



**TAMIL NADU AGRICULTURAL UNIVERSITY
COIMBATORE – 641 003, INDIA**

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**No. TNAU/DPM/F 158/0005/TAWDEVA/XII FYP- New Proposals 2013 dt.
30.08.2013.**

To

All University Officers, TNAU/Heads of Departments in TNAU, Coimbatore/ Heads of Research Stations/Programme Coordinators of KVKs.

Sir,

Sub: DPM – XII Five Year Plan document based – New Proposal under NADP and Part II funding and other sources of funding – reg.

Ref: 1. Ir. No. 0005/TAWDEVA/NADP/2013 dt. 6.08.2013 of the Executive Director, TAWDEVA, Chennai – 600 032.
2. Approval of the Vice Chancellor in this office note file no. TNAU/DPM/F 158/XII plan/New proposal/2013. Dt.26.08.2013

I am by direction to enclose a copy of the part of the XII plan document of Tamil Nadu relating Agricultural Research and Education. It is requested that all new proposals to various agencies may please be prepared to address issues that are flagged in the above document incorporating latest development if any

It is also requested that proposals may please be prepared by the Directorates/Colleges/Units concerned for implementation of the schemes considering the outlay indicated in Table 3.4.3 of the above documents. The Vice Chancellor shall take up review then and there in this regard.

Encl : a/a.

**Director (i/c)
Planning and Monitoring**

CC: The Technical and Personal Officer to the Vice-Chancellor, TNAU, Coimbatore.



3.4 AGRICULTURAL RESEARCH AND EDUCATION

Introduction

Growth of agriculture and allied sectors is crucial for an overall accelerated performance of the country's economy. In order to achieve balanced nutrition and inclusive growth, considering the trend of diversification of food basket and experience on the factors underlying growth during the past decade, attaining and maintaining a steady growth in cereals, pulses and oilseeds is essential and an accelerated growth of livestock, fishery, forestry and horticulture sub-sectors is also required. Since land is a shrinking resource for agriculture, the pathway for achieving these goals has to be higher productivity per unit of arable land and water.

Research has to be focused more on the society's needs. It has also to take note of changes due to globalization, technological development and growing emphasis on value addition. At the same time, resource and time limitations necessitate prioritizing and optimizing research activities. The thrust areas in which research is to be undertaken, strategies to achieve the targets and specific research programmes such as crop improvement, crop management and crop diversification, crop protection and post harvest technologies required to be achieved are to be prioritised.

Vision Tamil Nadu 2023 envisages the development of eleven marquee projects that will create a huge positive impact and provide significant spin-off benefits. Among the ten signature projects, development of world class institutions of research and knowledge in agriculture is one of the key areas and the Twelfth Five Year Plan will create ways to achieve the same.

To achieve the target of 5.0 percent growth in agricultural and allied sector and to double the farmer's income, research institutions like Tamil Nadu Agricultural

University (TNAU), Coimbatore, Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), Chennai and Tamil Nadu Fisheries University (TNFU), Nagapattinam are to play a major role.

I. Agricultural Research and Education

Tamil Nadu Agricultural University (TNAU), Coimbatore

As the agricultural education and research systems in the State has to face new challenges in the coming years, the education and research systems have to respond effectively to these challenges to produce output that are economically viable and efficient. The processes that lead to these outcome have to be reoriented in a competitive, demand-driven model. The advent of modern information and communication technology revolution should be effectively harnessed to make the education, research and extension activities socially relevant.

The area under agriculture in the State is declining. The breakthrough in agriculture will thus, ultimately have to come from technology with a right vision that places the farmer and his welfare at the centre of action. For this, the State should exploit its comparative advantage in the production of certain crops and should accordingly plan about agricultural research and production strategy. The role of TNAU therefore becomes crucial.

