

44585

REPORT ON THE TECHNO-
ECONOMIC SURVEY OF THANJAVUR
DISTRICT. - Part - I - 1973.



R
X:75.21193 N73
N73.1
44 585

**TECHNO-ECONOMIC SURVEY
OF
THANJAVUR**

PART - I X.73-21193 NB
X73-1
111-5-55
44585

**FEDO
FACT**

**REPORT ON THE
TECHNO - ECONOMIC SURVEY
OF
THANJAVUR DISTRICT
(PART I)**

(SEPTEMBER 1973)

**FACT ENGINEERING AND DESIGN ORGANISATION
THE FERTILISERS AND CHEMICALS TRAVANCORE LIMITED
UDYOGAMANDAL.**

CONTENTS

Scope and Methodology of the Survey

	<u>page</u>
	i-v
Summary	1
1·0 GENERAL FEATURES	12
2·0 RESOURCES	12
2·1 Agriculture	42
2·2 Irrigation	56
2·3 Crop Profile	97
2·4 Cropping Pattern for Thanjavur District	131
2·5 Forestry	144
2·6 Fisheries	161
2·7 Animal Husbandry	169
2·8 Agricultural Development Programme	
3·0 INFRASTRUCTURE	208
3·1 Power	209
3·2 Transport	217
3·3 Education	219
3·4 Public Health and Family Planning	223
3·5 Banking	228
3·6 Markets	229
3·7 Warehousing	229
3·8 Population analysis	235
3·9 National Employment Service	

MAPS AND CHARTS

1. ADMINISTRATIVE MAP
2. RELIEF AND NATURAL DRAINAGE
3. RAINFALL
4. DISTRIBUTION OF SOIL
5. TEXTURAL CLASSIFICATION OF SOILS
6. MAJOR SUB-REGIONS
7. SOIL FERTILITY MAP
8. ACIDITY, ALKALINITY AND SALINITY STATUS
9. EXISTING LAND USE
10. CROPPING PATTERN
11. AVERAGE YIELD OF IMPORTANT CROPS
12. IRRIGATION IN THANJAVUR DISTRICT
13. GROSS IRRIGATED AREA AS PERCENT OF GROSS CROPPED AREA
14. PROPOSED CROPPING PATTERN
15. THANJAVUR FOREST DIVISION
16. KEY MAP OF TIRUCHIRAPALLI FOREST DIVISION
17. ROAD MAP
18. RURAL-URBAN COMPOSITION OF POPULATION—SEX-WISE
19. LITERATE AND ILLITERATE POPULATION—SEX-WISE
20. WORKERS AND NON-WORKERS—SEX-WISE
21. CLASSIFICATION OF WORKERS—SEX-WISE

SCOPE AND METHODOLOGY OF THE TECHNO-ECONOMIC
SURVEY

1. The Techno-Economic Survey of Thanjavur and South Arcot Districts was undertaken by FACT Engineering and Design Organisation (FEDO), a Division of The Fertilisers And Chemicals, Travancore Limited (FACT), Udyogamandal, as per terms of reference by the Government of Tamil Nadu vide the Government Order G.O.MS.No.1491 dated 14th September, 1972.

2. Scope

This Report on the Techno-Economic Survey of Thanjavur District is presented in two parts having the following coverage:

PART-I:

- a) The appraisal of the physical and the geographical features of the district which have a bearing on the development possibilities of the district;
- b) An elaborate review and assessment of the district covering agriculture, fisheries, animal husbandry, forests, etc.;
- c) A study on the infrastructural facilities like transport and communication systems, public health facilities, education and manpower structure, irrigation, power, banking and credit facilities, markets, etc.; and
- d) Detailed recommendations on agricultural development programmes for the district.

PART II:

- a) A review and evaluation of the present industrial spectrum in the district, highlighting the technical and economic constraints hindering their growth and suggestions for improving their operational efficiency;
- b) Recommendations of technically and economically feasible industrial possibilities suitable for the district, indicating the process details, cost estimates, etc.;
- c) Evolution of a development strategy for the district, taking into consideration the relative efficiencies of the various sectors of the district economy and the potential for future growth.

3. Methodology

The preliminary data collection was facilitated by the availability of latest basic economic indicators, collected at district level in connection with the perspective plan for Tamil Nadu, undertaken by the State Planning Commission. The Block-level data thus collected was cross-checked at random and compared with District-level data. The investigating officers were organised into different task groups to undertake detailed study of various aspects of the district's economy. They conducted interviews and had discussions with various departmental officials at the district level as well as the State level. In addition to this, a team of engineers, economists, and agronomists visited the district to further refine the findings and formulate more realistic and operationally viable recommendations for development. The team had elaborate discussions with district officials which helped to evolve industrial possibilities for the district. Discussions were also undertaken with industrial associations, Chambers of Commerce and trade agencies who were in grips with the problems of marketability, raw materials and procedural constraints. Industry contact was adopted as the methodology for reviewing the existing industrial sector of the district. Development possibilities from sector-to-sector are explored after discussions with official agencies who were charged with the development administration of the respective sectors.

----:oooOooo:----

SUMMARY

1. Thanjavur District, located in the most fertile area of Tamil Nadu, is essentially agrarian, its agriculture being sustained by a wide network of irrigation sources and improved methods of cultivation. Topographically, the district could be divided into; (a) the deltaic region, (b) the upland area and (c) the salt swamp. Four groups of soils are found in the district, viz. alluvial soils, soils derived from Cuddalore sandstone, alluvial soils affected by marine influence and recent marine deposits and soils derived from archaean schists and gneiss. The region has an excellent drainage system consisting of 36 main rivers totalling 1600 kms. and 29,881 channels totalling 24,000 kms. screening the delta below the Grand Anicut. The district has a high mean temperature and a low degree of humidity.. The annual average rainfall of the district is 1147.8mm. compared to 945.7 for the State. Catchment areas of river Cauvery are subject to floods during monsoon periods. The district cannot boast of any valuable mineral deposits. Kankar, pebbles of quartz, building materials, red earth and peat are the only minerals found in the region. Regarding ground water resources, the region is blessed with abundant reserves.
- 2.1 Paddy being the major crop, covers 80% of the gross area cultivated in the district and 24% of the total area under paddy for the whole State. Next in importance is groundnut, while sugarcane and banana come in the third place. Paddy is grown in wet lands while groundnut

is mainly grown as a dry crop. Sugarcane is cultivated in garden lands and wet lands. Coconut is a major plantation crop in the district.

2.2 Thanjavur district has the maximum irrigation facilities compared to other parts of Tamil Nadu. Nearly 83.5% of the net area sown is irrigated while for the whole State, the percentage is only 41.3. Still, the farmers are at times put to severe hardships due to problems of irrigation arising from variations of storage position in the Mettur Dam. This could be solved by digging filter point tubewells in places where there is sufficient groundwater resources, to serve as a supplementary source. Schemes are in operation for soil and water conservation in the district.

