



3.3 AGRICULTURAL MARKETING, POST HARVEST MANAGEMENT, VALUE ADDITION AND FOOD PROCESSING

Introduction

The agricultural sector needs well functioning markets to drive growth, employment and economic prosperity in rural areas. Due to globalization, liberalization and privatization of the economy, agricultural marketing has become the key driver of the agricultural sector. As agriculture plays a major role in deciding the economy of the country, the schemes for agricultural production receive high priority resulting in increased agricultural production. Though our farmers have succeeded in the production front, they have not achieved appreciably in terms of price realization for their produce owing to their inaccessibility to efficient and scientific marketing system. The middlemen, commission agents and traders are depriving them of their due share of profit. An efficient and organized marketing system would ensure the maximum price realization to the farmers, which will induce them to produce more and market their produce in an increasing proportion.

Presently, marketing system (including collection, handling, storage, transport, processing, wholesaling, retailing, exports and associated infrastructure and support services) is fragmented and is uncoordinated, with inadequate infrastructure and supply chains involving high wastage and losses. As a result, the producer gets about only 30-40 percent of final price, as compared to around 60 percent in advanced countries. Even an additional margin of 3 percent in final price translates into 10 percent increase in net income of the farmers and that itself is a powerful incentive to invest in agriculture. But, this requires cutting down of the long chain of intermediaries, which can happen only with improved market access by farmers, interconnected markets, efficient supply chain and a robust marketing information system. Most of the farmers in the State are

small and marginal farmers, often lacking the ability to produce enough marketable surplus for larger and remunerative markets. As a result, farm gate sales are high in the State (about 45 percent) and this is due to lack of information on market prices and on required quality parameters. If farmers are to get better prices, level of farm gate sales has to be brought down by giving the farmer, access to distant and bigger markets.

Currently, agricultural markets are regulated under 'State Agricultural Produce Marketing (Regulation) Act 1987 and Rules 1991'. Besides, there are other regulations viz: - Essential Commodities Act and various Control Orders issued thereunder. All these have partially created restrictive and monopolistic marketing structures.

Marketing Channels

The agricultural marketing channels are distinguished from each other on the basis of market functionaries involved in carrying the produce from the farmers to the ultimate consumers. The marketing channels can be divided into four broad groups viz: a) Direct to consumers, b) through public agencies or cooperatives, c) through wholesalers and retailers and d) through processors.

Direct to Consumers

Uzhavar Sandhaigal (Farmers' Markets)

To promote direct marketing facilities, the Uzhavar Sandhaigal (Farmers' Markets) have been set up in the urban areas in Tamil Nadu for the benefit of farmers as well as consumers. 179 farmers' markets are functioning in Tamil Nadu. Farmers get higher price i.e., 10-15 percent more than the prevailing wholesale market price and consumers also benefit by paying 5-10 percent less than the prevailing retail price due to the absence of middlemen.



Through Public Agencies and Cooperatives

Regulated Markets

Regulated markets act as a common forum for farmers and traders on equal footing for marketing of agricultural produce, thereby eliminating multi middlemen. In Tamil Nadu, at present there are 277 Regulated markets, 164 Rural godowns and 188 Godowns are functioning under 21 Market committees. Also, there are 288 Transaction sheds, 353 Drying yards, 89 Farmers' rest houses, 183 sanitary facilities, 10 Rural Business Hubs (RBHs) and 189 market information facilities in regulated markets. During the Eleventh Five Year Plan period, around 17.50 L.MT/annum agricultural commodities were transacted, about 4.37 lakh farmers were benefited by regulated market transaction. During the plan period, 13,280 farmers and 701 traders had availed the pledge loan facilities.

Forty important agricultural commodities have been notified so far under Tamil Nadu Agricultural Produce Marketing (Regulation) Act 1987. Though there is a provision in the Act for notifying fruits and vegetables, cattle, poultry, sheep, pisciculture and apiculture products, these commodities are yet to be notified.

Pledge loan facility helps the farmers to avoid distress sale of agricultural produce during harvest season by storing their produce in the godowns of regulated markets and also to meet their immediate requirements and preparations for next cropping season. Small and marginal farmers can avail pledge loan upto 75 percent value of the produce and other farmers can avail upto 50 percent value of the produce limited to the maximum of ₹2.00 lakh with 5 percent rate of interest, upto a period of six months. Traders can avail pledge loan upto 50 percent value of the produce limited to the maximum of one lakh with 9 percent rate of interest upto a period of three months

The agricultural marketing system in Tamil Nadu needs to be strengthened. Out of the total agricultural production, only 20 percent arrives at the regulated and cooperative markets, while nearly 45 percent is farm level sales, 10 percent by private trading mandies and more than 25 percent is not at all accounted.

Cooperative Marketing Societies (CMS)

There are 110 Marketing Societies functioning all over the State. The cooperative marketing societies have tie up with the cooperative wholesale stores. This enables the cooperative marketing societies to procure the farmers' produce, process it and sell it to the cooperative wholesale stores so that the farmers get a good price and consumers get good quality produce at a reasonable price.

Through Wholesalers and Retailers

Commodity Groups

The Department of Agricultural Marketing and AgriBusiness has concentrated in the formation of commodity groups and direct tie-up with traders are made to fetch 15-20 percent higher income to the farmers. Agri-Business Centre (ABC) is focusing on market linkage/tie-up arrangement through MoUs between commodity group farmers and traders/ firms/private entrepreneurs to realize better remuneration by the farmers. So far, 1657 commodity groups have been formed and 1179 MoUs were made between farmers and traders through 21 ABCs during the Eleventh Five Year Plan. Similarly, Rural Business Hubs (RBH) created under NADP, envisaged expansion of opportunities through which farmers have increased access to markets through forward linkages.

Through processors

Direct Channel- Farmers- Processors/ Bulk consumers

Apart from linking the farmers to consumer through farmers' organizations,



other initiatives for reducing transaction costs are a) establishment of direct channel between farmers and processors/bulk consumers, through contract farming, b) Large Retail Chains, c) Agri Export Zones (AEZ), d) Specialised Markets- viz:- Mega Market (Velanvilaiporul Perangadi), Terminal Markets and Market Complexes for agricultural commodities.

Developmental issues

a) Dominance of non-formal channels, b) Need for institutional innovation for efficient alternative system responsive to market signals including stakeholders'

interactions and linkages among growers – traders – processors – exporters, c) Developing wholesale markets by providing necessary infrastructure facilities, d) Prevention of post-harvest losses, e) Construction of roads linking villages with nearby assembling and wholesale markets (similar to sugarcane rural roads), f) Greater private investment in revamping agricultural marketing, g) Developing commodity exchanges, h) Capacity building training on post-harvest management, value addition and processing, quality and food safety for the farmers and market intermediaries and i) Strengthening of Market Intelligence and Information System.

Tamil Nadu Irrigated Agriculture Modernization and Waterbodies Restoration and Management Project (TN- IAMWARM)



Fig.3.3. 1: Agri Business Centre



During the Eleventh Five Year Plan period, for the benefit of farmers of 61 sub-basins, 293 marketing infrastructure like ABCs, Storage godowns, Drying yards, Collection centers and Pack houses and 3280 supporting equipments were provided under IAMWARM project. Awareness campaigns 448 numbers at a cost of ₹ 0.36 crore, benefiting 8,960 farmers and other stakeholders were also conducted.

Tamil Nadu Small Farmers Agri Business Consortium (TNSFAC)

Small Farmers Agri Business Consortium is functioning in association with Government, private, cooperative and service sectors with the objective of linking small farmers to technologies and to markets by

providing both forward and backward linkages through assured purchase at reasonable price for their produce by making formal/informal arrangements. This scheme is being implemented in coordination with State Bank of India and its subsidiary banks and other nationalized banks. During the Eleventh Five Year Plan, a venture capital assistance of ₹ 15.30 crore for 28 agri business projects was sanctioned by TNSFAC.

Status of Grading and Packaging System, Warehouse/godowns, Cold chain:\

The storage capacity available under various public sector institutions is listed in Table 3.3.1.

Table 3.3.1: Institution-wise Storage Capacity Available in the State

(in L.MT)

S.No.	Agency	Storage capacity
1	Central Warehousing Corporation	6.85
2	Food Corporation of India	6.36
3	Tamil Nadu State Warehousing Corporation	6.47
4	Dept. of Agricultural Marketing and Agri Business	2.38
5	Tamil Nadu Civil Supplies Corporation Ltd.	9.47
6	Cooperative Sector	8.75
Total		40.28

Source: Dept. of Agricultural Marketing and Agri Business, GoTN

Cold Storage Facilities

In Tamil Nadu, the private sector firms have established 201 cold storage units with a capacity of 2.15 L.MT for the storage of vegetables, fruits, dairy and fisheries products. Also, they are actively investing in logistics, warehouse establishment, standard quality certification, etc. Walk-in coolers of 2 MT capacity have been established in 27 farmers' markets and 8 cold storage with 500 MT. capacity in market complexes to prevent

deterioration of fruits and vegetables and the details are given in Table 3.3.2.

Infrastructure facilities were provided at farm gate level to minimize post harvest losses to a large extent. Farmers are encouraged for setting up pack houses with washing and grading facility for fruits and vegetables in farm premises.



