



3.1

AGRICULTURE

உழவார் உலகத்தார்க்கு ஆணி அஃதாற்றாது
எழுவாரை எல்லாம் பொறுத்து.

– திருக்குறள் 1032

The ploughers are the linch-pin of the world;
they bear Them up who other works perform,
too weak its toils to share.

- Thirukkural 1032

Introduction

Agriculture is a critical sector in the Indian economy. Achieving a 8.2 percent of growth in the overall GSDP may not deliver much in terms of poverty reduction unless agricultural growth accelerates. At the same time, 'growth with inclusiveness' can be achieved only when agricultural growth accelerates and is also distributed amongst the people and regions. Agriculture has to be kept at the centre of any reform agenda or planning process, in order to make a significant dent on poverty and malnutrition and to ensure long-term food security of the people.

Tamil Nadu has about 5.96 percent of Nation's population, occupies 4 percent of the land area and has 3 percent of the water resources of the Nation. In the State, agriculture provides livelihood to about 40 percent of the population. Hence, the State's economy swirls around agriculture and allied sectors. Therefore, any disturbance in the growth of the agriculture sector will influence the State's overall growth rate, ultimately

leading to deceleration in its economic growth. Realizing agriculture sector's importance, the Government of Tamil Nadu is taking all out efforts to usher in Second Green Revolution so as to enhance the farmers' income by 2-3 times from the present level through appropriate land use, farm level planning through Farm Crop Management System (FCMS), moisture harvesting, crop diversification, supporting secondary agriculture, value addition and facilitated marketing.

An Average Annual Growth Rate (AAGR) of 5.1 percent is envisaged for agriculture sector in Vision Tamil Nadu by 2023 and to achieve this target, the key initiatives identified in this sector are: a) promotion of market driven agricultural produce, b) accelerating innovation and extension mechanism, c) functional consolidation of land holdings, d) emphasis on mechanization, e) improving productivity, f) assurance of timely irrigation, g) creating robust supply chain and h) skill development in agriculture. Towards the infrastructure



development in agriculture, ₹40,000 crore has been proposed in the Vision Tamil Nadu 2023.

Tamil Nadu performs well in the all India scenario in productivity of major food crops. It ranked (2009-10) second in productivity of rice next to Punjab. (Agricultural Statistics at a Glance, 2011, GOI). The State ranked first position in the case of maize and oilseeds productivity. The State also holds first place in groundnut productivity surpassing Karnataka and Gujarat. Similarly, in productivity of sugarcane, it is the Numero Uno State and its productivity is nearly 45 percent more than the National average. In the case of vegetables and fruits productivity, it ranked first and second place respectively at National level.

The issues and challenges of the agricultural sector is complex. The productivity has stagnated in the recent years due to: a) declining farm size and income, b) depleting water resources, c) escalating inputs costs, d) increased incidence of micronutrient deficiency, e) deteriorating soil health as a consequence of indiscriminate use of chemical inputs, f) low level of post harvest technology, g) uncertain market prospects, and h) relatively higher incidence of indebtedness of farmers (Swaminathan, 2010). In addition to the above, marginalization of land holdings, high variability in rainfall distribution, pressure of expanding habitat intruding into farm space, inadequate capital formation by the public sector and declining public investment in agriculture affect the agricultural performance in the State.

Salient Features of Agriculture

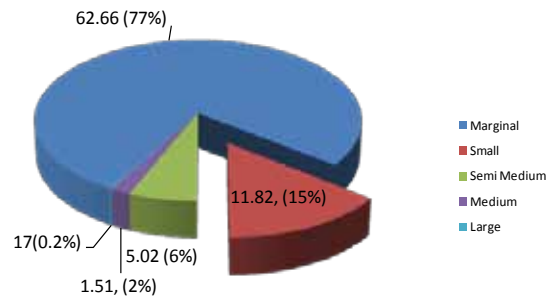
The salient features of Tamil Nadu's agriculture are: a) marked water scarcity, the need for a shift and diversification from present concentration of cultivation from water intensive crops like rice and sugarcane to more nutritious but less water consuming crops like pulses, millets, oilseeds and so on in terms of total irrigated land and b) predominance of small and marginal farmers

in overall agriculture production.

Dominance of Small and Marginal Farmers

The distribution of landholding is skewed towards small and marginal farmers and the average size of holding is low. The semi-medium, medium and large farmers accounted for a small proportion (9 percent) of the holdings but operating a higher proportion (41 percent) of the total area. The average size of holding was higher in the case of large farmers (20.59 ha.) followed by medium farmers (5.61 ha). The overall average size of land holding had come down from 0.83 ha. in 2005-06 to 0.80 ha. in 2010-11. (Graph 3.1.1).

Graph 3.1.1: Land Holding Pattern in Tamil Nadu (in Lakh Nos)

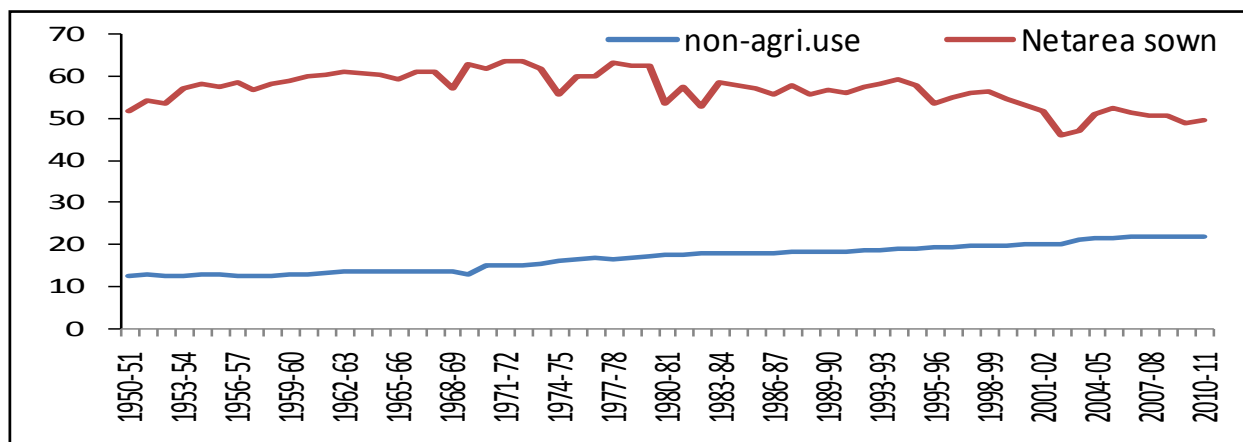


Source : Dept. of Economics and Statistics, GoTN

The reduction in land holding size in Tamil Nadu directly affects the productivity as the farmer would not be able to afford the investments required for technological improvements. Vision Tamil Nadu 2023 envisages functional consolidation of holdings through cooperative farming, contract farming and other mechanisms such as farmer groups and joint liability groups and implies the urgent need to increase the penetration of modern agricultural technologies and improve output.



Graph 3.1.2: Shrinking Net Area Sown



Source: Dept. of Economics and Statistics, GoTN

Declining Net Cultivated Area

Rapid urbanization and related factors exert significant pressure on net cultivated area in the State. An analysis of time series data on net cultivated area and land put to non-agricultural uses in the State clearly reveals the above fact. (Graph. 3.1.2) Land put to non-agricultural purposes increased from 9.8 percent in 1950s to 14.56 percent in 1990s and reached 16.17 percent in 2000s, which is mainly due to urbanization and industrialization. The trend in decrease in net area sown was analyzed and the net area sown came down from 56.38 Lakh hectares (L.ha) in 1950s to 50.22 L.ha. in 2000s though it had registered some increase during the mid 60s and 70s. The main challenges faced by agriculture are: high pressure on land, deterioration in soil health due to depletion of top soil and decline in organic content, marginalization of landholdings, dwindling ground water resources, shortage of labour force, declining cropping intensity and poor adoption of crop management practices. The Twelfth Five Year Plan will make efforts to address these issues by bringing back the fallow lands under cultivation of oilseeds, pulses and millets.

Review of the Eleventh Five Year Plan Performance

Many initiatives were undertaken during the Eleventh Five Year Plan apart

from implementing various schemes. As against the outlay of ₹2885.90 crore for Crop Husbandry sector, an amount of ₹3063.04 crore was spent (106 percent). The actual expenditure is much more under Government of India and World Bank projects. The expenditure is higher than the outlay due to the implementation of National Agricultural Development Programme (NADP), National Food Security Mission (NFSM), Integrated Scheme for Oilseeds, Pulses, Oil palm and Maize (ISOPOM), Crop Insurance Schemes, Seeds Multiplication Scheme of paddy, millets, pulses, oilseeds and cotton and World Bank assisted Tamil Nadu Irrigated Agriculture Modernization and Waterbodies Restoration and Management Project (TN IAMWARM) etc.

For effective delivery of quality inputs and extension services, additional initiatives such as establishment of 18 Seed Testing Laboratories, nine new Bio Fertilizer Production Labs in addition to six existing units, 11 Soil Testing Laboratories, Agri Clinic cum Mini Soil Testing Laboratories at one per block, Automatic Weather Stations (AWS) for medium range weather forecast in 224 blocks and 79 seed storage godowns to store 79,000 MT of certified seeds were undertaken. Further, Agriculture Information Service Network (AGRISNET) was developed as an Information, Communication and Technology (ICT) tool for work flow automation of information by restructuring the whole State



extension system and bringing the entire line departments under one umbrella.

Agricultural Growth during the Eleventh Five Year Plan

In the Eleventh Plan, a target of 4 percent growth rate in agriculture and allied sectors was aimed. In the first two years of the plan period (2007-08 & 2008-09), a negative growth rate of 4.69 percent and 2.70 percent respectively was observed in the Agriculture (including livestock sector). (Table 3.1.1).

Table 3.1.1: Growth rate of Agriculture & Allied Activities and Agriculture (2004-05 prices)

Year	(in percentage)	
	Agriculture and allied activities	Agriculture
2007-08	-4.41	-4.46
2008-09	-2.29	-2.70
2009-10 (RE)	6.14	6.31
2010-11(QE)	4.54	4.20
2011-12 (AE)	7.08	7.98
Average (5 Years)	2.21	2.22

Source: Dept. of Economics and Statistics, GoTN

Though the growth rate in agriculture was negative during the first two years of

the Eleventh Five Year Plan, the average agriculture growth in the Eleventh Five Year Plan period registered a positive growth of 2.22 percent as it recovered in the later years due to the favourable conditions in 2010 to 2012. The negative growth during 2007-08 was due to the crop damage caused by natural calamities. In spite of the crop loss due to Nisha cyclone, agriculture growth had shown recovery during 2008-09, due to many initiatives taken by the Government. In 2009-10, 2010-11 and 2011-12, the agriculture sector revived with a positive growth of 6.31 percent, 4.20 percent and 7.98 percent respectively due to receipt of sufficient rains in the northeast monsoon, adoption of technologies such as System of Rice Intensification (SRI) and Precision Farming and also a high contribution from the dairy sector. However, the growth level continues to be less than adequate and well below the target set for the State.

Area, Production and Productivity of Major Crops
Rice

Rice is the staple food occupying 33 percent of the gross area sown. Of the total rice area, 93 percent is irrigated and balance is under rainfed lands mostly under semi-dry conditions. The normal area under rice is 19.32 L. ha and production is 56.63 L.MT.