2.3 High yielding varieties and multiple cropping programmes are very popular in the district. A well-established Paddy Research Station at Aduthurai is the key for successful introduction of high yielding paddy varieties in the district. IADP has been very successful in popularising and supplying quality seeds, chemical fertilisers and plant protection chemicals. These measures have helped to increase the yield per acre considerably. Agricultural credit assistance is provided through Village Co-operative Societies and Commercial Banks. In spite of this, Thanjavur farmers seem to prefer money lenders and pawn brokers. During the peak seasons of agricultural activity in Thanjavur, agricultural labour has to be brought from neighbouring

- :iii: -

districts for completing the operations in time. This shows that there is much scope for introducing mechanised farming in the district.

- 2.4 Major industrialisation programmes for agro-based industries in Thanjavur can be thought of only if the existing cropping pattern is changed. Commercial crops like sugarcane, groundnut, pulses, etc. should be introduced in the district as part of a new multiple cropping scheme.
3. Thanjavur has got only a small area under forests, accounting to only 2.1% of the total area of the district. Important forest crops of the district are casuarina, cashew, eucalyptus and mangroves. Except cashew, all the other trees are used as fuel. A small Wild Life Sanctuary is located near Point Calimer where antelope, cheetal, jackal, wild pigs and monkeys are found. There is also a Bird Sanctuary at Vedaranyam.
4. Thanjavur district has a coastline of 238 kms. offering vast scope for developing marine fisheries. There are about 30 marine fishing centres and about 40 centres covering both inland and river fishing. The main varieties of fish landed off the coast are mullets, cat fish, skates and rays, sabre fish, prawns etc. Inland fish nurseries have been started in various Panchayats. Though there are many Ice Plants in Thanjavur, freezing units are completely absent. Introduction of mechanised vessels, electric equipment and the use of synthetic materials have revolutionised the fishing industry in the district. Still, there is an obvious under-exploitation

- :iv: -

of marine resources due to the scarcity of facilities in the district. There is much scope for oyster farming and chank fishing off Tanjore district. Many new industrial possibilities could be thought of if fisheries development is properly planned in the district.

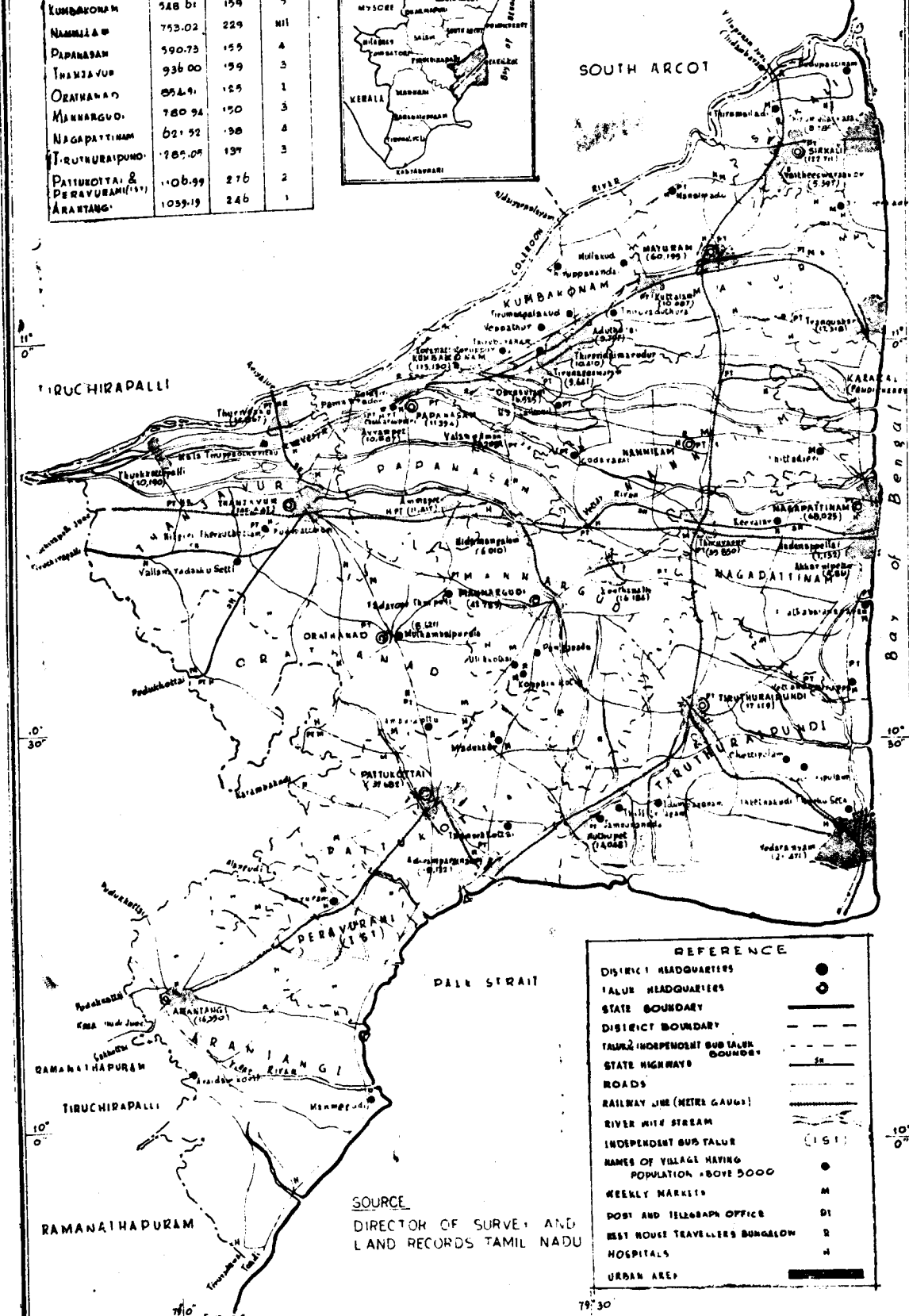
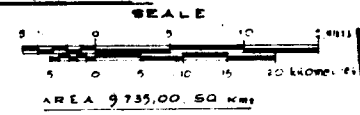
5. Animal husbandry is another significant sector promising immense potentialities for development in the district. The quality of indigenous cattle available in Thanjavur district is very poor. Inadequacy of pasture lands and scarcity of fodder crops have been attributed as the reasons for this state of affairs. Artificial Insemination Centres and Key Village Centres are highly inadequate in the district. The Livestock Farm at Orathanad is actively engaged in improving the quality of cattle, poultry and pigs.
6. The agricultural development programmes recommended for the district cover digging borewells, opening agro-service centres, starting seed farms and introduction of new cash crops.
7. Thanjavur district does not have proper infrastructural facilities necessary for rapid industrial development. There are no power generating stations and the district is dependent on Mettur and Periar Power Houses. More than fifty per cent of the electricity consumed in the district is for street-lights and domestic purposes and the remaining for agricultural purposes. The district has a fairly developed railway network, but the absence of broad-gauge lines poses the major problems of transportation. The road system suffers from a number of

- :v: -

bottlenecks like low accessibility, bad surfacing, etc. The district has only one minor port - Nagapattinam. Educational facilities in the district are mainly academic-oriented. Technical training Institutes are scarce and highly inadequate for developing industrial manpower. Regarding health and family planning, the district has started making good progress. The situation of rural water supply is far from satisfactory. Commercial Banking has yet to catch up in the district, but Co-operative Banking already plays an active role. Private money-lenders are still popular in the field of agricultural finance. Organised market centres are functioning throughout the district covering mainly agricultural produce. Warehousing facilities are also available to a certain extent. The district shows a slightly slower population growth compared to the State average, but density is higher. In spite of the magnitude of the problem of unemployment, there are some categories in which qualified hands are in short supply in the district.