Table 3.3.2: Existing Storage Capacity of Cold Storage Units

(in MT)

S.No.	Cold Storage	No.	Capacity
1	Cold storage at Farmers' Markets (Walk-in coolers)	27	54
2	Tomato market complex- Maicheri, Salem district.	1	100
3	Hilly vegetables market complex-Karamadai, Coimbatore district	1	50
4	Onion and other vegetables market complex-Perambalur district.	1	50
5	Chillies market complex-Paramakudi, Ramnad district.	1	100
6	Mango market complex - Krishnagiri district.	1	50
7	Tomato market complex - Palacode, Dharmapuri district.	1	50
8	Onion market complex-Pongalur, Thiruppur district.	1	50
9	Grapes market complex- Odaipatti, Theni district.	1	50
Total		35	554

Source : Dept. of Agricultural Marketing and Agri Business, GoTN

Agmark Grading

“Agmark” is the symbol of quality and purity. The main objective of the scheme is to provide unadulterated foodstuff to the consumers. The scheme is implemented as per the norms prescribed by Government of India. The Grade Standards are prescribed for more than 192 agricultural and allied products. In Tamil Nadu, 30 Agmark grading laboratories in districts and one principal Agmark grading laboratory at Chennai are functioning.

Food Processing and Post Harvest Management

Scenario of Food Processing and Post Harvest Management

Augmentation of agricultural productivity needs a concurrent development of post harvest support mechanism including normal and cold storage facilities, packaging facilities, agro processing industries, crop sterilization and sanitation facilities and an effective marketing reach to global markets. Food processing adds value to the agricultural, horticultural, livestock and fisheries products by using various techniques like grading, sorting and packaging, etc. which enhances

their shelf life. It leads to diversification of agricultural activities, improves value addition opportunities and creates surplus for export of agro food products.

In Tamil Nadu, about 188 L.MT. of fruits and vegetables are produced. Due to heavy post harvest losses, there exists a considerable gap between gross production and net availability to the consumers. The post harvest loss is estimated at 30 to 40 percent in fruits and vegetables, which is primarily due to non adoption of post harvest management technologies. The post harvest losses start in the farm and travel along procurement chain and entire marketing channel. Adoption of post harvest technology and growth of food processing industries are inter-related as post harvest management increases the shelf life of fruits and vegetables and feed more to the agro processing industries.

Factors contributing to the development of Food Processing Sector

- a). Vast source of agricultural/ horticultural raw material to food processing industries, b). Transformation of conventional farming to market-led commercial farming, c). Emerging domestic market in the form of



large urban middle class with its changing food habits, d). Change in consumption patterns driven by the processed food markets, e). Government assistance for setting up and modernizing of food processing units and creation of infrastructure, f). Increasing Foreign Direct Investment (FDI) in food business sector, g). Conducive food processing policy environment and h). Availability of huge scientific and research talent pool.

The current focus of research in food processing is to evolve technologies to reduce post harvest losses, minimize it in processed foods, evolve energy efficient and safe technologies for novel methods of preservation. The introduction of new dairy, poultry and fish products, perceptible shift in eating habits and increase in income have resulted in a change in demand for the processed foods especially for animal products.

Milk production in the State is around 6.83 million tonnes and the State contributes 5.61 percent of total milk production of India and ranks 8th in the country. Tamil Nadu is one of the leading States in broiler production with a record production of 397 thousand tonnes in 2009-10. The State ranks 2nd in the country's egg production with a production of 11.51 billion eggs and accounts for 19.74 percent of the poultry population of the country. More than 90 percent of poultry or poultry products exported from India originate from the State. At present, poultry concentration is restricted to certain poultry belts such as Namakkal, Erode and Coimbatore. Taking into consideration the export potentials for Europe and other countries, further planning and development should be made in processing. Integrated broiler production in the State is striving to move still forward in processing, packaging, preservation, developing diversified value added products and exploit global demand, as their level of operation has gone up. It would also take measures to ensure strict quality control by adopting Good Management

Practices (GMP), monitoring mycotoxin, pesticide and drug residues etc. in poultry meat and assuring feed quality.

Tamil Nadu government has come out with a policy to achieve the following:

- i. Increase in processed foods in the market from 1 percent to 10 percent.
- ii. Rise in value addition levels from 7 percent to 30 percent

Key strategies to achieve the objectives are : single window clearance for agro based industries, creation of agro based Special Economic Zones (SEZs), setting up of agro clusters, providing incentives, evolving and implementation of food processing policy for the State, subsidy to stand alone small and medium enterprises, exemption from electricity charges and support for getting Hazard Analysis and Critical Control Point (HACCP).

Past and Current Trends in Food Processing Sector

Department of Agricultural Marketing and Agri Business is the State Nodal Agency for the Ministry of Food Processing Industries (MoFPI), Government of India. The MoFPI has decided to decentralize the implementation of food processing schemes in the Eleventh Five Year Plan period through banks/ financial institutions to provide a thrust and wider coverage for food processing industries in the country and simultaneously decentralize the procedures for appraisal, grant of assistance and monitoring standards.

Being a State nodal agency for MoFPI, the Department undertake activities like: processes Projects on Food Industry, Entrepreneur Development Programme (EDP), Food Processing Training Centers, Seminars and Exhibitions, Infrastructure for Food Processing Courses and Projects on Backward/Contract Farming with a grant sanctioned amount of ₹ 36.76 crore.



Food Parks for Processing

A Food Park in the name of Indian Food Processing Park at Aruppukottai in Virudunagar district was established at a total cost of ₹ 11.58 crore and availed a grant of ₹ 4.00 crore by private sector. M/s. Nilakottai Food Park Ltd., (NFPL) established a Food Park at Nilakottai in Dindigul district at a total cost of ₹ 16.00 crore and availed a grant of ₹ 3.25 crore.

Marketing Information Services and Dissemination

Agriculture has become increasingly market oriented. The farmers have to be sensitized to the market demand and price while taking production decisions. This has increased the need for the latest information on price in various markets. Market price information and intelligence plays a vital role in marketing of agricultural produce and for this, mass media and ICT could be used effectively. In the Central sector scheme of Marketing Research and Information Network (MRIN), computers were provided to 21 Market Committees and 189 Regulated Markets as an e-governance initiative. In addition to this, another mobile based information service viz:- 'Nokia Life Tools Agriculture services' aims to plug the information gap and caters to the needs of farmers via their mobile devices, by providing information on crop advisory, localized weather, agriculture related news and market prices was initiated. Besides, 6 Information Kiosk were established in Agricultural Producers' Cooperative Marketing societies.

Achievements during the Eleventh Five Year Plan

Market Development: 104 godowns in regulated markets have been constructed at a total cost of ₹ 23.03 crore. Seven transaction sheds at a cost of ₹ 1.89 crore and 17 auction sheds were created at a cost of ₹ 4.12 crore in regulated markets to facilitate easy transaction. Modern terminal market with all value addition facilities in Perundurai (Erode District) is being established under Public

Private Partnership (PPP) mode at a total cost of ₹ 120.63 crore. 350 drying yards to prevent post harvest losses were constructed in villages, at a total cost of ₹ 9.49 crore. 75 Farmers' markets were established for fruits and vegetables in various places. Specialized market complexes for mango, onion, grapes, tomato and coconut were established at a total cost of ₹ 8.00 crore. RBHs have been established at Cuddalore, Villupuram, Salem, Dharmapuri, Erode, Dindigul, Ramanathapuram, Tirunelveli, Vellore regulated markets and in Coimbatore district under NADP at a total cost of ₹ 1.50 crore. Flower auction center at Kavalkinaru in Tirunelveli district at a cost of ₹ 1.63 crore and at R.S.Puram farmers' market in Coimbatore district at a cost of ₹ 0.11 crore were established.

Cold Storage and processing: Cold storage for tomato at Maicheri in Salem District and for chillies at Paramakudi in Ramnad district with 100 MT capacity each were established at a total cost of ₹ 1.99 crore. Cold storage rooms of 2 MT capacity for vegetables and fruits were created in 27 farmers' market at a cost of ₹ 1.33 crore. Cold storage for vegetables at Chekkikulam in Perambalur district and market complex for coconut at Pethappampatti in Thiruppur district were established at a cost of ₹ 2.15 crore. Market complex with cold storage for hilly vegetables at Karamadai regulated market in Coimbatore district was established at a cost of ₹ one crore. Banana ripening chambers (5 MT/day capacity) were established to maintain uniform colour and quality of fruits in Trichy, Srivaikundam, Chinnamanoor and Mohanur at a total cost of ₹ 2.00 crore. At farm gate level, 50 pack houses with washing and grading facility for fruits and vegetables have been established at a cost of ₹ 1.25 crore.

An AEZ for cut flowers at Hosur in Krishnagiri district by M/s.TANFLORA, for flowers at Udhagamandalam in The Nilgiris district by M/s.Nilflora, for Mango at Nilakkotai in Dindigul district by M/s. Maagrita Export Ltd., and for cashew at



Panruti in Cuddalore district by M/s.Sattva Agro Export Pvt. Ltd., were established at a total cost of ₹ 78.28 crore. 12 Agmark grading laboratories were provided with latest equipments like electronic weighing balances and UV-visible spectrophotometers.

