were made available.

- ***Other Extension activities:*** The farmers were imparted knowledge on various practices through 5135 TV programmes and 3777 Radio programmes. For faster dissemination of information 583 whatsapp groups were created, through this 270187 text messages and 15018 voice messages were sent to farmers and extension workers of line departments. 1985 Field days covering 92106 participants; 8958 no.of method demonstrations benefitting 130946 farmers; 1798 result demonstrations benefitting 21126 farmers were conducted as a part of mass communication efforts. The Acharya N.G. Ranga Agricultural University has been organizing Kisan melas at various research stations and colleges throughout the state to create awareness and to educate the farmers about latest farming technologies and development. Kisan melas provide an opportunity 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 advices. Till date 748 no.of Kisan melas were organized, with the participation of more than 5,11,906 farmers.

Enhanced linkages with line departments through convergence activities

Linkages with RSKs: The Government of Andhra Pradesh has established 10,778 RSKs to offer service to farmers at their doorstep. The RSKs are playing an important role in providing quality seed and fertilizers and also conducting e-crop booking for every crop. The Assistants who are working at RSKs should know the latest technologies in agriculture and allied sectors for working effectively at field level. ANGRAU has set up an effective and dynamic research and extension system in Andhra Pradesh for catering the needs of Extension Functionaries and farmers. In this direction ANGRAU has conducted different programmes for VAAs of RSKs.

- *Capacity building programmes:* From 2020, 2389 training programmes were organized with the participation of 86,265 RSK staff including VAAs and VHAs on productivity enhancement of crops, soil health and fertility management, integrated pest and disease management, resource conservation technologies including drone technology, beekeeping, seed production at farmer level to increase farmers net income, commercial production of vegetables, processing and value addition of millets, livestock production and management and protective cultivation. These trainings were imparted to upgrade knowledge and skills of RSK staff.

- *Diagnostic field visits:* The changed climatic conditions, cropping pattern and varietal distribution influence the biotic and abiotic stresses on crops. Hence, there is a need to monitor the fields continuously for timely identification of the problem to initiate mitigation measures to reduce the crop loss and input wastage. A total of 3,475 diagnostic visits were conducted benefiting 73,806 staff of RSKs and farmers for last three years.
- *Polambadi:* Farmers Field School (FFS) is a group based adult learning approach that teaches farmers how to experiment and solve problems independently. During last three years, ANGRAU has taken massive steps in popularizing FFS among 32,926 VAAs and farmers by covering 2,828 RSKs. Polambadi is like a hands on training to the farmer for adopting best management practices in the way of correct identification of insect/disease/weed/deficiency symptoms to take appropriate control measures, to understand the role of bio-agents, field condition, crop and pest sensitive stages.
- *Interaction Programmes:* A total of 2038 Scientist-Farmer-RSK interaction meetings were conducted benefiting 47053 RSK staff.
- *Other Extension Activities:* Social media tools such as WhatsApp offer new form of disseminating farm extension information. ANGRAU has created 1330 whatsapp groups, 54,254 VAAs have been covered through these WhatsApp groups and other digital platforms. Mandal wise agro-met advisory bulletins (twice in a week), are being provided to VAAs through mobile apps and messages.
- *Field days:* A total of 216 field days were organized at 960 RSKs to show the results of field implemented technologies.
- *Scientist's participation for content recording in RSK Channel:* RSK Studio and Channel at Integrated Call Center, Gannavaram were maintained by Department of Agriculture with the support of Agriculture, Horticulture and Veterinary Universities to provide timely solutions to field level problems. A total of 264 no. of Programmes recorded and broadcasted with Scientists of ANGRAU.
- *Linking of RAWEP Students with RSKs:* Rural Agricultural Work Experience Programme is a part of Academic activity to B.Sc. (Hons.) agriculture students, during this period 2009 no.of students surveyed 4,022 RSKs activities to learn the ground level extension and farmer welfare programmes though Department of Agriculture.

Disaster management and Climate Adaptation

Extension Services of ANGRAU promote climate- resiliance agricultural practices and technologies to help farmers for adaptation to climate change variability,and extreme weather events. ICAR entered into a Memorandum of Understanding (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 to receive weather data from IMD and Automatic Weather Stations to be established at each DAMU to prepare and disseminate block level weather forecast for next five days, Agril. Sub Division and District Level Agro-Met Advisory Bulletins. Under ANGRAU, DAMU unit was established in seven (7) KVKs viz., Amadalavalasa, Rastakuntubai, Garikapadu, Darsi, Nellore, Utukur and Banavasi with SMS (Agromet) and Agromet Observer and these units are under operational since October, 2019 to 2023.

DAMU Units issue Experimental Block Wise Agromet Advisory Bulletins (containing weather forecast for next five days and location & crop specific weather based Agro Advisories for different crops in Agriculture, Horticulture, Animal Husbandry, Fisheries for their respective district in both Telugu and English languages by using Agro-DSS platform on every Tuesday and Friday and the same bulletins were disseminated to the farming community through different communication channels like m-Kisan Portal, AKPS Portal, Farmer WhatsApp Groups, emails to Line Department Officials, Local Extension Functionaries (RSKs), Print and Electronic Media, AIR, uploading in KVK and IMD websites, Reliance Foundation Information Services and by attending farmers' Phone Calls etc.Through this programme 35086 text messages, 4011 voice messages were sent through 372 whatsapp groups covering 1049511 farmers.

NEW INITIATIVES

Annapurna Krishi Prasar Seva (AKPS):

An Interactive Information Dissemination System (IIDS) is an integrated model to address the problems of farmers by using ICT applications. IIDS is a Web, Mobile and IVRS based application, where the farmers are required to be registered with their farm and other details. The expert would provide the personalized solutions based on the inputs provided by the farmers and his available farm profile. There is a mobile (Toll free No. 1800 425 3141) interface at front end and web interface at the back end. Data will be transmitted through voice, text, images and videos from both ends (farmer to expert and back) i.e. it would allow farmers to send images / videos of the field along with their queries by using a smart phone.

The model is operational in all 13 districts of Andhra Pradesh through eight KVKs and five DAATTCs (KVKs – Nellore, Amadalavalasa, Utukur, Reddipalli, Darsi, Garikapadu, Undi, Kalikiri and DAATTCs – Kurnool, Guntur, Vizianagaram, Kakinada, Anakapalle) since 2016-17.

Benefits to the farmers through IIDS:

- Farmer can get personalized advice on Agriculture, Horticulture, AH and Fisheries from their respective KVK / DAATTC on Toll Free number (1800 425 3141).
- Farmer can record their queries 24x7 through Toll Free Number.
- They can get SMS alerts on raised query and solved queries from their respective KVK / DAATTC.
- Farmers can receive Text & Voice messages in Telugu on their mobile from the respective KVK / DAATTC.

Kisan Mobile Advisories (m-Kisan Portal)

To determine the latest information, knowledge on weather, market prices of various commodities, livestock and crop-based technologies to the farmers, Kisan mobile advisories were given by KVKs through text and voice messages.

Village adoption programme

To ensure optimum development of the villages, and increase of agricultural production, APAU implemented the Village Adoption Scheme under the Prime Ministers new20-point programme from June,1982.Every major and medium research stations and the colleges have each adopted 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 teachers of agriculture, animal husbandry, horticulture, fisheries and women in agriculture, help them to get quality inputs of seeds, pesticides, fertilizers, arrange credit through banks and co-operatives, improve literacy and render assistance in maintaining better sanitation and health and ultimately in the overall economic development and upliftment of the people. In other words, the University teachers and scientists serve as guides to the farming community in the adopted villages.

Student READY (Rural Entrepreneurship Awareness Development Yojana)

The DAATTCs and KVKs have been involved to guide the B.Sc. (Hons.) (Ag.) final year students of Agricultural Colleges to provide practical training and experience for one semester by keeping them in villages and through allotment of one host farmer through RSKs to each student.

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. One key informant farmer is identified in each Panchayat who will influence other farmers' decisions in farming. The Key Informant 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, awareness on government schemes and ICT applications.

They were provided with prestigious publication of the University Farmer's Almanac Vyavasaya Panchangam' and subscription to 'Vyvasayam Telugu agriculture magazine published by the University to place them in the village Panchayat library to facilitate their access to the farmers in the village.

Flag method of extension:

The DAATTC / KVK scientists during their field visits, visit the road side / nearby farmer's fields and the yellow / conspicuously visible 'Flag' labelled with Name of the Centre, Contact no, Date of visit, Crop, Problem identified and Remedial measures, is placed in the farmers field with the help of a twig / stick / support of plant material at a strategic point to be visible to the farmer.