FEDO FACT THANJAVUR DISTRICT

NAME OF TALUK	AREA IN SQ KMS	NO OF VILLAGES	URBAN CENTRES
SIRKALI	44.94	83	3
MAYURAM	731.62	77	3
KUMBakonam	528.61	159	5
NAMMILAM	752.02	229	NIL
PAPANASAM	590.73	155	4
THANJAVUR	936.00	199	3
ORATHANAD	654.41	125	1
MANHARGUO	780.94	150	3
NAGAPATTINAM	621.52	98	4
TRUTHURAI PUNDI	785.05	137	3
PATTUROTTAI & PERAVURANI (191)	1106.99	276	2
ARANTANGI	1059.19	246	1



REFERENCE	
DISTRICT HEADQUARTERS	●
TALUK HEADQUARTERS	○
STATE BOUNDARY	—
DISTRICT BOUNDARY	- - -
TALUK INDEPENDENT SUB TALUK BOUNDARY	- · -
STATE HIGHWAYS	==
ROADS	---
RAILWAY LINE (METRE GAUGE)	—+—
RIVER WITH STREAM	~~~~~
INDEPENDENT SUB TALUK	(191)
NAMES OF VILLAGE HAVING POPULATION ABOVE 5000	●
WEEKLY MARKETS	M
POST AND TELEGRAPH OFFICE	DT
BEST HOUSE TRAVELLERS BUNGALOW	S
HOSPITALS	H
URBAN AREA	■

SOURCE
DIRECTOR OF SURVEY AND
LAND RECORDS TAMIL NADU

1.0 GENERAL FEATURES

- 1.1 Thanjavur District, located in the most fertile area of Tamil Nadu, lies between 9°-50' and 11°-23' north latitude and 78°-23' and 79°-53' east longitude. Well known as the granary or rice bowl of Tamil Nadu, the district's economy is essentially agrarian, its agriculture being sustained by a wide network of irrigation sources and improved methods of cultivation. The district extends over an area of 9684 sq. kms. which is about 7.5% of the territory of the State. To the north of the district lie South Arcot and Trichy of which the latter extends to the western border also. The Palk Strait and Ramanathapuram district form the southern border and the Bay of Bengal the eastern. The district's coastline extending over 237 kms. turns south-west at Point Calimere. The sea board can be divided into two sections, one extending almost 115 kms. from the mouth of the river Coleroon to Point Calimere in the south and other bordering the Palk Strait for about 108 kms. from Point Calimere. The coastline has a number of minor harbours like Nagore, Point Calimere, Nagapattinam and Tranquebar.
- 1.2 Topographically, the district can be characterised as a vast plain of fertile soil with a gentle but definite slope towards the sea. The region can, however, be divided into three topographical divisions, viz. the deltaic region, the upland area and the salt swamp. Of these, the deltaic region consists of the northern and eastern parts of the

- :2: -

district comprising the taluks of Sirkali, Kumbakonam, Mayuram, Nagapattinam and Thiruthuraipoondi. This region is a wide expanse of alluvial soil with rich paddy fields interspersed with green groves. The western and southern parts of the district form the upland area irrigated from various projects. Known as the New Delta, it is dry, but irrigated crops are raised chiefly with the help of Grand Anicut Canal. It also slopes towards the sea and is devoid of hills. In the south and south-western part of the district, a small plateau called the Vallam Tableland is found. The third region is Vedaranyam Salt Swamp which is the largest of its kind in the State. It runs along the coast from Point Calimere towards west covering an area of about 48 kms. in length and 7 kms. in breadth.

1.3 Soils

There are four groups of soils in the region:

- i) Alluvial soils
- ii) Soils derived from Cuddalore sandstone
- iii) Alluvial soils affected by marine influence and recent marine deposits
- iv) Soils derived from archean schists and gneiss.

1.3.1 Alluvial soils

It occurs on the natural delta of Cauvery and its tributaries. The greater parts of the taluks of Sirkali, Mayuram, Kumbakonam, Papanasam, Thiruthurai-poondi, Nagapattinam and northern portion of Mannargudy and Thanjavur taluks belong to this group. The depth of soil varies from several feet near the water courses

- 13: -

to a foot or less in regions of higher topography away from the rivers. Some of the excellent river alluvium of South East Asia occur in this region. They are very fertile and capable of giving massive yields, if managed properly.

1.3.2 Soils from Cuddalore Sandstone

New delta area consisting of southern parts of Thanjavur and Papanasam taluks, western portions of Mannargudi taluk and almost the entire area of Pattukkottai taluk come under this group. The soils are loamy in texture and the profiles invariably contain ferrugeneous gravel concretions. They are laterite in character and poor in fertility status. Poor drainage in some areas have adversely affected the condition of the soil with salinity and alkalinity in some places.

1.3.3 Soils affected by marine influence and recent marine deposits

The soils are in fact Cauvery alluvium near the coast having marine influence due to proximity of sea and are termed as coastal alluvium. Some soils have risen from recent marine deposits. These soils occur in the coastal area very near the sea and are sandy loam or sandy at the top with a clay loam or clay in the lower depths. Due to marine influence, shells and bleached sand are found in this area. They are of low to medium fertility. Some areas contain appreciable amounts of salts, mostly sodium chloride and sulphate due to inundation by sea water and tidal waves.

1.3.4 Soils derived from archean schists and gneisses

It is a small area found in western parts of Budalur block. They are brownish gray loams or clay at the top with brown or brownish gray clay as the sub-soil. They are of poor fertility.

1.4 Drainage system

1.4.1 No other district in the State has this much facilities for irrigation as Thanjavur district. There are altogether 36 main rivers totalling 1600 kms. and 29,881 channels totalling 24000 kms. serving the delta, below the Grand Anicut.