Twelfth Five Year Plan (2012-2017)

Objectives

Agriculture in developed countries has achieved greater success owing to its close integration with the market. Forward and backward integration of industry has resulted in better understanding of the global needs of the agricultural sector resulting in efficient production and distribution of agricultural produce (Vision Tamil Nadu 2023). With this in view, the Twelfth Five Year Plan aims at:

- To help the farmers in marketing their agricultural produce at fair price.
- To ensure remunerative income to the farmers by forming commodity groups.
- To create a healthy competition to sell farmer's produce in various marketing avenues.
- To make the farmers to participate in national/global markets through market intelligence.

Strategies

a).Enhancing the marketability of agricultural commodities by creating necessary modern infrastructure facilities and strengthening of existing markets by providing additional infrastructure facilities, b). Formation of Commodity Groups and forward linkage for direct purchase of agricultural produce by the traders/ buyers from farmers, c).Creating awareness among the farmers on market intelligence by providing market-led extension and Information, Education, Communication and Capacity Building (IEC&CB) activities, d). Integrated approach from planting to marketing which includes choice of crops (mainly banana, mango, tapioca, spices,

flowers crops) grading, packaging, storage and marketing in domestic and international markets, e).Commercialization of agriculture through market driven production approach by utilizing the infrastructure and market intelligence available through ABC and RBH, f). Encouraging to set up Agri/Horti processing units by arranging backward and forward linkages and also through venture capital assistance under Small Farmers Agribusiness Consortium, g). Minimising post harvest losses by creating market infrastructure, cold chain and scientific storage facilities, h). Providing pack houses with gamma irradiation facilities, i). Encouraging the private sector to set up agro processing industries and Food Parks for processing at large scale with farmers' participation, j). Implementing Food Processing Mission with special emphasis on formation of State and District level Food Processing Mission and k).Initiating Food Processing Business Incubator facilities near production catchments.

Box 3.3.1: Agro Processing and Agri-Business Entrepreneur Development

A young entrepreneur with Doctorate in food processing pursued a special training on 'Agri Business Entrepreneur Development' in Tamil Nadu Agricultural University (TNAU). He entered into a Memorandum of Understanding (MoU) with TNAU to utilise the infrastructure facilities like Pasteurizer, Pulper, Homogenizer, Segragator etc., and started a juice unit. A market survey revealed that there was a demand for nutritive millet based products. He started production of nutrient cereals cookies at a cost of ₹ 40.00 lakh with ₹ 16.00 lakh as soft loan from GOI agencies. The initial production capacity was 1.25 tonnes per day. Entrepreneurs and talented youth may be encouraged to set up food processing units.

Source: Millets Workshop Proceedings, State Planning Commission, Tamil Nadu



Thrust Areas / Prospects

Food parks for processing:-

Includes food processing units such as fruits and vegetables processing, rice mill, flour mill, bakery unit, dairy products, milk products, animal feed, flakes and fast food. Besides State-of-the-art laboratory, hi-tech cold storage, captive power plant, effluent treatment plant with all other ancillary facilities are mandatory for these parks. Farmers will get ready market for their produce and processing companies will get continuous supply of raw material. Food park is poised to become a catalyst for the socio-economic development of the region.

Agri Export Zones (AEZ):-

With globalization and liberalization of Indian economy, international trade is playing a significant role in the growth of National and State economies. To increase the share of exports from Tamil Nadu, two more AEZs are to be promoted with modern pack house and gamma irradiation facilities to control the incidence of pest and diseases and also to enhance the shelf life of farm produce.



Fig.3.3.2: Agri Export Zone

Terminal Markets: -

In order to encourage private investment for development of marketing as well as value addition, Department of Agricultural Marketing and Agri. Business is taking efforts to establish modern terminal markets with all value addition facilities in Public Private Partnership (PPP) mode near metro areas of Chennai at Navalur village of

Sriperumbudur taluk, Kanchipuram district at a cost of ₹ 113.85 crore, a terminal market complex at Perendurai, Erode district is under progress at a cost of ₹ 120.63 crore and at Mukkampatti and Thiruvathavur, Madurai district at a ₹ 105.05 to minimize the post harvest losses in perishables like fruits, vegetables and other agricultural commodities and to serve local and export markets.

Establishment of Business Incubators for Millets and Modernisation of Millet Processing Unit and Value Addition will be given adequate emphasis and for details, the sub chapter 3.1. 'Agriculture' may be referred.

Schemes Envisaged for the Twelfth Five Year Plan:

Market Promotion & Processing

- Strengthening of regulated markets by creating rural godowns, drying yards, transaction sheds, traders shops and own buildings at a total cost of ₹159.00 crore.
- Establishment of 25 RBHs in production centers at a total cost of ₹ 5.00 crore (@ ₹ 0.20 crore each).
- Strengthening of State Agmark grading laboratories by constructing own buildings for Agmark grading laboratories and providing scientific equipments at a total cost of ₹ 7.50 crore.
- Up-scaling the existing 1500 commodity groups, forming 1000 new commodity groups, construction of drying yards, storage sheds and providing value addition equipments at a total cost of ₹ 20.39 crore.
- Strengthening of IT infrastructure for market information dissemination and post harvest management (PHM) in 100 regulated markets at a total cost of ₹ 2.50 crore.
- Creation of food court for farmers in 50 regulated markets at a total cost of ₹ 10.00 crore.
- Establishment of 20 agro processing industries with farmers and private



participation at a total cost of ₹ 100.00 crore (₹ 5.00 crore/unit). for Viz., Tomato in Krishnagiri, Salem and Coimbatore districts, Banana in Trichy, Erode and Thoothukudi districts, Groundnut in Vellore and Thiruvannamalai districts, Pulses in Cuddalore, Vellore and Thiruvannamalai districts, Coconut – Copra in Kanyakumari and Thiruppur districts, Chillies in Ramanathapuram and Virudhunagar districts, Tamarind in Krishnagiri and Dindugal districts and Tapioca in Namakkal and Dharmapuri districts.

- Establishment of four Mega Markets at a total cost of ₹ 300.00 crore (@ ₹ 75.00 crore each).
- Creation of eight specialized market complexes at a total cost of ₹ 80.00 crore (@ ₹ 10.00 crore each).
- Creation of cold storages with 100, 1000 and 2000 MT capacity in 75 places to minimize the post harvest losses at a total cost of ₹ 240.00 crore.
- Cold storage market complex for fruits and vegetables at Mettupalayam with 500 MT capacity, Cold storage godown at Kinathukadavu, Cold storage facility for Sankarankoil Regulated Market and Cold storage market complex in Theni Regulated Market will be established during the Twelfth Five Year Plan period.
- 51 cold storage godowns with a capacity of 25 MT will be constructed at Regulated markets in the districts of Thiruvannamalai, Cuddalore, Erode, Vellore, Trichy, Coimbatore, Villupuram, Dharmapuri, Ramanathapuram, Salem, Dindugal, Kanyakumari, Thanjavur, Theni, Madurai, Tirunelveli and Pudukkottai for storing the farm produce and reducing the post harvest losses.
- Establishment of ripening chambers in 10 places at a total cost of ₹ 10.00 crore (@ ₹ 1.00 crore each).
- Establishment of terminal markets at



Fig. 3.3.3: Capacity Building to farmers

Chennai and Madurai at a total cost of ₹218.90 crore.

- Setting up of 2 AEZs at a total cost of ₹70.00 crore (@ ₹ 35.00 crore each).
- Establishment of Agro Information Cell (AIC) at PACCS level and district level.
- Establishment of Food Processing Business Incubator at a cost of ₹ 5.00 crore per incubator in Dindigul, Tirunelveli, Krishnagiri, and Dharmapuri districts with an outlay of ₹ 20.00 crore.
- Setting up of food testing laboratories at a cost of ₹ 1.00 crore each in Dindugal, Tirunelveli, Krishnagiri and Dharmapuri districts with a total outlay of ₹ 4.00 crore.
- Assessment of post harvest losses in Tamil Nadu through research studies and survey on post harvest losses with an outlay of ₹ 0.15 crore.
- In line with the Solar Energy Policy 2012 of the State, as an initiative, cold storage unit in Ulundurpet RM, and Gingee RM, Villupuram district will be provided with Solar photo voltaic power generation system.

Capacity Building

- Organizing trainings, IEC&CB activities to 1.50 lakh farmers at a total cost of ₹ 3.50 crore.



- Post harvest technology training to farmers and department staff by Tamil Nadu State Agricultural Marketing Board (TNSAMB) at a total cost of ₹0.87 crore.
- Establishment of capacity building institute in Chennai at a cost of ₹15.00 crore.
- Empowering farmers with knowledge on price forecasting, high price period, best priced market, quality parameters, pre & post harvest technologies and value addition for different agricultural commodities and export opportunities for doubling their income through 'Market-led Agriculture'



Fig.3.3.4:Food Processing Business Incubator

- Agro Market Intelligence & Business Promotion Centre (AMI&BPC) is being established at Trichy at a cost of ₹1.35 crore. Based on 'Farmers cluster for a particular commodity', crop and market advisories will be rendered to farmers as 'one stop shop services' through AMI&BPC. This would help the farmers to tap market potential, future market alert and switching over to crops that gives the best returns during current / next season etc. AMI & BPC will be further expanded to Agri Business Development Center (ABDC) for direct marketing by farmers. Establishment of ABDC at Trichy as Special Purpose Vehicle (SPV) at a cost of ₹7.00 crore has also been proposed.