Table 3.1.2: Area, Production and Yield of Major Agricultural Crops

Year	Area (L. ha)			Production (L.MT.)			Yield (Kg/ha.)	
	Paddy	Millets	Food grains	Rice	Millets	Food grains	Rice	Millets
2006-07 (Terminal Year of 10 th FYP)	19.31	6.98	31.66	66.11	13.62	82.64	3423	1950
2007-08	17.89	6.99	30.97	50.40	13.57	65.82	2817	1941
2008-09	19.32	7.24	31.92	51.83	17.51	71.01	2682	2419
2009-10	18.46	6.53	30.34	56.65	16.35	75.04	3070	2504
2010-11	19.06	6.31	31.74	57.92	15.57	75.95	3039	2468
2011-12 (third adv.est)	20.28	8.05	37.16	75.96	24.31	103.85	3746	3022

Source: Dept. of Economics and Statistics, GoTN



Rice production during the Plan increased from 66.11 L.MT (2006-07) to 75.96 (2011-12) L.MT. Due to natural calamities, rice production in the State was around 50-52 L.MT during initial years of the Plan. Productivity of rice increased from 3423 kg/ha (2006-07) to 3746 kg/ha. (2011-12).

Technical Intervention for Rice Production

In Tamil Nadu, System of Rice Intensification (SRI) technology was introduced in a big way in the year 2007-08 and efforts were taken to popularize the technology and for its adoption over a larger area. In the year 2007-08, 4.21 L.ha. paddy area was brought under SRI out of total paddy area of 17.89 L.ha. which was only 24 percent. Productivity achievement under SRI was 4051 kg/ha. increase of 66 percent over the conventional method. With the objective of increasing rice production in districts wherein potential exists to expand area and increase productivity, National Food Security Mission (NFSM) is being implemented in Nagapattinam, Tiruvarur, Pudukottai, Ramanathapuram and Sivagangai districts. Implementation of Seed Multiplication /Seed Village schemes has resulted in increased seed replacement rate to 68 percent against 33 percent norms fixed by the Government of India.

Millets

The main reasons for drastic reduction of area under millets over the years are: people's preference for rice or wheat, less returns to farmers, absence of added economic value based food items, changing lifestyle of the people, mismatch between minimum support price and cost of cultivation, less area under irrigation and cultivation of local varieties.

Millets occupy 11 percent of the gross area sown and the major millets cultivated are Cholam, Cumbu, Maize and Ragi. Normal area under millets is 7.07 L.ha and production is 15.57 L.MT. Technical interventions such as adoption of millet based

cropping system, use of hybrids, precision farming and implementation of schemes such as procurement and distribution of millet seeds, ISOPOM-Maize, NADP and Seed Village scheme brought in substantial improvement in productivity and production. Millets witnessed significant increase in production from 13.62 L.MT to 24.31 L.MT and productivity enhanced from 1950 kg/ha to 3022 kg/ha. during the Eleventh Five Year Plan period. Maize, being a highly remunerative crop also paved the way for shift in cropping pattern and increase in area under millets. Area under maize registered an increase from 1.97 to 3.44 L.ha. production increased from 7.59 to 17.81 L.MT and yield increased from 3888 to 5176 kg/ha. during the Eleventh Five Year Plan period.

Pulses

Pulses occupy nearly 11 percent of the gross area sown in the state of which only 8.73 percent is irrigated. Normal area under pulses is 5.80 L.ha and the normal production is 2.24 L.MT. With an objective of increasing the production and productivity of pulses and bridging the demand – supply gap, pulses were promoted as pure crop under irrigated condition on cluster basis. Suitable strategies were adopted in rice fallow pulses and rainfed areas under NFSM. Similarly, foliar spraying of 2 percent DAP from 2007-08, intensification of Redgram cultivation since 2010-11 under NADP and implementation of Accelerated Pulses Production Programme (A3P) from 2010-11 with an objective to bring a compact area of 1000 hectares per unit purely under pulses helped the State to increase pulses production.

Food grains

The area and production of food grains registered an increase from 31.66 L.ha to 37.16 L.ha and 82.64 L.MT to 103.85 L.MT respectively during the Eleventh Five Year Plan period. The implementation of flagship programmes such as NFSM, A3P and NADP led to considerable increase in the area and production of food grains.



Cotton

Cotton occupies nearly 2 percent of the gross area sown. The normal area under cotton is 1.09 L.ha. with a production of 2.24 lakh bales (170 kg lint each). With an objective to increase the production and productivity of cotton, schemes viz., procurement and distribution of cotton seeds, Technology Mini Mission-II for cotton, NADP and increasing production of cotton using growth promoter-Naphthalene Acetic Acid (NAA), TNAU cotton plus and micronutrient mixture were implemented in the State. The major technological interventions like adoption of precision farming, micro irrigation systems such as drip and sprinklers at subsidized cost motivated cotton growers to take up cultivation extensively. The area and production increased from 1.00 L.ha to 1.45 L.ha. and from 2.21 L.bales to 3.78 L.bales respectively during the Eleventh Five Year Plan period.

Sugarcane

Sugarcane is a major irrigated crop of the State next to rice which plays a vital role in the State's economy. It is a high water and labour intensive crop occupying 5.5 percent of the gross area sown. The normal area, production and productivity of the crop is 3.38 L. ha. 375.23 L.MT and 108 MT (cane) per ha respectively. In the year 2011-12, the area, production and productivity were 3.82 L. ha. 393.67 L. MT and 108 MT (cane) per ha. respectively.

Oilseeds

Tamil Nadu ranks first in the productivity of oilseeds in the country. Oilseeds occupy 7.7 percent of the gross area sown. Major oilseeds grown in Tamil Nadu are

groundnut, gingelly, sunflower and castor. The normal area under oilseeds was 5.56 L.ha. of which groundnut occupies 4.75 L.ha. The normal production of oilseeds is 11.13 L.MT. Normal production and productivity of groundnut are 9.93 L.MT and 2323 kg per ha. respectively.

During 2007-08, almost all the districts witnessed low productivity and the State recorded 1747 kg per ha. from an area of 6.59 L.ha. resulting in production of 11.52 L.MT. In the succeeding years, even though the area declined substantially, productivity in most of the districts was found to be higher with reference to the State average. During the Eleventh Five Year Plan, components such as procurement and distribution of quality seeds, combined nutrient spray under ISOPOM, micro irrigation and gypsum distribution for groundnut under NADP were implemented and significant results were recorded. There was a 48 percent yield increase with water saving to an extent of 30-40 percent and higher oil content was recorded under precision farming. Factors attributed for steady increase in the productivity were: a) supply of quality certified seeds, b) promotion of micro irrigation in a larger extent, c) encouragement of farmers by the adoption of seed village scheme and d) Integrated Nutrient and Pest Management (INPM).

Horticulture

Major initiatives taken during the Eleventh Five Year Plan for increasing the area coverage and productivity were precision farming, micro irrigation and fertigation, protected cultivation, rejuvenation of old orchards, organic farming, hi-density planting and canopy management.

**Table 3.1.3: Area, Production and Yield of Horticultural Crops**

Year	Area(L ha.)				Production (L MT)				Productivity (Tonnes/ha.)			
	Fruits	Veg	Spice and Cond.	Plant ation crops	Fruits	Veg	Spices and Cond.	Plant crops	Fruits	Veg	Spices and Cond.	Plant crops
2006-07 (Terminal Year of 10 th FYP)	3.77	2.38	1.48	2.33	69.40	73.51	8.02	7.92	25.80	30.38	5.65	3.40
2007-08	3.86	2.39	1.45	2.31	67.78	76.61	7.39	7.98	24.21	31.40	5.28	3.45
2008-09	3.88	2.24	1.46	2.46	68.03	71.86	8.63	9.85	23.06	28.52	5.60	4.00
2009-10	3.90	2.84	1.44	2.30	63.27	58.72	8.04	10.18	21.71	26.22	5.77	4.42
2010-11 (P)	3.90	2.27	1.52	2.65	79.65	83.87	9.35	11.47	24.89	30.72	5.66	4.31
2011-12 (esti- mated)	3.32	2.84	1.73	2.75	85.35	90.52	10.87	11.99	25.69	31.87	6.28	4.36

Source: Dept. of Economics and Statistics and Dept. of Horticulture and Plantation Crops, GoTN

During the Eleventh Five Year Plan, the State schemes viz., the Integrated Horticulture Development Scheme -IHDS (₹29.84 crore), Integrated Tribal Development Programme - ITDP (₹2 crore), Western Ghats Development Project (WGDP) and Hill Area Development Programme (HADP) (₹12.38 crore) and NADP (₹182.45 crore) were implemented. The Government of India shared schemes like National Horticulture Mission -NHM (₹565.43 crore), Micro Irrigation (₹353.34 crore), National Bamboo Mission -NBM (₹4.28 crore), National Mission on Medicinal plants (₹21.72 crore) were implemented. The State also implemented the World Bank assisted IAMWARM project (₹42 crore). Under precision farming, an extent of 22294 ha was brought and 1238 clusters were established during 2008-11. During Eleventh Five Year Plan period, an area of 72531 ha. was covered under micro irrigation.

National Horticulture Mission (NHM)

National Horticulture Mission is a flagship scheme of GOI, with a sharing pattern of 85:15 between Centre and State. The scheme is implemented on a mission mode from 2005-06 and aims at holistic development of horticulture with focus on expansion of area under high income generating horticulture crops. The scheme is implemented in 22 districts. Components of the scheme include: a) area expansion in high value horticulture crops, b) production of planting materials, c) rejuvenation of old orchards, d) canopy management, e) protected cultivation, f) organic farming, g) mechanization, h) post harvest management, i) creation of marketing infrastructure and j) human resources development.



Performance of Access to Inputs

Seeds

Seed availability and Seed Replacement Rate (SRR) remained inadequate and below the desired levels, thereby hindering production. There was also a mismatch in the demand for and supply of seeds of different varieties. The desirable SRR is around 33 percent for self-pollinated crops like paddy, ragi, pulses, groundnut, gingelly etc, 50

percent for cross-pollinated crops such as cholam, cumbu and cotton and 100 percent for hybrids. The present SRR of all the crops is higher except for pulses and oilseeds. The SRR achieved during 2011-12 was 68 percent for paddy, 55 percent for millets, 20 percent for pulses, 15 percent for oilseeds and 100 percent for cotton. The Government is taking various steps to ensure the availability of quality seeds to the farming community. The SRR during 2011-12 is shown in the Table 3.1.4.

Table 3.1.4: Seed Replacement Rate of Major Agricultural Crops – 2011-12

S. No.	Crop	Total requirement (in tonnes)	Dept.-C seeds (in tonnes)	Private-C /TFL seeds. (in tonnes)	SRR achieved (percent)
1	Paddy	110000	18000	57250	68
2	Millets	12153	450	6243	55
3	Pulses	24000	4500	300	20
4	Oilseeds	80652	6376	5716	15
5	Cotton	555	100	455	100

Source: Policy note-2011-12 of Agriculture Department, GoTN

As against the target of 2.24 L.ha. to be registered under seed certification during the Eleventh Five Year Plan, an area of 2.47 L.ha. was registered and a quantity of 3.91 L.MT (as against the target of 4.02 L.MT) seeds were certified.

Organic Certification

Organic Certification intends to assure quality of organic products and aims at regulating and facilitating the sale of organic products. Tamil Nadu Organic Certification Department (TNOCD) was established in the year 2007-08 to carry out inspection and certification of organic production system in accordance with National Programme for Organic Production (NPOP). TNOCD has been accredited by Agricultural and Processed Food Products Exports Development Authority (APEDA), New Delhi. The Department imparts free training to registered organic farmers on NPOP and TNOCD standards. During the year 2007-08, 5244 acres were registered

under organic certification. It has increased considerably in the last four years and 28115 acres have been registered under organic certification during 2010-11. The main thrust areas for organic farming are: inclusion of organic seed production through local seed banks, production of bio inputs as a part of fertilizer and pesticide production, facilitation of transition from chemical to organic farming through a government programme, strict protection to organic farms, dissemination of benefits of organic food and market linkages for organic produce.