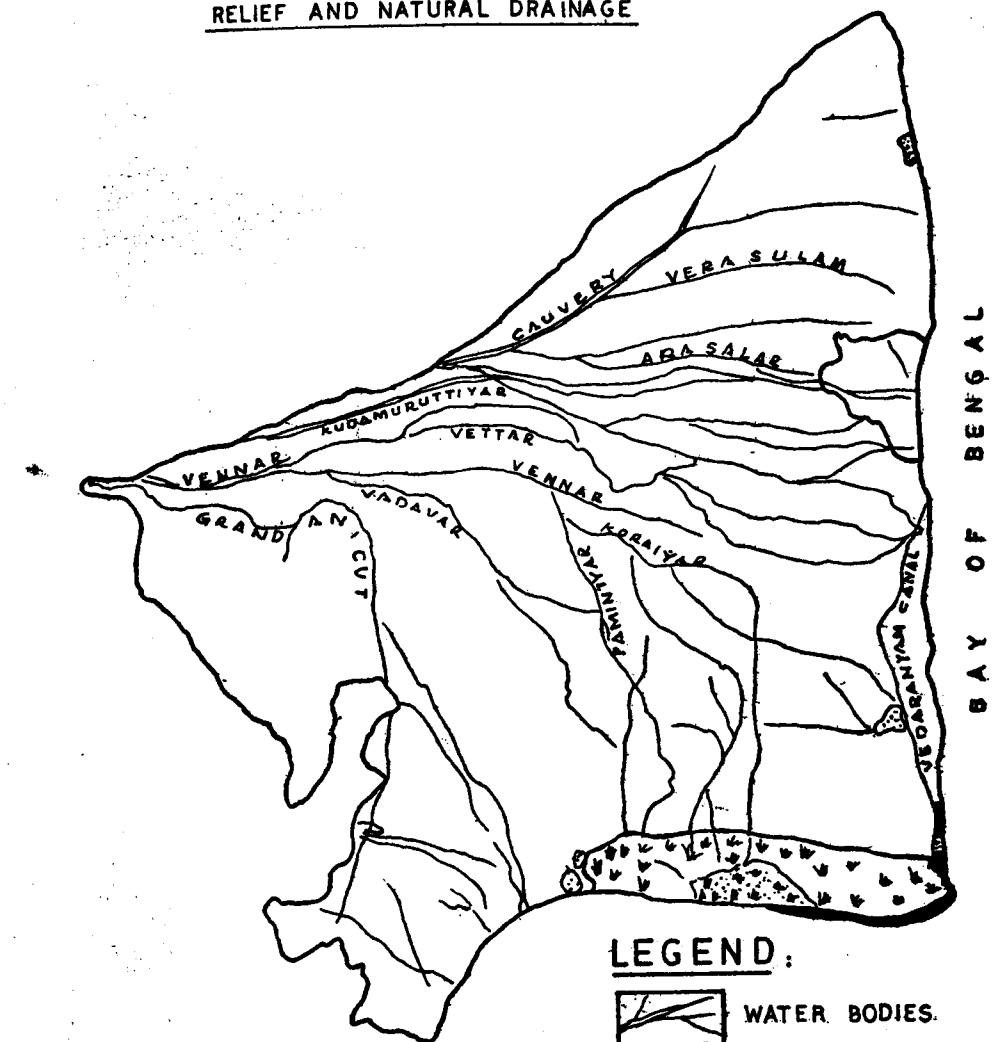
1.4.2 River Cauvery with her tributaries has blessed the district with a good irrigation system. Taluks of Thanjavur, Papanasam, Kumbakonam, Mayuram, Sirkali, Nannilam, Nagapattinam, Thiruthuraipoondi and eastern parts of Mannargudi are covered by the natural delta of river Cauvery known as old delta. Grand Anicut canal irrigation system started in 1933 under the Cauvery-Mettur Project irrigates the upland tracks of Thanjavur, Mannargudi and Pattukkottai. This area is known as the new delta.

1.4.3 Cauvery river bifurcates into two main rivers at the upper anicut, 16 kms. west of Thiruchirapalli. The northern branch, known as Coleroon is mainly a flood carrier, while the southern branch, known as Cauvery itself is the main source of irrigation.

1.4.4 Grand anicut is 28 kms. below the upper anicut. Here, Cauvery again bifurcates into two branches known as Cauvery and Vennar, with regulators at their head.

THANJAVUR DISTRICT

RELIEF AND NATURAL DRAINAGE



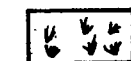
LEGEND:



WATER BODIES.



RESERVED FOREST



SWAMP AREA



SAND BAND

SOURCE:

I. A. D. P. THANJAVUR

- :5: -

From there, the two branches divide and sub-divide into innumerable distributories which form the irrigation source for the entire delta. The main branches of Cauvery below the Grand Anicut are Kodomuruthy, Paminar, Pandavayar and Vellayar. There are altogether 36 main rivers totalling 1600 kilometres and 29,881 channels totalling 24000 kilometres serving the delta below Grand Anicut.

1.5 Climate and rainfall

1.5.1 Temperature

The district has a high mean temperature and a low degree of humidity. Summer months are quite hot and the difference between maximum and minimum temperatures are only moderate. January and February are pleasant with warm days and cool nights. March, April, May and June months are hot with a daily maximum temperature of 37.9°C. (100.2°F.). On very hot days, the temperatures reaches 42°C. or more. During this period, dry winds prevail and life becomes uncomfortable. The mean daily minimum temperature in summer months is 27.1°C. (80.7°F.). Though occasional rains are received during this period, the temperature does not come down to normal level.

1.5.2 Rainfall

Table below gives the average rainfall of the district for various seasons.

INTENSIVE AGRICULTURAL DISTRICT
PROGRAMME - THANJAVUR.

**INTENSIVE AGRICULTURAL DISTRICT
PROGRAM - THANJAVUR.**

RAIN FALL.

RAIN FALL IN M.M.

	800 - 900
	900 - 1000
	1000 - 1200

	800 - 900
	900 - 1000
	1000 - 1200
	1200 - 1400
	1400 - 1600

SOURCE :
I . A . D . P . THANJAVUR

Table-1
Rainfall (in mm) - Thanjavur District

	South West Monsoon (June '70 to Sept. '70)	North East Monsoon (Oct. '70 to Dec. '70)	Winter period (Jan. '71 to Feb. '71)	Hot weather (Mar. '71 to May '71)	Grand Total
Thanjavur District	286.0	663.5	83.7	114.6	1147.8
Whole State	307.3	449.7	50.9	137.8	945.7

Source: Agricultural Compendium - 1972-73
Directorate of Agriculture, Tamil Nadu.

There are five regions of rainfall in the district. The following table gives the number and name of blocks in each region.

