

UNIT-II

AGRICULTURE AND IRRIGATION-TYPES AND DISTRIBUTION-PROBLEMS-MAJOR CROPS:PADDY,SUGARCANE,COTTON AND GROUNDNUT-PLANTAIN CROPS:TEA,COFFEE AND RUBBER

AGRICULTURE IN TAMIL NADU

Agriculture pattern of Tamil Nadu - definition

Agriculture is the prime and traditional occupation for the people of Tamil Nadu. About 56% of the people of Tamil Nadu are farmers. Agriculture sector supplies food and fodder to the people and cattle, respectively. It is the source of raw material for many of the industries.

Cropping seasons of Tamil Nadu - definition

Farmers selected particular crops to be cultivated in a season, to suit soil and availability of water in that season. Thus, most farmers in Tamil Nadu cultivate crops in three different seasons as given below:

1. Sornavari (Kharif season - Chitthirai pattern)
2. Samba (Summer season - Adipattam)
3. Navarai (Rabi season - Karthigai pattern).

Food crops of Tamil Nadu - definition

Among the food crops, paddy is the prime crop cultivated in all the districts of Tamil Nadu. The Kaveri delta (especially the undivided Thanjavur district) is known as the granary of south India. Pulses that are grown in Tamil Nadu include Bengal gram, red gram, green gram, black gram and horse gram.

Subsistence intensive farming of Tamil Nadu - definition

Farming that is carried on small land holders that produce food crops for local consumption and not for external trade is known as subsistence intensive farming. Most farmers in Tamil Nadu practice subsistence intensive farming. With the availability of water for cultivation, farming methods are classified into three types namely (i) Wet farming, (ii) Dry farming, and (iii) Irrigation farming.

Factors influencing agriculture in Tamil Nadu - definition

The factors influencing agriculture may be classified as physical, social and economic factors.

1. Physical factors include soils, temperature, rainfall, humidity, climate and slope of land.
2. The social factors include traditional knowledge, belief and myths of farmers, farm size and holdings and farmer's acceptance towards innovation.
3. Economic factors are market, loan assistance, government subsidy and incentives.

Non-food crops of Tamil Nadu - definition

Among **non-food crops**, cotton is a major fibre crop grown in Tamil Nadu. Commercial crops like sugarcane, tobacco, oilseeds and spices like chillies, turmeric and coriander are grown in Tamil Nadu. Tea, coffee, rubber, pepper and cashew are the main plantation crops of Tamil Nadu.

Plantation farming in Tamil Nadu - definition

Plantation farming is yet another type of farming where crops are grown on large farms or estates. Plants like tea, coffee, rubber and pepper are grown as plantation crops on the hill slopes of Tamil Nadu.

Sources of irrigation in Tamil Nadu - definition

The main sources of irrigation are canals, tanks and wells. Canals are man-made channels of water taken from a perennial river, dam or lake to supply water to the agricultural fields. Canal irrigation is the most important type in the basins of Kaveri and Tamiravaruni. Twenty seven percent of irrigated land in Tamil Nadu cultivates crops using canal irrigation.

Animal husbandry pattern in Tamil Nadu - definition

Rearing animals for the production of milk, meat and hide is known as **animal husbandry**. Tamil Nadu Cooperative Milk Producers' Federation (AAVIN) produces milk and dairy products for the state. The poultry hub of Tamil Nadu is Namakkal, Erode, Coimbatore and Salem. Tamil Nadu produces 8394 million eggs during the year 2007-8. Per capita availability is 128 eggs per year.

Mixed farming in Tamil Nadu - definition

Mixed farming is one wherein land is allotted for more than one activity along with agriculture. The farmer grows two or three varieties of crops along with cattle rearing, poultry and fishing on a large land holding. This method is profitable to the farmer as it provides regular and continuous income. This type of farming is prevalent in the Kaveri delta.

Fisheries in Tamil Nadu - definition

Tamil Nadu ranks fourth in fishing among the states of India. Long coastline of 1,076 km, the broad continental shelf favour coastal fishing in Tamil Nadu. Pearl fishing is predominant in Gulf of Mannar region. Thuthukudi is a leading port in fish export. Both marine and inland fishing is practiced in Tamil Nadu. The state has 370 hectares of inland water, 63000 hectares of estuaries, backwaters and swamps. Oysters and prawns are cultured in organised nurseries at Ennore and Pulicat lake for export.