Fertilizers

Need based application of fertilizers is recommended to get maximum productivity and any excess or inadequate application will result in lower productivity. As against the distribution target of 50.75 L.MT for inorganic fertilizers, 36.76 L.MT have been distributed during the first four years of the Eleventh Five Year Plan. In case of Blue Green Algae



(BGA), as against the target of 2.65 L.MT only 1.57 L.MT have been produced and distributed to the farmers during the same period. Per hectare consumption of fertilizer in the state has increased from 40 kg per ha in 1970-71 to 194 kg per ha. in 2007-08 (nearly 5 fold increase). The Government of India has announced the policy of grant on Nutrient Based Subsidy (NBS) and in this context, awareness creation on the use of need based optimal application of fertilizers and Integrated Nutrient Management (INM) is a must and needs to be scaled up.

Pesticides

Nearly 20 percent production loss has been estimated due to pests and disease incidence and to prevent such loss, a perfect monitoring is essential. Integrated Pest Management (IPM) is being popularized extensively. By this, the State's consumption of technical grade pesticides which was 10,926 MT during 1984-85 has now been brought down to 2,335 MT. Apart from this, the use of bio-pesticides and bio control agents were encouraged. Localized production of these bio-pesticides needs to be encouraged and support facilities to be provided both financially as also through technical knowledge transfers.

Agricultural Mechanisation

At present (2011-12), 94 bull dozers, 165 tractors, 31 combine harvesters and 2 hydraulic excavators are hired out to farmers through the Agricultural Engineering Department (AED). The available machinery in the AED is not adequate to meet the requirement of the farmers. During the Eleventh Five Year Plan under NADP, 50 percent subsidy assistance to the tune of ₹162.20 crore was given to farmers for promotion of agricultural machinery and 7807 power tillers, 3414 rotovators, 987 paddy transplanters, 765 paddy combine harvesters and 48,144 numbers of agricultural machinery / implements were procured. Also, under the centrally sponsored

programme (90:10) of Macro Management Mode Programme, agricultural machinery/ implements were popularized among the farming community so as to supplement the available farm power, to meet out shortage of agricultural labourers, to ensure timeliness in carrying out various farm operations and to increase agricultural production. Subsidy assistance was given to farmers to the tune of ₹38.15 crore which includes the State share of ₹3.81 crore to procure 1072 tractors, 7730 power tillers, 1535 rotovators and 572 agricultural implements.

Scheme for Replacing Old Pumpsets with New Efficient Pumpsets

The energy efficiency in farm sector pumpsets is poor as the farmers are using inefficient and/or old pumpsets which have poor discharge compared to their rated horsepower. In order to overcome these setbacks and with an aim to save electricity, subsidy assistance was provided to farmers for replacing their old pumpsets and renewal of electrical accessories. During the Eleventh Five Year Plan, this programme was implemented to replace 45778 old pumpsets with new energy efficient pumpsets, at a total subsidy of ₹30.66 crore.

Twelfth Five Year Plan (2012-2017)

Strategy

Revitalizing Agriculture

Vision Tamil Nadu 2023 envisages that infrastructure development in agriculture are to be undertaken through three initiatives: a) improving the productivity in agriculture, b) assurance of year round irrigation and c) marketing extension. With this in view, the Twelfth Five Year Plan has focused on strategies to achieve an AAGR of 5.0 percent in agriculture and allied sector.

The hiatus in agriculture is mainly due to deteriorating soil health, declining water resources, inadequate investment in rural infrastructure, inadequate research



& development activities and spiraling prices of inputs, change in the mindsets of people viewing agriculture as of low value. To break this hiatus, the government is actively formulating farmer/farm oriented, crop focused and region specific strategies with adequate investment in developing rural infrastructure to augment agricultural production.

Farmers are motivated to adopt professional approach in agriculture by measures such as bringing fallow lands under cultivation, adoption of two-pronged approach to obtain high productivity by identifying districts having large cropped area but less productivity and districts having high productivity but less cropped area, identification of constraints in obtaining high productivity, promotion of zonewise / region specific strategies and large scale adoption of frontier production technologies are proposed. In addition to this, multiple concession to agro based industries and nutritional security through Nutri-cereals Promotion Programme will be encouraged.

The major strategies to spur SECOND GREEN REVOLUTION are:

- Crop specific strategies like System of Rice Intensification (SRI) and SRI villages, Improved Pulses production technologies – System of Pulses Intensification (SPI) as Whole Village Concept, Sustainable Sugarcane Initiatives (SSI) and Precision Farming for agricultural and horticultural crops are proposed to bridge the yield gap.
- Improving agriculture marketing infrastructure and promoting primary producer owned agri business ventures.
- Increasing the cultivable area and diversifying the cultivation in favour of high value, organic horticulture and commercial crops while ensuring food and nutritional security for all.
- Input Supply Management System (ISMS) - Assessing the requirement of agricultural inputs by conduct of meeting at village

panchayat level and bottom up planning will be given priority so as to meet the local needs effectively and ensuring availability of adequate quantity of inputs in appropriate time and that are to be locally produced.

- Soil health improvement-reclamation of saline and alkaline soil, issue of Farmers' Integrated Handbooks (FIHB).
- Promoting hi-tech agriculture, precision farming and micro irrigation for efficient use of irrigation water – Promoting horticulture technologies and micro irrigation as whole village concept.
- Strengthening research and extension services to all farm families in Tamil Nadu-Farm level interventions for 'end-to-end' involvement of extension staff with individual farmer – Conducting pre season village campaigns (Uzhavar Peruvizha) in close coordination with the all allied sectors.
- Capacity building for farm based research and agriculture innovation and excellence by the farmers
- Supply of gender friendly equipments such as power /cono weeders and markers

In Tamil Nadu, agricultural operations are constrained by sub-optimal water resources to a great extent. To ensure “more crop/income per drop of water”, special emphasis will be given for the cultivation of high value – less water intensive crops for effective land use system.

Water Use Efficiency (WUE) would be increased by enhancing productivity of per unit of water for which strategies such as mass adoption of Micro Irrigation Mission approach, promotion of Precision Farming, SSI, SRI and Rainwater Harvesting structures for recharging groundwater are proposed.

Land

The conversion of lands for various purposes has to be regulated and at the same



time it cannot be entirely dispensed with, as rapid growth is possible only if agriculture and other activities go hand in hand. The Union Planning Commission highlights the decline in net area sown due to diversion of agricultural lands for urbanization and industrialization purposes. It has also suggested that reasonable restrictions on acquisition of multi-crop irrigated land should be laid and wherever net area sown is less than 50 percent of total geographical area, the State concerned should necessarily set a cap on cultivable area to be acquired. The Government of Tamil Nadu has passed an Act prohibiting unnecessary and unwarranted diversion of agricultural lands to other purposes wherein District Collector has been authorized to impose restrictions in case there is no justification for such diversions. Similar to forest land conversions, strategies may be adopted to ensure optimal land usage to protect food and nutritional security.

Following are the initiatives that have been contemplated to achieve the goals set in the Twelfth Five Year Plan to overcome the shortcomings of the Eleventh Five Year Plan:

The ongoing schemes such as National Agricultural Development Programme, National Food Security Mission, National Horticulture Mission, Procurement and Distribution of paddy, millets and pulses, Crop Insurance including Weather Based Insurance Scheme, Oilseeds Production Programme, Horticulture Development Programme will be continued during the Twelfth Five Year Plan. However, in view of the increased importance being given to the enhancing agricultural growth and farm income, a set of new schemes will be initiated to achieve the targeted growth of the Twelfth Five Year Plan.

New Initiatives

Farm Level Planning

With the objective of increasing the income of small and marginal farmers by 2-3 times from

the present level, it is proposed to increase the cropping intensity, irrigation intensity, productivity by 50 percent and above and bringing fallow lands under cultivation. The Government has taken initiatives to ensure scheme benefits reach the farmers directly in a transparent manner. As a first step, to ensure sustainable agricultural production, the Department of Agriculture has envisaged farm level interventions through “Farm level planning”. The prime objectives are to enable farmers to adopt improved cultivation methodology and techniques in their landholding, to provide linkages and easy access to critical inputs in time, enable farmers to use most appropriate farm machinery to reduce drudgery, labour cost and get higher production and productivity, to empower farmers with complete access to the information related to his farming operations, extension functionaries to become a friend and guide of farmers throughout the cultivation cycle. To achieve the above objectives, the following activities are to be carried out:



Fig. 3.1.1: Personal Digital Assistant (PDA)

- Development of crop cultivation matrix specific to individual farms, soil type and irrigation status.
- Finalization of future cropping plan for every farm.
- Assessment of critical input requirement at village, block and district level through ISMS. Online input monitoring system in the Agricultural Extension Centres along



with customized billing has also been proposed.

- Converging the efforts of all stakeholders to match the inputs supply with demand by sharing continuously the available information among the stakeholders through internet on AGRISNET portal.
- Extension functionaries to visit the farm at critical stages; make bio metric observations with still photos and video clippings.
- Facilitating marketing linkage based on the assessment of production to get remunerative prices for the produce.

Farm Crop Management System(FCMS)

Integrated Farming System (IFS)

The threefold increase in farmer's income will be possible with farm level interventions by adopting Integrated Farming System (IFS) approach. So far, the extension efforts were generic by increasing the production through intensive cultivation. It is imperative for farmers to adopt agricultural production with horticulture, animal husbandry and fisheries by Integrated Farming Systems Approach. Based on the resources available, a farm based plan needs to be developed for harnessing the synergy among the enterprises which will ultimately provide a higher income. So far, no such plan was formulated by the extension system. With this in view, during the Twelfth Five Year Plan, it is proposed to take up activities such as collection of basic data on allied enterprises, categorizing the villages based on the micro climatic conditions, development of crop plans in relation to soil type, irrigation and rainfall and integrating with other enterprises like dairy, poultry, fisheries etc to gain higher net income, facilitation for timely availability of inputs, credit, insurance, farm machinery besides technologies, periodical monitoring by extension functionaries for corrective measures in scheme implementation, providing market intelligence and instant

expert advice on farm related issues. Considering this, an Integrated Farming System Model Village will be organized in all blocks.

As an ICT initiative, the basic information along with the farm resource inventory is maintained in Farmer Database of AGRISNET portal. Mostly this information is relevant to the agricultural sector alone and now it has been planned to maintain information about other enterprises too. Further it has been planned to provide information to farmers through Personal Digital Assistants (PDAs), Touch Screen Kiosks, SMS gateway etc.

Soil Health Management - Farmer's Integrated Hand Book (FIHB)

Soil samples from all the 81.13 lakh farm holdings will be collected and analysed for macro and micro nutrients with recommendations for profitable cropping pattern. The data will be digitized and linked to AGRISNET Portal for easy retrieval.

As a part of farm level interventions, it is proposed to distribute Farmer's Integrated Hand Book, a fool proof record containing the personal information of farmers, soil test results, nutrient recommendations and scheme benefits. The Hand Book is valid for three years. This is being distributed to farmers to guide them in applying appropriate fertilizers and also to keep a record of farm wise/season wise production and productivity. FIHB empowers farmers to draw their own cropping programme, input requirements and also avail scheme benefits.