Whenever the flag is seen by the concerned farmer, he / she reads the message written on the flag, he / she can take instant action based on the recommendations. If the farmer requires any clarification, he / she may call on the Scientists / Extension functionality and clarify their doubts. In this way the Flag method not only provides immediate solution to the diagnosed field problem even in the absence of the farmer, but also brings awareness and build up rapport with the Extension Scientists of ANGRAU eventually strengthening the Scientist – Farmer linkage.

Developing Farmer Master Trainers:

In order to enrich knowledge, skills and attitude of the farmers in a focused way, on a selected crop, an initiative called Farmers master Trainings were introduced in ANGRAU during 2011. It is the process wherein an identified 15-20 farmers selected from different villages spread over 2-3 Mandals of a district, are being provided training (knowledge & skills) at critical stages of the identified crop.

The training is staggered over the crop season to the same farmers who will be exposed to technologies at different critical stages of crop cycle, (4-5 trainings of 1 day duration) facilitating the Farmers as Master Trainers.

Once they have developed mastery over the crop selected, they are in turn used as Resource Farmer for training other farmers of their locality.

Innovative Farmers Network (IFN) :

The innovative farmers network was initiated by ANGRAU in 2012. One innovative farmer among the five farmers felicitated by the DAATTC during the Foundation Day Celebrations was identified as Coordinator of the Innovative Farmers Network. The coordinators of the network were provided with technology support by the DAATTCs and KVKs to update their knowledge and skills, who in turn need to share their skills and knowledge to other farmers of the network (30 members) in the district. The main objective of this network is to promote farmer to farmer extension.

Farm Science Clubs:

Krishi Vigyan Kendra, Rastakuntubai has been conducting "Farm Science Clubs" as an innovative extension methodology. Farm Science clubs were initiated in the tribal villages with a main objective of providing student mediated extension services to the tribal farming community for transfer of technology and reaching the unreached. High School and College students (Science group) are formed into clubs and were given orientation and other activities to encourage and motivate them to take up agriculture in future. These Farm club members in turn disseminate knowledge to the farmers in their villages and families. The activities include:

- Fortnightly interaction on recent agricultural technologies
- Distribution of agricultural information material
- Organization of guest lectures to the members on topics related to agriculture and allied sectors.
- Organization of quiz & essay writing competitions on important days.

Tribal Youth Networks:

Another initiative taken up by Krishi Vigyan Kendra, Rastakuntubai include "Tribal Youth Networks". Tribal Youth were formed into groups and conducted capacity building programmes. The main objective of tribal youth network are:

- To empower & educate the tribal youth on farm activities.
- To make them as change agents for transfer of technology in remote areas.
- To promote agriprenuership among tribal youth.
- KVK facilitates these groups by establishing linkages with the line departments.
- These groups actively take part in various welfare and developmental activities at village and mandal level.

Pocket Cards:

An innovative low-cost extension methodology in transfer of technology was introduced by the KVK, Garikapadu. The critical crop interventions were published on a single small pocket card of size 3" X 4", printed in multi colour on either side highlighting the technologies impacting the productivity with attractive pictures. Its smartness, farmers had shown interest in possessing them and to keep them for reference.

Agricultural Technology Hub (Ag Tech Hub) at RARS, Tirupati

An ICT initiative in RARS, Tirupati was initiated on 16-03-2016 (on Kisan Mela Day) for providing mobile based agro advisory services through mobile voice calls, SMSs, existing social media networks like WhatsApp. For this purpose a

smart phone and a BSNL mobile connection bearing number 9441670829 was taken and made popular among the farmers in the Southern Zone. Three WhatsApp groups were created each for one district in the Southern Zone and agro-advisory services are being providing.

Partnership activities of ANGRAU

Reliance Foundation: Since its inception in 2013, the Reliance Foundation Information Services (RFIS) programme closely working with ANGRAU with aims to provide critical information and linkages using various communication media to poor households. Information is disseminated through audio and dial out conferences, local cable TV, Live TV Phone in programmes, TV Scrolls Daily basis-Agro weather News Bulletins, voice advisories and text SMS, Jio Chat, WhatsApp and field based programmes and trainings. These enables expertise farmers to make better decisions in areas of livelihood, health and disaster preparedness. Themes covered on broadcasts include agriculture, horticulture, fisheries, health, employment, micro –enterprises and skill building.

SERP under APRIGP: In order to upgrade the knowledge and skill of members of the FPOs assisted by the Society for Elimination of Rural Povery (SERP), the University had entered MOU with SERP and implemented the project entitled "Collaborative strategies of ANGRAU-SERP" in enhancing the livelihood of small and marginal farmers, Nutri & Hygiene entrepreneurship promotion in Andhra Pradesh" under Andhra Pradesh Rural Inclusive Growth Project (APRIGP).

Farming Systems for Nutrition with MSSRF, Chennai: FSN is a model that entails mainstreaming the nutrition dimension design of the farming system based on locally available crop and animal husbandry resources and extinct farming practices. The FSN model envisages developing and demonstrating a sustainable framework of farming to improve nutritional outcome that can be used for up scaling and wider adoption. MSSRF has been engaged in advocating the FSN approach in three KVKs (Reddipalli, Undi & Rastakuntubai) under ANGRAU, Lam, Guntur.

Distance Education:

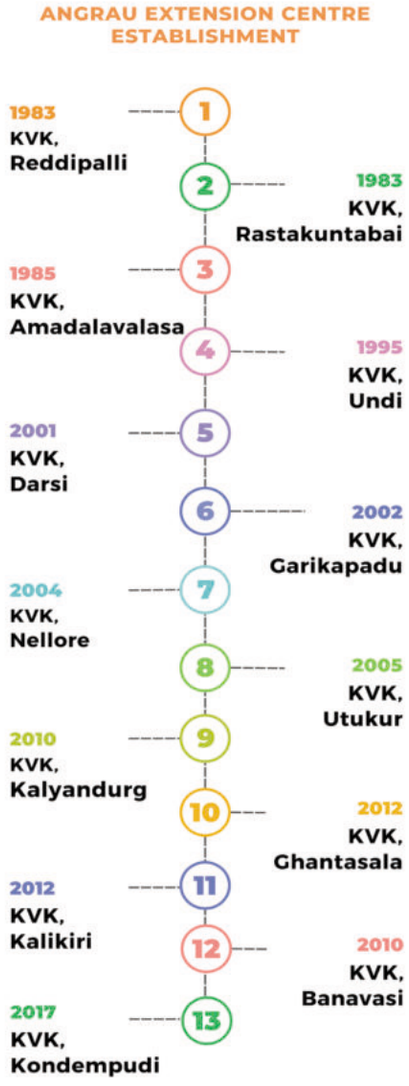
ANGRAU is one of the few Agricultural Universities in the country to start distance education through a private TV channel, ETV under "Annadata – Velugubata" programmes from 2nd October, 2018, twice a week, Tuesday and Friday. In the wake of WTO and highly diverse micro-farming situations present in the state, in order to exploit the role of electronic media to educate the farmers on efficient use of inputs in sustainable and export oriented agriculture, post – harvest handling, market information etc., an Electronic Media Wing was established during 2001 to promote e-extension.

Kisan Melas / Exhibitions / Fairs

University is organizing Kisan Melas at Station / District Level, Zonal Level and State Level as regular events every year, in addition to exhibitions and fairs. South Zone Agri Expo-2015 was organized during 19-21 December, 2015 at Regional Agricultural Research Station, Lam, Guntur. From 2021 onwards, State level Ag.Tech (exhibition & conference) is being organized in December.

The extension services of ANGRTAU are being through the following extension centres.

- Krishni Vigyan Kendras (KVKs)
- District Agricultural Advisory and Transfer of Technology Centres (DAATTCs)
- Extension Units in RARSs / ARSs
- Agricultural Information & communication Centre (AI& CC)
- Electronic Wing (EW)
- Farmers Call Centre (FCC)



KRISHI VIGYAN KENDRAS (KVKS):

ANGRAU has a network of 13 Krishi Vigyan Kendras established across the state to support agricultural development and rural livelihoods. *The first KVK was established in 1983 at Reddipalli of Ananthapuram District.* These KVKs are actively involved in providing knowledge and skill training to the farmers, rural youth and field level extension workers, On-Farm Testing and Front-Line Demonstrations of major agricultural technologies with location specific environment. ANGRAU is administering 13 KVKs sanctioned by ICAR spread across the 12 districts in Andhra Pradesh.