Market gardening of Tamil Nadu - definition

Market gardening includes horticulture and floriculture (growing fruits, vegetables and flowers) in large scale for supply to the urban markets and also for export purposes. Districts such as Madurai, Nilgiris, Thiruvallur and Kancheepuram practice this type of farming.

Agriculture development in Tamil Nadu - definition

After independence, there has been a steady development in all aspects of agriculture. Irrigation facilities were improved with the proper implementation of Five Year Plans in the state. Green revolution in terms of hybrid varieties and application of chemical fertilizers increased the production to a great extent. Abolition of Zamindari system, land tenuring, consolidation of farms, introduction of the land ceiling act and co-operative farming were the new reforms introduced after the independence. Recently, globalization has influenced the agricultural production positively in Tamil Nadu.

Changing trends in Agriculture in Tamil Nadu - definition

The traditional methods of agriculture is slowly being replaced by scientific and technical methods. As a result of this, the merit of the traditional methods have vanished. The Agriculture University in Coimbatore and the M.S. Swaminathan Research Foundation are trying to fuse the tradition with the modern methods so as to obtain maximum produce in the long run.

Tamil Nadu Agriculture Regions

Tamil Nadu agriculture is the most overriding sector in the economy of the state. Around 70 percent of the state's population is involved in agricultural activities as this is one of the major means of livelihood in Tamil Nadu. Tamil Nadu has occupied an area of 1.3 lakh sq. km with an overall area of around 63 L.Ha for plantation.

The agriculture in Tamil Nadu has executed a creditable performance over the years with the help of so many efficient farmers who are both responsive and receptive to the technological development introduced in the agricultural sector of Tamil Nadu.

The agricultural department of Tamil Nadu has decided upon implementing various development schemes and generating innovative technologies to ensure growth in the state's agriculture. Tamil Nadu Agriculture Dept. has taken up various programmes to step up the agricultural production as well as to improve the economic status of the cultivation sector.



The details are below:

- Intensive Integrated farming system
- Massive Wasteland Development Programme
- Extensive watershed development activities
- Water management through Micro irrigation systems
- Organic farming
- Soil health improvement through Bio-fertilizer including Green Manuring
- Adoption of Integrated Nutrient Management (INM) and Integrated Pest Management (IPM) technologies

Tamil Nadu Government that leaves no stone unturned for uplifting the economic status of farmers has conceived agriculture –demand led –industrialization strategy to increase the agricultural productivity so as to expand the internal demand for intermediate and consumer goods which would generate higher income for the farmers.

Tamil Nadu State has been classified into seven distinct agro-climatic zones based on rainfall distribution, irrigation pattern, soil characteristics, cropping pattern and other physical, ecological and social characteristics including administrative divisions.



Tamil Nadu is the eleventh largest State in India by area and the seventh most populous state with 6 per cent of the nation's population. The total geographical area of Tamil Nadu is 130.33 Lakh Hectare (4 per cent of the nation's 12 geographical area). Tamil Nadu being a coastal state (coastal line of 1076 km) is highly vulnerable to seasonal fluctuations causing uncertainty in Agriculture production. Tamil Nadu is one of the most water starved states endowed only with 3 per cent of the nation's water resources putting high stress on irrigation water availability.

Sl. No	Agro climatic Zone	Districts	Soil Types
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1	North Eastern Zone	Kancheepuram, Tiruvallur, Cuddalore, Vellore and Tiruvannamalai	Red sandy loam, clay loam, saline coastal-alluvium
2	Northern Western Zone	Dharmapuri, Salem and Namakkal	Non-Calcareous red, non-calcareous brown, calcareous black
3	Western Zone	Erode, Coimbatore, Tiruppur, Karur, Namakkal, Dindigul and Theni	Red loam, black
4	Cauvery Delta Zone	Trichy, Perambalur, Pudukkottai, Thanjavur, Nagapattinam, Tiruvarur and Part of Cuddalore	Red loam, alluvium
5	South Zone	Madurai, Sivaganga, Ramanathapuram, Virudhunagar, Tirunelveli and Thoothukudi	Coastal alluvium, black, red sandy soil, deep red soil.
6	High Rainfall Zone	Kanniyakumari	Saline coastal alluvium, deep red loam
7	Hill Zone	The Nilgiris and Kodaikanal (Dindigul)	Laterite

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The Tamil Nadu land use pattern:

S. No	Details	Area (L.ha)	% wrt to Geographical area
1	Forest	21.57	16.55
2	Net Cropped Area (*)	43.47	33.35
3	Area under Misc. Tree crops	2.32	1.78
4	Permanent Pastures	1.08	0.83
5	Current fallow	13.61	10.44
6	Other fallow	18.47	14.17
7	Culturable Waste	3.23	2.48
8	Land put to non agricultural use	22.01	16.89
9	Barren and unculturable land	4.58	3.51
		130.33	100.00

Total Geographical Area Cropping Intensity (%)	118	-
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Tamil Nadu being a lower riparian State has to depend on water release from neighboring states to a large extent. With distinct periods of rainfall and distribution pattern, Tamil Nadu is entirely dependent on monsoon rains for recharging its water resources and thereby, monsoon failures lead to acute water scarcity and severe drought. As the State lies in the rain shadow region of Western Ghats, it is deprived of rains during South West Monsoon season which is the assured monsoon for the rest of the Country.

Moreover, the spatial and temporal changes in rainfall distribution add woes to the cropping pattern in the State. The average annual rainfall of the State is around 921 mm which is less than the National average of 1,200 mm. The quantum of rainfall received during Winter (January - February), Summer (March - May), South-West Monsoon (June – September) and North-East Monsoon (October - December) is 3%, 14%, 35% and 48% respectively.



The per capita availability of water is 750 cubic meters per year as compared to the all India average of 2,200 cubic meters. Out of the Gross Cropped Area of 60.74 Lakh Hectare, the land suitable for irrigated agriculture is around 35.75 Lakh Hectare of which 80% is brought under food crops and 20% under non-food crops.

Tamil Nadu Irrigation Sources

The details of net area irrigated using various sources of irrigation across the state are as follows:

Source	Availability (Nos)	Net Irrigated Area (Lakh Ha.)	% wrt to Net Area Irrigated
Canals	2,239	5.27	22.10
Tanks	41,127	3.02	12.66
Wells	18,72,088	15.54	65.16
Others		0.02	0.08
Total		23.85	100.00

Canal irrigation

Majority of the canal irrigation system in Tamil Nadu are supply-based systems. It is very difficult to improve water use efficiency in supply-based systems beyond a certain level. Therefore gradually all the canal irrigation systems are converted to demand based systems. Better way to beneficially use water during nights is to do groundwater recharges through the existing open wells and construction of injection wells.

Farmers are encouraged to allot land for construction of farm ponds in their own lands through subsidies. Canal water available during night time may be stored in these farm ponds. Sometimes, when their due share of water is more than the field demand, that water can also be stored in their farm ponds. The promboke lands available in the canal command areas are also used for the construction of tanks to store water.



Tank Irrigation

The water use efficiency in tank irrigation are improved more easily than the canal irrigation system. The area of tank irrigation systems is smaller than the canal irrigation systems. For all the tank irrigation systems, water users association are strengthened and the total management of tank irrigation systems are handed over to water users associations.



Well irrigation

Compared to canal and tank irrigation, the water use efficiency is found to be always higher in well irrigation. But there is still a good scope for improving water use efficiency in well irrigation. If water is conveyed through pipes from well to the field instead of field channels, the conveyance efficiency can be increased. Subsidies are provided for installation of plastic conveyance system. If subsidy is provided for this, then the present popular way of applying water to coconut through tap system would also be recognized as an efficient water conveyance system eligible for government subsidy.



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Tamil Nadu Irrigation Methods

There are four methods of irrigation followed in Tamil Nadu.

1. Sprinkler
2. Drip/trickle
3. Subsurface / Surge
4. Surface / Flood

Sprinkler irrigation

Applying the water above the ground surface in the form of spray resembling rainfall through the nozzle with a pump

A minimum of 1.0 kg/cm² pressure needed to operate one sprinkler head to cover a diameter of 12 m

Owing to the non economy of operating one sprinkler head, a pressure range of 4-5 kg/cm² is normally needed for operating 4 sprinkler heads at a time

It is better to operate under wind speed less than 15 KMPH to avoid drift loss in normal field holdings

Use of sprinkler early in the morning and late in the evening is preferable to minimize the evaporation losses. In sprinkler or overhead irrigation, water is piped to one or more central locations within the field and distributed by overhead high-pressure sprinklers or guns. A system using sprinklers, sprays, or guns mounted overhead on permanently installed risers is often referred to as a solid-set irrigation system.