National Mission on Food Processing (NMoFP)

Ministry of Food Processing Industries (MoFPI) has proposed to launch a new Centrally Sponsored Scheme (CSS) in the ratio of 75:25 by GOI and State Governments. The National Mission on Food Processing during Twelfth Five Year Plan to be implemented through States. The basic objectives are : to augment the capacity of food processors working in unorganized sector and upscale their operations through capital infusion, technology transfer, skill upgradation and handholding support; to support established self help groups working in food processing sector and facilitate them to emerge as Small and Medium Enterprises (SME) status to ensure the standards of food safety and hygiene to the globally accepted norms, to facilitate food processing industries to adopt HACCP and ISO certification norms and to provide better support system to the organized food processing sector.

Institutional Mechanism for Monitoring and Evaluation

It is planned to have monitoring and evaluation of the activities to be carried in the Twelfth Five Year Plan by engaging available staff in the district headquarters.

Food Technology and Value Addition

The priority areas of food technology and value additions are research and development, quality control and capacity building. Research and development is needed to encourage both fundamental and applied research and keep abreast of global standards. Quality certification infrastructure in terms of labs and protocols for quality certifications have to be upgraded to World standards. Following schemes are proposed on education and capacity building in food processing and to address the issues of paucity of chilling infrastructure for milk and milk products, lack of modern slaughter houses, lack of value addition and infrastructure of fisheries export.



Education

Extending financial support to the students for internship/externship programme:

A grant of ₹3000 per student for in-plant training/internship and a travel grant to meet the travel expenses of students for their externship programme abroad at a cost of ₹0.50 crore are proposed.

Research & Human Resources Development

Centre of Excellence in Food Technology in State Agricultural / Veterinary University

It is proposed to take up research activities on minimizing nutrient loss in food processing, food safety, shelflife extension and quality through establishing Centre of Excellence in Food Technology in State Agricultural / Veterinary University. Tamil Nadu has a very wide range of eating habits and food products. Such products and processes need to be documented, improved upon and patented. R&D on foods shall not only address regional needs but also open up a market amongst food industry at large. Contracting food technology specialist in each block to monitor and ensure safety of the food chains and creation of Food Technology Council of India on the lines of Medical/ Veterinary Council of India for synchronising the syllabus and curriculum of food processing academic courses are suggested. Exchange of scientists between institutes of national and international importance is to be promoted.

Post Harvest Management

Clean Meat Production

Setting up mini slaughter units in 1600 villages ensuring quality and safety meat to the consumers. Waste utilization - The generation of waste in present situation

ascertains the need for effective waste treatment. Effluent treatment plant needs to be established in all the 385 blocks for safe disposal of waste from meat and animal products.

Creation of post harvest cold storage facilities for meat and egg

Creation of post harvest cold storage facilities on PPP mode to ensure food safety to a considerable extent. Establishment of post harvest centres in Fisheries at Chennai, Nagapattinam and Ramanathapuram districts of Tamil Nadu is proposed with the following components a) Establishment of fish products incubation centre, b) Establishment of vocational training centre, c) Establishment of certification centre and d) Establishment of post harvest centre in fisheries.

Outlay for the Twelfth Five Year Plan

An outlay of ₹541.39 crore is proposed as State fund for Twelfth Five Year Plan in agricultural marketing and food processing sector. The detail is given in Table 3.3.3. Apart from State fund, the funds from Ministry of Food Processing Industries GoI, Market Committee, Tamil Nadu Agricultural Marketing Board and Private will flow to this sector as shown in Table 3.3.4.



Fig.3.3.5: Post Harvest and Value Addition



Table 3.3.3: Twelfth Plan Outlay – (State Funding) Agricultural Marketing

(₹ crore)

S.No.	Programme/Schemes	Outlay
Ongoing schemes		
1	Strengthening Agmark grading laboratories	7.50
2	NADP-Agricultural Marketing	112.00
3	(IAMWARM) Project	20.39
Total Ongoing schemes		139.89
New Schemes		
4	Establishment of Capacity Building Institute at Chennai	15.00
5	Establishment of AMI&BPC	1.35
6	IT infrastructure market information for market	1.00
7	Establishment Agro Information Cell at district level	302.00
8	Establishment of Agribusiness Development Centre at Trichy	7.00
9	Establishment of Food Processing Industries-SCP	50.00
10	Establishment of Agro Processing Parks with farmers participation	25.00
11	Assessment of post harvest losses	0.15
Total New Schemes		401.50
Grand Total		541.39



Table 3.3.4: Twelfth Plan Outlay (other than State Fund) - Agricultural Marketing

		(₹ crore)
S.No.	Programme/Schemes	Outlay
1	Mega markets / Food parks (GOI 25 percent)	75.00
2	Specialized Market Complexes (GOI)	80.00
3	Cold Storage Units(GOI)- (including SCP of ` 10 crore)	240.00
4	Ripening chambers for SC and ST farmers	10.00
5	Establishment of Terminal markets	50.00
6	Establishment of Food Processing Business Incubators (GOI)	20.00
7	Establishment of Food Testing Laboratories	4.00
8	IT infrastructure market information for market (Market Committee)	1.05
Total - GOI		480.05
Others		
9	Establishment of Agro Processing parks with farmers participation (private)	75.00
10	Mega markets / Food parks (Private 75percent)	225.00
11	Establishment of Terminal markets(Private)	168.90
12	Agri Export Zone (Private)	70.00
13	Post harvest technology training to farmers and staff by TNSAMB	0.90
14	Creation of Food court for farmers in Regulated Markets (TNSAMB)	10.00
Total - Others		549.80
Grand Total		1029.85



3.5 COOPERATIVES INCLUDING AGRICULTURAL CREDIT

Introduction

Cooperatives act as an effective organization intended for the welfare and economic upliftment of the people, particularly living in rural areas. The cooperatives implement several socio-economic programmes such as disbursement of agricultural credit, non-agricultural credit, supply and distribution of agricultural inputs like seeds, fertilizers, facilitating the marketing of agricultural produce, sale of essential commodities at reasonable prices to protect consumers' interest etc., and public distribution system.

In the State, to cater to the credit needs of agriculture and rural development, a State Apex Cooperative Bank (TNSACB), a State Cooperative Agriculture and Rural Development Bank (TNSCARDDB), 23 District Central Cooperative Banks (DCCB), 4534 Primary Agriculture Cooperative Credit Societies (PACCS) and 180 Primary Cooperative Agriculture and Rural Development Banks (PCARDB) are effectively functioning. Besides, to meet the credit needs of urban people, 120 Urban Cooperative Banks (UCB) and One Tamil Nadu Cooperative Urban Bank Federation (TNCUBF) are functioning in the State.

Review of the Eleventh Five Year Plan

Performance of Cooperative Credit Institutions

The primary level cooperative credit institutions at village level are functioning for effective delivery of credit. As against the Eleventh Five Year Plan target of ₹10369 crore in the short term agricultural loans, an amount of ₹10495 crore was disbursed as shown in Table 3.5.1.

Table 3.5.1: Performance of Cooperative Credit Institutions

Loan Type	Target	(₹ crore)	
		Achievement	Achievement(%)
Short term loans	10369.00	10495.00	102.00
Medium term loans	968.00	635.00	66.00
Long term loans	310.00	36.16	12.00

Source: Dept. of Cooperation, Food and Consumer Protection, GoTN

Similarly under long term loans, the target fixed for the Eleventh Five Year Plan period was ₹310 crore, the achievement was ₹36.16 crore only. The target with respect to long term loans could not be achieved mainly due to the absence of refinance from the National Bank for Agricultural and Rural Development (NABARD) and this lending segment has also reached a point of saturation. There was low offtake on investment credit due to fragmentation of lands.

Besides loans for agricultural production and for undertaking activities allied to the agriculture, the cooperatives are providing jewel loans to meet the urgent needs of the public throughout the State through the branches of TNSC Bank, DCCBs, PACCS, UCBs, Cooperative Marketing Societies and PCARDBs. Against a target of ₹64451.50 crore, an amount of ₹62397.17 crore was disbursed as jewel loans by DCCBs and PACCS. Urban Cooperatives disbursed ₹15268.65 crore against a target of ₹18066.29 crore.



Non-Farm Loans

Non-farm loans are disbursed for investment and productive purposes. In the non-farm loans, DCCBs disbursed ₹151.44 crore, PACCS disbursed ₹125.66 crore and UCBs disbursed ₹663.56 crore and all were well less than the target of ₹479.60 crore, ₹398.25 crore and ₹837.90 crore respectively.

Housing Loans

The cooperative banks provide loans for house construction and extend house mortgage loans in rural and urban areas. As against the target of ₹594.22 crore, only ₹490.10 crore was disbursed during the Eleventh Five Year Plan period through cooperative institutions for housing purpose.

Pledge Loan

The PACCS provide pledge loans to farmers in order to help them to avoid distress sales during the peak harvest seasons. During the Eleventh Five Year Plan, out of the target of ₹347.50 crore, an amount of ₹280.32 crore was disbursed under pledge loan.

