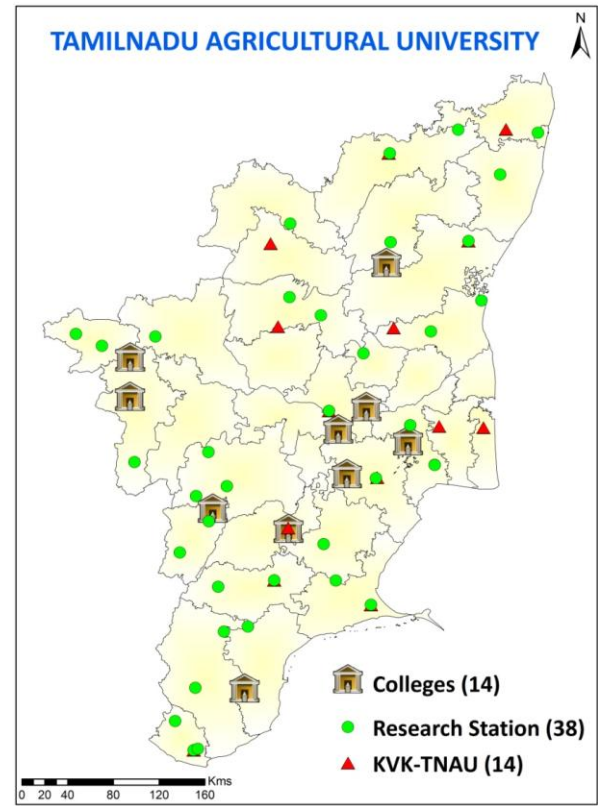


Directorate of Research
Tamil Nadu Agricultural University
Coimbatore 641 003

APC Review Meeting For Research Stations of TNAU (30.9.2021)

The Directorate of Research, Tamil Nadu Agricultural University, Coimbatore, was established in 1971 with an intend to coordinate all research activities in TNAU and to administer / monitor the activities of Technical Directorates (14), Constituent Colleges (14), Research Stations (39) and KVKs (14) spread across **seven agro-climatic zones** of Tamil Nadu. The Director of Research is the Nodal Officer for implementing university research projects, core projects funded by Tamil Nadu Government, ICAR – All India Coordinated Research Projects (AICRPs), Externally Funded Projects, Private Funded Projects besides technical control TANII, SLURB and other projects. The 39 research stations are under the administrative control of Director of Research (**Region I** – 14 Agricultural Research Stations), Director, TRRI, Aduthurai (**Region II** – 13 – Agricultural Research Stations) and Dean, HC & RI, Coimbatore (12 **Horticultural Research Stations**)

Agro-Climatic Zones of Tamil Nadu



1. Mandate Crops, Major Activities and Achievements

The Tamil Nadu Agricultural University, Coimbatore, has Research Stations spread across the State of Tamil Nadu covering all the seven Agro-Climatic Zones and is grouped into 27 Agricultural Research Stations (Region I 14; Region II 13) and 12 Horticultural Research Stations. Each Research Station has its own mandate and specific activities pertinent to the region and to address the local field problems raised by the farmers or department officials.

Region I Research Stations

No	Name of the Research Station	Mandate Crops	Major Activities	Achievements
1	Agricultural Research Station, Bhavanisagar	Rice, Groundnut, Maize, Turmeric	Seed Production, Water Management, IFS, Mechanization	Seven varieties released Turmeric BSR 1 & 2 Redgram BSR 1 Aonla BSR 1 Groundnut BSR 1 & 2 Sorghum BSR 1 Complete mechanization Major Seed Production Center
2	Regional Research Station, Paiyur	Rice, Ragi, Horsegram, Mango	Breeding of crops, Seed Production, Bioinput production	Varieties released Ragi Paiyur 1 & 2 Rice Paiyur 1 Horsegram Paiyur 1 Bioinoculant production
3	Tapioca & Castor Research Station, Yethapur	Castor, Tapioca	Breeding, Management, IFS	Varieties released Castor YTP 1, YRCH 1 & 2 Tapioca YTP 1 & 2

				Cassava tonic Technology capsule for cassava mealybug
4	Maize Research Station, Vagarai	Maize	Breeding, Management, Hydroponic Fodder	Variety Released for Eastern Zone of India VGI HI (2018) Hydroponic fodder production
5	Agricultural Research Station, Vagaidam	Rice, Vegetables, Agro-forestry	Seed Production, Breeding of briyani rice	Varieties Released VGD 1 (Briyani rice) Seed production of rice and vegetables
6	Regional Research Station, Arupukottai	Millets, arid zone fruit crops, mushroom	Rainfed technologies, IFS	Varieties released in mushroom (APK 1 & 2) Assembling of Arid Fruits
7	Agricultural Research Station, Kovilpatti	Cotton, sorghum, millets	Rainfed technologies, IFS	59 crop varieties released KC 3 – source for resistance against sucking pests Developed drland technologies
8	Rice Research Station, Ambasamuthiram	Rice	Breeding rice for Tamiraparni Command Area	20 rice varieties released ASD 16 is most popular
9	Agricultural Research Station, Thirupathisarum	Rice	Seed production	Rice varieties released TPS 5 is most popular
10	Cotton Research Station,	Cotton	Breeding of medium / long	Nine cotton varieties and

	Srivilliputhur		staple cotton for summer irrigated	hybrids released Compete mechanization in cotton
11	Dryland Agricultural Research, Chettinad	Millets, groundnut, agri-forestry	Silivi-pastoral models, water conservation	Exhibition of Dryland Technologies
12	Agricultural Research Station, Paramakudi	Rice, Mundu chillies	Breeding for Direct sown and drought tolerant rice	Released 4 rice varieties Anna 4 is very popular
13	Coastal Salinity Research Center (CSRC), Ramanathapuram	Saline tolerant crops	Soil reclamation technologies	One rice variety (RMD 1) released for coastal soils
14	Hybrid Rice Evaluation Center (HERC), Gudalur	Rice	Hybrid rice	Hybrid rice seeds

Region II Research Stations

No	Name of the Research Station	Mandate Crops	Major Activities	Achievements
1	Tamil Nadu Rice Research Institute	Rice, Blackgram, Jute, Mesta	Breeding rice for CDZ	55 Rice varieties released ADT 6 blackgram released Jute & Mesta research

				PME assessed nutrient dynamics in CDZ
2	Agricultural Research Station, Kattuthottam	Rice	Seed Production, IFS Models	Water Management Technologies
3	Rice Research Station, Tirur	Rice	Breeding rice for NEZ, Seed Production	Varieties released – 13 Most popular TKM 13
4	Center of Excellence for Millets	Small Millets	Breeding, technology development, mechanization	Small Millet varieties released (Ragi ATL 1, Samai ATL 1, Tenai ATL 1, Varagu ATL 1)
5	National Pulses Research Center, Vamban	Pulses	Breeding of pulses, Bioinoculants	Pulse varieties released Blackgram (up to VBN 11) Greengram (up to VBN 6) Nationally known Rhizobium strain identified
6	Agricultural Research Station, Virinjipuram	Pulses, Brinjal	Breeding, management	Varieties released Brinjal (VRM 1 & 2) Seedless lime (VRM 1)
7	Oilseed Research Station, Tindivanam	Groundnut, Sesame	Breeding, seed production, management technologies	Released Groundnut varieties (up to TMV 14) Sesame varieties (up to TMV 4)
8	Regional Research Station, Vridhachalam	Groundnut, Sesame, Cashewnut	Breeding of groundnut, sesame and cashew, management technologies	Released Groundnut varieties (up to VRI 8)

			Seed production	Sesame varieties (up to VRI 4)
9	Sugarcane Research Station, Cuddalore	Sugarcane	Breeding, management, tissue culture	Released sugarcane varieties (CoC 13339)
10	Sugarcane Research Station, Sirugamani	Sugarcane	Clonal evaluation	Released sugarcane varieties Betelvine varieties (SGM 1 & 2)
11	Sugarcane Research Station, Melalathur	Sugarcane	Cane Breeding for jiggery and tannery affected areas	Sugarcane varieties released For tannery affected areas CoG 6and drought tolerant CoG 94077
12	Cotton Research Station, Veppanthattai	Cotton	Long-staple cotton for rainfed areas, technologies	Long staple cotton in the pre-release stage
13	Agricultural Research Station, Pattukottai	Oilpalm & Coconut	Multiplication, management technologies	Oilpalm as demo plot