Ensuring Quality Inputs - Input Supply Management System (ISMS)

Efforts taken to ensure the availability of quality prime inputs like seeds, fertilizers, micro nutrients, bio-fertilisers, plant protection chemicals, credit, etc., to the farmers and to enable them to take up various cultivation activities in the appropriate seasons are as follows: i) Seed requirement assessed and made available in time by creating additional capacity with modern



machinery and strengthening existing Seed Processing Units (SPUs). ii) Establishment of local seed banks, iii) Fertilizers – required quantity of fertilizers to be stocked in Primary Agricultural Cooperative Credit Societies (PACCS) and private and localized production of bio fertilizers to be facilitated and iv) Credit requirement of the farmers assessed and arranged through cooperatives and nationalized banks.

Extension with Renewed Vigour by Extensive Use of Information Technology

Present day agriculture is technology propelled and so extension coupled with information technology is pivotal for transforming agriculture into information packed genre to enable farmers in accessing innovative technologies for which the following activities are carried out:

- Participatory scientific crop planning.
- Convergence of input suppliers' activities.
- Collection of baseline information of all farm families by Farmer Database Management System (FDMS) through mobile application.
- Providing handheld PDAs to extension functionaries enabled with General Packet Radio Service (GPRS), Geo Information System (GIS), Global Positioning System (GPS) and Pico mini projector for implementation of Farm Crop Management System (FCMS).
- Server enabled timely information dissemination and farmer's data updation through Interactive Voice Response (IVR)
- Scheme benefits tracking system.
- Provision of touch screen kiosks at sub-block level - empowering farmers to have an access for information on input availability, agriculture technology, market information apart from farm plan.
- Strengthening research and extension services to all farm families in Tamil Nadu.

- Mass media - Radio plays a pivotal role in enriching the awareness level of farmers on farm technologies. Considering the benefits realized by the farmers through the existing Community Radio Station functioning at Coimbatore, it is proposed to establish 28 Community Radio Stations in the TNAU - Krishi Vigyan Kendras (KVK).



Fig. 3.1.2: Farmers guide booklet

- Farmers guide booklet – Farmers' Ready Reckoner Hand book and pocket book. Eight types of farmers guide booklet covering food grains, commercial crops, annual and perennial horticultural crops, soil and water conservation, agricultural marketing, technologies of TNAU and watershed programmes have been prepared.
- Facilitating technology transfer, quality input distribution and testing of soil samples through agri-clinics.
- Establishment of 'Farmers Hub' which will act as a platform for information dissemination between farmers, farmers groups and extension functionaries and also as a centre for solving all field oriented problems related to agriculture and sister departments at one spot.

Crop specific approaches will be made to achieve the targets set below in the Table 3.1.5.



Table 3.1.5: Twelfth Plan Targets – Agriculture and Horticulture Crops

S. No.	Crop	Area (L.ha)		Production (L.MT)		Productivity (kg./ha.)	
		2010-11 (base)	2016-17	2010-11 (base)	2016-17	2010-11 (base)	2016-17
1	Paddy/ Rice- Conventional	10.56	5.50	21.80	20.97	2064	3813
2	Rice- SRI	8.50	16.50	36.12	79.04	4250	4790
3	Total-Rice	19.06	22.00	57.92	100.01	3039	4546
4	Millets	6.31	15.00	15.57	60.00	2468	4000
5	Pulses	6.37	12.00	2.46	10.00	385	834
6	Food grains	31.74	49.00	75.95	170.00	2393	3469
7	Cotton	1.21	1.65	2.48	5.36	349.00	552.00
8	Sugarcane	3.16	3.73	342.52	545.00	102	146.00
9	Oilseeds	4.48	7.21	9.33	16.74	2078	2322
10	Fruits	3.90	4.42	79.65	139.05	24.89	31.46
11	Vegetables	2.26	3.79	83.87	145.36	30.72	38.46
12	Spices & Condi- ments	1.66	2.30	9.39	17.48	5.66	7.60
13	Plantation crops	2.65	3.67	11.47	19.19	4.31	5.23
14	Medicinal Plant	0.11	0.16	0.61	1.05	5.55	6.56
15	Flowers	0.31	0.42	3.00	5.18	9.67	12.33

Source: Dept. of Agriculture & Horticulture and Plantation Crops, GoTN

Note: Area in terms of Paddy, production and productivity in terms of rice. Productivity of horticulture and plantation crops (fruits, vegetables, spices and condiments, plantation, medicinal plants and flowers) in Tonnes/ha. Sugarcane production in terms of cane and yield in terms of cane tonnes/ha. Cotton production in terms of bales (Bales of 170 kg lint each), yield in terms of lint

New Interventions:

System of Rice Intensification (SRI) Technology as a village concept

In spite of introduction of SRI four years ago, yield gap still exists due to non-adoption of all critical technological components and this necessitates the promotion of SRI as a village concept. Under this concept, rice growing villages will be selected and promoted on cluster basis to ensure perfect adoption of the technology. This scheme will be implemented with the creation of community nursery; pooling and timely provision of resources / inputs such as water, seeds, fertilizers including bio-fertilizers, plant protection chemicals, machinery, etc; conduct of demonstration

to prove the efficacy of the technology at one place, convincing the laggards of the same village and motivating the farmers of nearby villages; minimizing cost of cultivation by optimal and localized need based timely management of resources to augment productivity. Weather proofing with drought and flood resistant varieties in specified locations will be attempted.

The Government has announced prize money and a medal worth ₹3500 to encourage paddy cultivation using SRI technology. Farmers who have cultivated paddy in minimum 50 cents of land and achieved a yield of more than 2500 kg of paddy in an acre are eligible to participate in the SRI yield contest.



System of Rice Intensification - Suitability

Synergy of the recommended twelve critical steps of SRI, when adopted in toto, would lead to considerable increase in rice yield. In SRI, alternate wetting and drying is an important step to ensure root aeration. SRI should not be adopted where soil and water conditions are not suitable like low lying areas. While SRI adoption has been given more emphasis in the Twelfth Plan striving to achieve the target of 16.50 L. ha, care has to be taken to spread the SRI in the suitable areas only.



Fig.3.1.3: Raised beds for SRI

Millet Mission

In the Twelfth Five Year Plan, it is proposed to introduce an Integrated Millets Mission through a convergent approach by involving Department of Agriculture, Department of Civil Supplies and Consumers' Protection as well as Department of Agricultural Marketing and Agri Business. Farmers all over the State will greatly be benefitted by this Mission and there will be a great fillip to millets production. Introducing millets in PDS and creating business incubators for millets would help the millet farmers to a large extent. Agriculture and food production by the small and marginal farmers who are vulnerable will be improved by introduction of Millets Mission.

Box 3.1.1: Snapshot of SPC Millets Workshop

State Planning Commission organised a workshop to promote millets in the State where the stakeholders from Government of India, Government of Tamil Nadu with officials from Agriculture, Agricultural Marketing, Social Welfare, Health, Cooperation and Civil Supplies, Horticulture, Animal Husbandry, Research Institutions, Researchers, Academic Professionals, NGOs and Operational Functionaries like food processing entrepreneurs, farmers also were present. The major recommendations were: region specific and block specific production technology identification, extension of whole village concept, increasing area under millets by bringing in the fallow lands, incentivisation of small entrepreneurs, formation of millet clusters and CLGs. While the above will address the supply issues with regard to millets production, demand also needs to be generated by popularization of millets through PDS, food fortification and value addition with millets, popularization of millet based nutrient diet and changing dietary habits.

Source: State Planning Commission, GoTN

India, despite being one of the emerging economies, is ranked as low as 128 among the malnourished nations; i.e., lower than even some of the sub-Saharan African countries. A recent study has further indicated that almost 20 percent of all diabetes cases in India are due to rice consumption. A similar study in Tamil Nadu has revealed equal or higher incidence of diabetes. This needs immediate attention. Introducing millets in our diet which was in vogue during our ancestral period could resolve this anomaly. It has been scientifically proven that millets are way ahead of rice and wheat in terms of nutritional content. For instance, millets contain 10.6 grams of protein per kilogram, as against rice which contains only 6.8 grams.



Similarly, millets are also richer in fibre (1.3 grams to 10.1 grams), minerals (1.9 grams to 4.4 grams) and calcium (31 mg to 344 mg) in comparison to rice. Millets are crops that can survive adverse climate change conditions. It has been shown that millets can grow in conditions of low rainfall requiring as little as 300 to 350 mm depending on the type of millet and in poor and heavily degraded soils, which are the characteristic traits of the arid and semi-arid regions of the State. All these characteristics make millets the ideal crop for the climate crisis that is looming ahead of our State.

Twelfth Five Year Plan Strategy for Millets Production

Millets Production Enhancement

The following strategies will be implemented during the Twelfth Five Year Plan period:

- Encouraging the use of appropriate hybrids, local varieties and high yielding cultivars, especially for cholam and cumbu. Care will be taken to ensure that this does not create new seed monopolies.
- Distribution of quality foundation / certified seeds.
- Promotion of precision farming, micro irrigation with fertigation to increase input use efficiency.
- Promotion of ridge planting for better moisture conservation and efficient utilization of rain water, especially in rainfed areas.
- Encouraging use of dryland machinery for soil and moisture conservation through supply of dryland machinery at subsidized cost.
- Distribution of maize sheller at subsidized cost to reduce the cost of cultivation.
- Efforts are taken to bring more area under pure crop (irrigated condition) by providing adequate support mechanism in terms of seeds, fertilizer, irrigation, etc.



Fig. 3.1.4: Millet - Cholam

System of Millets Intensification

To demonstrate the improved production and post harvest technology in an integrated manner with visible impact to catalyze increased production of millets, strategies proposed are: a) distribution of certified seeds, b) preservation, promotion and distribution of scarce indigenous varieties, c) supply of critical inputs, d) distribution of improved varieties / hybrids as minikit, e) seed production and sensitizing the farmers on various local and indigenous technologies, f) generating consumers' demand for millets based food products through awareness creation and g) processing and value addition techniques will be implemented in a massive way under various ongoing/new programmes.

Market Linkages

Business Incubators for Millets.

Ensuring millets and millet based value added foods in the ready-to-eat and ready-to-cook form is the need of the hour. For this, establishment of business incubators is essential. Business incubators for processing of millets and production of millet based value added products will be established by entrepreneurs. These incubators help to upscale processing methods for development of traditional foods, production of millet based bakery products, millet based extruded products, functional health mix, ready-to-cook, ready-to-eat convenience foods, low glycemic health foods and high



fibre functional foods. In the proposed Millets Mission, setting up these incubators is proposed and will be implemented through Department of Agricultural Marketing and Agri Business.

Modernisation of Millet Processing Unit and Value Addition.

Millets being small seeded, contain large proportions of husk and bran which requires de-husking and de-braning prior to consumption. Despite their nutritional superiority, utilization of millets is restricted due to non availability of refined and processed millets in ready-to-eat form. Hence, millets are confined to traditional consumers. Thus, suitable modifications in the existing millet processing units are essential to increase the availability of millets in the ready-to-use form. Financial assistance for establishment of modern millets based processing units and modernization of existing millet processing units to increase the recovery percentage are the required strategies to achieve the objectives. The proposed Millets Mission would extend such necessary assistance through Department of Agricultural Marketing and Agri Business.

Distribution of Millets through PDS.