Table-2

<u>800 - 900 mm</u>	1. Budalur 2. Avadayarkoil and part of Aranthangi Blocks
<u>900 - 1000 mm</u>	3. Thiruvayaru 4. Thanjavur 5. Tiruvonam 6. Papanasam 7. Ammapet 8. Orathanad 9. Peravarani 10. Aranthangi (Part) 11. Sethubavachatram
<u>1000 - 1200 mm</u>	12. Kumbakonam 13. Tirupanandal 14. Tiruvidamarudur 15. Valangiman 16. Nidamangalam 17. Kodavasal

- :7: -

18. Koradachery
19. Manargudi
20. Thiruthuraipoondi
21. Kottur
22. Maddukkur
23. Pattukottai
24. Muthupet

1200 - 1400 mm

25. Kollidam
26. Sirkali
27. Mayuram
28. Sembanarkoil
29. Kuttalam
30. Nannilam
31. Tiru anandal
32. Tiruvarur
33. Kivalur
34. Nagapattinam
35. Thalanayar and Part of
Vedaraniyam

1400 - 1600 mm

Eastern part of Thalanayar and
Vedaranyam.

Source: I.A.D.P. Thanjavur

The rainfall map shows that there is a definite decrease in the rain received as we move from the coast to interior places. Thiruvaiyaru and Tiruvonam Panchayat Unions forming the western part of the district receive only 800 to 900 mm of rain in an year and these are the driest parts of the district. Eastern half of Vedaranyam receives the maximum rainfall (1400 to 1600 mm). Most of the precipitation is in the north-east monsoon period (October-December). Some showers are received in summer months (March-May). Relative humidity is generally between 50 and 80 per cent. Maximum humidity is

felt in October-early December which is the wettest period of the year. The air is drier between February and July.

.5.3 Floods

Catchment areas of river Cauvery are subject to floods during south-west monsoon periods when

- (i) south-west monsoon is very active or vigorous along the west-coast;
- (ii) depressions and storms are formed in the Bay of Bengal; and
- (iii) depressions are formed in the Arabian Sea near the west-coast.

North-east monsoon affects only the lower catchment area. The number of occasions during the 70 year period 1891 to 1960, when the Cauvery delta in the lower catchment was subject to major depressions or storms moving in from the Bay of Bengal in the months of October to December are ^{as} follows:-

October	-	1 storm
November	-	2 storms and 4 depressions
December	-	2 storms and 1 depression

.5.4 Geology

It is only a delta region containing the sedimentary deposits of river alluvium which cover parent material to greater depths. The alluvium consists of sands, clays, silts, gravels, and sandy clay which is deposited in fluviatile fresh water conditions. The thickness of formations range from 12 m in the west to 75 m towards east near the coast. The alluvial formations cover nearly 65 per cent of the delta

regions. Cuddalore sand stones are the extensive group of rocks underlying the alluvium.

1.5.5 Minerals

Kankar, pebbles of quartz, building materials, red earth and peat are the minerals found in the district. Kankar occurs at Thirumalai Samudram of Thanjavur taluk in five patches with an estimated reserve of 5.3 lakh tonnes. Pebbles of quartz are found in appreciable quantities in and around Vallom. The beach sands of Kodaimpalayam in Sirkali taluk and those lying north and south of Tranquebar upto Karaikal carry a high concentration of ilmenite and also certain garnet. The estimated reserve is 94,000 tonnes of ilmenite and 4,900 tonnes of garnet. Peat is found in a spot near the promontory about 32 kms. from Point Calimere. The alluvial soils of the delta and the river sands are the source for construction materials like brick and mortar.

1.5.6 Ground water resources

The Cuddalore sandstone of upper miocene are the prolific water yielding aquifers of the area. Here there is good scope for tapping ground water by means of deep tubewells upto a depth of 400 metres. Detailed investigations have been carried out in the delta region by the United Nations Development Programme (UNDP) for ground water, the Exploratory Tubewell Organisation (ETO) and other agencies like Agricultural Department. The results are very encouraging.

5.7 Land use

Land use break-up for the district is given in the following table:-

Table-3
Land Utilisation Details - 1970-71

Land use	District		State	
	Area in thousand hectares	Percen- tage to total area	Area in thousand hectares	Percen- tage to total area
(a) Geographical area as per professional survey	968.265	100%	13011	100%
(b) Area as per village papers	968.265	100%	13011	100%
(i) Forests	14.112	1.46%	1925	14.8%
(ii) Barren and un- cultivable land	32.186	3.32%	878	6.75
(iii) Land to non- agricultural uses	193.987	20.03%	1378	10.59
(iv) Cultivable waste	27.932	2.88%	630	4.84
(v) Permanent pastures and other grazing lands	6.370	0.66%	334	2.57
(vi) Land under misc. tree crops and groves not included in the net area sown	16.323	1.69%	258	1.98%
(vii) Current fallows	24.469	2.53%	1090	8.38%
(viii) Other fallow lands	23.711	2.45%	626	4.81

- :11: -

(ix) Net area sown	629.175	64.98%	5892	45.28%
(x) Area sown more than once	268.943	27.78%	1032	7.93%
(xi) Gross area sown (ix + x)	898.118	92.76%	6924	53.22%

Sixty five per cent of the total geographical area is under cultivation while for the whole State it is only 45%. Area under non-agricultural use such as urban land and buildings account for 17.3% of the total area. Current fallows, cultivable waste and other fallow lands come to a total of 76112 hectares which is 7.9 per cent of the total geographical area. Forests occupy only 1.46% of the total area while for the whole State, this percentage is 14.8. Hence, forests in Thanjavur are not of much importance. Except Thiruthuraipoondi taluk, in all other areas, land under cultivation covers more than two-thirds of the geographical area of the respective taluks. Paddy is the main crop in old delta. Perennial banana is grown in Padugai lands. Pattukkottai has got the maximum area under garden lands. Dry lands are situated mainly in Arathangi and Thanjavur taluks.

2.0 RESOURCES

2.1 Agriculture

The economy of Thanjavur district is mainly based on agriculture. Paddy is the only major crop covering an area of 6,48,000 hectares (gross). This forms 80% of the gross area cultivated in the district and 24% of the total area of paddy for the whole State. Production of rice is to the tune of 14 lakh tonnes and contributes 25% of the total production in the State. A major portion of rice produced is sent outside the district and rightly this region is known as the Granary of South. Agriculture provides sustenance to more than 70 per cent of the total workers in the district and forms the basis for a vast market for consumer goods and agro-based industries. Hence, a detailed examination of the existing state of agriculture and implications of its probable rate of growth in the future is necessary to assess its industrial potential. Productivity in agriculture is influenced by a number of factors, mainly soil, climate, irrigation, cropping pattern, credit facilities and market. Another important factor in this area is the pressure on land. Here, there is heavy pressure on land with a density of population of 394 persons/sq.km. as compared to 316 for the entire State. Seventy per cent of labour depend upon agriculture, while for the State it is only sixty per cent. The availability of cultivated land per head of agricultural population is 0.68 hectare which is less than the State average (0.90 hectare).