Horticultural Research Stations

No	Name of the Research Station	Mandate Crops	Major Activities	Achievements
1	Horticultural Research Stations, Ooty	Temperate fruits, vegetables, flowers	Breeding, greenhouse cultivation, management technologies	17 varieties released Garlic is most important

				Establishment of low chilling temperate fruit orchard
2	Horticultural Research Stations, Kodaikanal	Temperate fruits, introduction of less known fruits, vegetables	Breeding, greenhouse cultivation, management technologies	Five crop varieties released (KKL) Butter bean, moringa bean, Apple, Gladiolus, Geranium
3	Horticultural Research Station, Pechiparai	Tree Spices, pepper	Breeding, greenhouse cultivation, management technologies	Varieties released Long green brinjal, cinnamon, jack fruit, kodumpuli
4	Horticultural Research Station, Thadiyankudisai	Butter fruit, mandarine, pepper	Breeding, greenhouse cultivation, management technologies	Varieties released butter fruit (TKD 1) supply of planting materials (pepper, avocado and coffee)
5	Horticultural Research Station, Yercaud	Avocado, litchi, jackfruit, figs	Breeding, greenhouse cultivation, management technologies	Varieties released YCD Fig, cinnamon
6	Flowers Research Station, Thovalai	Flowers	Collection, conservation, extraction of essential oils	Production and supply of jasmine planting materials
7	Grapes Research Station, Theni	Grapes	Collection, evaluation, management	Production and Supply of Dogridge Rootstocks

8	Citrus Research Station, Sankarankovil	Acid lime	Collection, supply of samplings	Production and supply of seedlings plants
9	Coconut Research Station, Vepankulam	Coconut	Collection, supply of seedlings, hybridization	Varieties released Coconut (VPH 1-4)
10	Coconut Research Station, Aliyar Nagar	Coconut	Collection, supply of seedlings and parasitoids	Varieties released Coconut (ALR 1-3) Hybrid chandrasankara Groundnut ALR 1 Parasitoids against coconut spiraling whitefly
11	Vegetable Research Station, Palur	Gourd Vegetables, jackfruit	Breeding, seed production	Varieties released Jackfruit PLR 1-3 Bottle Gourd PLR 1
12	TNAU Information Center, Chennai	Urban Horticulture	Training, Exhibition, Skill Demonstrations	Exhibition of TNAU Varieties & Technologies

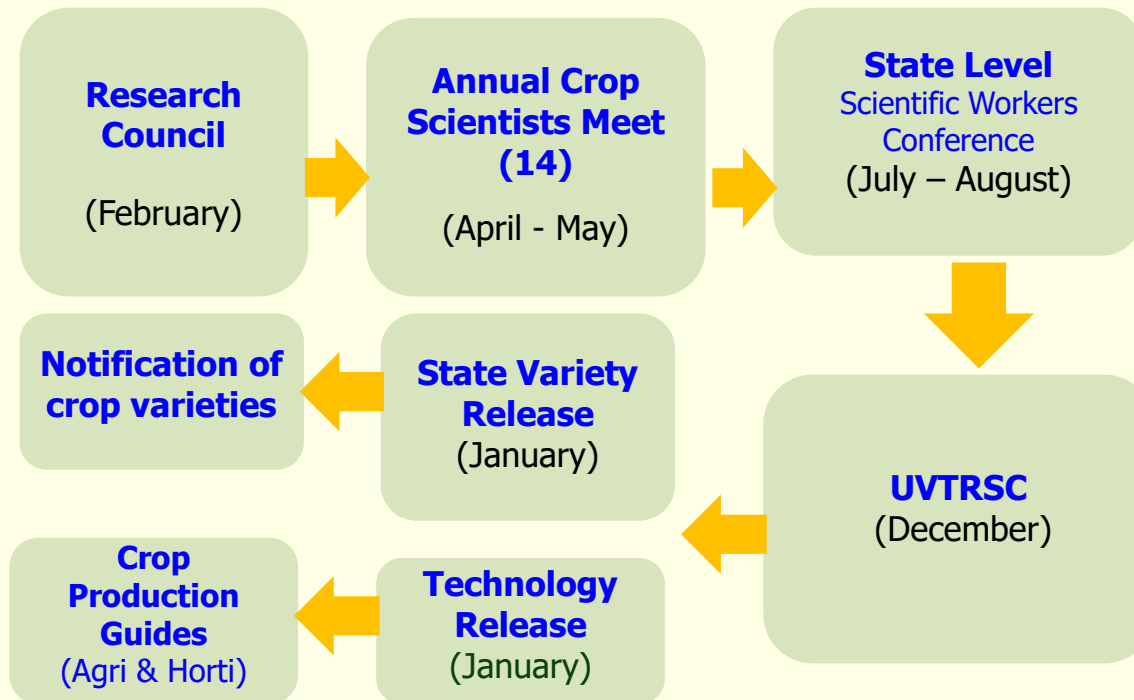
2. Research & Researchable issues

2.1. Identification of Research Problems and Technology Delivery Mechanism

The research programs of Tamil Nadu Agricultural University is designed based on the recommendations of **Research Council** that identify researchable issues / problems raised by the Heads of Department (DOA, DHPC, CAM-AB, AED, SCOC, COS, PCF), a team of five external experts, all university officers, nominated members besides subject specialists. The Vice chancellor is the Chairman of the Research council and the Director of Research is the Member

Secretary. The identified research problems are undertaken as research programs under university research projects (1064), All India coordinated Projects (62), Externally Funded Projects (254), State funded Projects (SADP, TNSLURB, TANII, NADP) and Private Funded Projects. The outcome of these projects are discussed in **Annual Crop Scientists Meets** (14 – Rice, Millets, Pulses, Oilseeds, Cotton, Sugarcane, Horticulture, Forestry, Agricultural Engineering, Community Science, Non-crop specific project, Social science, production oriented projects, agriculture – allied faculty meet) under the Chairmanship of the Vice Chancellor, organized by the Director of Research and Technical Directors involving HODs, Heads of Research stations and scientists involved in the project. After three years of testing, validation and large scale demonstrations in farmers fields, the conclusive data are presented to the Department officials in the **State level Scientific Workers Conference (SWC)** chaired by APC & PS and Vice Chancellor, organized by the Director of Research involving all Heads of Department from the State Government, JDAs, DDHs, University Officers, Heads of Departments, Heads of Research Stations, PCs of KVKs etc. In this inter-phase meeting, varieties and technologies suitable for the Tamil Nadu State is recommended for release besides proposing new research projects to address emerging field problems. The SWC recommends / suggests varieties and technologies that are to be adopted for the year to come.

Varieties & Technology Delivery Mechanisms



2.2. Researchable issues

- Extra short duration rice varieties for drought prone areas
- Rice varieties with special traits (heat tolerance, herbicide tolerance, therapeutic)
- Pulses varieties resistant to Yellow Mosaic Viral Diseases
- Transplanting technique in redgram
- Bold & Short duration groundnut varieties as that Gujarat varieties
- Vertebrate pest management in agricultural and horticultural crops (peacock, wild boar, elephant, birds, monkeys)
- High density planting in fruit crops (mango, guava, cashew)
- Invasive pest management (Fall army worm, Cassava mealy bug, Coconut Rugose Whitefly)
- Coconut wilt management
- Pest management in curry leaf
- Bioinoculants for nutrient and drought management
- Complete mechanization in millets and pulses
- Agro-forestry models for fallow lands

3. Inter-Departmental Involvements

The Tamil Nadu Agricultural University, Coimbatore, is closely working with State Department of Agriculture in organizing several joint programs to reach out farmers particularly to manage invasive pests like fall army worm, coconut spiraling whitefly and cassava mealy bug. In the

3.1. Maize Fall Armyworm Joint Awareness Campaigns

The Maize Fall Army Worm Campaigns are being conducted regularly. During the past three years, **795** campaigns have been conducted involving Department officials. This helped to minimize the damage caused by the maize fall army worm.

Year	No. of Awareness programmes	Participants			
		Farmers	Dept. officials	Dealers	Total
2019	384	21750	1250	1450	24450
2020-21	215	14350	880	850	16080
2021-22 (Up to August 2021)	196	12200	720	780	13700
Total	795	48,300	2850	3080	54230

3.2. Monthly Zonal Workshop:

MZW is organized every month jointly by TNAU and the O/o Joint Director of Agriculture as part of ATMA, in the premises of TNAU main campus at Coimbatore, Constituent Colleges and KVKs, in the respective districts.