Most Significant contributions (outreach & Impact) of KVKs:

The KVKs of ANGRAU conducted 3784 trainings to extension functionaries, 24739 trainings to farmer/farm women/rural youth and 2985 other capacity building programmes benefitting 13,32,260 members directly on various agricultural, agricultural engineering, horticultural, veterinary, fisheries and home science technologies.

- The scientists of multidisciplinary subjects conducted 27359 diagnostic visits to all agricultural, horticultural crops and fish ponds and animals to identify the problems on field to give solutions on spot and to give alerts via print and electronic media to reduce the damage due to those problems.
- Conducted 226 minikits of advanced crop

cultures to be released as varieties.

- Conducted 3117 onfarm trials of various successful technologies from research stations in 15,149 locations, 4786 nos as FLDs in 14604.7 ha farmers fields for further spread.
- Under CFLD (oil seeds) conducted demonstrations in 4549 ha, under CFLD(pulses) in 5911ha, with this KVKs increased the availability of quality seed of improved latest varieties to farmers from these demonstrations.
- KVKs support poverty alleviation efforts by conducting special programmes to SC and ST Communities under SCSP and Tribal Communities under TSP with an aim to provide physical and financial security to the members of the Scheduled Caste and Tribals for upliftment and livelihood, various activities were taken up by KVKs to improve the socio-economic conditions, reducing poverty and unemployment in the operational area and include technology assessment, FLDs, capacity building programmes to farmers, rural youth and physical assets/micro-enterprises creation for income generation. Till now 1,43,731 under SCSP and 1,56,805 under TSP were benefitted.
- KVKs acted as resource centres for supply of quality inputs required by the farmers. Till date 58329 quintals of quality seed worth Rs.25,50,61,344/- and 78,13, 927 quality planting material worth Rs.1,01,41,491/- was produced and supplied among farming community.
- KVK, Amadalavalasa continuously encourasing farmers/ farm women/ rural youth for self empowerment , among them tribal women Smt P Bhudevi received Naari Shakthi Puraskar for women empowerment in Agriculture, from Hon'ble President of India, Sri. Ramnath Kovind on World Women's day, on 08.03.2020.i.e. Developed enterprenueres based on millet value addition, pinapple products. Trained on mesta fibre products making, mushroom cultivations. Spread technologies on DDS, MSRI, Drum seeder cultivation in rice, weedicides in major crops, sunhemp seed production in rice fallows, improved varieties in rice, pulses etc.
- KVK, Rastakuntubai is mainly working in tribal communities, till now distributed 4000 coconut plants, 6000 high yielding cashew grafts, expanded 100 acres of cashew area, conducted highest no.of trainings on value addition of millets, through this encouragement Smt.K.Saraswati (running Sabala NGO) formulated one FPO exclusively for millets with women got "Jayaho Mahila Award", one MP-one idea contest award from The Vice President of Inida, encouraged no.of tribals with backyard poultry with improved poultry breeds.
- KVK, Kondempudi created awareness

regarding management of overaged seedlings planting in rice, introduced salt tolerant paddy varieties, ratoon, pest and disease management, single bud seedlings in sugarcane, improved varieties in chilli, marigold, rajmah; Guli method of cultivation in ragi, value addition to jackfruit seed powder along with millets. Introduced raised bed technology in turmeric and ginger along with supply of quality improved varieties seedling raised in protrays. Introduced non traditional flower crop- gladiolus in tribal areas.

- Exclusive trainings from KVK, Undi on Apiculture
- KVK, Garikapadu popularised improved varieties of groundnut, redgram and blackgram, where as KVK, Ghantasala popularised specific salt tolerant varieties of rice in saline patches.
- Popularisation of redgram and bengalgram improved varieties along with production technologies by KVK, Darsi.
- Popularisation of improved tomato varieties and value addition to tomatos by KVK, Kalikiri in addition to popularisation of groundnut improved varieties and production technologies.
- With the activities of KVK, Utukur improved fodder varieties were popularised, spread up to 75%, introduced korra as preceding crop to bengalgram, NDLR-7 and NDLR-8 rice varieties occupies 42% by replacing BPT-5204 in YSR district. IPM practices of PBW spread in 20,000 ha, FAW in 3000 ha and wet root rot management in bengalgram in 30,600 ha saving crores of rupees by the KVK's efforts besides introduction of improved varieties in groundnut, sesamum, blackgram and bengalgram etc.,.
- By the trainings of KVK, Banavasi product based entrepreneurs based on value addition of millets, tomato, onion and chillies were developed. Improved varieties of rice, groundnut, bengalgram, korra,redgram, blackgram, jowar, castor, safflower were popularised.
- Significant technologies spread by KVK, Reddipalli through FLDs and extension activities include mechanized sowing in groundnut with Anantha planter (4.5 lakh ha), soil test based fertilizer application in groundnut (0.98 lakh ha), crop diversification with castor (8910 ha), introduction of safflower crop in black soils (1350 ha), IPM strategies for pink boll worm management in cotton (11500 ha), correction of micronutrient deficiencies in sweet orange (697 ha), insitu soil moisture conservation by sub soiling with chisel plough (0.98 lakh ha) in combined Ananthapuramu district.
- Developed low cost technology for tomato flakes and tomato powder making using solar driers for benefitting farmers during glut season. Climate resilient technologies were demonstrated under NICRA project to make the farmers resilient to climatic risks and obtain sustainable livelihood. 13 check dams were renovated/desilted, 12 farmponds were dug and 13 percolation ponds were renovated under this program.
- Due to this 59 borewells, 18 open wells got recharged benefitting 184 farmers during 2012 to 2022. The total water harvested from these accounts to 27813 m3 and farmers could be able to provide supplemental irrigation to 316 acres with the harvested rainwater.

KVK -AMADALAVALASA

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The Krishi Vigyan Kendra (KVK), Amadalavalasa, Srikakulam, established on January 1, 1985, has a rich history marked by significant milestones and a robust array of infrastructural facilities. Since its inception, this KVK has achieved several notable milestones. In 2011, it initiated the NICRA (National Innovations in Climate Resilient Agriculture) Project, aimed at addressing climate change impacts on agriculture. This was followed by several prestigious awards: the ANGRAU Best Krishi Vigyan Kendra Award for 2014-15 and the ICAR Best Krishi Vigyan Kendra Award in 2015, recognizing its excellence in agricultural practices and contributions.

In 2016, the KVK developed the Krishi Vigyan app, a significant step towards integrating technology into agricultural practices. The same year, it successfully implemented the whole village adoption of zero tillage maize technology, showcasing its commitment to sustainable farming practices. The centre was honored with the Best Dhanuka Innovative Agriculture Award for 2019-20, highlighting its innovative approaches in agriculture. Additionally, in 2020, tribal entrepreneurs promoted by the KVK received the prestigious "Nari Shakti Puraskar" from the President, celebrating the empowerment of women in agriculture. By 2022, the KVK had also promoted Direct Seeded Rice (DSR) through farm mechanization in the Srikakulam district, further advancing efficient farming methods.

The KVK is well-equipped with extensive infrastructural facilities that support its mission of enhancing agricultural productivity and sustainability. These facilities include a Smart Training Hall for educational programs, a Seed Hub & Processing unit for quality seed distribution, and a Mushroom Production unit to promote mushroom cultivation. The Soil Testing Laboratory offers essential soil health analysis, while the Vermi composting unit aids in organic farming practices.

The Custom Hiring Centre provides farmers with access to agricultural machinery, and the Poultry unit supports poultry farming initiatives. The Integrated Farming System (IFS) unit and the Information Centre offer comprehensive support and resources for diversified farming practices. Additionally, the KVK boasts a Shade net unit and an Azolla mother culture unit to enhance crop protection and livestock feed respectively. The Farmer Hostel provides accommodation for visiting farmers, and the Terrace garden demo unit showcases innovative urban farming techniques.

KVK- BANAVASI

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The Krishi Vigyan Kendra (KVK), Banavasi, established in 2010, has made significant strides in agricultural development and farmer support through various initiatives and infrastructural enhancements. Over the years, KVK Banavasi has marked several milestones that underscore its contributions to the agricultural sector.

One notable achievement is the development of

mobile applications for fertilizer calculations and the Cluster Front Line Demonstration (CFLD) of oilseeds and pulses. These applications, launched in 2018-19, have been widely accepted, with a remarkable 50,000 downloads, indicating their utility and the trust farmers place in digital tools provided by KVK.In the domain of soil health, KVK Banavasi has established a soil and water testing laboratory in the 2019-20 period. This facility is pivotal for determining soil fertility and optimizing fertilizer use. To date, 3,503 soil samples have been tested, providing farmers with crucial insights to enhance crop productivity sustainably.