In this region with 33.9 per cent of population in the earning group, the per capita income in the agriculture sector is very low and improvement of land productivity mainly depends upon labour. Employment oriented large-scale industries are not at all sufficient in Thanjavur district and hence agriculture will have to play a major role in the development of the economy of the region for a fairly long time to come. Consumer goods like sugar, vegetable oils, leather and leather goods are based on farm produced raw materials and hence expansion of agriculture both in quality and quantity of produce, is of primary necessity in this region so as to sustain the industries for consumer goods. It is, therefore, clear that for the economic development of the region, productivity of agriculture must rise, both in terms of yield per hectare of food crops to meet the rising demand and in terms of value of output per hectare to augment the purchasing power of large agricultural population. Major factors which influence agricultural productivity are discussed below:

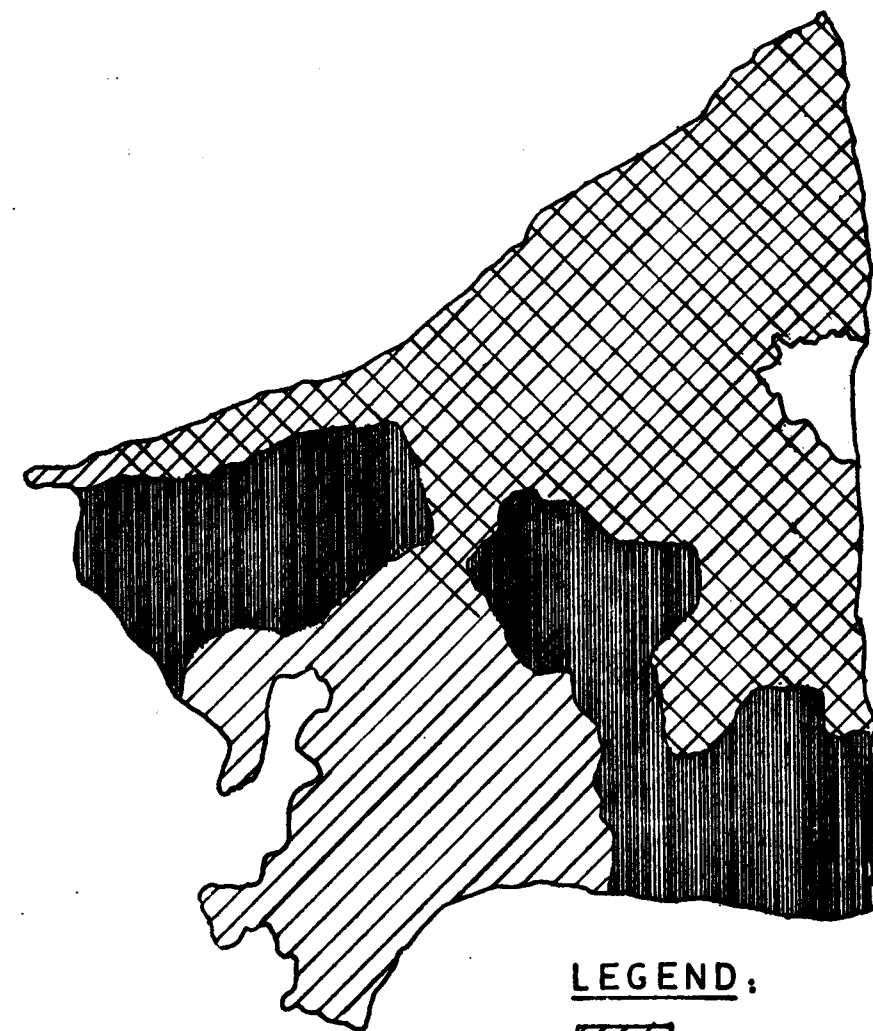
2.1.1 Soils

Main types of soil in the district are:

i) Red sand	..	307,565 hectares
ii) Red loams	..	305,171 "
iii) Black loams	..	207,080 "
iv) Black clay	..	130,787 "
v) Black sand	..	43,595 "
vi) Arenaceous sand	..	21,797 "
vii) Arenaceous loams	..	10,898 "

THANJAVUR DISTRICT

DISTRIBUTION OF SOIL



BAY OF BENGAL

LEGEND:



SAND, SANDY LOAM.



MIXTURE OF SAND,
LOAM AND CLAY.



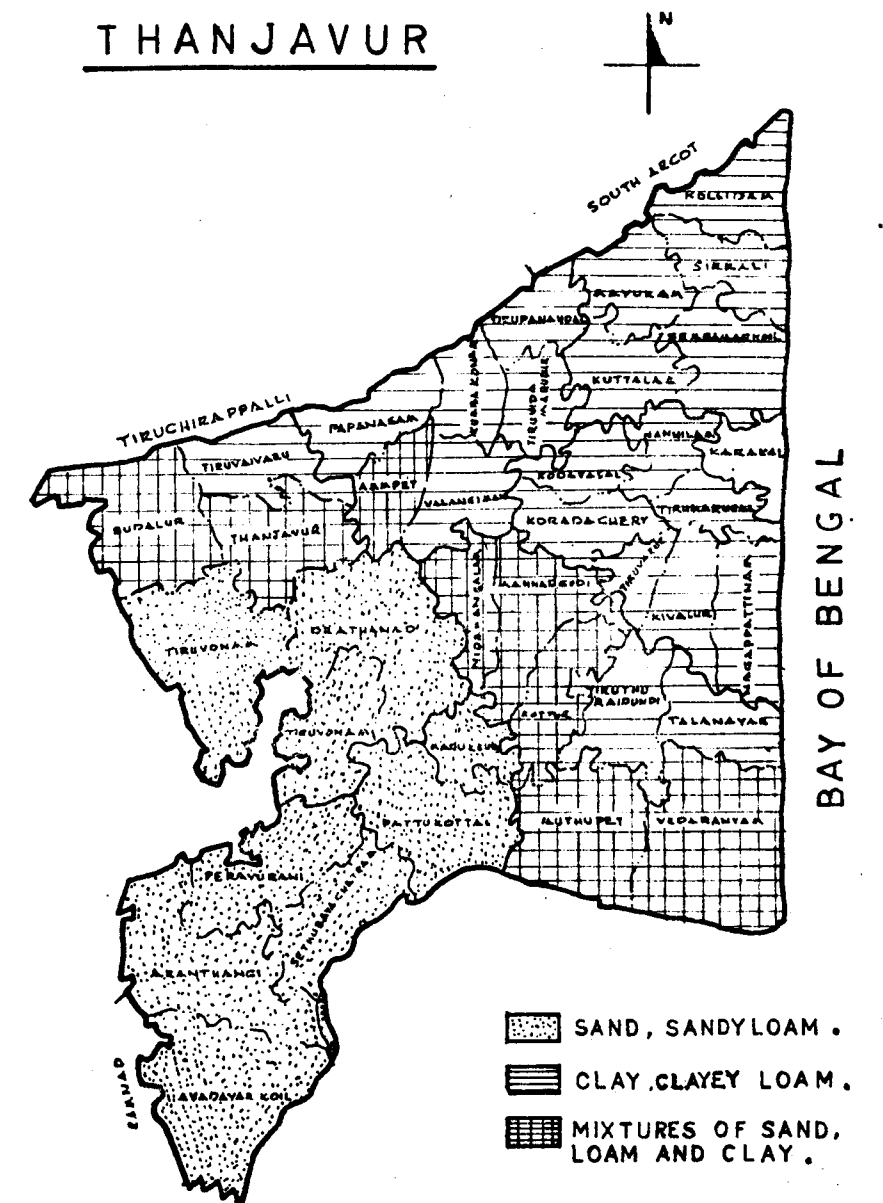
CLAY, CLAYEY LOAM.