3.3. **Exposure Visits / Trainings:**

During the last two years (2019-2021), 702 number of Exposure Visits / Trainings were organized for the farmers under ATMA, belonging to different districts of Tamil Nadu, at TNAU, Coimbatore, benefitting 29,100 farmers.

3.4. **Capacity Building Programmes:**

- In association with Tamil Nadu Disaster Risk Reduction Agency, of Revenue Administration, Disaster Management and Mitigation Department, GoTN, Chepauk, Chennai, **900 farmers** and village level functionaries were trained on disaster management during the year 2020, by all the **30 KVKs** in Tamil Nadu, under the scheme '**Capacity Building of Farmers and Village Level Functionaries**' for Disaster Management Planning and Awareness on Drought Mitigation Measures at local level by involving Community Institutions'.
- In association with the State Planning Commission, GoTN, Chennai 284 Agrl. Instructors of Govt. Higher Secondary Schools in Tamil Nadu were trained on latest agricultural technologies, during Jan. 2021 under the scheme 'Knowledge Enhancement Capsule Programme for Agrl. Instructors'.

3.5. **Refresher Training 1.0:**

The Five Batches of Refresher Training was organized for Agriculture, Horticulture, Agricultural Engineering, Agricultural Marketing and Seed Certification. The purpose of the refresher training is to provide technology update in various field. The Training program was managed by the Director of Extension Education, TNAU, Coimbatore. During the first year in 2020, a sum of 889 officers have been trained.

No.	Department	Training Dates	Budget (Rs.)	No. of Participants
1.	Agriculture (Batch I)	Aug. 24-28, 2020	98,000.00	149 (ADAs)

2.	Horticulture & Plantation Crops (Batch I)	Sep. 1-5, 2020	74,500.00	193 (ADHs)
3.	Agriculture (Batch II)	Sep. 14-18, 2020	66,750.00	145 (ADAs)
4.	Horticulture & Plantation Crops (Batch II)	Sep. 21-25, 2020	74,250.00	192 (ADHs)
5.	Agrl. Engineering	Oct. 5-9, 2020	63,750.00	150 (AEs & JEs)
6.	Agrl. Marketing & Agri Business	Oct. 12-16, 2020	38,750.00	35 (DDAs, ADAs, AOs)
7.	Seed Certification & Organic Certification	Oct. 19-23, 2020	41,250.00	25 Seed Certification Officers & 25 Seed Inspectors
		Total	4,57,250.00	889 Officers

3.6. Krishi Vigyan Kendras:

KVKs work in close association with different development departments in the district for implementing their mandated activities, and for providing necessary technical support as follows:

S. No.	Department / Institution/ Scheme	Nature of Coordination
1.	Dept. of Agriculture / Horticulture/ Forestry/ Sericulture/ Fisheries	<ul style="list-style-type: none"> • Facilitating conduct of Monthly Zonal Workshops • Resource persons for training programmes, awareness programmes, Farm Schools • Facilitating exposure visit of farmers of ATMA etc. • Joint Diagnostic visits
2.	Dept. of Agriculture / Horticulture	<ul style="list-style-type: none"> • Involving department officials in Demonstrations of FLDs & conduct of OFTs, and disseminating the success of technological interventions through extension officials. • Joint participation in various awareness programmes. • Implementing all national level awareness programmes
3.	Dept. of Agriculture / Horticulture/ other line	<ul style="list-style-type: none"> • Inspection by KVK scientists of schemes implemented by development departments. (Eg. Micro irrigation programme)

	departments	
4.	Social Welfare department	• Training ICDS project beneficiaries
5.	Member in various district level committees	• IDWG at district level • ATMA District committee
6.	Jal Sakthi Abhiyan	• Implementing awareness programmes jointly with Water Resources department and other line departments
7.	Poshan Maa Abhiyan	• Awareness programme in association with Department of Social welfare
8.	Krishi Kalyan Abhiyan/ PKVY / NICRA / Seed hubs / ARYA/ Skill development programmes	• Implementing programmes in association with all line departments in the district
9.	Cluster FLDs \ Seed hubs	• Availing help of line departments in seed testing and inspection
10.	Grievances Day meeting	• Technical facilitation with JDA at District Collectorate
11.	DDK/ All India Radio	• Providing technical programmes for farmers
12.	Lead banks	• Organizing capacity building programmes

3.7. Activities conducted in association / jointly with State Dept. of Agriculture and other Departments / Collectorate, etc. by TNAU KVKs are as follows:

No.	Activities	Year		No. of beneficiaries
		2019 - 2020	2020 - 2021	
1.	Exposure Visits	153	113	10059
2.	Trainings	213	223	19041
3.	Joint Diagnostic Visits	432	440	4327
4.	Resource Persons	465	579	--
5.	Others	201	111	29663
	Total	1464	1466	81409

4. Status of the State Schemes

Over the past three years, the number of projects obtained from the external sources has increased that assisted in mobilizing funds worth of **Rs. 46.6, 72.5** and **107.6 crores**, during 2018-19, 2019-20 and 2020-21, respectively. The financial support assists to design and articulate research programs to address challenging field problems faced by the farming communities to develop climate resilient crop varieties, technologies to suit changing production systems, therapeutic and trait specific varieties using molecular breeding, smart farming, innovative technologies to manage biotic and biotic stresses, complete farm mechanization, commercialization of technologies besides close coordination with Directorate of Extension Education and the State Department of Agriculture to reach the unreached through internet of things (IOT) besides innovative tools and techniques.

4.1. State Government Sponsored Projects

More than **78%** of the State's budget to the university goes for the salary and hardly funds are available to meet the research expenditure. Considering the special needs and emerging invasive pests and diseases, State Government began to fund projects TANII (Tamil Nadu Innovative Initiative), State Balanced Growth Fund (SBGF) and TNSLURB (Tamil Nadu State Land Use Research Board) and SADP (Special Area Development). These projects address problems of supply of seeds & quality planting materials, soil health, balanced crop nutrition, automation, farm mechanization, management of invasive pests and diseases etc. The total number of State Funded Projects in operation is 21, 25 and 39 with a Budget outlay of **Rs. 14.71, 21.61** and **31.82 Crores**, respectively during 2018-19, 2019-20 and 2020-21, respectively. The Government of Tamil Nadu sanctioned **Rs. 5.0 Crores** to manage an invasive pest fall army worm in maize.

4.2. Extension Projects Funded by Government

There are research projects being supported under NADP (National Agricultural Demonstration Project), TN-IAMP (TN Irrigated Agriculture Modernization Project) by the World Bank and National Seed Programs. The main purpose of these projects is to reach the farmers with latest technologies and to promote rural livelihood. The TN-IAMP covers **66 basins** with

a budget outlay of **Rs. 16.54 Crores** to demonstrate proven technologies at large scale in rice (SRI, green manuring, alternate wetting and drying, direct sown), precision farming technologies (fruits, vegetables, redgram, diversity of crops (maize, gingelly and cotton during delayed release of water from Mettur dam), pulses seed production, oilseed production, flower crops, and pesticide free vegetable production.

4.3. University Research Projects (URPs)

The URPs are proposed by the scientists to meet the requirement of the regional researchable issues generated from the Crop Scientist Meets, Scientific Workers Conference, Research Council or specific problem felt by the university / government to be addressed immediately. It is mandatory that each scientist should have at least one URP to meet the requirement of local needs. The proposed URPs are screened by the RPAC (Research Project Approval Committee) constituted by the Technical Directors and the final approval by the Director of Research. In order to meet the challenging field problems in the State of Tamil Nadu, the Agricultural Production Commissioner has sanctioned **Rs.5.0 Crores** as a special grants to support **190 core projects** that are being implemented in TNAU during 2018-2020. This helped us to develop medicinal rice, identify microbes to enhance host plant drought tolerance, seed encapsulation of nano-fibres for input delivery, development of technology capsule for fall army worm, artificial intelligence to monitor pests, biofortification of rice and millets etc.