Millets are also consumed by a certain percentage of high end consumers. A study on preference of food grains indicated that consumers may be willing to increase the offtake of millets through PDS if it is made available at the outlets. Hence, through the Millets Mission, it is suggested to provide three kg of any one of the available millets to all family card holders. The family card holders eligible for rice could be provided with three kg of millets per month if requested at no additional cost. The other category of family card holders will be provided with three kg of millets at subsidized rate. The total requirement of millets for 1.97 crore family card holders will be 59,100 tonnes/month and their annual requirement would be seven L.MT.

Pulses

Generally, production and productivity of pulses could not be matched with the increasing area since pulses are mostly raised

Box 3.1.2: Garden Land Pulses (GLP)-Improved Pulse Production Technology

Thiru.L.Lingavanaickker, Padarnthapuli, Thoothukudi district, a farmer for the past 20 years demonstrated with his 2 ha. land under blackgram by adopting improved production technology in garden land pulses. The technologies like 2 % DAP spray at flower initiation stage and after 15 days was adopted which prevented flower shedding. Foliar nutrition increases number of pods/plant (32-34 nos.) and also maturation of black gram. Farmer was able to get a net income of ₹25,000 in 75 days with minimum water usage, lower cost of production and also enriching soil health.



Source: Tamil Nadu Agricultural University

as rainfed, intercrop and bund crop and are more susceptible to pests and diseases. Further, there are no suitable varieties to match up the highest yield obtained by other States. Needless to say, an extent of about three lakh hectares which is under rice fallow pulses also pull down the overall production and productivity of the State. The constraints are: adequate plant population could not be maintained in blackgram and greengram under rice fallow conditions due to improper levelling, uncertainty in time of sowing and terminal moisture stress under rice fallow conditions resulting in poor yield.



The following strategies will be adopted during the Twelfth Five Year Plan period to enhance pulses production:

- System of Pulses Intensification.
- Application of 2 percent DAP foliar spray.
- Application of 'pulse wonder' which is a growth inducer.
- Conducting demonstrations for intensification of redgram cultivation and raising redgram through transplantation of seedlings. Short duration redgram varieties like ICPL 87, Vamban1, VBN(RG)3 will be promoted in a larger area.
- Raising pulses as pure crop under irrigated conditions in a compact area.
- Introduction of improved redgram varieties released by ICRISAT such as ICPL 87119, ICPH 7035, ICPL 88039, ICPH 2671 & ICP 2740.
- Promotion of micro irrigation equipments like raingun, mobile sprinkler, etc to increase pure pulses area under irrigated condition
- Focus on enhancing productivity of rice fallow pulses.
- Distribution of agricultural machinery and implements such as rotovators, power tillers, mobile sprinkler / raingun, pumpsets, plant protection equipments, laser land leveller etc.
- Rainfed pulses will be promoted as a Mission Mode approach by tapping the existing potential except in the delta districts.
- Improved Pulses Production Technologies –Whole Village Concept.

Long Term Strategies for Pulses.

- Focus will be on popularization of alternate varieties with high yielding traits. Enhanced seed rate to be adopted to maintain optimum plant population.
- Providing incentives in addition to Minimum Support Price and procurement of grain pulses through PPP.

- Effective steps will be taken to improve the post harvest infrastructure to minimize the losses.
- A Price Monitoring Committee for periodical review and to monitor the price escalation.
- Establishment of polythene lined farm ponds in more numbers will help the farmers to raise pulses crop even during summer season.
- Encouraging SHGs / TANWABE groups to raise more area under pulses and to involve them in seed production / value addition by providing incentives.

Improved Pulses Production Technologies- as Whole Village Concept

Organizing pulses villages is a major initiative wherein various integrated production technologies like: a) cultivation of season specific high yielding pest and disease resistant varieties, b) seed treatment with Rhizobium and Phosphobacteria, c) Integrated Nutrient Management (INM) and Integrated Pest Management (IPM) adoption,

Box 3.1.3: 'Pulse Wonder'

"Pulse Wonder" a new crop booster developed by Tamil Nadu Agricultural University (TNAU) will be made available to farmers at half the original cost to be applied in 50,000 ha. in 1695 villages to enhance productivity of pulses. This announcement was made by the Hon'ble Chief Minister to encourage adoption of the novel innovation of TNAU as a growth regulator viz, auxins. The 'Pulse Wonder' mixture can be applied as foliar spray preferably in the morning or late evening during the peak flowering stage of the pulses, particularly, for blackgram and greengram (35 days after sowing) to reduce flower shedding and thereby increasing the production by 10 to 20 percent. This mixture can be used in lieu of DAP spray.

Source: Dept. of Agriculture, GoTN.



d) maintenance of optimum population and e) spraying of 2 percent DAP twice and using of 'TNAU pulse wonder' are to be adopted. These are recommended to obtain yield not less than 1000 kg/ha. for redgram and 750 kg/ha for other pulses like blackgram and greengram. To encourage the farmers in getting higher yield, crop yield competitions are proposed to be conducted in pulses crops wherein the farmers will be awarded with cash prize and medals.

Cotton

Cotton cultivation can be revived, only, if specific approaches are promoted in the ongoing schemes with sufficient funds. Further, new schemes will be introduced for

Box. 3.1.4: Campaign for Traditional farm products

Hon'ble Chief Minister announced a special initiative for ₹10.00 crore to promote traditional agricultural products viz., tender coconut, soap nut powder and cotton clothing. These products are suitable to the climatic conditions of the State. But, increasing westernisation and globalisation has reduced demand for these products. A renewed awareness campaign will be conducted to improve the demand by products promotion, packaging and advertising.

Source: Dept. of Agriculture, GoTN.

production and distribution of quality seeds, bio-agents, contract farming, commodity group formation, promotion of farm machinery such as cotton plucking machine. The following strategies will be focused to overcome the constraints in enhancement of production and productivity. 1) increasing the availability of treated quality seeds with an emphasis on de-linted seeds, 2) Promotion of micro irrigation to conserve water and bring more area under cotton especially in dryland areas, 3) area expansion and production improvement of irrigated cotton through precision farming and transfer of

technology, 4) promote localized supply of quality seeds to meet requirement as per the SRR targets, 5) training farmers on IPM aspects and encouraging the usage of bio-inputs including bio-pesticides, 6) supply of plant protection equipments, micro nutrients, bio-fertilizers at subsidized cost and 7) facilitate localized processing of lint through appropriate indigenous technology developed.

Sugarcane

It is planned to extend subsidy for sett treatment, purchase of machinery, cultivation of tissue culture canes and usage of weedicides to overcome the bottlenecks faced in sugarcane cultivation. Further, the following strategies will also be taken up:

- Implementing Sustainable Sugarcane Initiatives (SSI) comprising innovative technologies like precision farming for increasing the production and productivity.
- Involvement of sugar mills in raising chip bud nursery under SSI.
- As adoption of micro irrigation in paired row method of planting saves about 40 percent of water besides assured increase in cane yield, it is planned to cover one lakh ha. over a period of five years.
- Subsidy to the tune of 100 percent to small and marginal farmers and 75 percent to other farmers for installing drip irrigation with fertigation will be extended.
- Distribution of power rotary weeders to sugarcane growers at subsidized cost.

Oilseeds

The focus is on the following strategies to increase oilseeds production viz.: 1) increasing the Seed Replacement Rate (SRR) and enhance the quality seed availability through seed village scheme, 2) bringing more area under oilseeds through promotion of micro irrigation and bring back two percent of other fallow lands under oilseeds cultivation,



3) adoption of INM, IPM and bio-fertilizers usage, 4) encouraging farmers on usage of micro nutrients for increasing productivity as well as oil content and 5) application of gypsum in groundnut crop to increase the productivity.

Coconut

With an objective of distributing quality coconut seedlings to farmers and make them aware of modern technologies, Demonstration cum Coconut Seedling Production Farm at Jallipatty village in Udumalpet taluk, Tiruppur district will be established through the Coconut Development Board (CDB). For this purpose, an extent of 82.66 acres of land will be earmarked to the Board. Besides, steps will be taken for increasing the production of Dwarf x Tall Hybrid and Dwarf variety coconut seedlings in the State Coconut Nurseries and for improving the infrastructure facilities in those farms.

Soil and Water Management Approaches

During the Twelfth Five Year Plan, it is proposed to take up detailed soil survey with the objective of identifying saline and alkaline soils and to reclamation of the problem soils. It is also proposed to take efforts to develop irrigation sources such as farm ponds, check dams, percolation ponds, etc., to meet the irrigation water requirement of rainfed crops at critical stage, for which funds under various schemes viz., A3P, Initiatives for Nutritional Security through Intensive Millets Promotion (INSIMP) and Rainfed Area Development Programme (RADP) will be dovetailed. (Detailed proposals on soil management are dealt in the sub chapter viz., 3.2. Soil and Water Conservation including Rainfed Farming)

Precision Farming

Precision farming is an innovative method in which all the cultivation protocols are undertaken very accurately. Key steps viz., chisel ploughing, transplanting of young seedling, adopting recommended spacing, installing drip and micro irrigation

and timely application of critical inputs are followed. Upon success of the programme and unprecedented level of acceptance of the technology by the farmers, the programme was scaled up to 53,885 ha. over the past five years. It is proposed to further expand the project to cover 1 lakh ha. under precision farming during the Twelfth Five Year Plan period. Further it is also proposed to form precision vegetable clusters with market tie up or direct marketing by farmers by incorporating producers companies.

National Mission on Micro Irrigation (NMMI)

The conventional method of irrigation requires more water leading to wastage. The use of micro irrigation systems like drip, sprinkler and raingun ensures efficient use of surface as well as ground water resources. Each drop of water is made productive in this technology. Uniform crop growth and produce size are achieved through this method. Using micro irrigation, more area can be brought under cultivation with less water. NMMI is a centrally sponsored scheme, in which 100 percent subsidy is given to small and marginal farmers (50 percent by Centre and 50 percent by State) and 75 percent (40 percent by Centre and 35 percent by State) to other category farmers for installation of drip, sprinkler and raingun systems for all horticulture crops and agriculture crops like sugarcane, coconut, cotton, maize, groundnut and pulses. This scheme is being implemented only through registered and empanelled micro irrigation firms. During the Twelfth Five Year Plan period, it is proposed cover an area of 3.10 lakh ha. under micro irrigation (1.86 L.ha. under horticulture crops and 1.24 L.ha under agriculture crops).

Micro Irrigation Model Villages

To give a big push to extend the area coverage under micro irrigation, a model village in each district will be set up to demonstrate the advantages of micro irrigation. It is also proposed to provide micro irrigation equipments at subsidised cost and impart training to the farmers.



Approach and Strategies for Profitable Agriculture

- Develop region specific cropping pattern according to the local demand and consumption
- Adoption of 500 to 1000 villages by the Government on pilot basis to promote sustainable agriculture and to provide technical assistance, design cropping pattern, supply of inputs viz., seeds, fertilizers, plant protection chemicals, irrigation facilities, farm machinery, etc., post harvest management, food processing, market linkages etc.,
- Promotion of community based farming system and nursery to reduce the cost of cultivation in terms of consumption of inputs such as, seeds, fertilizers, water, labour, capital, etc. and to accelerate the pace of appropriate low cost mechanization.
- Consolidation of fragmented farm holdings possessed by small and marginal farmers and promotion of community based farming system, which will enable them to take up mechanized agriculture and other hi-tech farming practices without any additional financial liabilities.
- Integrated Farming System (IFS) approach enables the farmers to take up various enterprises at one place and ensures financial stability throughout.
- Group Farming by SHGs: SHGs which are mainly organized for supporting micro enterprises with the assistance of micro credit shall now be entrusted with intensification of agricultural activities. As the size of the operational holdings decline day by day, the Government can promote SHGs to take up agriculture as a profession by providing agricultural lands, current fallows and wastelands on lease basis. This can be made viable only if they have backward linkages with technical backup and credit and forward linkages with processing and adequate market infrastructure.
- Contract farming for organic produce benefits both the producers and the buyers

and ensures assured and remunerative marketing opportunities. Promotion of primary producers' cooperatives and corporate, that can adopt contract farming and other practices with the profits being ploughed back into the farming community.