SOURCE:

I. A. D. P. THANJAVUR

INTENSIVE AGRICULTURAL DISTRICT PROGRAMME -

THANJAVUR



SOURCE:
I. A. D. P. THANJAVUR

TEXTURAL CLASSIFICATION OF SOILS

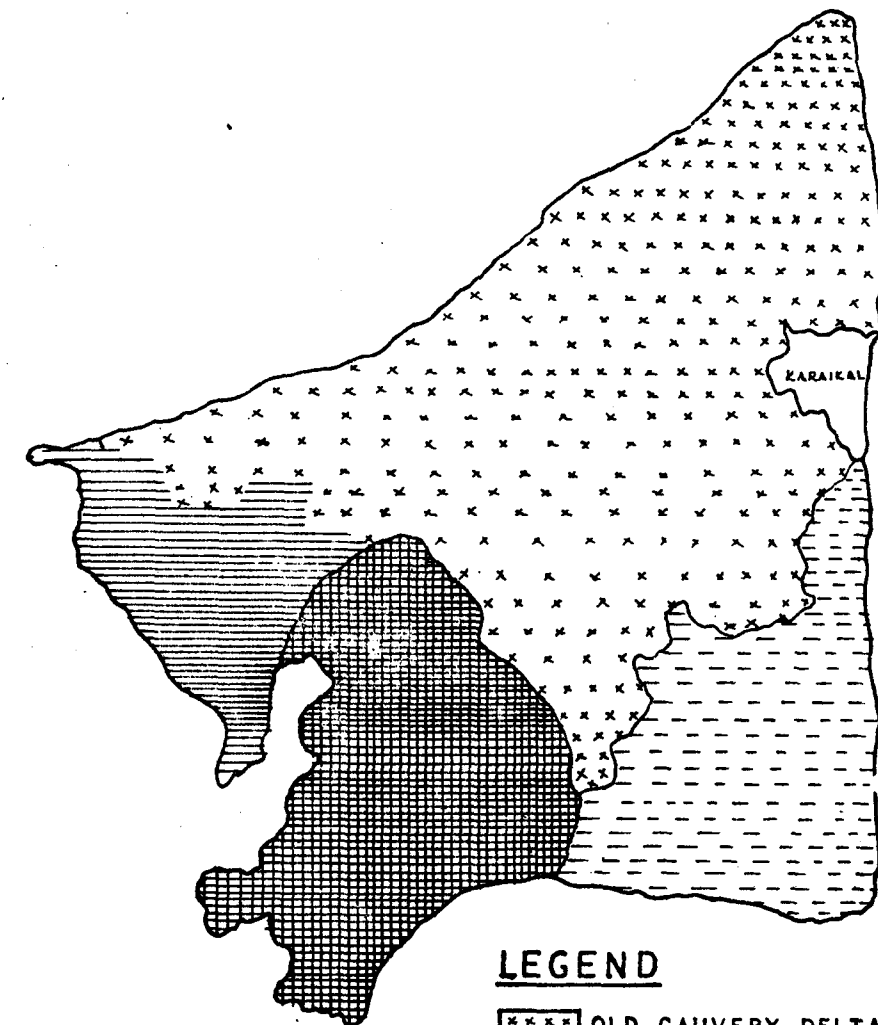
The whole district can be divided into two groups:-

a) Old Delta : consisting of the natural delta of Cauvery and its tributaries. Sirkali, Mayuram, Kumbakonam, Papanasam, Thiruthuraipoondi, Nagapattinam and northern portions of Mannargudi and Thanjavur taluks belong to this group. The soil profiles show alternate layers of clay, silt sand and sand overlying each other, with clear contact. The nature of surface soil depends on what layer is at the top. If a sand bed comes up at the surface, the region is sandy soil or if a clay or silt is at the top, sandy loam results. Texture of soil varies from place to place. Water table in the region as a whole is high. Some of the excellent alluviums of South East Asia occur here. These are very fertile soils and are capable of giving massive yields, if managed properly.

ii) New Delta : Southern parts of Thanjavur and Papanasam taluks, western parts of Mannargudi and entire Pattukkottai taluk come under new delta. Here, the irrigation system is from the Grand Anicut. Soils are loamy in texture with varying colours from deep light red ^{to} yellow and light yellow and even grayish white in some places on account of leaching and reduction. The profiles of these soils invariably contain ferruginous gravel concretions in variable amounts. The soils are laterite in character. Water table varies from place to place depending upon the physiological features of the locality. Soils are generally sandy loam in texture and of low fertility status.

THANJAVUR DISTRICT

MAJOR SUB-REGIONS



LEGEND

- OLD CAUVERY DELTA
- COASTAL SUB REGION
- NEW DELTA
- DRY REGION

SOURCE:
I . A . D . P . THANJAVUR

In some areas, drainage is poor and with a rise of the ground water, the soils tend to become alkaline. Water logged soils develop salinity from the salts of the water and later become alkaline. Old delta is best suited for paddy cultivation. New delta is suitable for garden land crops of industrial importance.

2.1.1.1 Fertility status of the soil

Block-wise fertility level is indicated in the table given below:

Table-4
Block-wise fertility levels

Sl.No.	Name of Block	Nutrient Status		
		N	P	K
1.	Mayuram	M	M	L
2.	Sirkali			
3.	Kuttalam			
4.	Sembanarkoil			
5.	Mannargudi			
6.	Ammamet	L	L	VL
7.	Budalur			
8.	Tiruvaiyaru			
9.	Thanjavur			
10.	Pattukkottai			
11.	Sethubavachatram			
12.	Peravurani			
13.	Aranthangi			
14.	Madukkur			
15.	Kollidam			
16.	Nagapattinam	M	L	VL
17.	Kodavasal			
18.	Nidamangalam			
19.	Kivalur	M	L	VL
20.	Nannilam			
21.	Tiruvarur			
22.	Kumbakonam			

contd....