University Research Projects (2020-2021)

No	Directorate	URP (as on 10.08.2021)	Core Projects (2018-21)
1.	Plant Breeding and Genetics	229	24
2.	Plant Molecular Biology and Biotechnology	27	14
3.	Center for Plant Protection Studies	235	26
4.	Crop Management	140	27
5.	Natural Resource Management	177	17
6.	Seed Center	57	7
7.	Water Technology Center	5	0
8.	Agricultural Engineering	55	19
9.	Centre for Agricultural & Rural Development Studies	94	13

10.	Horticulture	185	29
11.	Community Science	20	5
12.	Forestry	16	9
13.	Allied Faculty	15	0
	Total	1255	190

4.4. ICAR All India Coordinated Projects (AICRPs)

The TNAU has the highest number of **62 AICRPs** in the country and are being funded by ICAR (75%) and the remaining 25% from the State Government. The 62 AICRPs support **192 scientists** and **254 supporting staff** spread across the university. The focus of the AICRPs is to address national priorities such as enhanced productivity of crops through improved crop varieties, technologies, farm implements and drudgery reduction through handy tools and devices. The 62 AICRPs spread across Plant Breeding (22), Horticulture (15), Natural Resource Management (5), Crop Management (4), Seeds (2), Agricultural Engineering (4), Plant Protection (8), Water Technology Center (1), Community Science (1) and Forestry (2). The total budget outlay for AICRPs is **Rs. 78.0 Crores** annually. During the year 2019-20, TNAU received 5 Best AICRP Centers Awards their outstanding performance.

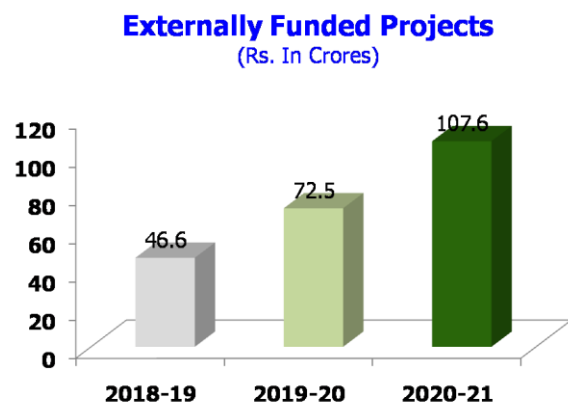
Number of All-India Coordinated Research Projects (2020-21)

No.	Directorate / Centre	No. of Projects
1.	Plant Breeding and Genetics	22
2.	Horticulture	15
3.	Natural Resource Management	5
4.	Crop Management	4
5.	Seeds	2
6.	Agricultural Engineering	4
7.	Plant Protection	8
8.	Water Technology Centre	1
9.	Community Science	1
10.	Forestry	2

	Total	62
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4.5. Externally Funded Projects

The university receives competitive research grants from International and National Funding Agencies such as GAC-IDRC, Canada, DBT, DST, DST Nano Mission, GOI, BRNS, Ramalingaswamy faculty fellow etc to undertake research in biotechnology, nanotechnology, geoinformatics, plant breeding, crop management, crop protection and social research (Table 1).



Externally funded projects from National and International Funding agencies have increased by **2.31** times during 2018 to 2021.

Number of Externally Funded Projects (2020-21)

No.	Directorate / Centre	2018-19	2019-20	2020-21
1.	Plant Breeding and Genetics	9	5	8
2.	Plant Molecular Biology and Biotechnology	6	4	6
3.	Plant Protection	19	14	23
4.	Crop Management	11	12	14

5.	Natural Resource Management	6	10	11
6.	Seed Center	6	4	6
7.	Agricultural Engineering	4	9	8
8.	Centre for Agricultural and Rural Development Studies	5	7	8
9.	Agri-Business Development	3	3	2
10.	Horticulture	2	8	9
11.	Forestry		3	4
12.	Extension Education		2	3
13.	Community Science		1	2
	Total	71	82	104

4.6. Private Funded Projects for Product Testing

The private companies approach TNAU for testing their products, new molecules for their efficacy and field performance. The products include pesticides, fertilizer formulations, growth regulators, varieties and hybrids that are tested on cost basis. Some of the companies are approaching TNAU for specific reasons such as registration of products that involve testing the products in three agro-ecological regions. During the year 2019-2020, there were **33 private funded** projects with a budget outlay of **Rs. 3.95 Crores**. Since, these projects are mere evaluation, the university instead that there should be a basic research component in order to gain insights while providing field data to the companies.

Table 3: Private Funded Projects for Product Testing (2020-2021)

No.	Directorate / Centre	No. of Projects
1.	Natural Resource Management	6
2.	Crop Management	7
3.	Plant Protection	16
4.	Horticulture	4
	Total	33

5. Infrastructure

The TNAU has good infrastructure carrying a wide range of high end equipments for research (> Rs. 10 Lakhs) numbering 382 with a worth of more than **Rs. 100 Crores**. The university has advanced Nanotechnology Center, Biotechnology Center, Geoinformatics, Molecular Breeding Center, Ramiah Gene Bank, Post-harvest Technology Center, NABL accredited labs (4), COE (7), Vertical Farming in Horticulture, Agro-forestry Models etc.

6. Problems & Issues if any

- Acute scientific manpower shortage both colleges and research stations. More programs being operated with deficit manpower
- Research support for research stations
- Shortage of labour in many of the farms unable to meet the challenges in ensuring cropping program
- Complete mechanization
- Fencing & roads are to be laid / relaid in most of the research stations
- Man-animal conflict and management of vertebrate pests (peacock, wild boars, elephants, parrot, monkeys)
- Renovation of old research stations (TRRI, Aduthurai, ARS, Kovilpatti, ARS, Vaigai Dam etc)

7. Research outcomes from various Directorates

7.1. Crop Varieties

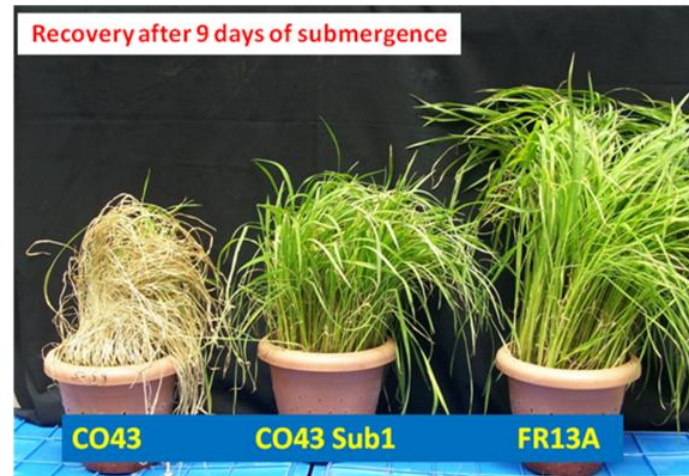
- The TNAU has released 865 varieties in a wide array of crops in the past 100 years during 1920 to 2021.
- The newly released notable TNAU varieties during the past five years include **rice** (Co. 51, VGD 1, TKM 13, CR 1009 Sub1, TPS 5), **millet**s (Samai ATL1; Tenai ATL 1; kodo millet MDU 1), **pulses** (blackgram VBN 6, VBN 8, VBN 11), **oilseeds** (Groundnut VRI 8; TMV 14; BSR 2), **cotton** (Co. 17), **castor** (YTP 1; YRCH 1 & 2) and forages (CSV 33MF; BN 4)
- Rice (**Co. 51**) is one of the landmark variety spread across the country in 13 States possessing a wide spectrum of resistance to abiotic and biotic stresses besides high yield. This is widely used as an adopted line in breeding programs.
- **VGD 1** Seeragasamba (briyani) rice is very popular in the State of Tamil Nadu and promoted as the non-basmati rice. Within 2 years of release, the variety spreads across the major rice growing tracts of Tamil Nadu. Farmers who cultivates get lucrative additional income of more than **Rs 65,000 – 85,000** per ha.
- The **TKM 13** is highly adaptable variety with less incidences of blast and equivalent to BPT 5204 and spread over **2.25 lakh ha** in the State. The monetization of this variety works out to Rs. 430 Crores. The **CR1009 Sub1** which is highly recommended for submergence and suitable for lowlying and flood prone areas.
- The TNAU has dedicated COE for **Small Millets** that has brought three varieties in foxtail millet (ATL 1), little millet (ATL 1) and vargu (ATL 1) besides banyard millet (MDU 1) that climate resilient varieties being promoted by the State and Centre.
- Maize hybrids (**Co HM 6 and CoHM8**) are nationally known for its high yield and wide adaptability even in southern and northern States. One of the maize hybrid developed by TNAU under AICRP is VMH 130-14 and released for Eastern Zone of India.