TNAU is a leading agro technology provider of India and its graduates are recognized throughout the world. TNAU has won the Indian Council of Agricultural Research's (ICAR) prestigious Sardar Patel Outstanding ICAR Institution Award in 2010 amidst stiff competition from 97 ICAR institutes and 53 State Agricultural Universities (SAU) in the Nation. TNAU is serving the country through six avenues:

Agricultural Education, Research, Extension, Open and Distance Learning, Agribusiness Development Programmes and Agricultural Policy Support. There are 11 colleges functioning in eight campuses, 36 research stations, 14 Krishi Vigyan Kendras (KVKs) and five Plant Clinic Centres. The University also provides affiliation to six agricultural colleges to offer degree courses and five agricultural institutes to offer diploma courses.

Achievements and Initiatives taken during the Eleventh Five Year Plan

Education

The century old campus of TNAU houses more than 3000 students and offers courses from the undergraduate level to the doctorate level. Several innovative programmes like dual degrees and international collaborations have enhanced its stature. ICAR, New Delhi, has provided the Certificate of Accreditation for the education programmes of TNAU from 2001 onwards.

TNAU records the highest employment rate among the 53 SAUs of India. In the scientists recruitment conducted by 'Agricultural Scientists Recruitment Board', a substantial number of the TNAU candidates are being selected. In the past four years, 81 students have cleared Civil Services (Main) examination which is about 40 percent of the candidates from Tamil Nadu.

TNAU is also offering many correspondence courses through the Directorate of Open and Distance Learning. At present, 16 certificate courses in Tamil, three certificate courses in English, seven Post Graduate diplomas and three PG courses are being offered. All the courses have gained wide popularity within a short period of time. A new three year degree programme, 'Bachelor of Farm Technology' in Tamil medium was started in 2010 exclusively for the farmers, as first of its kind in India. A total of 229 farmers have joined in this programme during 2010.

Research

Research is carried out in all the college campuses and 36 research stations spread all over the seven agro climatic zones of Tamil Nadu. TNAU is now operating 1076 research projects, including 604 external agencies and private agencies funded research projects. During the Eleventh Five Year Plan period, 38 new varieties and hybrids of various crops, 13 new farm implements and 16 management technologies were released for the benefit of the farming community. The University has obtained nine patents and submitted applications for 36 more patents.

The Research Priority Setting, Monitoring and Evaluation Cells are proposed to be strengthened during the Twelfth Five Year Plan for which proposals have been included. The Government of Tamil Nadu extends financial support for establishment and operation of TNAU. Out of the total budget, 58 percent is contributed by the State Government through Plan, Non-plan, NADP and other schemes. The ICAR, GOI and other agency sponsored research programmes besides the University receipts accounted for approximately 42 percent. The financial support by Government to TNAU under plan scheme and NADP including Irrigated Agriculture Modernisation and Waterbodies Restoration and Management (IAMWARM) during the Eleventh Five Year Plan period is given in the Table 3.4.1.

Table 3.4.1: Eleventh Plan Performance - TNAU
(₹ crore)

S.No.	Sub-Head	2007-2012	
		Allotment	Expenditure
1	State plan	277.29	190.78
2	IAMWARM	123.25	36.73
3	NADP	104.56	48.90
	Total	505.10	276.41

Source : Tamil Nadu Agricultural University

Twelfth Five Year Plan: Goal, Objectives, Strategies and Programmes-TNAU

Goal

The goal is to help the agricultural sector to be resilient and grow in the midst of adversities and help farmers to increase their income through research.

Objectives

The objectives of agricultural research and education during the Twelfth Five Year Plan period are:

- To produce graduates capable of multi-tasking and to serve the Nation.
- To evolve varieties/ hybrids and integrated crop production technologies for sustained increase in yield and to meet the end users' expectations in terms of quality and food safety.
- To ensure soil and water qualities and enhance output per unit.
- To ensure service provision to enable farmers to take informed decisions based on price and weather advisories.
- To expand the further use of Information, Communication Technology in education, research, coordination, administration and technology delivery.
- To harness research output of frontier sciences to increase value added crop production, storage and processing.
- To investigate climate change, to design mitigation strategies and to supplement disaster management programmes.

Strategies

Broad strategies envisaged for achieving targeted agricultural growth in Tamil Nadu would cover four categories: a) Agricultural education to cater to the globalising agriculture needs, b) Research for innovative solutions, c) Putting innovative solutions into practice and d) Promoting agribusiness.