Further expanding its impact, KVK Banavasi has set up 18 demonstration units spanning agriculture, horticulture, and allied sectors within its instructional farm. These units serve as practical examples and learning sites for farmers, showcasing innovative and effective farming techniques.

The dissemination of Agromet Advisory Services, conducted bi-weekly under the District Agro-Meteorological Unit (DAMU) project, represents another significant effort. These advisories help farmers make timely and informed decisions to minimize crop losses. Additionally, KVK Banavasi has leveraged modern communication tools by creating 32 WhatsApp groups encompassing 148,659 farmers, enabling efficient and rapid dissemination of weather-based advisories through text messages.

In terms of production, KVK Banavasi has generated 591,806 units of planting material for crops such as acid lime, tomato, moringa, chillies, and napier grass slips. It has also produced 540.51 quintals of seeds from improved crop varieties, including korra, groundnut, castor, cotton, redgram, and bajra. These efforts contribute significantly to enhancing crop yield and quality in the region.

KVK Banavasi has also built a comprehensive database of 151,365 farmers. This database facilitates the real-time dissemination of tailored agricultural information through various Information and Communication Technology (ICT) sources, addressing specific farming challenges and needs. The infrastructural facilities at KVK Banavasi are robust and designed to support its diverse activities. The centre includes an administrative building, a farmer's hostel, an instructional farm, a custom hiring centre, an automatic weather station, an information centre, and a training hall. These facilities are integral to providing comprehensive support and training to the farming community, fostering an environment of continuous learning and improvement.

KVK- DARSI

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The Krishi Vigyan Kendra (KVK) located in Darsi, Prakasam District, was established in 2001 under the aegis of the Agriculture Research Station (ARS), Darsi. Since its inception, KVK, Darsi has made significant strides in agricultural development and support for local farmers through various milestones and infrastructural advancements.

Initially established in 2001, KVK, Darsi operated under the control of the Agriculture Research Station. In 2003, a Training Centre cum Farmer Hostel was constructed, providing essential training and accommodation facilities for farmers. By 2004, KVK, Darsi had expanded its role to function as a full-fledged training organizer, performing operations across 29 mandals in Prakasam district. This expansion was supported by the allocation of 20 acres from ARS, Darsi, and an additional 30 acres from the Department of Horticulture in 2005.

One of the key infrastructural advancements occurred in 2005 with the establishment of a Soil & Water Testing Laboratory, enhancing the KVK's capacity to offer vital agricultural testing services. Another significant development was the establishment of a Custom Hiring Centre (CHC) in 2017, which allowed farmers to hire agricultural machinery at affordable rates. The same year, the KVK was granted a new administrative building, further improving its operational efficiency.

In 2020, several important projects were inaugurated, including new buildings for the KVK and a Solar Power Grid Panel System, which emphasized the KVK's commitment to sustainable energy practices. Additionally, KVK, Darsi initiated a seed production program at farmers' fields through a buyback agreement, supplying blackgram seed to farmers within Prakasam district. They also provided 45 quintals of redgram (LRG 105) foundation seed to the Department of Agriculture under the Seed Village Programme (SVP).

KVK, Darsi's contributions to agricultural development were recognized in 2023 when it received the "ANGRAU Best KVK Award." This recognition was followed by the "2nd ANGRAU Best KVK Award" in 2024, highlighting the continuous excellence and impact of its initiatives.

The infrastructural facilities at KVK, Darsi are comprehensive, including an administrative building, training hall, information centre, farmers' hostel, demo units, a Custom Hiring Centre (CHC), and a threshing floor. These facilities collectively support the centre's mission to educate, assist, and empower local farmers through training, demonstrations, and access to necessary agricultural resources.

KVK- GARIKAPADU

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Dr. K.L. Rao Krishi Vigyan Kendra (KVK), Garikapadu was established on 3rd July, 2002. Since its inception, the KVK has made significant strides in agricultural research and development, marked by several historical milestones. In 2016, it was honored with the ANGRAU Best KVK Award, highlighting its excellence in agricultural activities and extension services. The following year, on February 7, 2017, the KVK hosted a visit from a team from Israel, underscoring its international recognition and collaborative efforts in agriculture. In 2021, the KVK's outstanding performance in the CFLD (Cluster Frontline Demonstration) pulses project earned it second place at the Annual Zonal Review Workshop of KVKs under ICAR ATARI Zone-X. Additionally, it secured first place in providing mobile advisory services, reflecting its commitment to leveraging technology for farmer outreach and support. More recently, on June 23, 2023, an Ethiopian team visited the KVK, further indicating its role as a centre of agricultural excellence and global interest.

The KVK boasts a comprehensive array of infrastructural facilities designed to support diverse agricultural activities and innovations. Among these are 20 well-planned and maintained demonstration units that serve as practi`cal training and research grounds. The KVK includes specialized units like a shade net, pandals unit, and a dragon fruit orchard, emphasizing its focus on diversified and innovative agricultural practices. There are nurseries for ornamental plants and fruit saplings, as well as a kitchen garden, which together promote horticultural diversity and home gardening techniques.

Additionally, the KVK hosts a mushroom unit and a textile printing unit, showcasing its commitment to integrating agricultural produce with value-added processes. The sticky traps production unit highlights its focus on sustainable pest management practices. The apiary unit supports beekeeping and honey production, while the millet value addition unit focuses on enhancing the market value of millet products. The livestock facilities include units for sheep and goats, poultry, and dairy, which provide training and resources for animal husbandry. Furthermore, the chicken value addition unit underscores the KVK's efforts in promoting poultry farming and processing.

Dr. K.L. Rao Krishi Vigyan Kendra, Garikapadu, stands out as a pivotal institution in agricultural development, offering a blend of advanced infrastructural facilities and achieving notable milestones that contribute significantly to the agricultural community both locally and internationally.

KVK- GHANTASALA

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The Krishi Vigyan Kendra (KVK), Ghantasala, established in 2012, has achieved several significant milestones over the years, marking its impact on agricultural development in the region. In 2022, the KVK earned a commendable accolade by securing second place for its efforts in seed distribution. This achievement reflects the center's dedication to enhancing agricultural productivity and supporting local farmers.

The KVK has adopted a total of 48 villages, extending its reach and influence significantly within the local farming communities. One of the pivotal services offered by the KVK is soil testing for determining soil fertility and optimal fertilizer use. This service has seen substantial engagement, with 305 soil samples analyzed to help farmers optimize their crop yields based on precise soil health data.

Additionally, the KVK has established 15 demonstration units across agriculture, horticulture, and allied sectors within its instructional farm. These demo units serve as practical learning sites for farmers to observe and adopt advanced farming techniques and practices.

The centre has also distributed an impressive 2,75,500 planting material, tomato, moringa, chillies, marigold, papaya, and mango grafts, contributing to the diversification and enhancement of crop cultivation in the region.

The KVK has developed a comprehensive database of 51,365 farmers. This database is instrumental in disseminating information and addressing real-time farming problems through various ICT sources, ensuring that farmers receive timely and relevant guidance to improve their farming practices and outputs.

The infrastructural facilities at the KVK are robust and well-equipped to support its multifaceted activities. These facilities include an administrative building, a farmer's hostel, a seed processing plant, an instructional farm, an information centre, and a training hall.

Each of these components plays a vital role in the KVK's operations, providing essential support for administrative functions, farmer training and accommodation, seed processing, practical instruction, and information dissemination.

Through these combined efforts and resources, the KVK in Ghantasala continues to significantly contribute to agricultural development and farmer empowerment in the region.

KVK-KALIKIRI

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The Krishi Vigyan Kendra (KVK), Kalikiri, established in 2012, it has played a significant role in advancing agricultural practices and supporting the farming community in the thirty-three western mandals of Chittoor district. Since its inception on 10th February, 2012, this KVK has focused on uplifting the socio-economic conditions of local farmers through various scientific interventions in agriculture and allied sectors.

One of the key milestones for KVK, Kalikiri, was the development of the Greeshma Plus mobile app in 2020, which serves as a technological tool to assist farmers with timely information and support. Furthermore, on September 23, 2022, KVK inaugurated a soil and water testing lab, which has tested 2592 samples, helping farmers better understand their soil and water conditions to optimize their farming practices.

The KVK has also established twelve demonstration units in its instructional farm, showcasing best practices in agriculture, horticulture, and allied sectors. This initiative allows farmers to observe and learn about modern and effective farming techniques directly. Additionally, the centre has produced a remarkable total of 10,99,111 planting materials, including tomato, chilli, moringa, acid lime, and mango grafts, which are essential for promoting high-yield and quality crops.