- Steps will be taken up to evolve a new Organic Farming Policy in the State to encourage toxic free organic farming besides ensuring food security.

Inputs: Seeds, Fertilizers and other Inputs

Seeds: Seed Systems

Quality seed is the key input for realizing potential productivity. The following initiatives will be focused in the Twelfth Five Year Plan. a) Supply of region specific varietal seeds and ensuring adequate stocks and timely supply of quality seeds to farmers for which the State will prepare a comprehensive Seed Plan, b) Sensitizing farmers on production and usage of indigenous and certified seeds, c). Encouraging private entrepreneurs in quality seed production, d). Involving farmers, women SHGs, TANWABE groups and NGOs in local seed production and seed processing activities and e) Improving infrastructure facilities for seed production, processing and storage.

Enhancing Seed Replacement Rate (SRR)

An Action Plan for all the blocks has been prepared by incorporating details of crop wise / variety wise requirement of breeder seeds, foundation seeds and certified seeds for the next five years. A Perspective Plan would be prepared to meet the requirements indicated in the Action Plan with the following arrangements: a) tie-up arrangements with TNAU / ICAR Institutes to meet the breeder seed requirements, b) tie-up arrangements with National Seed Certification (NSC) and private seed producers to meet the certified seed requirement for enhanced SRR, c) quality seed production, processing and distribution involving Farmers' Interest



Groups (FIG), SHGs, TANWABE groups and NGOs, d) upgradation of infrastructure facilities including agricultural implements in the State Seed Farms (SSFs) to increase the cropping area to produce additional quantity of foundation seeds, e) enhancing the seed processing capacity by utilizing the 20 new SPUs in addition to the already existing SPUs in the Department of Agriculture and the 75 new SPUs to be established involving farmers, women SHGs and NGOs with back ended subsidy and f) emphasizing the farmers to register their farms with the Department of Seed Certification for the seeds distributed through Seed Village programme seed requirement.

The following suggestions are given to improve the seed delivery mechanism:

- 1) generation system of seed multiplication (Nucleus–Breeder–Foundation–Certified) should be strictly followed, 2) strengthening of SSFs for quality seed production, 3) seed production on contract basis in farmers’ field could be encouraged, 4) providing incentives and adequate infrastructure facilities like power, irrigation, credit etc., for farmer operated seed production centres, 5) identification of potential seed production areas, declaring as seed valley, provide safety from seed contamination and encouraging PPP, 6) scientific seed processing, safety and storage and 7) increasing awareness on appropriate usage of hybrid seeds by the farmers. The seed demand projection for major crops during the Twelfth Five Year Plan is provided in Table. 3.1.6.

Table 3.1.6: Seed Demand Projection for Major Agricultural Crops - Twelfth Plan

(Unit: MT)

S.No.	Crop	2012-13	2013-14	2014-15	2015-16	2016-17
1	Paddy	18700	18700	18700	18700	18700
2	Millets	470	480	490	500	510
3	Pulses	4949	5050	5150	5256	5362
4	Oilseeds	6503	6627	6752	6877	7014
5	Cotton	102	104	106	108	110

Source: Dept. of Agriculture and Seed Certification, GoTN

Village Level Seed Bank for Rainfed Crops through Participatory Approach

With the advent of hybrid technology, the farmers are required to replenish seeds every season from external sources such as research institutions, public and private sector seed producers to harness hybrid vigour. This has increased the productivity significantly, but at the same time, has increased farmers’ dependence on external agencies. As a result, the informal and decentralized village seed industry has now been replaced by highly centralized seed market. However, it is almost impossible for the organized sector to meet farmers demand for the seed, considering the number of crops

and varieties cultivated across the country. In this back drop, the concept of ‘seed village’ which advocates village self-sufficiency in production and distribution of quality seeds, is fast gaining momentum. Seed villages or village seed banks operate with utmost transparency, mutual trust and social responsibility of the seed producing farmers towards seed using fellow farmers and under peer supervision. The establishment of village seed banks not only ensure good quality seeds for enhancing productivity, but also help in generating income for the community members resulting in improved livelihoods. It is proposed to form 7000 Commodity Interest Groups, 5000 village seed banks and to train 1.25 lakh farmers.



Seed Certification

Seed certification aims to increase the involvement of private producers for producing more of millets, pulses and oilseeds crop seeds. Increased attention will be paid to meet timely availability of breeder seeds to the seed producers. To satisfy the need for quality seed distribution to the farming community, the seed certification wing has proposed to certify 1.2 LMT of major crop seeds during the Twelfth Five Year Plan. Focus on strengthening the organic certification to meet the need for organic core at the international standard will be done. Peer certification systems that are approved by National Organic Certification body such as PGS will be promoted. It is also proposed to establish laboratories for testing samples of soil, water, pesticides, residues, heavy metals and food products accredited by National Accreditation Board for Testing and Calibrating Laboratories (NABL).

Fertilizers

Soil Nutrient Management

Intensive cropping, indiscriminate use of fertilizers and insufficient usage of organic resources has resulted in the deterioration of the physical, chemical and biological health of soil. Appropriate soil management technologies to improve the soil health and to increase crop yields are: a) ensuring balanced fertilizer application through distribution of FIHBs, b) emphasizing and encouraging organic farming, c) reclamation of saline and alkaline soils and d) correcting micro nutrient deficiencies. In addition to this, to rejuvenate soil health, it is proposed to produce and distribute liquid bio-fertilizers which have advantages such as longer shelf life of 12 to 14 months, free of contamination, higher microbial population, cost effective and easy to use

Referral Laboratories for Complete Soil Analysis

The era of indiscriminate use of NPK is over and due to dwindling supply of organics to soil, the soil organic carbon, humus and

microbial load have come down considerably and the soil has also lost the micronutrient replenishing capacity in locations where two crops in a year or crops like turmeric, tapioca, banana, sugarcane are cultivated. Hence, external application of micronutrients for every crop and every season has become compulsory. The foliar application is only supplementary while the soil requires regular application. The existing soil testing laboratories have the facility to analyze NPK, micronutrients, Electrical Conductivity (EC), pH etc.

The proposed referral laboratory for complete soil analysis lends support to the farmer by providing micronutrient analytical information for better productivity of crops. The complete soil analysis includes the estimation of micro organism status of the soil. One such common facility for the state with capacity to handle 1000 samples a day shall serve the purpose. The approximate outlay proposed is ₹5.00 crore.

Efficiency in Use of Chemical Fertilizers

Tamil Nadu is adopting a multipronged strategy to maintain soil health and fertility status of the soil by the balanced application of inorganic and organic fertilizers. Schemes such as balanced and integrated use of fertilizers, production and distribution of bio-fertilizers, procurement and distribution of green manure seeds, vermi-composting of farm waste, composting of farm wastes with *Pleurotus* are implemented.

Nutrient Based Subsidy (NBS) was introduced from 1.4.2010, wherein firms were given liberty to fix their retail prices for all fertilizers except urea. Consequently, firms continue to increase their retail prices (RP) without prior notice frame, citing hike in the international prices of raw materials. For example, DAP (50kg bag) cost increased by 187 percent over MRP (₹990/-) in 2011 from ₹468.20/- in 2010. To reduce the burden of farmers, the Tamil Nadu Government has exempted 4 percent Value Added Tax (VAT) which is first time in the Country. As the



present NBS system is detrimental to farmers, the GOI may intervene by revising (increasing) the subsidy.

Liquid biofertilizer producing centres will be established to improve the shelf life of biofertilizers, at a cost of ₹2.75 crore through GOI assisted funds.

Table 3.1.7: Inorganic Fertilizer Demand Projection for the Twelfth Plan

(Unit: L.MT)

Fertilizer	2012-13	2013-14	2014-15	2015-16	2016-17
Urea	11.50	12.00	12.60	13.23	13.89
DAP	5.30	5.56	5.83	6.12	6.42
MoP	5.31	5.57	5.85	6.14	6.44
Complex	7.61	7.99	8.39	8.80	9.24
Total	29.72	31.12	32.67	34.29	35.99

Source: Dept. of Agriculture, GoTN

Effective Management of Pesticide Consumption

The successful adoption of Non-Pesticidal Management (NPM) in several rainfed and irrigated cropping systems has led to change in policy and research. Tamil Nadu is particularly attentive to increased adoption of this productivity enhancing, cost-effective and eco-friendly production practices.

The increased use of pesticides has disturbing consequences on the farming system, particularly, due to the development of resistance, resurgence of insect pests and decline in population of the natural enemies of pests. Over-use of pesticides may lead to serious repercussion on environment and ecology. Hence, it is imperative to step up investment in research and technology, development of organic and bio-pesticides that are more effective in managing crops in an environmentally sustainable manner. TNAU will conduct multi-location field trials with different crops to identify crop and location specific methods of IPM and NPM in a participatory research framework.

Tamil Nadu is one of the pioneer

states in successful adoption of IPM and NPM. Strategies contemplated are: a) Create awareness on the indiscriminate usage of chemical pesticides, b) Promote knowledge of local production of bio-pesticides, c). Promote farmer field based NPM awareness programmes and exchange programmes and d) Provide subsidies for technologies that are part of the IPM and NPM practices.

Horticulture

With an aim to achieve a growth rate of 9 percent to 10 percent in horticulture, more area will be brought under horticulture crops through crop diversification from low income generating crops to high value horticulture crops. The overall production and productivity of the horticulture crops will be doubled during the Twelfth Five Year Plan period. Horticultural Parks for fruits, vegetables and spices would be developed across the state. More thrust will be given to micro irrigation with fertigation, precision farming, hi-density planting and organic cultivation by which large area will be covered under horticulture crops thereby the productivity per drop of water integrated crop management, post harvest management and market linkages and per unit area will be enhanced.



Urban Organic Cultivation

Increase in personal disposable income and awareness on food safety among urban dwellers have opened the gates for urban organic cultivation of vegetables. The consumers are getting the information on harmfulness of pesticides on human health and their entry into food chain through effective media and internet. Kitchen gardening and terrace gardening are handy tools that could satisfy the vegetable needs of most of the nuclear families of the urban centres. Besides the above, these gardens act as potential stress reducers. Models of kitchen gardening and terrace gardening to suit the urban consumers are already available with TNAU and matching the requirements of consumers is the only need. Hence, in the Twelfth Five Year Plan, it has been proposed to convert the awareness into actual kitchen and terrace garden models through capacity building programmes. The IEC funds available in the existing horticultural programmes will be utilized.

Popularising of Banana Cultivation Model of Theni in Intensive Banana Cultivation Tracts

Box 3.1.5: Banana Growers Company, Theni

Banana Growers Association with 3,500 small farmers and a trader in a joint venture project in agriculture promoted a popular banana variety and cultivation has been undertaken in 20,000 acres at Theni. Trader has established a ripening and a cold storage facility of 200 MT capacity at an investment of ₹20.00 crore. This has opened up the avenue of exporting to Dubai when they are competing with Maharashtra banana. The initiative of common ripening and storage facility has increased the prospects of Theni banana growers over the past 6 years.

Source : Dept. of Horticulture and Plantation Crops, GoTN.