Higher pressure sprinklers that rotate are called rotors and are driven by a ball drive, gear drive, or impact mechanism. Rotors can be designed to rotate in a full or partial circle. Guns are similar to rotors, except that they generally operate at very high pressures of 275 to 900 kPa (40 to 130 psi) and flows of 3 to 76 L/s (50 to 1200 US gal/min), usually with nozzle diameters in the range of 10 to 50 mm (0.5 to 1.9 in). Guns are used not only for irrigation, but also for industrial applications such as dust suppression and logging.



Drip Irrigation

The system controls the supply of water to the plants by a network of tubes with water under pressure.

The Head unit consists of a pump or over head tank.

Mainline 50 mm, 63 mm and 75 mm HDPE or PVC pipes are used

Submain 45 mm, 50 mm HDPE pipes are used.

Laterals 12 mm and 16 mm LLDPE pipes are used.

Drippers - pressure compensating type 2 lph, 4 lph, 8 lph are more suitable

Filter unit : Sand filter for coarse particle detention. Mesh filter (120 micron) for fine particle detention.

Fertiliser unit: A fertiliser tank with ventury setup is used for applying liquid or dissolved fertilisers. Pressure gauges 0.5 to 2.5 Ksc and gate valve depending on pipe size are also essential for the system to control and monitor the flow.



Drip (or micro) irrigation, also known as trickle irrigation, functions as its name suggests. In this system water falls drop by drop just at the position of roots. Water is delivered at or near the root zone of plants, drop by drop. This method can be the most water-efficient method of irrigation,[33] if managed properly, evaporation and runoff are minimized. The field water efficiency of drip irrigation is typically in the range of 80 to 90 percent when managed correctly.

In modern agriculture, drip irrigation is often combined with plastic mulch, further reducing evaporation, and is also the means of delivery of fertilizer. The process is known as fertigation.

Surge irrigation

Even as advanced pressure irrigation method, such as drip and sprinkler systems are in vogue the traditional gravity surface irrigation methods still remain inevitable due to their simplicity in layouts and low installation and operational expenses. However the short strip furrow and check basin layouts (the primary surface irrigation methods in Tamilnadu) warrant division of the irrigated fields into a number of square or rectangular (2m x 2m to 6m x 6 m) plots encompassed by criss-cross ridges and feeder channels for facilitating irrigation flow from head to tail end of the field.

This eventually results in prolonged irrigation application time and reduced irrigation efficiencies of 55 -65% only due to excessive seepage, deep percolation and runoff losses (35-45%). Besides, the criss- cross layout with cross ridges and feeder channels leads to a land loss of 15 -25%. In view of minimizing the land and water loss and to accomplish high level of irrigation and water use efficiencies a relatively new surface irrigation method called “surge irrigation” was introduced in TNAU campus with extensive experimental trials on its hydraulic performance evaluation and crop compatibility.



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Flood / Surface Irrigation

Flood irrigation is an ancient method of irrigating crops. It was likely the first form of irrigation used by humans as they began cultivating crops and is still one of the most commonly used methods of irrigation used today.

Very simply, water is delivered to the field by ditch, pipe, or some other means and simply flows over the ground through the crop. Although flood irrigation is an effective method of irrigation it is certainly not efficient compared with other options. With flood irrigation it is generally assumed that only half of the water applied actually ends up irrigating the crop. The other half is lost to evaporation, runoff, infiltration of uncultivated areas, and transpiration through the leaves of weeds.

Surface irrigation is the oldest form of irrigation and has been in use for thousands of years. In surface (flood, or level basin) irrigation systems, water moves across the surface of an agricultural lands, in order to wet it and infiltrate into the soil. Surface irrigation can be subdivided into furrow, border strip or basin irrigation. It is often called flood irrigation when the irrigation results in flooding or near flooding of the cultivated land. Historically, this has been the most common method of irrigating agricultural land and is still used in most parts of the world.



Although flood irrigation will never be as efficient as other types of irrigation there are several techniques that can be used to improve its efficiency:

Leveling fields – because water is transported using gravity it won't reach high spots in the field

Surge flooding – rather than releasing water all at once it is released in intervals allowing each release to infiltrate the soil before releasing additional water.

Recycling runoff – water that runs off the end and sides of the irrigated area is captured in low-lying areas and pumped to the top of the field where it can be reused.

It is common for flood irrigators to release water until the entire field is covered. By flooding the entire field all at once, irrigators fail to take advantage of capillary movement of water through the soil, particularly in clay soils.

This results in significant runoff, anaerobic conditions in the soil and around the root zone, and deep irrigation below the root zone that is unavailable to the plants. Soil moisture sensors provide irrigators with a useful tool when used in conjunction with surge irrigation (also known as cut-off irrigation).