In recognition of its efforts, KVK, Kalikiri, received an appreciation certificate for providing the best service in planting materials during the Annual Zonal Workshop, 2022. This accolade underscores the KVK's commitment to excellence and its impact on the farming community.

KVK, Kalikiri, is well-equipped with various infrastructural facilities to support its operations and services. These facilities include an administrative building, a training hall for conducting educational programs, a soil testing lab for analyzing soil health, a custom hiring centre that likely provides equipment on rent to farmers, a farmers' hostel for accommodating visiting farmers, and an information centre to disseminate crucial agricultural information.

Krishi Vigyan Kendra, Kalikiri, has made significant contributions to the agricultural sector in Chittoor district, providing essential services, infrastructure, and innovations to support and empower the local farming community.

KVK- KALYANDURG

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The Krishi Vigyan Kendra (KVK), Kalyandurg, Anantapuramu District, was established on October 11, 2010. Initially sanctioned by the Indian Council of Agricultural Research (ICAR), it began operations in a rented house in Jaya Nagar Colony within Kalyandurg town. This arrangement was temporary, and on May 27, 2013, the KVK moved to its current location. The relocation was marked by an official inaugural ceremony, and the new site featured an administrative building and a farmers' hostel, situated on a 50-acre plot located approximately 5 kilometers from Kalyandurg town, within the Yerrampalli village boundaries of Garudapuram panchayat.

The KVK has achieved several significant milestones since its inception. In the 2011-12 period, it established a shade-net to support various agricultural activities. In 2022, the KVK organized two PM Kisan melas, which were significant events that saw participation from 568 farmers, highlighting its role in farmer engagement and community outreach.

In terms of advancements and recognitions, 2023 was a notable year for the KVK. It established a soil testing laboratory, which is crucial for assisting farmers in optimizing their soil health and crop production. Additionally, the KVK received two appreciation certificates at the Annual Zonal Workshop held at Tamil Nadu Agricultural University (TNAU) in Coimbatore. These awards were for its achievements in the Cluster Front Line Demonstration (CFLD) on pulses and for its Comprehensive Annual Report. Moreover, in the same year, the KVK expanded its infrastructural capabilities by setting up a new vermicompost unit, emphasizing its commitment to sustainable agricultural practices.

From an infrastructural standpoint, the KVK has made significant developments since its establishment. The administrative building and the farmers' hostel were both constructed in 2010, providing essential facilities for the smooth operation of the KVK and accommodation for visiting farmers. These buildings have been instrumental in supporting the KVK's various programs and initiatives aimed at improving agricultural practices and livelihoods in the region.

VKVK-KONDEMPUDI

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KVK Kondempudi's exemplary work has been recognized at various zonal levels. For the Year 2022, it secured first place in the Tribal Sub-Plan category and was noted for its outstanding extension activities. Additionally, it earned third place in planting material production among KVKs in Zone X. In 2021, the KVK's annual report was awarded the second place for the best project in CFLD Oil Seeds at the zonal level. Further accolades include third place in natural farming and first place in photography during the zonal competitions for 2023.

The Krishi Vigyan Kendra (KVK), Kondempudi, established in the year 2016-17 on December 19, 2016, spans a substantial 50 acres in Anakapalli district. Since its inception, KVK Kondempudi has actively engaged with 20 Mandals, including 13 plain Mandals and 7 tribal Mandals, extending its services across three districts: Anakapalli, Visakhapatnam, and Alluri Seetharama Raju. The primary mission of the KVK is to foster agricultural research, disseminate technology, and improve the welfare of farmers in these regions.

Over the years, KVK Kondempudi has achieved several significant milestones. Notably, in 2021, it established a facility dedicated to value addition and income generation for tribal communities by producing jackfruit powder at the SUSAG Farmer Producer Organization (FPO) in Santabayalu Village, Paderu Mandal. This initiative underscores the KVK's commitment to enhancing the livelihoods of tribal farmers through innovative agricultural practices and value-added products.

In terms of infrastructure, KVK Kondempudi boasts a comprehensive array of facilities to support its diverse activities. This includes an administrative building, a farmers' hostel, and a training hall with a capacity of 50 members. The centre also features various demonstration units, an Integrated Farming System (IFS) unit, a poultry unit, shade nets, and a compost unit. To support its agricultural initiatives, the KVK has implemented a permanent pendal system, a rainwater harvesting system, a natural farming block, and an agro-processing unit equipped with a solar poly tunnel dryer. Additionally, it houses a soil science laboratory, an aquaponics unit, and an Azolla unit, all of which contribute to its robust research and training capabilities.

KVK Kondempudi stands out as a pivotal institution in the region, driving agricultural innovation, providing valuable training, and significantly contributing to the sustainable development of the local farming community.

KVK-NELLORE

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The Krishi Vigyan Kendra (KVK), Nellore established in 1999, has undergone significant developmental milestones since its inception. Initially established at ARS, Nellore, it evolved into a full-fledged KVK by April 2004. Over the years, it has played a crucial role in agricultural development in the region, marked by several achievements.

One notable accomplishment is the popularization of Direct Seeded Rice (DSR) in the SPSR Nellore district, covering an impressive area of up to 1600 hectares. This adoption of DSR signifies a shift towards more sustainable and resource-efficient farming practices.

Another achievement lies in enhancing yield in Carp culture by effectively managing plankton colour and density. This improvement is crucial for the aquaculture sector, contributing to increased productivity and profitability for fish farmers in the region.

The KVK has also promoted innovative techniques like the use of Alley ways in rice for controlling Brown Plant Hopper (BPH), addressing pest management challenges in rice cultivation. Additionally, the popularization of specific crop varieties such as BPT-5204 and NLR34449 underscores the centre's efforts in promoting high-yielding and resilient cultivars suited to local agro-climatic conditions.

Furthermore, the adoption and dissemination of TBG-104 in black gram cultivation in the SPSR Nellore district have contributed to improving productivity and income for farmers in the region.

In terms of infrastructural facilities, the KVK is well-equipped to support its agricultural extension activities. It boasts an Administrative Building, a Training Hall with a capacity to accommodate 70 members, a Soil Testing Laboratory for ensuring soil health, a Farm Godown for storage purposes, a Vermicompost Unit for organic farming practices, an Information Centre for disseminating agricultural knowledge, and Staff Quarters to accommodate personnel involved in extension activities.

Moreover, the KVK has made significant contributions to the production of planting materials, including acid lime, tomato, moringa, and chillies, totalling an impressive 391,406 units. This highlights its role in promoting crop diversification and providing farmers with access to quality planting materials, thereby enhancing agricultural productivity and livelihoods in the region.

The Krishi Vigyan Kendra, Nellore has made substantial strides in agricultural development through ARYA programme. A total of 76 training were conducted on various enterprises viz., vermicomposting, mushroom production, nursery and value addition in which 2852 youth were trained. Out of them 274 youth have established enterprise units.

KVK- REDDIPALLI

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The Krishi Vigyan Kendra (KVK) located in Reddipalli, established in 1983. Over the years, the KVK has achieved several significant milestones in agricultural technology dissemination and extension activities.

One of the key highlights is the widespread adoption of various technologies facilitated by KVK through Frontline Demonstrations (FLDs) and extension activities. These technologies have had a substantial impact on agricultural practices in the region. Notable examples include mechanized sowing in groundnut with the Anantha planter, conservation furrows in groundnut and redgram, insitu soil moisture conservation by sub soiling with chisel plough, and soil test-based fertilizer application in groundnut. Additionally, the KVK has successfully promoted crop diversification with castor and introduced safflower crop in black soils, along with implementing Integrated Pest Management (IPM) strategies for pink bollworm management in cotton and correcting micronutrient deficiencies in sweet orange.

Furthermore, the KVK has been proactive in developing and implementing innovative solutions to address agricultural challenges. For instance, the development of the KVK Agri Tech App in 2021-22 and the creation of low-cost technology for tomato flakes and tomato powder making using solar dryers have greatly benefited local farmers, particularly during surplus seasons.

In terms of sustainability and climate resilience, the KVK has demonstrated climate-resilient technologies, resulting in the recharge of borewells and open wells, thereby benefiting numerous farmers. This initiative has significantly contributed to water harvesting and supplemental irrigation, enhancing agricultural productivity and resilience to climate variability.

Additionally, the KVK has diversified its activities to promote alternative livelihoods, such as sheep farming, thereby contributing to the socio-economic development of the community. The center has also received recognition and accolades for its exemplary work, including 16 appreciation certificates from ATARI Zone X for various projects and activities, as well as the Best ANGRAU KVK award for the year 2017-18.