Equitable Access to Credit: The programme for sanction and disbursement of loans to the members belonging to the scheduled castes/scheduled tribes during the Eleventh Five Year Plan was 15 percent as short term and 30 percent as medium term loans.

Gender orientation: Cooperative credit structure has been fulfilling the credit needs of the Self Help Groups (SHGs) and the flow of credit to SHGs is on the increase. For SHGs ₹1414.35 crore was disbursed as loans against a target of ₹2040.02 crore.

Problems and Constraints faced by Cooperatives

The problems and constraints faced by the cooperative sector are: poor recovery of loans due to persuasive policy, differential rates of interest when compared to commercial and private banks and also customer friendly technological solutions provided by nationalized and private banks,

restricted area of operation of the PACCS, high transaction costs as well as the traditional policy of undiversified lending. On the management side, there is a need for rationalization of staff and introduction of modern management techniques. To address the above issues, the borrowers have to be sensitized in such a way that loans given by cooperatives have to be repaid on time and necessary infrastructure including consumer/farmer-friendly technologies in cooperative institutions have to be adopted. In agriculture, more importance has to be given to the emerging agricultural extension and diversification activity such as horticultural development and godown construction. Lending has to be extended to horticultural, herbal crops, wasteland development programmes and micro irrigation schemes. Diversified lending for profitable avenues has to be encouraged. Common Service Centres (CSCs), Agri-clinics and Agro Service Centres are also being established in PACCS to diversify their activities.

Financial Health of Cooperatives- Short term cooperative credit structure

TNSAC bank is the oldest among the cooperative credit institutions in the State. The bank presently has 46 branches including head office at Chennai. The net profit of the bank was ₹15.12 crore during 2007-08 and it increased to ₹40.69 crore in 2010-11. Credit-Deposit Ratio (CDR) rose from 83.54 to 125.07 during the above period. The DCCBs registered a sharp increase in deposits and it rose from ₹8844.66 crore (2007-08) to ₹13274.66 crore (2010-11). Now all the DCCBs have become profit making banks. Number of profit making banks has increased from 11 to 23. Due to the initiatives taken by the department, all the 23 DCCBs have received banking license from the RBI. Similarly, the PACCS registered a sharp increase in deposit and it rose from ₹3055.81 crore in 2008-09 to ₹4245.00 crore in 2010-11. The borrowings of PACCS also increased from ₹5113.11 crore to ₹7544.80 crore during the same period.

**Table 3.5.2: Key Financial Parameters of TNCSARDB**

(₹ crore)					
S. No.	Parameters	2007-08	2008-09	2009-10	2010-11 (P)
1	Share capital	40.29	40.35	40.37	40.37
2	Reserves	432.42	591.17	587.41	612.64
3	Deposits O/S	40.00	38.74	37.96	46.28
4	Borrowings O/S	449.46	263.71	153.56	183.76
5	Loans & Adv O/S	931.92	1107.77	1182.37	1343.24
6	Investment O/S	239.26	254.46	173.25	95.44
7	Accumulated loss	- 43.62	-44.96	Nil	Nil
8	Profit/Loss	+41.02	+1.97	+49.56	+4.94

Source: Dept. of Cooperation, Food and Consumer Protection, GoTN

Long term Structures- Tamil Nadu Cooperative State Agriculture and Rural Development Bank (TNCSARDB)

The long term cooperative credit structure in Tamil Nadu is federal in character with the TNCSARDB at the State level and 180 Primary Cooperative Agriculture and Rural Development Banks (PCARDBs) at block / taluk level. (Table 3.5.2)

In the absence of refinance from the NABARD, the performance of TNCSARDB during the last four years as reflected above was not satisfactory and its operations have been restricted to disbursement of jewel loans only. The TNCSARDB has started funding the PCARDBs from out of its own resources, enabling them to lend for minor irrigation and other agriculture related activities. The TNCSARDB is making all efforts to improve the financial parameters of its own and that of PCARDBs.

Primary Cooperative Agriculture and Rural Development Banks (PCARDBs):

There are 180 PCARDBs in the State established at block/taluk levels. The functioning of PCARDBs is not impressive during the recent past. Absence of fresh lending, declining recovery levels and raising costs are the matters of serious concern.

Measures taken to strengthen the cooperatives

Revival of Short Term Cooperative Credit Structures-

Based on the recommendations of Prof. Vaidyanathan Committee, the Government of India has initiated a scheme of 'Revival package for Short Term Cooperative Credit Structure (STCCS)'. Government of India, Government of Tamil Nadu and NABARD has signed MoU on 3.1.2008 to implement the scheme. The Government of Tamil Nadu fulfilled its obligations by taking necessary actions and carrying out amendment to Tamil Nadu Cooperative Societies Act, 1983 with reference to STCCS. As per the MoU, Government has formed State Level and District Level Implementing and Monitoring Committees to monitor the revival scheme.

As per the revival package, the accumulated losses as on 31.3.2004 amounting to ₹2129.50 crore (4540 PACCS) shall be recapitalized. Further, the Government has taken the following action as per the MoU:-

- Necessary amendments had been carried out to the Tamil Nadu Cooperative Societies Act, 1983 and as well as Rules and bylaws of societies and the same had



been published in the Government Gazette on 02.12.2008.

- Based on the Special Audit Report of the DCCBs and PACCS, the Government has provided assistance to 4540 PACCS to wipe out the accumulated losses as on 31.3.2004 as recapitalization assistance.
- The GoTN and GoI have released a sum of ₹230.82 crore and ₹1080.12 crore respectively to 4296 PACCS.

Transforming PACCS into multifunctional organizations

The accounting systems have been improved and made transparent so as to give greater confidence to all the members of cooperatives.

Extension Services to the Members and Public

Cooperatives has taken steps to provide a variety of services like extension services to the farmers through formation of Agri clinics,

Box 3.5.1: Farm Machinery for PACCS

The Government has perceived the difficulties that the farmers confront in day to day agriculture and steep escalation of input prices, especially, wages for farm labourers. Moreover, due to rapid urbanization in the State, availability of labour has become a cause of concern. In order to solve the above twin problems, the Government has taken a prudent step to extend subsidy to the tune of ₹80 crore @ ₹20 lakh/PACCS for 400 PACCS towards procurement of farm machinery. Government has given guidelines that these machinery will be custom hired for lesser cost than the prevailing market charges. This would pave way for efficient utilization of farm machinery that could assist in increasing the food production and thereby assuring food security.

Source: Dept. of Cooperation, Food and Consumer Protection, GoTN.

establishment of CSCs, commencement of Agro Service Centres, formation of Joint Liability Groups (JLGs) and Interest subsidy and subvention for the crop loans. The JLGs have been formed with a view to help marginal and small farmers and tenant farmers who are in normal circumstances unable to obtain institutional credit facilities. Under this scheme, each JLG is provided with a revolving fund of ₹10,000. The scheme also paved way for the adoption of technology and mechanization through joint agricultural operations including post harvest technology adoption.

Augmentation of Storage Capacity in Cooperatives

At present, the total storage capacity of the PACCS and Agricultural Producers Cooperative Marketing Societies is eight lakh metric tonnes (L.MT.) and part of it is used for storing PDS items and inputs like seeds and fertilizers. As a result, space available for storing the agricultural produce is only 40 percent of the installed capacity. It is proposed to construct 1141 godowns at a cost of ₹97.20 crore with Infrastructure Development Fund. In the year 2011-12, it was programmed to create additional storage capacity of 1.55 L.MT. in PACCS and Agricultural Producers Cooperative Marketing Societies by constructing 1166 godowns at a cost of ₹107.26 crore by availing financial assistance under the Rural Infrastructure Development Fund (RIDF) of the NABARD.

Major components required for strengthening of credit cooperatives:

- As of now, NABARD is providing refinance upto 45 percent. This needs patronage of the Government/Quasi Government by way of deposits
- Recruitment of adequate and competent personnel. Professionalism of the Cooperative Credit Institutions and HRD policies.
- Increase in volume of transactions.



- Since cooperatives are member driven institutions, periodical member education and development of Human Resources through IEC & CB activities is essential.



Fig. 3.5.1: Storage Godown

- Strengthening of supervisory mechanism for project appraisal, timely disbursement of credit and other inputs, etc.
- Strengthening the infrastructure in extension centres, PACCS and diversification of business activities

Twelfth Five Year Plan Objectives

- Cooperative institutions are engaged in financing the economically downtrodden people in improving their standard of living.
- Financing the SHGs by various cooperative institutions.
- Providing micro credit to men and women for undertaking petty trade economic activity to earn livelihood.
- Making the small farmers and marginal farmers to avail cooperative credit easily and if necessary under the JLGs concept to ensure timely repayment due to peer pressure.
- Horticulture, floriculture, commercial

hi-tech agriculture to be given more importance viz., establishment of banana ripening chambers, procurement of black gram at remunerative prices.

Modernisation of Cooperative Banking

Computerization of banking transactions in Credit Cooperative Institutions will improve the operational efficiency and enhance their customer service. With this in view, steps have been taken to computerise the Credit Cooperative Institutions in the State.