- The **forage crop varieties** such as Bajra Napier Hybrid (Co. 6), desmanthus (Co.2), multi-cut fodder sorghum (CSV 33 MF) and *Cenchrus setigerus* (Co. 2) are nationally accepted and spread all over India.
- TNAU released YMV resistant blackgram varieties (**VBN 6 & 8**) that are recommended for rainfed conditions. These two varieties constitute more than 2.5 lakh ha in the State of Tamil Nadu. In red gram, **Co. 8** performs well under rainfed conditions, resistant to sterility mosaic, with a yield potential of 3 tonnes per ha.
- The groundnut varieties (**BSR 2 & TMV 14**) are known for their high yield of 2.5 tonnes per ha with less incidence of leaf spot diseases
- Castor variety (**YTP 1**) and hybrid (**YRCH 1**) are high yielder, non-shattering and well known for their adaptability to drought prone areas
- In cotton, zero monopodia **Co.17** variety is amenable for high density planting and machine harvest. It is also suitable for rice fallow conditions. One of the upland cotton varieties released by TNAU long back KC 3 serves as the resistance for sucking pests.
- Tamil Nadu is one of the richest State conserving genetic resources and gene pools that assist in development of climate resilient varieties and hybrids to sustain productivity under the changing climate scenarios. "**Ramiah Gene Bank**" established at TNAU in 2010 which is housing more than **One Lakh genetic resources** for a medium term storage up to **20 years** and long-term storage up to **1000 years**. Currently, **28,750 genotypes** are stored at 20°C. The TNAU helps the country in collection, conservation and evaluation of genetic resources to sustain crop production regardless of vagaries of monsoon. This facility is opened to other States as well on cost basis.

7.2. Biotechnology & Molecular Breeding

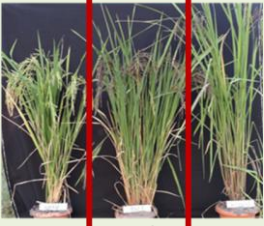
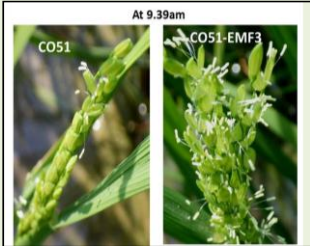

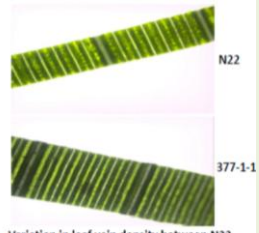


- The Tamil Nadu Agricultural University, Coimbatore, established the Center for Plant Biotechnology & Molecular Biology (CPMB) in 1985 and the center is well equipped with infrastructure, manpower and wide range of externally funded projects that enabled towards the development of processes and products leading to improved yield and quality of crops.

- The CPMB developed **three varieties (Anna 4 - drought tolerant; CO43 Sub1 - submergence tolerance; ADT 55 - BLB resistant)** in rice through marker assisted selection. These genotypes are trait specific and it being promoted to address the problem of abiotic and biotic stress conditions.



- The TNAU PG Biotechnology Program is rated as **A+** by the Department of Biotechnology, Government of India, New Delhi. The Centre has released a submergence tolerance variety of rice (Co 43 Sub1) for the benefit of Cauvery Delta Zone farmers and the Center is actively engaged in developing new varieties in rice, maize, millets, pulses and oilseeds through the innovative breeding methods involving gene pyramiding and gene editing techniques.
- DNA finger printing** has been done for most of the released TNAU crop varieties and the genetic resources available in the germplasm
- Therapeutic rice (Kavuni)** was improved as photo-insensitive and 2.5 times higher yield than the local land races. This variety is about to be released for cultivation.

Biotechnology - Rice varieties with Special Traits

<p>Therapeutic</p>  <p>COSO RIL 35/3 Kavuni</p>	<p>Heat Tolerance</p> <p>At 9.39am</p>  <p>COS1 COS1-EMF3</p>	<p>Herbicide Tolerance</p>  <p>N22 - Unsprayed N22 - Sprayed</p> <p>HTM - Unsprayed HTM - Sprayed</p>
<p>High Photosynthetic Efficiency</p>  <p>N22 377-1-1</p> <p>Variation in leaf vein density between N22 and its mutant 377-1-1 plants</p>	<p>Fe & Zn fortified rice</p>  <p>Trangenic ASD Before After</p> <p>Classic Breeding Advanced fortified lines</p>	 <p>Expected in 1-2 years</p>

- BTIS sub center is operating for the past 30 years and a new Bioinformatics & Computational Biology Center has been sanctioned up to 2025.
- The BIRAC has sanctioned **University Innovation Cluster** and e-YUVA center to foster innovation and entrepreneurship. The Center also received Biotechnology Ignition Grant.

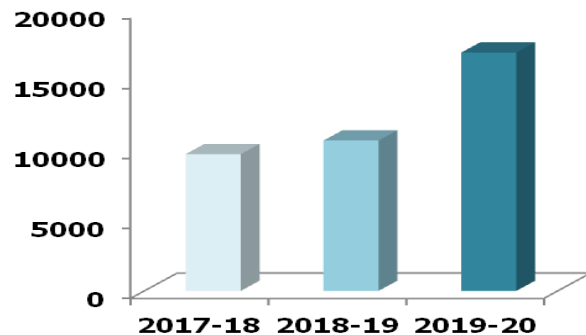
- To make Tamil Nadu State as a preferred destination for global investors in Biotechnology, TNAU joined hands with State Government and NABARD to establish "**Centre of Excellence in Biotechnology**" at the Centre for Plant Molecular Biology and Biotechnology with a budget of **Rs. 435 Crores** which is a "State-of-the-art facility" for carrying out research on "**Proteomics and Metabolomics**". This center will establish public-private partnership in biosciences to benefit the stakeholders and farmers

7.3. Seed Center

The Seed Center is the standalone directorate responsible for the production and supply of quality seeds in a vast number of crops besides carrying out research for invigorate seeds. The Center Seed Centre continues to facilitate enhanced availability of foundation seeds that constitutes the back bone of quality seed availability of notified varieties which subsequently multiplied to produce certified seeds in seed supply chain.

- The Seed Center has done exceedingly well in seed production and distribution activities. In order to meet the seed growers, farmers and private seed industries, a total quantity of **1832 tonnes** of seeds of various crops were produced and supplied which includes 129.7 tonnes breeders seeds, 583.5 tonnes of Foundation Seeds, 153.2 tonnes of Certified Seeds, and 965.5 tonnes of TFL seeds which is nearly two-fold increase as compared with 2017-18.

Seeds Produced (in Quintals)



Quantity of seeds produced and supplied has **doubled** in the past three years

- In addition, **23.8 lakh seedlings** of various horticultural crops and tree species were supplied during the year 2019-2020.
- During 2020-2021, TNAU got five NADP projects with a financial support of **Rs. 7.05 Cr** to undertake seed production, distribution of quality planting materials of onion, moringa and flowers besides Center of Excellence in Groundnut.
- The Center has developed designer seeds, seed pelletizing techniques for millets and seed invigoration methods that assist in improving the germinability of seeds and population maintenance in crops.
- The Seed scientists have developed a "Seed Ball" technology for tree species that was successfully demonstrated in teak and other tree species and planted 1 lakh seed balls in FC & RI, Mettupalayam and the performance being assessed.