The infrastructural facilities of the KVK are well-equipped to support its activities and outreach programs. These include a main building with a training hall, farmers' hostel, seed processing center (pulses), soil testing lab, information center, and units for mushroom production, millet processing, and vermicomposting. Moreover, livestock units for sheep, goat, poultry, and cattle, along with agriculture and horticulture crop cafeterias, custom hiring center, and value addition unit, further enhance the KVK's capabilities in agricultural research, education, and extension.

KVK-RASTAKUNTUBAI

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Krishi Vigyan Kendra, Rastakuntubai, established in 1984, holds a prominent position in the agricultural landscape of Vizianagaram District, situated in the north coastal zone of Andhra Pradesh. Over its decades-long journey, the Kendra has achieved notable milestones and garnered recognition for its exemplary contributions to agricultural development.

One of the remarkable achievements of Krishi Vigyan Kendra, Rastakuntubai is its receipt of the Best KVK award for the years 2022-23 and 2020-21 from ANGRAU. This acknowledgment underscores its consistent commitment to excellence in agricultural extension services and outreach programs.

The Kendra has also excelled in project implementation, earning accolades such as securing the first place in the CFLD (Cluster Frontline Demonstration) pulses project and the second place in the TSP (Tribal Sub Plan) project during 2022-23. Additionally, it clinched the second place in CFLD during 2021-22 for outstanding implementation among all KVKs in ATARI Zone – X. These achievements reflect the Kendra's proactive approach and effectiveness in executing agricultural projects.

Notably, Krishi Vigyan Kendra, Rastakuntubai has demonstrated a sustained commitment to rural development through initiatives like the Krishi Kalyan Abhiyan programme. It secured the first place continuously for two years (2018, 2019) for implementing this program in aspirational villages of the district, earning recognition in ATARI Zone. This consistent success highlights the Kendra's significant impact on uplifting agricultural practices and rural livelihoods.

In terms of infrastructure, the Kendra boasts a comprehensive array of facilities aimed at supporting agricultural research, training, and extension activities. These include an Administrative Building, Farmers Hostel & Heritage building, and a Training hall with a capacity for 50 members. Moreover, the Kendra houses various demonstration units such as IFS (Integrated Farming System) unit, ITK (Indigenous Technical Knowledge) Museum, Poultry unit, Shade net, Vermicompost unit, and Mushroom production unit.

Furthermore, the Kendra has established new demonstration units to showcase innovative practices and technologies, including a Value addition unit, Black Bengal goat unit, Millet cafeteria, Millet Museum, Nutri kitchen garden, Tropical and subtropical fruit block, Medicinal block, Natural farming block, Primary processing unit, Mega poultry shed, Soil science lab, Hydroponics unit, Azolla unit, and Weather station.

These infrastructural facilities underscore the Kendra's commitment to holistic agricultural development, encompassing areas such as agri-business, livestock management, horticulture, and sustainable farming practices. Overall, Krishi Vigyan Kendra, Rastakuntubai stands as a beacon of agricultural innovation and rural empowerment in the region, driven by its rich history, commendable achievements, and robust infrastructure.

KVK-UNDI

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Krishi Vigyan Kendra (KVK) Undi, established on 9th November 1995, has played a pivotal role in agricultural development and rural empowerment in the West Godavari District. Over the years, it has achieved several significant milestones that have directly benefited farmers and rural communities.

One of the notable accomplishments of KVK Undi is the production of 13,368 quintals of high-quality breeder and foundation rice seed. These seeds are supplied to around 32,000 farmers, ensuring access to improved varieties and contributing to enhanced crop productivity in the region. Moreover, KVK Undi has spearheaded initiatives to promote self-seed production among farmers, enabling them to become self-sufficient and reducing their dependency on spurious seed.

The centre has also focused on promoting climate-resilient agricultural practices. Through the National Innovations in Climate Resilient Agriculture (NICRA) project, KVK Undi has demonstrated flood-tolerant and saline-tolerant paddy varieties, addressing the challenges posed by climatic uncertainties. Additionally, it has provided training on water quality management in fish culture, mitigating the impact of climate change on aquaculture and ensuring sustainable production.

In line with promoting nutritional security, KVK Undi has introduced the concept of nutrition gardens in schools, Integrated Child Development Services (ICDS) centres, and among rural women. These gardens facilitate the supply of healthy vegetables to rural households, contributing to improved dietary diversity and nutrition outcomes.

Furthermore, KVK Undi has prioritized soil health management through the analysis of soil samples and distribution of soil health cards to farmers. By providing tailored recommendations, farmers are empowered to adopt soil conservation practices and optimize fertilizer use, thereby enhancing soil fertility and crop yields sustainably.

In addition to its agricultural interventions, KVK Undi has been instrumental in fostering rural entrepreneurship. It has trained and mentored individuals in beekeeping, designer textile making, pickle making, millet value addition, jute bag making, mushroom cultivation, and cleaning product manufacturing. These initiatives have not only generated livelihood opportunities but have also diversified rural economies.

To disseminate knowledge and technologies, KVK Undi regularly organizes events such as Kisan melas, World Soil Day celebrations, Kisan sammelans, technology weeks, and Poshan Abhiyan campaigns. These platforms bring together farmers, experts, and stakeholders to exchange ideas, showcase innovations, and promote sustainable agricultural practices.

In terms of infrastructure, KVK Undi is well-equipped with facilities such as administrative cum training blocks, farmers' hostels, staff quarters, shade net houses, seed processing units, training halls, soil and water testing laboratories, and agricultural information centres. These facilities support its training, research, and extension activities, facilitating holistic agricultural development in the region.

KRISHI VIGYAN KENDRA, UTUKUR

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KVK, Kadapa-1, initially established in August 1993 at Mahanandi, was relocated to Utukur, Kadapa in 2005. This move marked a significant shift in the institution's efforts to better serve the local agricultural community. Over the years, KVK, Utukur has achieved numerous accolades and milestones. In 2023, the KVK was honored with the Best KVK award for promoting millets through value addition in YSR District by Nutrihub, ICAR-IIMR at the "International Nutri-Cereal Convention 5.O" held in Hyderabad. The KVK received the National level Mahindra Agri Sammriddhi Award for the year 2015-16 on March 3, 2016, in New Delhi. In 2017, it was awarded the ICAR Zonal level Pandit Deendayal Upadhyay Krishi Vigyan Protsahan Puraskar for the year 2015-16. It secured the second prize at the national level for the best exhibition of traditional varieties during an awareness program on the Protection of Plant Varieties and Farmer Rights Act on July 7, 2016, in New Delhi. KVK, Utukur has hosted several significant state-level programs, including a three-day workshop on value addition to millets and entrepreneurship development from August 24-26, 2015. On April 18, 2017, it organized a workshop on strengthening the extension services of ANGRAU for program coordinators of KVKs, DAATTC coordinators, and progressive farmers from YSR district, Chittoor, Nellore, Kurnool, Anantapuramu, and Prakasam districts.

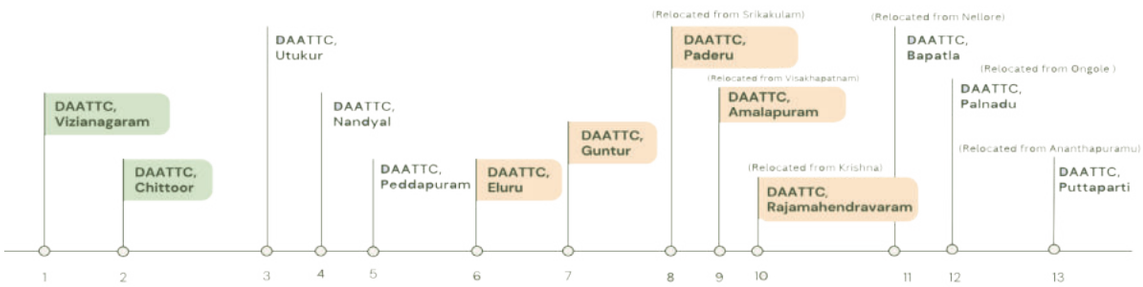
KVK, Utukur plays a pivotal role in disseminating various agricultural technologies and crop varieties among the farming community in the YSR district. The introduction of the groundnut TCGS-1694 variety in rainfed and irrigated alfisols has increased yields by 10.89%, and the K-1812 variety has seen a 33.8% yield increase, now occupying a major area in the district. Integrated Pest Management (IPM) practices for managing the fall armyworm in maize and jowar have been implemented over 3000 hectares. Demonstrations on managing wet root rot in bengalgram have increased farmers' net returns by Rs. 4500 per hectare, and the technology is now used over 30,600 hectares. Rice varieties NDLR-7 and NDLR-8 now cover about 42% (5600 hectares) of the rice area during the kharif season as an alternative to BPT-5204. The introduction of fodder varieties APBN-1, CO-4, and Super Napier through OFTs has led to a 75% adoption rate, yielding net returns of Rs. 10,000 per hectare. Sesamum variety YLM-66 has been widely adopted by 65% (1950 hectares) of the farmers in the district. The bengalgram variety JG 11 introduced by KVK now covers 50,000 hectares. Blackgram variety TBG-104 has resulted in cultivation over 10,850 hectares, with increased net returns of Rs. 15,600 per hectare. High-yielding cowpea variety TPTC 29 has been introduced and now occupies a significant area within three years. Technologies for crop intensification, such as using korra as a preceding crop to bengalgram, have been demonstrated and adopted, increasing income and now covering 500 hectares. Chrysanthemum varieties Paper Yellow and Paper White have performed well, with high yields and better shelf life, spreading across 700 hectares and gaining widespread acceptability.