The Banana Growers' Association model conferred higher and stable income for the farmers and resulted in increased share in consumer's rupee. In Tamil Nadu, potential belts of banana cultivation are available at Thothukudi, Thirupathur taluk in Vellore district, Krishnagiri district (Elakki banana) and Alangudi taluk in Pudukottai district. Farmers of the above tracts will be given exposure visits to Theni to emulate similar successful models in their locality. Also, capacity building programmes will be arranged for institutional building and technological upgradation. In the Twelfth Five Year Plan, it has been proposed to form farmers' federations in the above districts with active convergence of Department of Horticulture and Plantation Crops, TNAU and NGOs.

Farmers' Federations for Marketing of Flowers

Successful flower cultivation and marketing models are functioning in Dindugul and Madurai districts for marketing of Madurai malli flowers which also has a unique Geographical Indication (GI). Due to the initiatives of NGOs and TNAU, successful flower production and marketing models have been evolved in Gobichettipalayam block of Erode district and this initiative needs institutionalization for further upscaling and sustenance. Hence, in the Twelfth Five Year Plan it has been proposed to give adequate attention for institutional building for flower marketing in the major flower producing tracts viz., Vellore (marigold) and Krishnagiri (chrysanthemum), Thiruvannamalai (tuberose). Farmers' federation will be formed and the farmers will be facilitated with group marketing to get higher price for their produce.

New Initiatives in Horticultural Crops

- To increase the production of horticultural crops by adopting all Hi-tech horticultural technologies, Model Horticulture Villages covering an extent of 40-100 ha. in 15 districts is proposed.



- Assistance will be extended at 50 percent subsidy for construction of pandhals and distribution of hybrid vegetable seeds for promoting the pandhal vegetables viz., bittergourd, snake gourd and ribbed gourd.
- To attract tourists, a Rose Garden in an extent of 4.0 ha. and a cut flower demonstration unit in 0.4 ha. will be established in State Horticulture Farm, Kodaikanal. Excellence centres for vegetables and cutflowers will be established.
- Conduct of International Horti Fair: With an aim to create awareness among farmers on latest technologies in horticulture and to create export opportunities, an International Horti Fair will be organized in Chennai.
- New Horticulture Farm: To cater the need of planting materials of horticulture crops a new State Horticulture Farm will be established in an extent of 10 acres at Srirangam, Trichy district.
- It is proposed to upgrade the existing horticulture parks in the State.
- A vegetable nursery at a cost of ₹10.18 crore in Dindigul district and ornamental flowering plants nursery in Krishnagiri district at a cost of ₹8.8 crore are proposed, for which MoU as entered with Israel firm.
- E enabling peri metro horticulture project using mobile based agro advisory system has been proposed. Also, formation of Farmers Interest Groups and formation of Producers company has been proposed.
- Magazine entitled “EnHAaNS” (Menmai in Tamil) containing information on key production strategies for horticulture crops and other related information has been released.

Agricultural Engineering

Mechanisation in agriculture is still limited to usage of tractors and motor pumps. With availability of better paying service sector and construction jobs, increased migration from agriculture to other

sectors is observed in Tamil Nadu during the last decade. To increase the productivity of the land and to cope up with shrinking agricultural manpower, mechanisation is not only essential but also imperative. The constraints in promotion of mechanisation include non standardized agricultural practices, small and marginal land holdings, low investment capacity of farmers, lack of know-how and non availability of service and maintenance facilities. Policy and structural mechanisms shall be developed to address these issues and support increased mechanisation in all phases of agriculture (Vision Tamil Nadu 2023).



Fig. 3.1.5: Farm mechanization

As a first step, a three pronged approach is being adopted to promote farm mechanization. They are: a) at the first level, heavy duty high value machinery will be purchased by the AED for custom hiring to farmers, b) at the second level, medium-sized agricultural machinery and equipments will be procured by PACCS for custom hiring to farmers. For this, the societies are being provided with a subsidy of 50 percent of the cost, not exceeding ₹20 lakh, to purchase a set of agricultural machinery, c) at the third level, farmers, SHGs and farmers groups will be assisted with subsidy to acquire agricultural machinery and equipment.

Solar Energy Policy 2012 envisages judicious use of solar power and in line with the Policy, farmers will be motivated for Solar energization of irrigation pumpsets. Provision of solar energy is beneficial to the farmers on one hand and it also reduces the burden on the State Grid on the other.



Establishment of Agro Service Unit in every PACCS

It is proposed to establish an agro service unit in every Primary Agricultural Cooperative Credit Society (PACCS) in the State for providing necessary agricultural machinery/implements to the farmers on hire basis. As the farmers do not have adequate knowledge to operate and maintain the agricultural machinery, it is also proposed to form farmers group in the jurisdiction of every PACCS to render necessary service support to the farmers in that area on various aspects of operation, repair and maintenance of various agricultural machinery/implements. This farmers group will also take part in the activities like raising of seedlings, custom hiring, supply of machinery and labour for various agricultural operations in that area. In Tamil Nadu, 4534 numbers of PACCS are functioning. It is proposed to continue the programme of providing agricultural machinery/implements to 3500 PACCS.

Strategies proposed are: Mission Mode Approach to increase the pace of agricultural mechanisation in the State and demonstration of scientific management of soil & water resources techniques for sustainable agriculture in rainfed areas. Crop varieties will be selected to suit the mechanization and facilitation for easy movement of machinery by adopting planned planting.

Online Booking of Farm Machinery

Presently, the farmer has to approach in person for booking the farm machinery in AED which drains time and money. Hence, the Department of Agriculture has planned to provide an online booking system of farm machinery through the existing AGRISNET web portal. With this system, the farmers can plan well ahead about the requirement of farm machinery and book it online through telephone and can make payment online through a payment gateway. This would help the farmers, to save time and money.

SF and MF Friendly Machinery

Average farm size in Tamil Nadu is 0.80 ha and it is declining year after year. The intensity of marginalization of holdings gets aggravated due to increase in population, subdivision and fragmentation. On the other hand, increasing labour shortage in agriculture has resulted in dependence of machinery. Owing to the size of holdings, the capacity utilization of the machinery is not achieved in most of the farms as the existing machinery are designed for larger farm size. Increased availability of machinery in villages has reduced the potential revenue generation through custom hiring. In this context, usage of these machinery that are in vogue in small farms of Korea and Japan would be a viable alternative. Small size of these machinery demand relatively lesser initial capital and can be utilized fully in the small holdings. Hence, in the Twelfth Five Year Plan it has been proposed to popularize these small and marginal farmer friendly machinery. In addition to this, plant breeders should give emphasis on developing varieties which facilitate the use of these types of machinery.

Crop Insurance - National Agricultural Insurance Scheme (NAIS)

The State Government is making strenuous efforts to fine tune the Crop Insurance Schemes by introducing interim compensation to insured farmers, reducing the insurance unit area to revenue village level, uniform seasonality discipline, on account payment of claims for timely disbursement, etc., which will definitely motivate the farmers to take risks in agriculture and protect them at the time of distress.

The NAIS, since its inception has reached the pinnacle as of now in enrolling the farmers, area insured and premium subsidy. Initially, the farmers especially non-loanee farmers were reluctant to enroll under this scheme. However, extension of 50 percent premium subsidy to both loanee and non-loanee farmers brought higher percentage of farming community into the Crop Insurance Schemes.



The reforms proposed are as follows:

- Uniform seasonality discipline to be fixed for both loanee and non-loanee farmers.
- State Government should be empowered to fix the cut-off date for enrolling loanee and non-loanee farmers, as every time the State Government has to depend on Government of India for extension of cut-off date as and when the cultivation of crops gets delayed either due to delayed release of water from major reservoirs or due to natural calamities.
- 100 percent premium subsidy shall be extended under Crop Insurance Scheme so as to bring all the farmers under insurance coverage.
- Compensation which is being calculated based on the Crop Cutting Experiments shall be modified as follows:
 - Village-wise crop cutting experiments can be conducted for which State government shall be authorized to outsource manpower to conduct the experiments.
 - In the present system, compensation is worked out by comparing average yield with threshold yield which normally deprives affected insured farmers of compensation. Hence, the government can compensate affected individual farmers on merit basis.
- Individual yield based crop insurance scheme is proposed to be implemented on pilot basis in selected blocks by removing the bottlenecks in the existing NAIS and for timely disbursement of compensation.

Crop Insurance – Weather Based Crop Insurance Scheme (WBCIS)

The critical stages of a crop such as sowing, vegetative, flowering and harvest stages are insured for weather parameters like excess / deficit rainfall, temperature, relative humidity, consecutive dry days, wind speed, etc. Automatic Weather Stations (AWS) have been established in 224 blocks and linked with Tamil Nadu Agricultural University website

to provide medium range weather forecast to carry out agriculture related activities by the farmers in time and also to provide weather data to the insurance companies. TNAU was consulted to devise location-specific weather based crop insurance products. Sensitization programmes were conducted to bring awareness about the products.



Fig. 3.1.6: Automatic Weather Station

Coconut Palm Insurance Scheme (CPIS)

Coconut, a perennial crop which is profitable to the growers is cultivated in Tamil Nadu in an extent of 4.00 L.ha. with a production of 55,471 lakh nuts and productivity of 13,852 nuts/ha. and there are better prospects to bring more area and increase the production besides value addition. Coconut cultivation is largely affected by natural calamities. In view of this, CPIS has been introduced on pilot basis in 11 districts with the objective to provide insurance coverage against natural and other perils, provide relief against income loss, minimize risks and encourage replanting. Healthy nut bearing coconut palms grown as mono or intercrop, on bunds or homestead and all varieties of coconut (Tall varieties of 7 to 60 years and Dwarf and hybrids of 4 to 60 years) are insured. Individual farmers/ growers cultivating atleast 10 healthy nut bearing palms are eligible for enrolment. The subsidy pattern is 50 percent by CDB, 25 percent by State government and 25 percent by farmer.



Rural transformation

Dovetailing Agriculture Schemes with MGNREGS

Many departments are implementing various schemes with an aim to uplift the economic status of rural population. If there is convergence among the departments, synergistic effect can be achieved resulting in holistic development of rural areas. Mahatma Gandhi National Rural Employment Guarantee Scheme (MGNREGS) is implemented by Rural Development Department to generate employment opportunities in rural areas. The schemes implemented by Department of Agriculture can be integrated with MGNREGS so that the agricultural activities can be carried out in time by utilizing the available labour effectively.

Role of Science and Technology in the Development of Agriculture

New Technologies for the Farm Sector

Technology is the prime mover of productivity and at least one third of the future growth in productivity would come through innovations in crop technologies. Farmer-field based grassroot innovations too are included in the definition of innovative technological practices. Technological breakthrough is an essential factor to increase the productivity and it is imperative that the obsolete practices adopted should be replaced with suitable interventions to double the productivity and to achieve the ultimate goal of food and nutritional security.

The interventions should focus on developing suitable technologies for bridging the yield gap, development of drought and flood tolerant hybrid varieties, increasing the water and fertilizer use efficiency and nano-technology.

Strengthening Extension for Effective Delivery

- Single window system to provide quality inputs, best service, information, transfer

of technology to farmers in time by integration of all sister departments.

- Involving FIGs, Farm Women Groups and NGOs in extension through technical training.
- Farmers Training Centres and State Agricultural Extension Management Institute to conduct training to the farmers, Farm Women Groups and FIGs.