Price Stabilisation Fund

The Government has constituted a Price Stabilisation Fund with a corpus of ₹50.00 crore which enabled market intervention by the cooperatives to control the price of essential commodities. During the year 2011-12, 52980 kgs of tamarind and 22804 kgs of chillies for ₹53.18 lakh were purchased and sold through the wholesale stores. These measures control the price rise and will be continued during the Twelfth Five Year Plan.

Integrated Cooperative Development Project (ICDP)

The ICDP aims at integrated development of cooperative societies across various sectors within a district. This project is implemented throughout India with the financial assistance of National Cooperative Development Corporation (NCDC) and State Government. The scheme is being implemented in Salem, Erode, Madurai, Pudukkottai, Tirunelveli, Sivagangai, Dindugul, Karur, Nagapattinam and Vellore districts. The financial assistance is provided to cooperative societies through the State Government in the form of loan, share capital and subsidy under the refinance scheme of the NCDC. The NCDC has approved the implementation of ICDP in The Nilgiris, Thiruvallur, Namakkal and Kanyakumari districts. This project will be continued during the Twelfth Five Year Plan.



Interest Subsidy and Subvention for Crop Loans

Cooperatives continue to be the principal institutional agency in rural areas. With a view to keep the cost of agricultural credit at minimum and to encourage farmers to take up production, an interest subvention of 2 percent is being given on the total crop loan disbursed by the cooperatives from their own resources. Similarly, the entire interest loss accruing out of the interest free crop loan scheme is being given by the Government to the cooperatives on actual basis. (Table 3.5.3)

Table 3.5.3: Interest Subsidy and Subvention for Crop Loans

Year	Crop loans	Interest subvention		Interest incentive	Total
		@ 2%*	@ 7% **		
2012-13	3400	35	200	235	
2013-14	3900	45	225	270	
2014-15	4500	50	260	310	
2015-16	4200	60	300	360	
2016-17	6000	65	345	410	
Total	23000	255	1330	1585	

(₹ crore)

Source: Dept. of Cooperation, Food and Consumer Protection, GoTN

* interest subvention @ 2% for the involvement of owned funds of the coops to the extent of 55 %

** Interest incentive at 7% for timely repayment at 95% recovery rate for the loans disbursed during the previous years.

Equity & Gender Welfare Measures

To increase the credit drawal facility of women, differently abled, SC and ST members of cooperatives, it is proposed to increase the Share Capital Assistance to ₹2500 from ₹250 per member.

e-governance

To serve the public in an effective manner, it is proposed to introduce 'Core Banking Solutions' in 23 DCCBs. In view of the rapid urbanisation and to facilitate the better service to public, it is proposed to upgrade the 10 PACCS into Urban Cooperative Credit Societies.

Marketing Cooperatives

The Cooperative Marketing Societies (CMS) have been established with the objectives of facilitating its members with the marketing of agricultural produce at a remunerative price, distribution of farm inputs to farmers, provision of produce pledge loans, processing and value addition to the agricultural produce wherever possible.

Box 3.5.2: Pledge loans – Panacea to avoid distress sales

In agriculture, price reduction due to post-harvest glut is not uncommon. Large chunk of farmers' profit got wiped out and pledge loans serve as an effective tool to mitigate the related monetary loss. The Government has enhanced the produce pledge loan limit from ₹2.00 lakh to ₹3.00 lakh for facilitating the farmers to pledge their agricultural produce with the Cooperative Societies. In the Twelfth Five Year Plan, the marketing cooperatives will augment their storage capacity by another 62,200 MT. to improve their pledge loan operations by disbursing ₹100.00 crore annually to avoid the distress sale by farmers.

Source: Registrar of Cooperative Societies, GoTN.

The structure of cooperative marketing in Tamil Nadu is a two-tier structure with the Tamil Nadu Cooperative Marketing Federation at the apex level and 110 Primary Agricultural Producers Cooperative Marketing Societies at taluk levels. The programme under CMS is given in Table 3.5.4. Under agricultural cooperative marketing, following strategies are proposed.



- The auction yards would be strengthened and modernized to offer better services to its members.
- Distribution of fertilizers would be increased by 2 percent and seeds by 15 percent annually.
- Dissemination of market information through cooperatives would be institutionalized and strengthened.

Table 3.5.4: Programme of Cooperative Marketing Societies - Twelfth Plan

(₹ crore)

Year	Marketing of agri. produce	Distribution of pledge loans	Fertilizers	Pesticides	Seeds	Total
2012-13	930.00	57.00	645.00	4.50	29.00	1665.50
2013-14	1120.00	58.00	660.00	5.00	33.00	1876.00
2014-15	1340.00	59.00	675.00	5.50	38.00	2117.50
2015-16	1610.00	60.00	690.00	6.00	44.00	2410.00
2016-17	1930.00	61.00	700.00	6.60	50.00	2747.60
Total	6930.00	295.00	3370.00	27.60	194.00	10816.60

Source: Dept. of Cooperation, Food and Consumer Protection, GoTN

Twelfth Five Year Plan Outlay

The outlay for cooperative sector in the Twelfth Five Year Plan is provided in the Table 3.5.5.

Table 3.5.5: Twelfth Plan Outlay – Cooperative Sector

(₹ crore)

S.No.	Schemes	outlay
Ongoing Schemes		
State Schemes		
1	Price Stabilisation Fund	150.00
2	Grant for Implementation of Integrated Cooperative Development Project	169.45
3	Loans to Co-operative Institutions and Banks - controlled by the Registrar of Co-operative Societies and Share Capital Assistance to women, differently abled, SC and ST members as subsidy to increase their borrowing power	1585.00
4	Interest subsidy and subvention to Co-operative institutions towards reduced interest for crop loans to the farmers	1000.00
5	Assistance to Co-operative Institution in Tribal areas	4.50
6	Interest Free Loans to Scheduled Castes members of Cooperative Societies and Institutions - controlled by Registrar of Cooperative Societies	25.00
7	NABARD -Construction of godowns	129.00
8	Assistance to setting up modern retail outlets	2.00
9	Assistance for organisation of cooperative wholesale stores for newly formed districts	1.50
Total Ongoing		3066.45
New Schemes		---
Grand Total		3066.45



The monitorable targets in the cooperative sector is provided in the Table 3.5.6.

Table 3.5.6: Cooperative Loans Projections for Twelfth Plan

		(₹ crore)
S.No.	Loan type	Monitorable targets
1	Crop Loan	23000
2	Investment Credit	1875
3	Jewel Loan	185165
4	Loans for SHGs and JLGs	1350
5	Non-Farm Sector Loan	1840
6	Housing Loan	1840
7	Loans to differently abled persons	90

Source: Dept. of Cooperation, Food and Consumer Protection, GoTN



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), Kudumiyanmalai. 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. In short, 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**

S.No.	Schemes	(₹ crore) 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, Kudumiyanmalai	2.00
	Total-New scheme	754.00
	Grand Total-TNAU	1184.00



II. Animal Husbandry Research and Education - Tamil Nadu Veterinary and Animal Sciences University (TANUVAS), Chennai

Livestock play a vital role in the rural economy of our country. Apart from providing food products like milk, egg and meat, livestock sector also generates productive employment and valuable supplementary income to the rural households, majority of whom are small and marginal farmers and landless labourers. This sector contributes to many other socio-economic spin-offs like slowdown of rural-urban migration and empowerment of rural women. It also has strong backward and forward linkages which in turn promote livestock based food processing and leather industries that help in export earnings.

The Tamil Nadu Veterinary and Animal Sciences University was established in the year 1989 with the following objectives:

- To impart quality education to under graduate, post graduate and doctoral students in different fields of veterinary and animal sciences
- To carry out research in livestock and poultry protection and value addition.
- To disseminate knowledge on important technologies to line departments and farming community for the sustenance and growth of livestock and poultry in the State.

TANUVAS is the leading University in the country for promoting veterinary and animal sciences education and is recognized as a potential institution with strong faculty for academics and research in veterinary and animal sciences. The University has six constituent colleges namely, Madras Veterinary College, Chennai, Veterinary College and Research Institute-Namakal, Orathanadu and Tirunelveli and Institute of Food and Dairy Technology, Koduvalli.

Box 3.4.4: Mineral Mixture - Milk Production Booster

Thiru K.C.Gopal of Coimbatore district attended a two day training programme on 'Rearing of Milch Animals' by Veterinary University Training and Research Centre (VUTRC). After this refresher skills training, he fed the cows with fodder enriched with mineral mixture @ 40gm/ cow/ day. The impact of this technology were: absence of milk fever after calving, complete shedding of placenta, reduction in premature and still birth calves. Milk output of his farm increased to 70 litres per day. The farmer has appreciated the successful dissemination of technology and suggested for emulating the model across the State.

Source: Tamil Nadu Veterinary and Animal Sciences University.

In addition to the six constituent colleges, the TANUVAS has one post graduate Research Institute in Animal Sciences, Institute of Poultry Production and Management, Institute of Animal Nutrition, seven Research Stations, 15 Veterinary University Training and Research Centres, three Krishi Vigyan Kendras and three Farmers Training Centres and two Ethno-Veterinary Herbal Training Centres to take care of research and extension needs of the farming community. The research and developmental logistics provided to the various facets of the veterinary and animal sciences are the hallmark of this University.