Agricultural Education

New educational programmes and new institutions would be initiated based on the need for developing human resources. There are new developments discernible in the field of agricultural education and the system is to be made as a combination of formal and non-formal with an interdisciplinary orientation. Moreover, collaborative alliances with various institutions in the country and abroad with active participation of the stakeholders will be made. Future programmes will follow the new methods and some of which have already been followed in the University. Education infrastructure would be strengthened so as to improve the learning environment for the youth. To augment the availability of skilled human resource in rural areas, District Agricultural Polytechnics will be established. Besides the above, to increase the employment opportunity in agriculture among rural youth, it is proposed to establish a two year Diploma course in Agriculture at State Agriculture Extension Management Institute (STAMIN), Kudumiyamalai. Innovation and creativity will be the key features for future development. With this in view, an Innovation Centre for Post Doctoral Research has been proposed as a multidisciplinary institution.

An insect museum has been proposed for identification and description of new insects besides revision of existing taxa and beneficial insects identified will be utilised. Inshort, the museum will serve as a digitalized data repository for all known insects of India.

Research for Innovative Solutions

An analysis of the commodity share through the modified congruence method was done for Tamil Nadu considering the area and production data for three years (Triennium ending 2009). The harvest values were evaluated at 2008-09 prices. The study results are presented in Table 3.4.2.

Table 3.4.2: Ranking of Crops for Priority in Resource Allocation

Crop/ Group	Weighted share (in %)	Rank	Crop/ Group	Weighted share (in %)	Rank
Rice	23.48	1	Mango	3.13	9
Coconut	9.29	2	Maize	2.90	10
Banana	9.17	3	Black gram	2.71	11
Sugarcane	8.59	4	Sorghum	2.67	12
Groundnut	7.4	5	Green gram	1.43	13
Cotton	4.6	6	Cashew	1.16	14
Tea	3.21	7	Turmeric	0.97	15
Tapioca	3.16	8			

Source : Tamil Nadu Agricultural University

Note : The weighted share is: other cereals (7.88 percent), other pulses (0.72 percent), other oilseeds (1.10 percent), other fruits (2.52 percent), other vegetables (2.22 percent) and other spices (2.09 percent). Besides these, the importance of fodder crops needs to be visualized in the light of growing importance for animal based food and food products. Thus, the research focus and allocation of resources for crops will be determined accordingly.

Modified congruence method constitutes construction of weighted shares including the value of the produce, the equity captured through area share and foreign exchange earning potential by looking at the share in the total export of agricultural commodities. The expectation is the resource allocation for research to these crops should match the weighted shares for the respective crops. In the above table, for example, the weighted share for rice crop is 23.48 which indicated that approximately 23.5 percent of the resources committed for research should go directly or indirectly to rice research or rice based systems research.

Specific Research Thrust Areas

Crop improvement research on

developing new varieties and hybrids would continue to fulfill market needs and also to possess important traits such as drought tolerance, pest and disease resistance and nutrient enrichment especially in nutritional cereals.

- Standardising precision farming technologies for more crops of Tamil Nadu would be given impetus, which will help to increase yield of quality produce and conserve resources.
- Research would be strengthened to develop implements and machinery considering the needs of the farming community, particularly marginal and small farmers besides paying attention to designing gender-friendly implements.
- Research will be taken up to reduce post harvest losses and to enhance



Box 3.4.1: Precision Farming

Precision Farming approach includes precise soil preparation, seedling production, crop geometry, micro irrigation, fertigation, integrated pest and disease management and precise post harvest handling of produce. Precision farming increases the yield by 40-200 % and water use efficiency by 300% with almost 30-40 % water savings. Precision farming started as a turn key project by Tamil Nadu Agricultural University on 1000 acres has now spread to more than 81,000 acres across the State. This model experiment has created an interest in the neighbouring States for gross learning of best practices.

Source: Tamil Nadu Agricultural University

value addition and emphasis to be given for nutritional cereals so that their consumption level increases.