Strategic placement of sensors near the end of the irrigated area and at selected depths alert the irrigator when the soil is saturated and irrigation should be cut off to take advantage of the infiltration that occurs. This type of irrigation is similar to the 'cycle and soak' irrigation recommended for spray irrigation systems and provides similar benefits.

Tamil Nadu Agriculture - Major Crops

The principal food crops are rice, maize, jowar (cholam), bajra (cumbu), ragi, and pulses (Bengalgram, Redgram, Greengram Blackgram and Horsegram). The cash crops include cotton, sugarcane, oilseeds, coffee, tea, rubber, coconut, gingelly and chillies. The important horticultural products are bananas and mangoes. The state is the largest producer of bananas, flowers, tapioca, the second largest producer of mangoes, natural rubber, coconut, groundnut and the third largest producer of coffee, sapota, tea and sugarcane. Tamil Nadu's sugarcane yield per hectare is the highest in India.

The state has 17,000 hectares of land under oil palm cultivation, the second highest in India. Paddy is grown in large excess because rice is the main staple food of the state. There are three crops based on duration. The first one is the 'Kuruvai' (the short term crop) with duration of three and a half to four months from June to July to Oct - Nov. The second crop is called the 'Thaladi' that grown in 5 to 6 months Oct - Nov to Feb - March. Third is 'Samba' and has a duration of almost 6 months from Aug to January.



The major Crops sown in Tami Nadu are -

- Rice
- Jowar
- Ragi
- Bajra
- Maize and
- Pulses

Few other crops that are highly cultivated in the regions of Tamil Nadu are

- Cotton
- Sugarcane
- Tea
- Coffee and
- Coconut



Area and Production of Principal Crops

Name of the Crops	Area (Ha) (in '000)	Production ('000 Tonnes)	Yield Rate (In Kg/ Ha)
1. Paddy (Rice)	1493.28	4050.32	2712
2. Coconut (lakh Nuts) - (Yield rate : nuts/ha.)	424	50.75	11967
3. Groundnut (Dry Pods)	339.36	785.36	2314
4. Sugarcane (Cane) (Yield rate :tonnes / ha.)	348.38	34014.10	98
5. Black gram	208.62	88.71	425
6. Cholan (Jowar)	210.89	174.97	830
7. Maize	291.05	946.36	3252
8. Greengram	118.61	33.68	284
9. Mango	144.51	1189.27	8230
10. Cotton (bales of 170 Kg. lint each) (Yield rate : terms of lint)	133.21	255.47	326

11. Tapioca	81.03	2769.47	34180
12. Banana	105.78	3909.76	36879

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Oddanchatram is one of the major centres for vegetable supply in Tamil Nadu and is also known as the vegetable city of Tamil Nadu.

Productivity Position of Tamil Nadu at National Level

National Level Crop	Position of Tamil Nadu at National Level	Yield in Tamil Nadu (Kg/ha)	All India Average Yield (Kg/ha)
Maize	1	6,549	2,509
Cumbu	1	2,613	1,154
Groundnut	1	2,509	1,486
Total Oilseeds	1	2,230	968
Cotton	5	442	432
Coconut	2	9,238	6,721
Rice	2	3,918	2,404
Sugarcane(MT)	3	103	71
Sunflower	4	1,089	697
Jowar	3	1,558	780
Coarse cereals	2	3,759	1,596
Food grains	3	3,090	2,056
Total Pulses	8(*)	689	744
Total Geographical Area Cropping Intensity (%)		130.33	100.00
		118	-

Source: Department of Agriculture, Policy note 2018-19



Paddy is Cultivated in large amount of hectares(17.26 Lakh Hectares) because rice is the only main staple and tasty food of Tamilnadu. Paddy accounts for 31% of area under cultivation.

There are mainly three crops based on duration and season -

- The first crop is the 'Kuruvai' (the short term crop which is cultivated mostly in tanjore) within the duration of three and a half to four months from June,July,Oct,Nov.
- The second one is the 'Thaladi' that crop grown within in 5 to 6 months Oct, Nov, Feb, March.
- Third one is 'Samba' sagubadi and it will grown in the duration of 6 months from Aug to January.

Total Paddy Cultivating Districts in Tamil Nadu are :

Tiruvarur, Tanjore, Villupuram, Nagapattinam, Cuddalore, Ramanathapuram, Thiruvallur, Kancheepuram, Thiruvannamalai and Pudukkottai.