To meet the needs of the farming community, KVK, Utukur possesses a well-equipped 10-hectare farm with various demonstration units. These include a vermi compost unit, mushroom production unit, shade net facility for commercial nurseries, permanent pendal system for vegetables, sheep and goat units, poultry, fodder crops, horticulture crops, a millet processing unit, a cold-pressed oil expeller, and a dal mill. These facilities are instrumental in providing practical, hands-on training and demonstrations to farmers.

DISTRICT AGRICULTURAL ADVISORY AND TRANSFER OF TECHNOLOGY CENTRES (DAATTCS):

To give technological back up and end support & capacity building to the extension personnel of the line departments, ANGRAU started concept of District Agricultural Advisory and Transfer of Technology Centers (DAATTC) and these centres are popularly called as "Eruvaka Kendralu" in Telugu. This kind of initiative is the first of its kind in the country, State Agricultural University starting one DAATTC per district located in the District Head Quarter, consisting of multi-disciplinary scientists with the following objectives:

- To Develop Database of the District: - Farming situation wise, mandal wise cropping plans were prepared for the district which helps the farmers and extension workers in developing cropping plans based on soil and water requirement. Preparation of Contingency crop plan.



- Technology assessment and refinement: To assess and refine technologies generated by the Research stations for suitability to different farming situations in the district.
- To conduct Diagnostic Surveys periodically: To identify field problems and provide suitable solutions in the field itself to the farmers, where scientists of ANGRAU and Officers from Department of Agriculture and Horticulture are involved.
- To organize and participate in Kisan Melas, Rythu Chaitanya Yatras, Polam pilustondi, Chandranna Rythu Kshetralu, Rythu Sadassus and organizing exhibitions
- To organize training programmes to Extension functionaries and practicing farmers and participate in training programmes organized by the line departments as resource person.
- To maintain an information center at DAATT centre with need-based information materials and audio-visual aids
- To render Agro- advisory services to the farmer visiting to the centre.
- To develop linkages with all the line departments, NGOs working for promotion of Agriculture in the district.
- To Coordinate with AIR, TV and print media for dissemination of information.
- Development of literature and extend technical support to department of agriculture and other line departments

Presently, 13 DAATTCs are functioning in Andhra Pradesh covering entire State, located either in District headquarters or Regional Agricultural Research Stations/Agricultural Research Stations with a multidisciplinary team of Scientists mainly consisting of Crop Production, Crop Protection and Agricultural Extension.

The DAATTCs are meeting the farmers needs and in convergence with department of agriculture, line departments and NGOs from time to time. The one of the major activities of DAATTCs is to assess and refine technologies starts with testing the advanced lines of crop varieties in minikits to assess its performance in different field conditions in all agro-climatic zones.

After bifurcation of the Andhra Pradesh State from Telangana in 2015, as per the district reorganization act of 2022 in the State of Andhra Pradesh the 13 DAATTCs were reorganized in a way to distribute one Extension Center per district to scatter the transfer of technology uniformly.

Significant Contributions & Output of DAATTCs

- A total of 2904 minikits organised, based on which, 479 crop varieties released from ANGRAU.
- A total of 1587 OFTs, 980 successful OFTs demonstrated through FLDs.
- A total of 7,249 training programmes organised to extension personnel, farmers, farm women, rural youth.
- A total of 1020 All India Radio programmes & 2571 Television programmes were conducted.

since 2017, due to popularization of zero tillage tractor drawn marker and use of post emergence herbicide, led to spread of maize in 3,600 ha with economic contribution of Rs.234 lakh. Similarly, this centre popularized use of Drum seeder in paddy, led to spread in 2,358 ha with economic contribution of 198.072 lakh. Popularization of IPM for fall army worm management in Maize could save the crop in 7,000 ha. This DAATTC also made significant efforts in spread of Variety MTU-1121 Rice in 73,000 ha area (60% district area) in Vizianagaram district during 2019-20.

- A total of 30,857 diagnostic field visits conducted, to identify biotic, abiotic stresses and to give suitable suggestions to mitigate that problem timely to recover higher yields with limited cost of cultivation and making agriculture profitable.
- A total of 6,775 students of RAWEP were guided by DAATTCs
- DAATTC, Srikakulam's efforts led to spread of zero tillage Maize in 15,500ha, Direct sown paddy in 1,00,00 ha, new varieties of paddy and pulses in 1,00,000 ha which resulted in increased productivity and net returns.
- DAATTC, Vizianagaram made a significant change in maize cultivation in the area,
- DAATTC, Peddapuram contributed significantly popularizing MTU 1318, suitable for stagnant flooding in Konaseema area, which is now in >10,000 ha in the district and slowly replacing the popular variety swarna.
- DAATTC, Eluru popularized the IPM practices during rabi season for BLB, Sulphide injury and stem borer in rice, and due to which the losses were minimized significantly in 2020-21.
- DAATTC, Ongole by its activities popularised YMV resistant TBG104, GBG-1 in 22,000 ha, Maruca management in 65,000 ha, foliar sprays in bengalgram in 58,000 ha to get higher yields and for drought mitigation, led to increase in yield by 15-

20% in major crops by adopting ANGRAU varieties and introduction of foxtail millet as preceeding crop to bengalgram in 25,000ha in Prakasam district.

- DAATTC, Nandyal popularised mechanical harvesting in bengalgram and dry land technics.
- DAATTC, Puttaparthi popularised effective management module for PSND in groundnut.

AGRICULTURAL INFORMATION & COMMUNICATION CENTRE (AI&CC):

Email:paio@angrau.ac.in

The Agricultural Information and Communication Centre (AI & CC) was established in the year **1969** with the mandate of disseminating agricultural information to the farmers and extension personnel through print

and electronic media. It is providing information support to the various activities organized by the University since its establishment. This centre is responsible for processing of latest agricultural information generated by the university and transfers it for the benefit of end users in the state through various publications and media combinations. The centre publishes various research and extension publications both in English and Telugu, besides sending news bulletins regularly to All India Radio.

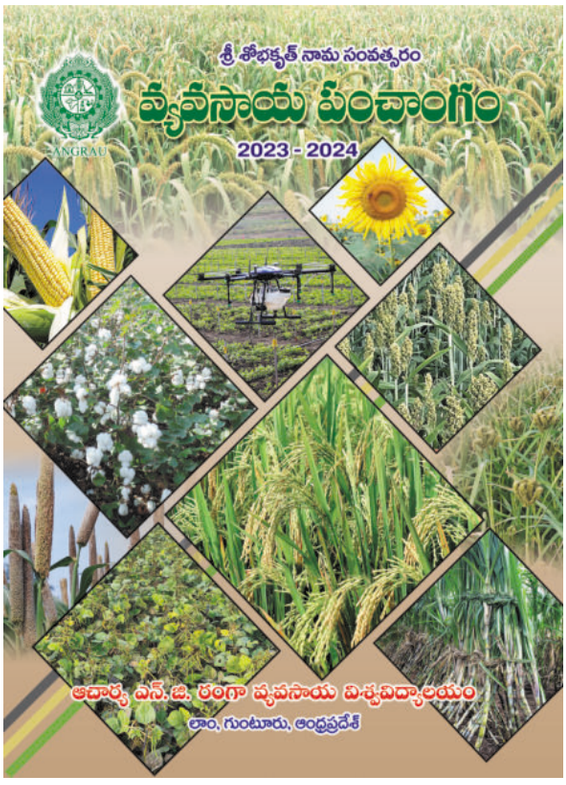
Post bifurcation of the University, the AI&CC was established in February, 2016 at Guntur. This centre has successfully initiated and streamlined the information dissemination through Publications such as The *Vyavasayam* monthly Telugu magazine, The *Vyavasaya Panchangam*, The Journal of Research ANGRAU and ANGRAU E- Newsletter. During January, 2018 the Electronic wing and Farmers Call Centre were also merged with AI & CC making it one-stop-centre for all types of information & communication needs