- Developing bio technology and nanotechnology based solutions for enhancing input use efficiency, productivity, post harvest life, value addition and maintaining resource quality.
- Bio inoculants to augment nutrient availability and to reduce pest incidence
- Rhizosphere engineering to enhance soil plant relationship
- Further intensification of research on climate change and mitigation
- Market research to promote market-led agriculture

Marginal and Small Farms Profitability

Integrated farming systems models for improving the revenue generation of marginal and small farms will be developed. Also, institutional approaches such as group farming and contract farming would be dovetailed to empower farmers in the market.

Improving Productivity in Rainfed Areas

Research and technology transfer initiatives for rainfed areas would be given major emphasis in the Twelfth Five Year Plan including crop improvement, management (especially for nutritional cereals) and improvement in the organic content of soil to achieve marked improvement in the standard of living of marginal and small farmers, particularly in less favoured areas. Organic farming practices will be standardized to help farmers who want to take up organic cultivation.

Grape Research

To bestow research in grapes and for encouraging production and export, a new Grape Research Station will be established at Mallingapuram alias Annamalaiyanpatty, Cumbum valley of Theni district.

Putting Innovative Solutions into Practice

Linking Farmers to Markets

High price spread and low farmers' share in consumer rupee for agricultural produce has contributed to the erosion of farm profitability. Farmers must be directly linked to processing units viz., oilseeds to oil mills, tapioca to starch industries, pulses to flour mills, rice to modern rice mills, fruits and vegetables to processing industries, etc., so that they can have a direct link with the industry as in the case of sugar industry or directly linked to consumers through retail outlets (Farmers shandies / organized retailing), through contract farming. This arrangement leads to weave-in a consortium of financial institutions, input suppliers, extension agencies and marketing service providers. Research and outreach programmes will be implemented to develop models for linking farmers to markets. Studies on linking farmers to national markets will also be taken up.

Market Oriented Agriculture

Greater emphasis needs to be shifted from production technologies, but henceforth the first thing required is the market oriented farm planning and production. Research would be undertaken to formulate market advisories based on the market intelligence and assess its impact and recommendations for larger adoption.

Targeted Technology Transfer

Special initiatives would be taken up for transfer of critical crop production technologies that would substantially increase yield of identified crops in potential districts. Market linkages would be facilitated by organizing growers and facilitating traders visit to the production areas, interaction among growers and traders, exposure visit for growers to markets and tying up

Box 3.4.2: Weather Advisory Based Crop Management

The Agro Climate Research Centre at Tamil Nadu Agricultural University in collaboration with the Department of Agriculture has established Automatic Weather Stations (AWS) network in 224 blocks of Tamil Nadu with financial support from NADP during 2008-2010. The Automatic Weather Stations Network provides weather forecast for the next six days and information collected can be viewed at an hourly interval in the website (www.tawn.tnau.ac.in). This information helps in day to day management of crops resulting in timely operations and cost savings.

Source: Tamil Nadu Agricultural University

with appropriate Government agencies for procurement to meet the needs of the Government programmes. Comprehensive technology demonstration in large plots (one acre) in farmers' fields will be continued. Crops cultivated in a large area in each district, which influence a larger dependant

population, would be selected for technology transfer.

Demonstrating Food Processing Model

Post Harvest Technology Centre at TNAU has designed a viable model for providing custom hiring of processing facility for small farmers, traders, entrepreneurs and prospective processors. Such centres would be facilitated and created in the districts to demonstrate the potential of processing in enhancing farmers' revenue.

Promoting Agribusiness Development

New initiatives would be formulated and implemented to promote rural youth to take up agribusiness ventures such as seed production, farm machinery and implements fabrication, production of bio inputs such as: bio control agents, vermi-compost, providing farm based services, etc., on a PPP mode involving Agriculture Department. This would provide off-farm employment for rural men and women and also contribute for extensive use of bio inputs, which have not been taken up on a large scale by big production establishments.