Eleventh Five Year Plan Performance-TANUVAS

During the Eleventh Plan period, 66 plan schemes and 49 non-plan schemes in veterinary faculty, 18 plan schemes in fisheries faculty were in operation resulting in better higher education (908 undergraduates and 418 postgraduates, significant findings in research, technology generation (58 Nos.) and ultimately technology reach to the end users



(7.31 lakh beneficiaries and 3700 extension programmes). Further, improvement in the productivity, sustainability and profitability of the animal husbandry, dairying and fisheries sectors have been done. Apart from these services, clinical facilities have been extended to 3.03 lakh animals through institutional hospitals.

Technologies with Commercial Potential

At present, 56 technologies developed by the University are having a big potential for commercialization viz:- TANUVAS RUSITEC, TANUVAS inactivated fowl cholera vaccine and inactivated Ranikhet disease virus vaccine, LipL32 recombinant antigen coated latex agglutination test kit, single radial immuno diffusion test kit and infectious bronchitis virus haemagglutination inhibition test (IBV- HI) kit.

Twelfth Five Year Plan (2012-17) Goal

The goal is to help the animal husbandry sector to be resilient and to help farmers to increase their income through animal sciences research.

Objectives

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

- To produce graduates capable of multi-tasking in different fields of veterinary and animal sciences.
- To evolve breeds / technologies for sustained increase in yield and to meet the end users' expectations in terms of quality and food safety.
- To ensure service provision and to enable farmers to take informed decisions based on prices of different animal products.
- To expand the further use of ICT in education, research, coordination, administration and technology delivery.
- To harness research output of frontier sciences to increase value added animal products, storage and processing.

Strategies

Broad strategies envisaged for achieving targeted growth in Tamil Nadu would cover four categories: a) Animal sciences education to cater to the globalising

Box 3.4.5: Oestrus Synchronization Technique for Rescue of Infertile Cows

Oestrus synchronization technique involves use of certain drugs to bring a herd of cows and buffaloes into oestrus at a predetermined time for breeding. Adoption of oestrus synchronization technique in cows and buffaloes is a significant intervention as in Tamil Nadu 30 percent of cattle suffer from reproductive failure, resulting in very long average calving interval of more than two years as against the desired one year. The scheme under NADP has resulted in improved fertility and milk production, reduced calving interval and enhanced economic returns to the farmer. Cost of oestrus synchronization was ₹750 per animal and 18,899 cows and buffaloes in 25 districts were covered and 60.23 percent conception rate in infertile cows and buffaloes was achieved. This technique resulted in increasing milk production by 46.00 lakh litres on annual basis and expected to rescue at least 20-30 percent of cows and buffaloes from going to slaughter as unproductive, thereby effecting a total economic benefit of ₹19.63 crore. Adopting this technique on a large, eg. in 2.00 lakh cows would increase total milk production by 700 lakh litres in a year. This strategy would help to meet the increase in demand for milk and control price increase too.

Source: Tamil Nadu Veterinary and Animal Sciences University.



needs, b) Research for innovative solutions, c) Putting innovative solutions into practice and d) Promoting agribusiness with animal husbandry as a base.

An amount of ₹592 crore proposed for TANUVAS for the Twelfth Five Year Plan is given in the Table 3.4.4.

Table 3.4.4: Twelfth Plan Outlay – TANUVAS

		(₹ crore)
S.No.	Schemes	Outlay
I	Ongoing Schemes	190.00
II	New Schemes	
1	Centre of Excellence in Veterinary Clinical Services	3.50
2	Centre of Excellence in Animal Genetic Resource Conservation	6.00
3	Institute of Animal Reproduction	10.00
4	Establishment of Animal Experimentation Facility (ABSL -2)	6.00
5	Strengthening of VC & RI Campus at Tirunelveli and Orathanadu, IFDT and Koduvalli	40.00
6	Special Res. contingency to each & every staff members	8.00
7	Institute of Distance Education for Skill Development	9.00
8	Student / Faculty Exchange programme in National and International	9.00
9	Stem Cell facility for Veterinary Regenerative Therapy	10.00
10	Nanotechnology facility to augment livestock production and health	20.00
11	Biosafety Level three Laboratories	10.00
12	Genomic research facility	22.00
13	Food safety, quality control, certification and eco-labeling laboratory at IFDT, Koduvalli	15.00
14	Establishment of University Library, digitization and networking of libraries of TANUVAS	18.00
15	Central instrumentation facility for six constituent colleges	30.00
16	Replacement of the old building of MVC, Chennai	35.00
17	Continuing education in veterinary and animal sciences	8.00
18	Establishment of New Veterinary University Training and Research Centres	18.00
19	Research and Development Centre for Ethno-veterinary Practices at VUTRC, Thanjavur	15.00
20	Dairy Science College and Research Institute	35.00

**Table 3.4.4: Twelfth Plan Outlay – TANUVAS (Contd.)**

S.No.	Schemes	(₹ crore) Outlay
21	Special contingency grant for transfer of Technology	5.00
22	Strengthening of Institute of Poultry Production and Management, Hosur	20.00
23	Creation of need-based and Location-Specific Centres at the existing University Centres	24.50
24	Pilot project on poultry litter based power plant	25.00
Total- New schemes		402.00
Grand Total-TANUVAS		592.00

III. Fisheries Research and Education - Tamil Nadu Fisheries University (TNFU), Nagapattinam

Tamil Nadu has a coast line of 1076 km and possesses one of the world's well known marine biodiversity regions, Gulf of Mannar. In addition, the State has innumerable number of tanks, reservoirs, village ponds that have been built to harvest water and provide for agriculture and other purposes. These water resources have not only been the source of capture fisheries, but also have been used for culture. With the increasing knowledge on fish as health food, the demand for fish is expected to grow rapidly. In view of all these resource potential and the need of people for quality and nutritious food in adequate quantity, the Government took a major policy decision to establish a separate Fisheries University with an aim to contribute to increased fish availability in the State for local consumption by igniting innovations at all levels. The Tamil Nadu Fisheries University has come into existence on 19th June, 2012.

Objectives

- To facilitate comprehensive development of fisheries sciences for increased contribution to State's economy and to set bench mark standards through appropriate interventions in fisheries teaching, research and extension

- To impart quality education in different branches of fisheries sciences
- To conduct organised research in frontier areas with the objective of developing cutting edge technologies in fisheries sciences
- To provide extension services to fish farmers, fisher folk, unemployed-youth and entrepreneurs in fisheries sciences
- To set up an aquatic disease diagnosis and surveillance system in the State.

The University has a Fisheries College and Research Institute at Thoothukudi, 4 Fisheries Research and Extension Centres viz:- Tharuvaikulam in Thoothukudi, Madhavaram in Chennai, Parakai in Kanyakumari and Thanjavur, 3 Institutes of Fisheries Technology viz:- Ponneri in Tiruvallur, Nagapattinam and Chennai; a Maritech Research and Extension Centre, Tharuvaikulam in Thoothukudi and a Staff Training Institute at Chennai

Fisheries Education

Undergraduate Programme

B.F.Sc is a four years professional degree programme in fisheries science with an intake capacity of 40 students every year. The college has adopted the ICAR – nationwide common syllabus pattern for B.F.Sc. programme from the academic year 2009-10.



Post graduate Programmes

M.F.Sc is a two years post graduate degree programme offered in eight disciplines, M.Phil in Climatic Change and Fisheries, Ph.D. programmes are being offered in regular and part time mode in four disciplines.

Research Areas in Fisheries

The prominent areas of research in the area of aquaculture are: improving the quality of progeny by developing sperm bank, development of techniques for the culture of fin fish in cages, enhancing the water use efficiency and productivity by bio-floc technology, developing the improved methods of ornamental fish culture and breeding techniques and inventing techniques to prevent and cure fish diseases. Stock assessment of important fishery resources, mapping the fauna and understanding the biology of commercially important and rare species, Coastal area and inland waters monitoring for the major pollutants and waste water management are the focus areas of research. In the area of harvest and post harvest technology, new fishing gears and techniques have been developed. Value addition to fish has been a major focus area and technologies for fish pickle, fish noodles and ready-to-eat products like fish curry, fish puff, fish cutlet and fish burger have been evolved. Quality control wing of fish processing has evolved several rapid techniques for detection of human pathogens.

A separate laboratory for quality monitoring will be built to help the industry. Quality of fish for microbes, nutrients and contaminants will be monitored on regular basis. Development of fish culture production models for the State, economic evaluation of mangroves, role of Self Help Groups in fisheries will be evolved. Fisheries extension is another major activity of the University and research and training centers will be spread throughout the State. Several training programs will be organized on a regular basis to transfer technology and empower people

with new skills and information to enable themselves to be innovators.

In this era of globalization and rapidly emerging communication means, building partnership with people and institutions is seen as a cornerstone in bringing benefits to humanity and safeguard environment. Keeping this in view, since 2010-11, a proactive initiative has been undertaken to build partnership with the national and international institutions by entering into Memorandum of Understanding (MoUs).

Twelfth Five Year Plan

Goal

The goal is to help the fisheries sector to be resilient and to help fishermen and farmers to increase their income through fisheries research.