7.4. Crop Management

- The TNAU has developed more than **1500 technologies** for adoption by farmers to improve the productivity and profitability of crops and the entire technology package has been capsulated as the **Crop Production Guide** in Agriculture and Horticulture and the updated version is released in **2020**.
- **Direct seeded rice cultivation practices** have been optimized to take as a contingent strategy to overcome water deficit conditions
- **Drip fertigation in rice** has been successfully demonstrated as a measure to improve the water productivity. It has been estimated that the water requirement for rice cultivation is 3000-5000 litres while drip fertigation consumes 1200-1400 litres of water to produce one kg of rice.
- **Broad spectrum weed control** can be achieved by adopting Pre-emergence (3rd Day) : Pyrazosulfuron ethyl 10% WP @ 20 g ha⁻¹ and Post-emergence (20-25 DAS) : Bispyribac sodium 10% SC @ 25 g ha⁻¹

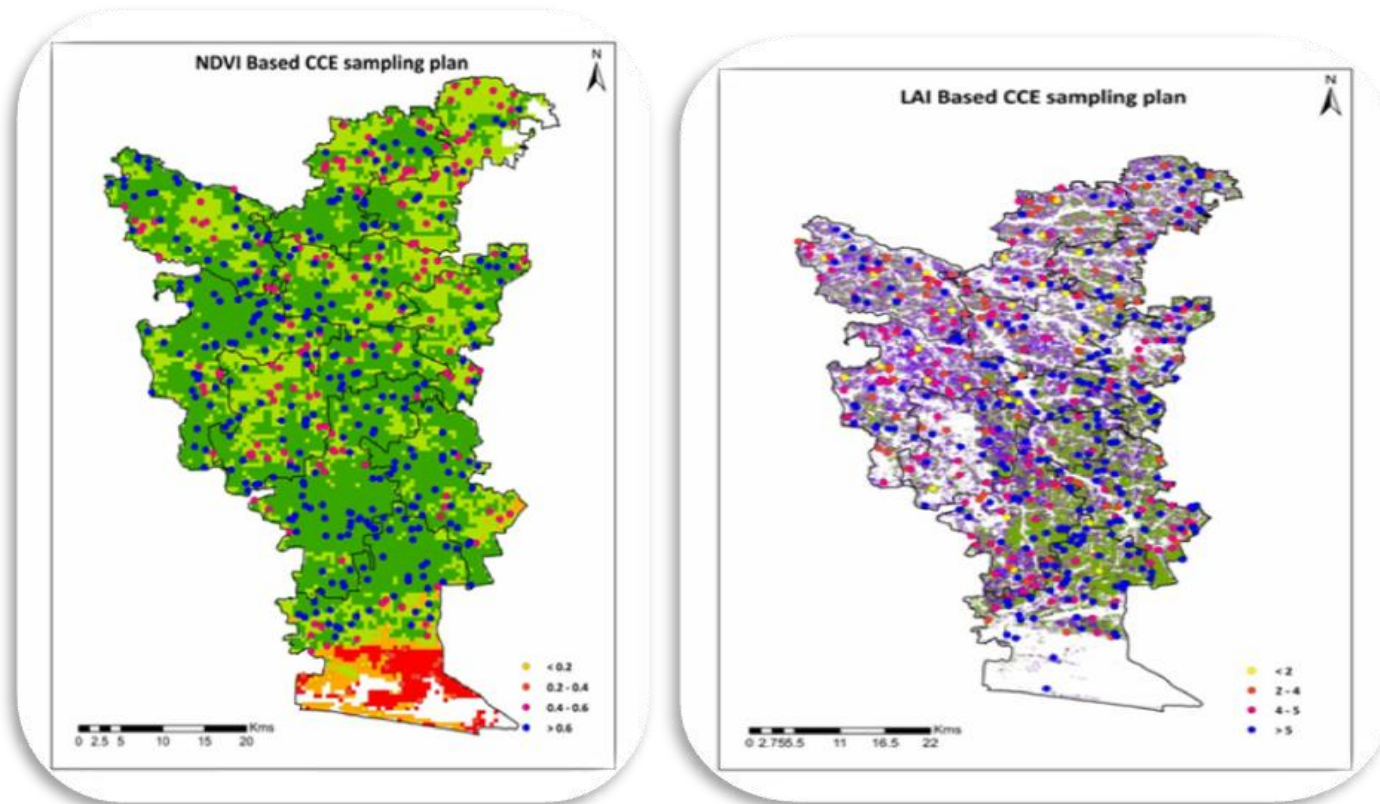
- Management technologies such as System of Rice Intensification (**SRI**), Precision farming, Sustainable Sugarcane Initiative (**SSI**), Drip fertigation and High density planting in fruits are highly recommended to suit current production scenarios. These management practices are widely adopted and responsible for sustaining the productivity.
- The crop boosters such as Coconut Tonic, Pulse Wonder, Groundnut Rich, Cotton Plus, Maize Maxim and Sugarcane Booster developed by the Department of Crop Physiology received bountiful of appreciation and helped the farming communities to sustain their farm income. The crop boosters have been sold out to the tune of **Rs. 136 Lakhs** to cover an area of **6686 ha** in the State of Tamil Nadu. A dedicated "**Crop Boosters Production and Supply Center**" has been established at TNAU with **Rs. 60 Lakhs**.
- The Agro-Climate Research Center provides agro-advisory services as SMS in local language for 108 crops for taking strategic and tactical farming decisions that help the farmers to save inputs by 10-15%.
- The Tamil Nadu State being the most water starved state next to Rajasthan, various strategies are being developed to conserve soil moisture. An exclusive **Dryland Agricultural Research Station** (DARS), Chettinad, has been established and various dryland technologies and various models have been exhibited for the benefit of farmers and department officials.
- The World Bank supported Tamil Nadu Irrigated Agricultural Modernization Project (**TNIAMP**) is in operation at the Water Technology Center for the period 2017-2024 in 66 sub-basins spread across the State of Tamil Nadu covering **2.35 lakh ha of ayacut area**. About 12,746 farmers were trained for better market access, crop diversification, value addition and IEC (Information, Education, Communication). Because of the World Bank Funded Project, the Tamil Nadu State has **12 lakh ha** under micro-irrigation which is the highest in the country as well as in the world. This attracted Krishi Karman Award for Micro-irrigation to the State of Tamil Nadu
- The TNAU has a well knitted weather network connected with 385 blocks in the State with **Automatic Weather Stations**. A WeatherApp has been developed by the Center that provides weather based agro-advisories to the farmers who have registered in the network.

2.5. Natural Resource Management

The Directorate of Natural Resource Management has five Departments namely Soil Science, Microbiology, Environmental Science, Nanotechnology and Remote Sensing & GIS. This is newly formed directorate and the achievements made are phenomenal.

- The **STCR-IPNS** fertilizer prescription decision support system "DSSIFER 2020" has been upgraded and released for adoption. Site specific fertilizer doses for 2235 soil-crop situations and fertilizer prescriptions for 190 agricultural and horticultural crops are available at the click of the mouse. The software also provides reclamation measures for problem soils.
- The Directorate of Natural Resource Management has come out with crop specific **micronutrient mixtures**, foliar micronutrients, chelated micronutrients, newer concentrated biofertilizer formulation, Zn solubilizer, PPFM, biomineralizers and other microbial consortia for improving the productivity of crops while ensuring environmental safety.
- **Stage specific inoculants** for rice, an efficient biofertilizer technology suitable for organic rice growers enables an additional income of Rs. 6000 - 7000 per ha. This is supported by National mission for Sustainable Agriculture (NMSA) in which 4300 farmers were benefited.
- The Department of **Remote Sensing & GIS** has helped the State Government in impact assessment, risk assessment, crop health monitoring. The Department Environmental Science in collaboration with ISRO is monitoring ozone and black carbon besides other atmospheric pollutants. The Department has developed smart sampling procedure that has been recommended to GOI for adoption to convert the imageries into insurance claims.
- The Department of Remote Sensing & GIS helped the State Government in assessing the impact of **Gaja cyclone** (Nov. 2018) on number of coconut palms affected as **38,78,324** in Tanjore and Pudukottai Districts using drones within three days of incidence. This facilitated disbursement of compensation to the affected farmers within few days. Further, it assessed the impact of drought in 2016-17 and the payment of insurance to the tune of **Rs. 3000 Crores** using RIICE (Remote Sensing Information based Crop Insurance).

- The team has developed **SOILDOC** App for the on-site information of geo-referenced soil data. The SoilDoc App carries information for the entire State of Tamil Nadu at the click.
- **Drone technology** was successfully demonstrated to deliver herbicides, insecticides, fungicides, bioformulations, nutrients and crop boosters. This technology is very powerful as it would cover one acre in 2 minutes and the cost of spraying is **Rs. 150** per acre. This will certainly help to tide over the acute labour shortage besides effective pests and disease management. The TNAU had discussion with Anna University, Chennai, Israel Consulate General, High Commissioner of UK in Chennai, to undertake research in sensors, robotics and drones technology.