Strengthening of ATMA

- Agricultural Technology Management Agency (ATMA) has to function as an independent agency with devolution of powers
- Implementing ATMA to provide vital link between the extension system and farmers at village level through bottom up approach, to promote group based approach, to involve farmers in planning and execution of schemes to suit their local needs, to encourage PPP and for recruitment of Farmer Friend to mobilize Farmer's Groups and facilitate dissemination of information.
- Decentralized decision-making and bottom up planning involving farmers and all the stakeholders.
- Strategic Research Extension Plan (SREP) has to be more location specific for which farmers, NGOs, commodity groups can be integrated with research scientists of TNAU and Extension functionaries of the Department of Agriculture.

Uzhavar Peruvizha

'Uzhavar Peruvizha' is a village level mass contact programme in Campaign Mode and it has been conducted for effective dissemination of information to help farmers to take rational decisions about various activities in agriculture and allied sectors. This campaign was organized at the village level in all 16,564 revenue villages to enable the farmers to take on the challenges posed by today's agriculture and gear them up to be a part of Second Green Revolution in the State. This campaign was conducted



Fig. 3.1.7: Propaganda Van

through 'Mobile Extension Centre Approach' operated and executed by the officials of agriculture and allied sectors and other stakeholders like input suppliers, bankers. All the stake holders spent one whole day with farmers to disseminate information and technologies. Integrated Farming System is being popularized during the mass contact programme. The information was disseminated through Street theatres, folk dance, songs, workshop with focus on the local farm problems and appropriate solutions. Various demonstrations, Mini Exhibition, discussion, Audio Visual shows, Mini cattle health camps were also conducted. Besides, farmers' baseline data, soil testing, feed back on Government Farmers' Integrated Handbooks and Farmers Guide Books were also distributed to the farmers. Based on the success of Uzhavar Peruvizha, it is proposed to conduct mass campaign every year to serve the farmers at their door steps.

Gender - Empowerment of Women Farmers

The Government of Tamil Nadu has taken the following special initiatives in the Twelfth Five Year Plan to motivate women farmers in agriculture: a) Subsidy to the tune of 30 percent to 33 percent extended under various crop oriented schemes, b) empowerment of farm women through capacity building on decision-making in the context of farm management, seed production and marketing, agricultural marketing with respect to post-harvest management, value addition of agricultural produce and market

requirements/demand and c) Empowering farm women groups by distribution of gender friendly farm equipments, farm machinery for their use and hiring. Farm women are motivated to form Farm Women groups and provided with financial assistance to start business and encourage farm women form commodity groups under ATMA.

Box 3.1.6: Shift towards High Value Crops



Burgur's women farmers shifted to Rosemary cultivation when the aromatic crop was introduced by MYRADA KVK, Erode district. Women Rosemary Association presently undertakes cultivation and marketing. Technical and financial support for setting up of distillation unit by district administration and poly-tunnel drying technology and structure provided by TNAU has helped the group's income increase by 5 times. The association has negotiated a market tie up with leading companies.

Source : Dept. of Horticulture and Plantation Crops, GoTN.

Equity Issues- Small and Marginal Farmers

The following interventions have been made by the Government for involving the small and marginal farmers in the developmental process:

- State Government provides additional incentives over and above the Minimum Support Price (MSP) fixed by the Central Government for paddy and sugarcane.



- The State Government is extending 33 percent of the allocation under various crop oriented schemes to encourage small and marginal farmers to avail benefits under these schemes and to motivate them to take up agriculture continuously.
- Providing 100 percent subsidy to small and marginal farmers to install drip irrigation units
- Interest free loans for prompt repayment of crop loans.
- Providing 50 percent subsidy (45 percent State + 5 percent Central Government) to the small and marginal loanee farmers and 55 percent subsidy (50 percent State + 5 percent Central Government) to small and marginal non-loanee farmers under Crop Insurance Scheme to motivate them to tackle the risks in agriculture by adopting progressive farm practices, usage of high value inputs, ultimately aiming on increasing the production.
- Increased relief assistance to the affected small and marginal farmers for damaged crops in the event of natural calamities. At present ₹10,000/-per hectare is extended for paddy crop, ₹8,000/- and ₹ 4,000/- for other irrigated and rainfed crops respectively.
- Apart from these, under all the schemes in general, preference will be given to small and marginal farmers.

Innovative Schemes for Upliftment of Scheduled Caste / Scheduled Tribe Farmers

The proactive policy interventions of the Government of India and the State Government are to improve the socio-economic status of the scheduled caste farmers for which the governments are ensuring flow of funds under various crop oriented schemes in proportion to scheduled caste's population in the State which now stands at 19 percent. In order to improve the economic status and to ensure transparency

in implementing schemes exclusively for SC/ST farmers, following schemes are proposed in the Twelfth Five Year Plan.

Purchase of Wetlands for SC/ST Farmers

Wetlands are of major importance in agricultural systems and are becoming even more valuable components of agro-ecosystems. The general understanding was that SCs do not own contiguous areas and that their holdings are scattered in the midst of land held by others. It may be observed that nearly two-thirds of the SCs and over 80 percent of the STs are engaged in agricultural activities. On the other hand, only about 53 percent of the 'Others' are involved in these activities. By and large, the SC & ST population depend on rain water and natural water resources for cultivating their fields and they are usually away from the existing irrigational facilities as available to other agricultural communities. Under this backdrop, it is imperative to provide wetlands to SC/ST farmers as it will be one of the viable livelihood to uplift the economic status of the farmers. The scheme may be implemented by the Revenue Department.

Apart from the above, a separate provision of outlay in case of IFS, multiplication and distribution of seeds, distribution of inputs especially tractor and machinery, establishment of food processing units, cold storage units and coverage of crop/weather insurance scheme and other welfare schemes.



Fig. 3.1.8: Paddy Field



Table 3.1.8: Outcome and Measurable outputs

Scheme	Outcome	Output
Precision Farming Protected Cultivation	60-80 percent increased yield 90 percent first grade marketable Produce 30 percent Premium Price Extended Shelf life Less labour dependence 30-40percent water economy Extended harvest ensuring higher price Technical, economical & social empowerment of farmers	10 percent of vegetable area will be covered in a period of 10 years
Hi-Tech Productivity Enhancement Programme	Increased Productivity per unit Area High Quality Produce Sustainable income to farmers Improved livelihood status of farmers	5 percent of total Mango & Cashew area will be covered under HDP in a period of 10 years.
Modernization of State Horticulture Farm	Less labour dependence High quality planting material Drudgery alleviation Reduced cost of production High quality of Labour produce	25 percent increase in production level of planting materials 30 percent increase in productivity levels of orchard crops.
National Mission on Micro Irrigation	40- 50 percent water saving Efficient weed control. Uniform crop growth. Increase in yield Less labour dependence Uniform application of fertilizers through fertigation	20 percent of Horticultural crop area will be covered in a period of 10 years
National Horticulture Mission i) Hi Tech Nursery ii) Hi density Planting iii) Canopy management/ Rejuvenation iv) Farm Mechanization	Less labour dependence High quality planting materials Increased Productivity per unit Area High Quality Produce Sustainable income to farmers Improved livelihood status of farmers Senile orchards are made productive. The cost is reduced by avoiding planting materials and other labour cost. Less labour dependence Timely field operations enhanced yield	25 percent increase in production of planting materials 30 percent increase in productivity of orchard crops. 10 percent of old and senile orchards will be rejuvenated and brought under high density 5 percent hort. farming will be mechanised in 10 years



Reversing the Trend of Declining Agricultural Growth

The Twelfth Five Year Plan has propounded the unique concept of Farm Level Planning which views the constraints in agriculture holistically and suggests practical solutions on individual farm unit basis and thereby contemplates to bring the desired increase in farm production. Strengthening research and extension services to all farm families in Tamil Nadu-Farm level interventions for “end-to-end” involvement of extension staff with individual farmer has been planned. The Twelfth Five Year Plan gives ample importance to the crop specific strategies like System of Rice Intensification (SRI) and SRI villages, improved pulses production technologies viz., System of Pulses Intensification as whole village concept, Sustainable Sugarcane Initiatives (SSI) and Precision Farming to bridge the yield gap. Also, strategies are designed for improving agricultural marketing infrastructure and promoting farmers’ participation in agri-business ventures. The Twelfth Five Year Plan has also framed strategies to increase the cultivable area and diversifying the cultivation in favour of high value horticulture and commercial crops while ensuring the food and nutritional security is ensured through the proposed Millet Mission. The requirement

of agricultural inputs by the farmers will be assessed through ISMS by conducting meetings at village panchayat level and bottom up planning will be given priority so as to meet the local needs effectively and strategies are designed for ensuring the timely availability of adequate quantity of inputs. Apart from the above Integrated Farming System will be popularized so as to increase the farm income. Gender inclusive approach is given much focus and there are specific plans to provide gender friendly equipments such as power weeders and markers. Adequate focus is bestowed on soil health improvement and reclamation of saline and alkaline soil, issue of Farmers Integrated Hand Book, promoting hi-tech agriculture, Precision Farming and Micro irrigation for efficient use of irrigation water. The Twelfth Five Year Plan includes strategies for need based human development through establishment of district poly-technics. The plan also proposes decentralized planning in the rural sector and linking it to the urban markets, and revitalizing the villages leading to the retention of the rural population in agriculture and allied sectors.

An amount of ₹7922.80 crore has been proposed in the Twelfth Five Year Plan and the details are given in the Table 3.1.9.

Table 3.1.9: Twelfth Plan Outlay – Crop Husbandry Sector

		(₹ crore)
S.No.	Agriculture (Crop Husbandry)	Outlay
Ongoing scheme		
1	Procurement and Distribution of Paddy, millet and pulses seeds (including TSP/SCP).	287.05
2	National Agricultural Development Programme (NADP)- including special programme for agricultural mechanization, Est. Agro Service Unit	1229.32
3	Crop insurance including WBCIS.	1200.92
4	Oil seed production programme including ISOPOM and coconut development.	180.27
5	National Horticultural Mission (NHM).	120.00
6	Horticulture Development-including Spl. Area development.	217.97



Table 3.1.9: Twelfth Plan Outlay – Crop Husbandry Sector (Contd.)

		(₹ crore)
S.No.	Agriculture (Crop Husbandry)	Outlay
7	National Mission on Micro Irrigation.	700.00
8	Production Incentives to farmers for supply of paddy.	1000.00
9	Micro Nutrient mixture.	175.00
10	Others - ongoing	225.48
11	IAMWARM	49.82
	Total Ongoing	5385.83
	New Schemes	
12	Purchase of Wet land and distribution-SCP	200.00
13	Farm level planning	338.37
14	System of Rice Intensification (SRI) and SRI Village Concept	425.20
15	System of pulses intensification(SPI)	50.00
16	Sustainable sugarcane initiatives(SSi)	250.00
17	Soil Management Approaches- Soil Survey & Reclamation of Saline and alkaline soils and reclamation of fallow lands	261.00
18	Village Knowledge centres in all districts	45.00
19	Integrated Farming System Approach(including SC/ST farmers)	137.50
20	Formation and scaling up of Commodity groups	50.00
21	Crop Insurance Scheme @ 100 percent premium subsidy	150.00
22	Bio-fertiliser production units	60.98
23	Village level seed bank	111.00
24	Distribution of Tractor with trailer -SCP	75.00
25	Others-publicity, Training the youth on operation and maintenance of machineries, awareness creation, IIFS, dry land development	38.92
26	Seed production and distribution (special programme)	80.00
27	Establishment of Community Radio Stations	14.00
28	Uzhavar Peruvizha	250.00
	Total-New Schemes	2536.97
	Grand Total	7922.80