Objectives

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

- To impart quality education in different branches of fisheries science
- To evolve breeds/technologies for sustained increase in yield and to meet the end users' expectations in terms of quality and food safety.
- To harness research output of frontier sciences to increase value added fish products, storage and processing.
- To provide extension services to fish farmers, fisher folk, unemployed youth and entrepreneurs in fisheries sciences.

Strategies

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



Strengthening of Staff Training Institute

At present, staff training institute is located in a rented building and it does not have adequate facilities to train staff on various aspects of fisheries. It is planned to strengthen the staff training institute and it is proposed to enhance the capacity of staff in rapidly emerging areas like climate change, mainstreaming, stock assessment, farmer participatory research, food safety and certification, environmental monitoring, etc.,

Establishment of Aqua Health Clinic

It is proposed to establish one State level and three regional level state-

of- art laboratories for the benefit of aqua farmers with central funding to increase the aquaculture production and export earning.

Fisheries Technology Institute, Ponneri

Fisheries Technology Institute is being established at Ponneri, Thiruvallur district with a objective to build the capacity of fishermen and fisherwomen on fish culture and development of fisheries. The outlay for the institute has been included in the sub chapter 3.8. Fisheries.

An amount of ₹148 crore proposed for TNFU for the Twelfth Five Year Plan is given in the Table 3.4.5.

Table 3.4.5: Twelfth Plan Outlay – TNFU

S.No.	Schemes	(₹ crore) Outlay
I	Ongoing Schemes	10.00
II	New Schemes	
1	Centre of Excellence in Food Processing	5.00
2	Strengthening FC & RI, Thoothukudi	5.00
3	Special Res. contingency to each & every staff members	2.00
4	Institute of Distance Education for Skill Development	1.00
5	Student / Faculty Exchange programme in National and International	1.00
6	Bio-safety Level Laboratories	5.00
7	Establishment of Fisheries Regional Research Stations and Fisheries Research & Training Centres in different districts of Tamil Nadu	3.00
8	Establishment of Additional Fisheries College in Tamil Nadu	20.00
9	Establishment of University Library, digitization and networking of libraries of Fisheries University	2.00
10	Central instrumentation facility for constituent colleges	5.00
11	Continuing Education in Fisheries sciences	1.00
12	Special contingency grant for transfer of Technology	1.00
13	Creation of need-based and Location-Specific Centres at the existing University Centres	2.00
14	Thrust areas for Fisheries Research and Education	35.00
15	Establishment of Fisheries University at Nagapattinam	50.00
	Total - New schemes	138.00
	Grand Total - TNFU	148.00



Agricultural Research and Technology Development

Since its establishment, Agricultural Research System (ARS) has made real progress in generating technologies for improving the productivity of crops, forestry, fisheries and livestock. Its performance in terms of returns to investment in agricultural research and development has been rated high (₹ 29 per rupee invested). Impact studies conducted indicate that investments in agricultural research have made more impact on poverty reduction than investments in the road, health and education sectors (IFPRI, 2006). This success has been attributed to the provision of technologies that enhance production and productivity by agricultural research institutions. Despite the above, significant challenges still prevail. Hence, the research system will invest in innovation from the traditional 3F (food, feed, fibre) to 6F (feedstock for industry, fuels, farm-aceuticals). Further, the research concentration will be more on maximising yield per acre, per unit of precipitation, per unit of fertilizer, per hour of work and minimise the cost per unit of production. Thus, ARS needs revamping.

While the ARS has been able to generate a number of technologies, most farmers have not been able to access them and poverty levels still remain unacceptably high. To address this, ARS will be strengthened so that it can generate more technologies further along the value chain, improve its ability to compete in the global knowledge market, coordinate and assure the quality of the services provided by an increasing number of participants and ensure continuity in research capacity for pursuing cutting edge science. The ARS should target the agro climatic zones for accountable technology development and technology as per the suggestions of the State Appraisal Committee (Kannaiyan's Committee, 2009).

Some of the Key Principles involved are:

- Decentralization of research services and reaching a balance between subsidiary stakeholder involvement and the need to maintain a critical mass of scientists
- Mainstreaming the Integrated Research for Development
- Further enhancement of the quality of the service providing process aimed at improving products and services to farmers
- Developing and maintaining a core strategic programme of advanced science to feed the adaptive research activities at the zonal level. Centres of Excellence will cater to the innovation, patents and knowledge delivery to the site specific problem.

To achieve this objective, activities will be implemented under three components.

Generation of New Technologies, Practices and Strategies (for improved uptake of technology and knowledge)

Demand driven market oriented and innovation focused research and research programmes on emerging issues of strategic nature (nutrition and climate change) will be undertaken. These components will be supported with the core research activities of Tamil Nadu as well as expanding and introducing Competitive Grants System (CGS). The CGS will finance strategic and zone specific programmes to maintain ongoing research as well as to undertake new work (including activities in climate change, sustainable soil health, precision farming, secondary agriculture and land management). It will also strengthen interaction with key value chain and innovation system stakeholders, notably small scale processors, based on the principles of joint diagnosis and planning, interactive learning and multi-dimensional assessment.



Strengthening of Demand-driven, Market-oriented and Innovation focused Research

Designing and implementing mechanisms for stakeholder needs identification and response, holding annual priority setting exercises, training stakeholders in demand articulation, designing impact assessments of projects and programmes and developing innovative methods for the diagnosis of constraints and opportunities viz:- Peri-urban agriculture, Urban agriculture, Hydroponics, High-density planting, Protected cultivation, Rhizosphere engineering, Revival of trees, Coastal wind shield, Micro irrigation, Inland fisheries, Location selective breeds, Race animal, Speciality animal, Quality meat, Packaging and cold storage, Dormancy and keeping quality, Nutritional grains, Quality oil, Unit productivity and profitability, Value addition and marketing, Pest and disease surveillance.

Implementation of Core Strategic Research Programmes

Generate technologies, strategies and practices addressing core national and zonal priorities, Develop Centres of Excellence, Liaise and undertake joint research with other regional Centres of Excellence and share information and research outputs with other Regional Centres of Excellence.

Initiating Research Programmes on Emerging Issues of a Strategic Nature (including climate change and nutrition)

Identify, develop and implement projects for emerging issues, provide short maturing and quality seed and cuttings for planting food and cash crops, improve livestock and crops in terms of resistance to drought, disease and pests and in terms of increased yields in a shorter time, develop drought resistant pasture and forage for animals in pastoral areas and develop nutrient dense crops and innovative farming

systems for improved household food security and nutrition.

Non-core Research Priorities Implemented through the Competitive Grant Scheme (CGS)

Prepare and fund research projects through CGS: Allocate funds for the CGS programme; and Generate technologies, strategies and practices (innovation/patents) from the CGS projects

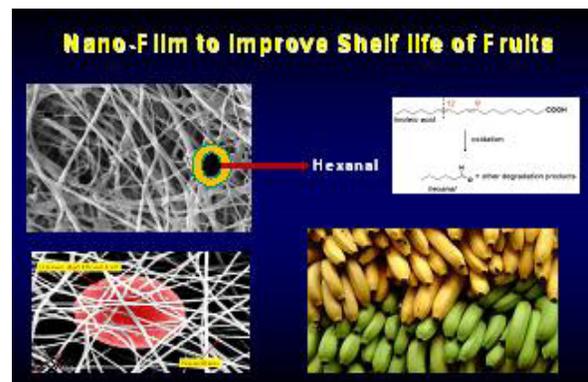


Fig.3.4.2. Nano films

Monitorable Indicators

The general indicators for monitoring besides specific indicators are given below.

- Higher yield level/ quality of output (grade)
- Higher farm income
- Hybrids and high yielding varieties (HYVs) developed based on end user demand
- Greater proportion of exportable quality of produce
- Adoption of weather based and market information based crop planning by farmers
- Greater provision of market information and market intelligence
- Post harvest management (reduction in post harvest loss and higher shelf life).
- Higher percentage of processing
- Mechanization (types of operations and levels and comparison of labour vs. mechanized operations)



- Promotion of agri business through focused entrepreneurship development (Agri Business Incubator)
- Knowledge empowerment of farmers (Number of farmers graduating and trained)
- Higher use of ICT in technology transfer and agri marketing
- Increasing Water Use Efficiency
- Improving soil health through increased organic matter content and physico-chemical properties of soil.
- Greater number of farmers following soil test based manure and fertilizer application
- Greater number of farmers using Integrated Nutrient & Integrated Pest Management
- Greater number of farmers using technology information systematically
- Increased participation of stakeholders in research planning, execution, transfer of technology (farmer Group/Association, Water User Association, etc).
- The specific benefits and indicators for monitoring are given then and there, where ever necessary.
- Excellence in the academic, research and extension in veterinary and animal sciences will facilitate accelerated annual compound growth rate of 4 percent in milk, 8 percent in egg and 10 percent in meat.

Table 3.4.6: Abstract of Total Outlay for Twelfth Plan – Agricultural Research

(₹ crore)				
S.No.	Institution	On going Schemes	New Schemes	Total
1	Tamil Nadu Agricultural University	430.00	754.00	1184.00
2	Tamil Nadu Veterinary and Animal Sciences University	190.00	402.00	592.00
3	Tamil Nadu Fisheries University	10.00	138.00	148.00
Total		630.00	1294.00	1924.00



Fig.3.4.3: Sustainable Sugarcane Initiatives