- The **Nanotechnology Center** has reached the centre stage in **Prime Minister VAIBHAV** program wherein TNAU will have opportunity to tie up with a wide array of foreign universities in a single platform. The Center begins to commercialize nano-products like enhanced freshness formulation, nano-stickers, nano-anti transpirant and nano-sanitizer against COVID -19.
- The Center has also developed a nano-fibre enabled input delivery technology that is known to substantially reduce the input use in agri-food systems. Indeed, it is a national pride for the university to state that **DBT & ICAR recognized TNAU Nanotechnology Center as the National referral laboratory** for technology development and biosafety. Dr. K.S. Subramanian, Director of Research received the National Award instituted by Fertilizer Association of India Golden Jubilee Award for his outstanding contribution in the field of nanotechnology in agriculture in general and nano-fertilizers in particular.



2.6. Crop Protection

The Center for Plant Protection Studies (CPPS) carries the Departments namely Entomology, Pathology and Nematology. The Center has taken various steps to protect the crop from trans-boundary pests such as Fall Army Worm, Rugose Spiraling Whitefly, Cassava mealy bug besides viral diseases and other emerging plant diseases and nematode management in horticultural crops.

- The TNAU has undertaken assiduous efforts to overcome the menace of invasive pests and effectively combat the spread through the timely interventions of TNAU scientists. The Tamil Nadu Government has sanctioned **Rs. 4.53 Crores** to develop IPM Module for Maize **Fall Army Worm (FAW)** and validation through farmers' participatory approach. The TNAU set a core team and taskforce scientists to circumvent the incidence of invasive pest "**FAW**" and the team is extensively working for the past eight months across the state of Tamil Nadu. During this period, 325 demonstrations on technology capsule in farmers' holdings and 20 Kisan melas were conducted to cover 22500 farmers, 2500 input dealers and 2150 extension functionaries.
- **Rugose whitefly** is being effectively managed by two natural enemies namely *Encarcia* parasitoid and *Chrysoperla* predator both are being supplied by CRS, Aliyarnagar and HC & RI, Coimbatore, respectively. TNAU has committed to supply the required predators to cover an extent of **12,500 ha** under coconut within a period of 6 months. The Coconut Development Board is supporting a project to multiply and supply to the farmers.

Fall Army Worm Technology



Coconut Rugose White Fly



- Yet another notorious pest is causing a great concern is the **cassava mealybug** which being addressed by TNAU scientists and the development of technology capsule integrating biological control agent which is going to be imported from other countries through ICAR - NBAII, Bengaluru.
- TNAU has developed a **Sweet Flag EC formulation against Bruchid beetle** (10 ml kg) which is recognized by the ICAR as National technology against storage pests. This formulation offers complete protection against pulse beetle and also known control other storage insect pests.
- A team has been set to manage viral diseases in plants covering all dimensions of strategies. A dedicated taskforce has been set to develop technology capsule for the management of viral diseases. Nano-silica loaded with biomolecules (Annosquamosin or azadirachtin)
- A National Seminar on "**Mushrooms - Rise of Research and Retreats**" was conducted to popularize medicinal mushrooms and develop novel formulations for managing plant and human diseases. Nearly, 900 individuals were trained for mushroom cultivation in one day and five days training programs.
- The nematology team has brought out a user friendly handy guide on "**Nematode Management in Horticultural Crops**" for the scientists and development officials.

2.7. Horticulture

- In the past five years, the Horticulture College & Research Institutes in Coimbatore and Periyakulam have released 18 improved crop varieties encompassing fruits, vegetables, spices, medicinal and flower crops.
- Notable ones are in **fruits** (Banana Co. 2; Papaya Co.8), **vegetables** (tomato: CoTH 4; Onion Co. 5 & 6; bhendi CoBH 4; cassava YTP 2) besides other crops. These varieties are well known in the State and popular in southern parts of the country. **Banana (Co.2)** is released after 30 years known to be resistant to nematode and highly preferred by consumers. Highly drought tolerant fruits such as Manila Tamarind (PKM MT 2) with red arils which is recommended for drought prone areas. **Onion varieties** (Co. 5 & Co. 6) are also popular in the State.

- The Faculty of Horticulture is known for its quality seed production and supply to the farmers. The Center produced and supplied **7482 kgs of vegetable seeds** of which 1953 kgs are hybrids to the farmers directly as well as through the Department of Horticulture and Plantation Crops.
- TNAU has developed **high density planting and ultra-high density planting** in mango, guava and moringa wherein the space and planting geometry is altered to accommodate more number of plants per unit area. This technology helped mango orchards to produce fruits in 3-4 years with a yield potential of 8 tonnes per ha with an added advantage of mechanized / easy to harvest because of the dwarf plant architecture.
- The horticultural crops have been promoted through **Jack day, Grapes Day and Banana day** to establish network among growers, traders and scientists. Indeed, this helped to attract a wide spectrum of collaborations for research and developmental activities. Such events will happen in other major fruits to gain fruition of benefits. This is a new initiative assisting the farmers to establish a supply chain management for a specific crop. Such collections serve as the large genetic resources for the varietal development.
- The **grafting technique** in brinjal is gaining popular among farmers and found to reduce incidence of nematode and fruit and shoot borer. TNAU has supplied **1,20,000 grafts** to the farmers and more research is underway to take the fruition of the grafting technology.
- The TANII (Tamil Nadu Innovation Initiative) project on '*Pilot plant for upscaling extraction of bioactive molecules from medicinal plants with backward and forward linkage*' was approved by the State Planning Commission with a budget of **Rs.183 lakhs**.
- Further, Horticultural Research Stations located in Kodaikanal, Thadiyankudisai, Pechiparai and Yercaud are being enriched with new fruits and plantation species to serve as a genetic resource to be supplied to the local farmers.
- The Horticultural College & Research Institute, Coimbatore, has taken up task of renovating the Botanical Garden established in 1912 with new garden components and more plant species besides garden entertainment to spare leisure time so as to serve as a unique learning environment for horticulture, agriculture and forestry graduates.

2.8. Agricultural Engineering

- **Farm mechanization** and automation in agriculture are gaining importance to overcome the acute labour shortage for agricultural field operations. The main focus of the AEC & RI, Coimbatore and Kumulur is to develop miniaturized farm implements that suit Indian agriculture as more than 90% farms in the State of Tamil Nadu are small and marginal.
- The notable new developments are **integrated processor for turmeric**, tissue culture banana seedling planter, ground nut harvester and stripper, promotion of solar dryers (chillies, coconut copra and medicinal plants), automatic vegetable seedling transplant mechanism and protray seeding device for red gram and a six row carrot seeder with electronic control.
- The Centre for Post-Harvest Technology is organizing skill development training programs in food processing and value addition of farm produces.
- Recently, engineering graduates are in the process of developing **robotics** for agricultural operations. An MOU has been signed between TNAU and NULES (National University of Life and Environmental Sciences), Ukraine.
- The TNAU had a dialogue with **Anna University**, Chennai, and **Israel Consulate General** to develop research collaborations in the sphere of sensors, artificial intelligence, robotics besides device & machinery development.
- The TNAU got a prestigious SPARC project to facilitate a Ph.D. scholar Ms. R. Sasireka to pursue part of her thesis research at the University of Minnesota, USA, for on-site detection of aflatoxin using FT-IR technology. **Thirty six Agricultural Engineering graduates** passed out in 2019 were recruited as Assistant Engineers in State Department of Agricultural Engineering through TNPSC selection.

2.9. Forestry

- The Forest College & Research Institute, Mettupalayam, has phenomenal progress in research and development activities besides entrepreneurship.