Box 3.4.3: DEMIC - Price Forecasting

Tamil Nadu Agricultural University operates Domestic and Export Market Intelligence Cell (DEMIC) through which price forecasts of agricultural produce before sowing and pre harvest are made available to enable the farmers to make rational choices on storage and sales post harvest. In the five year ending 2011, DEMIC made 325 price forecasts of different commodities and results published in English and Tamil dailies. Some of the commodities that are covered include: maize, cotton, turmeric, groundnut, sesame, blackgram, chickpea, coconut, tomato, chillies, onion, coriander and potato.

Source: Tamil Nadu Agricultural University.

Centres of Excellence

Eleven areas were identified in research and education for establishing 'Centres of Excellence' for achieving desired goals by 2023. In agricultural research, Centres of Excellence serve as nodes of research, industry partnership and innovation. It is proposed to establish such Centres in Molecular Breeding, Dryland Agriculture, Soil Health, Precision Farming, Bio-refinery and Farm Machinery.



Fig. 3.4.1: Precision farming

An amount of ₹1184.00 crore is proposed for TNAU as furnished in the Table 3.4.3.

Table 3.4.3: Twelfth Plan Outlay - TNAU

		(₹ crore)
S.No.	Schemes	Outlay
I	Ongoing Schemes including NADP, IAMWARM	430.00
II	New Schemes	
1	Centre of Excellence in Molecular Breeding at Coimbatore	7.00
2	Centre of Excellence in Soil Health at Trichy	20.00
3	Centre of Excellence in Precision Farming at Periyakulam	20.00
4	Institute of Innovation (Post Doctoral Facility) at Madurai	20.00
5	Centre of Excellence in Dry farming at Chettinadu	20.00
6	Centre of Excellence in Farm Machinery at Kumulur	20.00
7	Pilot Bio-refinery at Coimbatore	10.00
8	Insect Museum at Coimbatore	10.00
9	Farm Women Knowledge Centre at Horticulture College and Research Institute, Trichy	5.00
10	Strengthening of HC & RI, Trichy	25.00
11	Special Res. contingency to staff members	25.00
12	Distance Education - Professional Farmers Degree	15.00
13	Student / Faculty Exchange programme in National and International	15.00
14	NABL accredited Central Instrumentation facility in Colleges (Killikulam, Madurai, Periyakulam, Trichy)	25.00

Table 3.4.3: Twelfth Plan Outlay - TNAU

		(₹ crore)
S.No.	Schemes	Outlay
15	Strengthening of Biotechnology, Nanotechnology and Information technology facility in teaching institutions	20.00
16	Analytical, Certification and Labelling Centres	10.00
17	Gene and varietal conservation facility at TRRI, Aduthurai	5.00
18	Technology verification, Training and Translational Centre - Kudumianmalai	5.00
19	Establishment of new Research Centres at Tiruvannamalai and Tiruppur districts of Tamil Nadu	25.00
20	Improvement of hostel, sports, gyms and swimming pools at teaching campuses	40.00
21	Establishment of data base of farmer, crop, area, storage capacity and input	5.00
22	Common Student Analytical Facility-Coimbatore	20.00
23	Fencing of Campuses	30.00
24	Improvement of Infrastructure at Forest College, Mettupalayam	5.00
25	Medicinal Plants conservation Centre at Periyakulam and Yercaud	10.00
26	Extension Education - Continuing Education of Dept. Staff	30.00
27	New courses New programmes and Institutes	10.00
28	Disaster Management preparedness	6.00
29	Rhizosphere Engineering, Root pruning and Training with Rhizotron Facility	10.00
30	State Agricultural Education Digital Library support	15.00
31	District Agricultural Polytechnics	78.00
32	Special Human Resource Development - Teaching and Research	5.00
33	Special Human Resource Development - Administration	1.00
34	Community Nursery (two community bore well area in 5 districts)	10.00
35	Agricultural Education :student support and field demonstrations	48.00
36	Quality Seed Production and Supply	32.00
37	Demand Driven Research Support (Competitive Grant)	95.00
38	Diploma course in Agriculture at STAMIN, Kudumianmalai	2.00
	Total-New scheme	754.00
	Grand Total-TNAU	1184.00