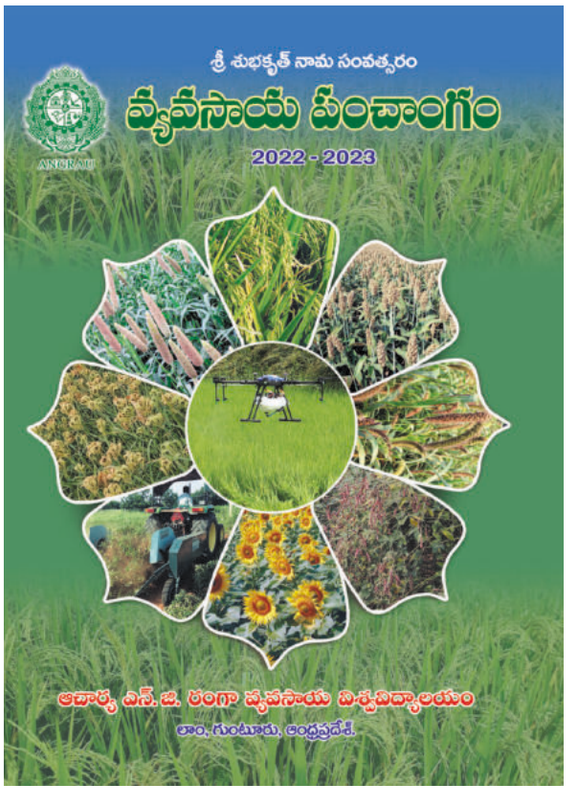
Historical milestones & Achivements:

- 1969: Vyavasaya Panchangam, a farmer's almanc in Telugu with package of practices of major crops (based on ZREAC recommendations) and technologies recommended by the University was initiated. A total 55 volumes were published till date.
- 1973: The Journal of Research ANGRAU publishing peer reviewed articles of agricultural sciences, horticulture, home science, agricultural engineering and veterinary sciences. A total of 51 volumes were published. Presently, a total of 253 life subscribers, 949 annual subscribers were enrolled.
- 1999: Crop diagnostic bulletins publications. Pocket size Multi Coloured Crop Diagnostic Bulletins on the major crops of the state were published with high quality pictures of pests, symptoms of damage, micro nutrient

deficiencies along with management practices. The pocket books were revised in 2019.

- 2016: Farmers Call Centre (FCC) is the first and the foremost of its kind established by ANGRAU in the history of Indian agriculture with an innovative idea of transferring novel scientific technology in Agriculture to the farming community. FCC is accessible to all the farmers of Andhra Pradesh on toll free number 1800 425 0430. After bifurcation of the State, Farmers Call Centre was initially established on 18.10.2016 at Regional Agricultural Research Station, Lam, Guntur to answer the queries raised by the farmers related to agriculture & allied sectors. So far, a total of **26,386** calls were received from the farmers of 13 districts of the state of Andhra Pradesh as well as Telangana and other parts of the country.
- 2009: Vyavasayam monthly magazine in Telugu, with latest information and technologies in agriculture, horticulture, agricultural engineering and veterinary sciences was initiated. A total 15 volumes were published. Presently, 701 life subscribers and 6906 annual subscribers are enrolled.
- 2017: ANGRAU E- newsletter, In-house magazine for visibility of university activities across India was started. The e-newsletter is being uploaded in the ANGRAU website. A total of 8 volumes were published.
- Short videos: Electronic Wing as a part of the AI&CC has prepared short videos on various aspects of agriculture and allied sectors. A total of 35 short videos, 8 DVDs and 3 success stories were developed so far.
- Advisories through Print & Electronic Media: In collaboration with state level print & electronic media, a total of 322 weekly advisories were sent and 707 Resource Persons were deputed to give on time advisories to farmers on agriculture, agriculture engineering and allied fields.





OPEN AND DISTANCE LEARNING CENTRE

Email : odlc@angrau.ac.in

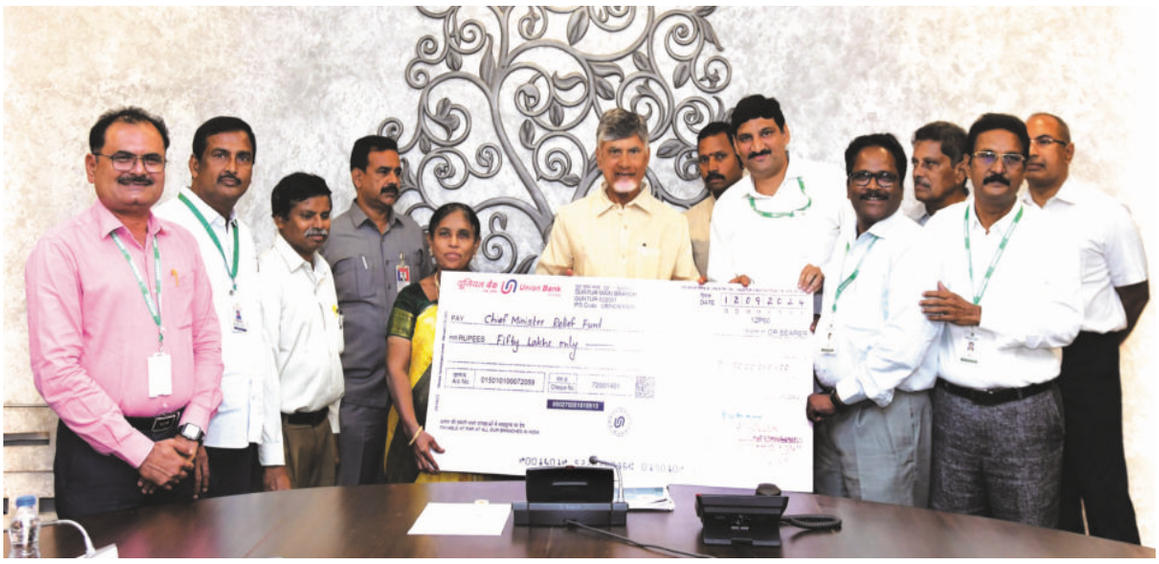
Acharya N.G.Ranga Agricultural University being a pioneer University of the country in imparting Agricultural education is expanding its wings with the aim of reaching the unreached. Considering the potential and the future of Open and Distance Learning, the Centre of Open and Distance Learning (ODLC) was established in the year 2018 with the major aim being to transform ANGRAU from its formal educational system to a dual and convergent mode, by adopting appropriate systems of ODL and ICT (Information & Communication Technology) so as to provide Agricultural knowledge and entrepreneurial skills for self-employment and income generation.

Establishment of Open Distance Learning Centre under the Faculty of Agriculture, ANGRAU was vested with the responsibility of offering online Distance learning programme in hybrid mode through certificate courses for the benefit of various segments of the farming community, entrepreneurs, Self-help groups, students and other learners who aspire for knowledge in Agricultural education and Self-employment. In a span of 5 years, ODLC has offered Certificate courses to 40 batches in various subjects

The certificate courses of 2 months duration will be offered in local language telugu with 8 weekly online sessions followed by one day practical session at the chosen study centre for experiential hands-on learning. The course syllabus printed in a book form will be made available to the registered candidates via post. An online exam will be conducted post the sessions to assess the eligibility of the candidate for receiving certificates. Till date, a total of 3851 candidates enrolled for the courses and 3039 successfully completed the courses and received ANGRAU certificates.

MOOCs courses on Organic Farming (in Telugu), Mushroom Cultivation (in Telugu), Terrace Gardening (in Telugu), Sericulture, Biofertilizers-Production and Management, Bee Keeping (in Telugu), Millets-Production, Promotion and Value addition, Vermicompost, Production and organic formulations, Biopesticides and Bio-stimulants and Seed Production are being presently offered from ODLC.


స్వాగతం ! ఆచార్య ఎన్.జి.రంగా వ్యవసాయ విశ్వవిద్యాలయం సుస్వాగతం !!



Significant activities during 2023-25

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Inauguration Ceremony
of
IIGR-RRS ANANTAPUR


University of Agricultural Sciences, Dharwad


ICRISAT


In the Service of Farmers
ANGRAU
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1964 - 2024