- During the year 2019-2020, **152 B.Sc (Forestry)** graduates from TNAU were recruited as Forest Range Officer and are serving across the State of Tamil Nadu.
- In addition, **21 B.Sc (Sericulture) graduates** were selected as Assistant Inspector of Sericulture through TNPSC and were felicitated by the Vice Chancellor of TNAU on 12.12.2019.
- The Institute mandated Forestry and Agro-Forestry Research which resulted in development of High Yielding Short Rotation clones amenable for multifarious industrial utility. The Kadam MTP 1 and *Melia dubia* MTP 1 released by the College is very popular among farmers.
- One lakh plantation carrying indigenous tree species was inaugurated by our **Honourable Governor of Tamil Nadu State** and Chancellor of Tamil Nadu Agricultural University a year ago has established well as an "**Oxygen Park**" which serve as a base to determine the growth and utility of those tree species.
- The center organized a stakeholders meet for "**Natural Dye**" to promote one of the tree species identified *Bixa orellana* colloquially called "**lipstick tree**" which yields natural dye from the mesocarp of the fruits. Since synthetic dye causes major havoc in farmlands juxtaposed with textile cities of Tiruppur and Karur districts, natural dye is a boon to the western regions of the State.
- In order to expand the area under green cover, **one lakh seed balls** of native tree species was sown for restoration. An international webinar on "Urban Forestry and Air Quality" was organized on 10.8.2020 involving scientists from Singapore, Thailand and Indonesia. The **TNPL and IFTGB** have signed MOU with TNAU in order to undertake planting of tree species in various research stations and colleges of TNAU with a view to utilize the waste lands more effectively.

2.10. Community Science

- Community Science College & Research Institute, Madurai, has done excellently in both education and research activities. During the period under report, 3 Ph.D students were with UGC NET. Another 3 UG students got ICAR - JRF to pursue their PG program.
- The CSC & RI organized several webinars to disseminate the food technologies and enriched food products available. The Government of India is promoting the activities of food processing under "**Aatmanirbhar Bharat**" and the auspice of PM Formalization of Micro Food Processing Enterprises Scheme (PM FME Scheme) organized by the Ministry of Food Processing Industries.
- **Three technologies** namely simulated rice analogues, kodo millet beverages and vitamin B12 were released as technologies for commercialization. Fortified rice analogues were also developed through natural and synthetic fortificants to enhance the micronutrients. Vitamin B12 which can be obtained only through animal source is enriched in millet fermented beverage serves as a good source of this vitamin especially for vegetarians was developed. Kodo millet beverage rich in minerals serves as a promising alternative for the soya and other milk products available in the market.

2.11. Center for Agricultural Rural Development Studies (CARDS)

- The Directorate of CARDS carries **DEMIC** (Domestic and Export Market Intelligence Cell) provides pre-sowing and pre-harvest price forecast of 14 major agricultural and horticultural crops of Tamil Nadu disseminate through print and electronic media. During the reporting period (August 2019 to August 2020), DEMIC has given 17 pre-sowing and 16 pre-harvest advisories with a 92% validity.
- The price forecast is broadcast widely through newspapers, magazines, FM Radio, TV, SMS, email, websites and Uzhavan APP. The **ICAR - NASF** has funded project on "Causes and Consequences of e-National Agricultural Market on the Economic Development of Indian Agriculture" with a budget outlay of **Rs. 143.14 Lakhs**. It is a network project involving Tamil Nadu, Telangana, Andhra Pradesh and Haryana.
- In Tamil Nadu, 15.65 Lakh Quintals of agricultural produce valued at Rs. 277.24 Cr transacted through **e-NAM** platform and **Rs. 48.50 Cr** e-payment made to 12,511 farmers. The Intellectual Property Management Cell (IPMC)

facilitated to get **8 patents** and a copy right for **KumET** besides providing assistance to file and process 75 patent applications.

2.12. Agri-Business Directorate

- The Directorate of Agribusiness Development (DABD) was established in 2007 with the major mandate of supporting startup companies in agriculture and also commercializing the technologies developed by the University. There are six Agri Business Incubation Forum (ABIF) are operating in TNAU, Coimbatore.
- The TNAU has six Agri-Business Incubation Centers (Coimbatore, Madurai, Trichy, Killikulam, Periyakulam and Mettupalayam) to cater to the needs and aspirations of the local farmers and communities.
- In total, 181 incubatees enrolled in ABI, out of which 30 have been granted **Rs. 165.3 lakhs** for their innovative ideas. Under Student Entrepreneurship program (AGPREUN), 138 students participated and three best teams were selected for the award with a cash prize of Rs. 30,000.
- During 2019-20, six technologies and two hybrids have been commercialized with a total value of **Rs. 29.1 Lakhs**. Three consultancy projects with a budget of **Rs. 25 Lakhs** are being implemented. In order to promote commercialization of TNAU products and technologies, 171 Venture capital Schemes are being implemented that generated revenue of **Rs 865.43 lakhs** for the year 2019-2020.
- Recently, Atal Ranking of Institutions on Innovation Achievements (ARIIA) 2020 ranked only TNAU in the **6-25 band** amongst SAUs, an indication of progressive growth in transformation of agricultural technologies, commercialization and entrepreneurships.

2.13 Directorate of Planning & Monitoring

- The Planning and Monitoring Directorate strives to compile differential data for the need based institutions/ Government on demand highlighting the entire university accomplishment /achievements/contribution in Teaching, Research and extension.

- To infuse confidence and to enhance research project, the **Tamil Nadu Innovation Initiative projects (TANII)** have been processed and mobilized funds to the tune of **Rs. 47.02 crores** for upscaling, marketing and policy formulations.
- The **Faculty Development Cell** was launched with slew of trainings on the ethical standards, quality teaching, augmented learning, ICT based teaching, quality research, intellectual writing etc., For the quality consciousness and for the holistic development, the **Internal Quality Assurance Cell (IQAC)** has been launched and the activities like guest lecture/ workshops were planned. The TNAU ranking has improved tremendously from 33 in 2018 to 7 in 2019 and there is a bright scope for further improvement within the rank of 3 in the years to come.

7.5. Extension Education

- Totally, **521 numbers** of Vocational training programmes were organized during the last 5 years, that benefitted **14,520 farmers**, farm women and youth were benefitted.
- Totally **six lakhs farmers** were benefitted by the various extension programmes conducted by the KVKs, Research Stations and College Campuses of TNAU. Through the Extension programs, awareness, knowledge, skills and adoption rates were enhanced among the beneficiary farmers.
- **4,72,008** Kilograms of seeds on rice, pulses, millets, oilseeds, vegetables, fruits and forage crops were distributed to the farmers for wider scale adoption. Besides, **6,45,433** numbers of planting materials of fruits and vegetables were also supplied to the farmers through KVKs. In addition, **4,85,315** numbers of cuttings mainly for forage crops were supplied to the farmers. In addition to ICAR – KVKs, the TNAU directly produce and supply seeds and planting materials to farmers.
- The TNAU has taken assiduous efforts to build e-extension center in 2006 in order to take the advantage of Information and Communication Technologies (ICT). The Open-Source ICT initiatives in e-Extension centre for the benefit of field extension officials, scientists, students, farmers and stakeholders in Tamil Nadu and India. The **TNAU**

AGRI TECH PORTAL: Repository to Stakeholders (<http://agritech.tnau.ac.in>) funded by Rashtriya Krishi Vikas Yojana (NADP) helped us to develop A-Z information on Agriculture and Allied Subjects.

- The TNAU Agri-Portal is a unique, dynamic and multimedia based portal for the benefit field extension officials and farmers being provided in Bi-lingual languages (Tamil & English) and carries more than six lakh pages of information. The salient features of portal include linking all the developmental departments under one platform, **900 success stories** besides networking producers' organizations.
- Expert systems intended for monitoring pests, diseases and nutrient monitoring in agricultural and horticultural crops. In addition, special techniques developed by TNAU such as system of sugarcane initiatives (SSI), system of rice intensification (SRI), ultra high density planting, red gram cultivation through drip and fertigation, weather forecast, updates on government schemes and precision farming etc, were included.
- This is an excellent technology transfer platform benefiting at least 10,000 people every day. The TNAU is a pioneer as far as **e-Extension** is concerned across the country. The university utilize **several e-learning tools / applications** such as TNAU Agri Tech Portal, Expert System Mobile Apps, e-Velanmai App, M-Velanmai App, YouTube channel, videos on agricultural technologies, Twitter, etc.
- TNAU Community Radio "*Vivasayee* FM 107.4 mhz" broadcast programmes on farm technology between 10-12 noon from Monday to Friday suited to the local needs of the people residing in 15-20 km radius. The programmes are produced by involving members of the community, progressive farmers, students and scientists. During the year 2015-16 to 2019-20, 6350 programmes broadcasted for the benefit of the farming community.
- A monthly Tamil farm magazine is published by TNAU since 1975 to disseminate farm technologies to the farmers, extension officials and students. The magazine has 17, 168 subscribers (16,466 annual and 702 life subscribers).