[illegible]

☒ LOW NITROGEN.
☒ MEDIUM NITROGEN.
☐ LOW PHOSPHORUS.
☐ MED. PHOSPHORUS.
☐ LOW POTASH
☐ MEDIUM POTASH.
☐ POTASH.

Sl.No.	Name of Block	Nutrient Status		
		N	P	K
23. Kottur	}	L	L	L
24. Muthupet				
25. Talanayar				
26. Koradachery				
27. Tirumargugal				
28. Papanasam				
29. Tiruthuraipoondi		M	VL	L
30. Vedaranyam	}	VL	L	L
31. Avadayarkoil				
32. Tiruvidamarudur		M	M	VL
33. Tirupandandal		VL	L	VL
34. Valangiman		L	M	M
35. Thiruvonam		VL	VL	VL
36. Orathanad		L	VL	VL

Note: VL - Very low; L - Low; M - Medium

It is seen that most of the soils are low in available P & K nutrients. Blocks of Kolledam, Mayuram, Nagapattinam, Kodavasal, Nidamangalam, Kivalur, Nannilam, Tiruvarur, Kumbakonam, Thiruthuraipoondi and Thiruvannamalai are of medium status in available nitrogen indicating the inherent potential for giving higher yields. Kivalur series and Kalathur series of soil consisting of 16 to 20% of the total area have got the maximum potential for rice production. Presence of 2:1 clay mineral (Montmorillonite), high clay content, medium organic matter content, good but not excessive drainage and availability of N P & K are the factors which are necessary for higher paddy production. These are found in Kivalur series and Kalathur series of soils in old delta. The major part of Mayuram, Kumbakonam, Nagapattinam, Nannilam and Papanasam blocks

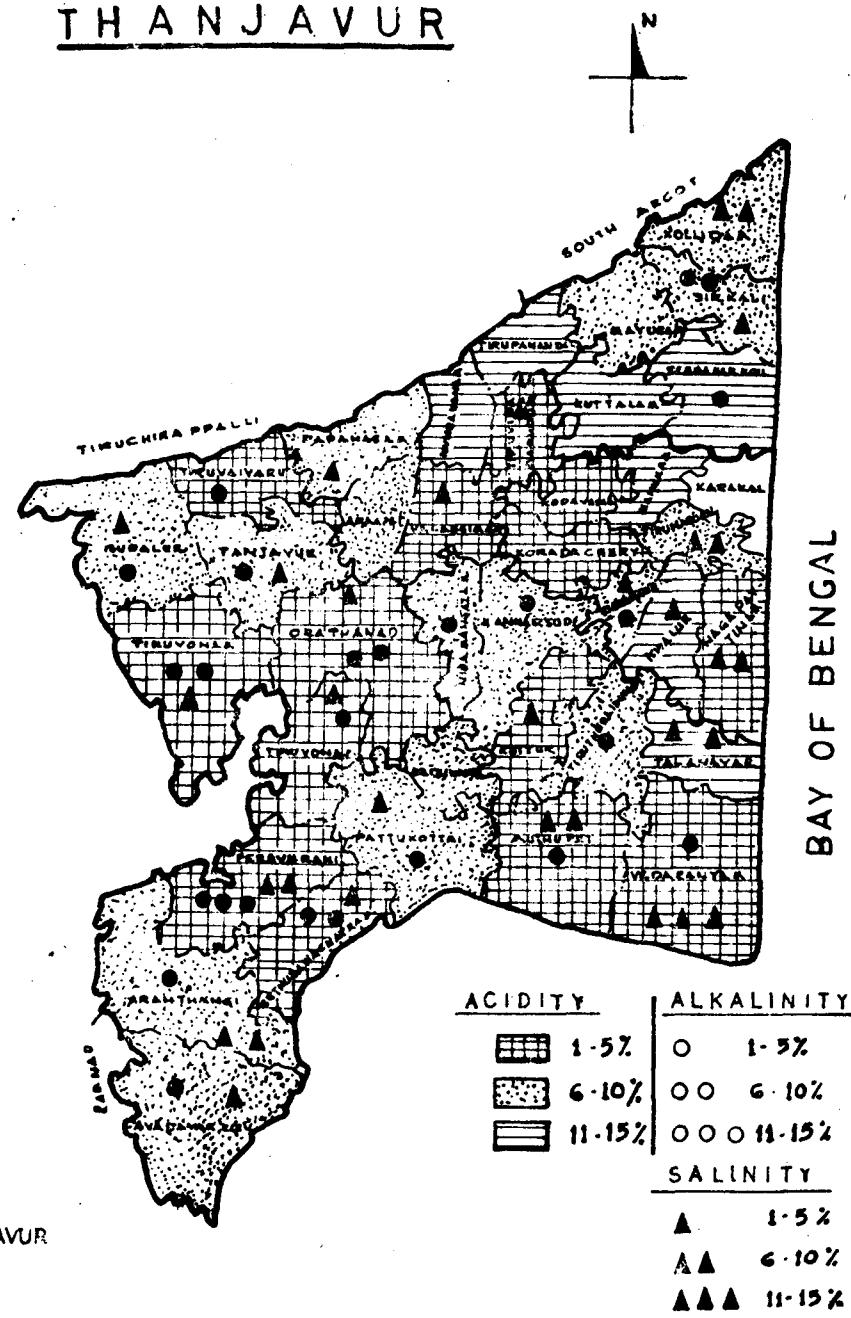
- :17: -

come under this group. Hence, it is the potential area for maximising paddy production. Average paddy yields in these blocks are 2500 to 3750 kgs. per hectare. It is definitely possible at least to double the yield by proper input of fertilisers and controlled irrigation. Pattukkottai series and Madukkur series of soils in the new delta have laterite soils and are quite suitable for successful cultivation of cash crops. Parts of Mannargudi, Orathanad, Pattukkottai and Aranthangi taluks come under this group. This area can be further exploited for production of raw materials for agro-based industries like sugar, vegetable oils and fibres.

2.1.1.2 Soil condition

An assessment of the adverse soil conditions in Thanjavur district has been made at Soil Testing Laboratory, Aduthurai. This was based on the soil test results of 1,44,207 soil samples collected from various parts of Thanjavur district. As per the assessment, under the presumption that each soil sample tested represents 25 acres, 7% of the cultivated area in the district is acidic, 2% alkaline and 3% saline. Block-wise distribution is given in the following table:-

INTENSIVE AGRICULTURAL DISTRICT PROGRAMME- THANJAVUR



SOURCE:
 I. A. D. P. THANJAVUR

ACIDITY, ALKALINITY AND SALINITY STATUS

Table-5
Acidity - Block-wise distribution

Blocks having 15% acid soils.	11 to 15% acid soils	6 to 10% acid soils	5%
Kumbakonam	Kuttalam Sembanarkoil Talanayar Kivalur Nannilan Tirupenandal	Mayuram Kollidam Mannargudi Nidamangalam Tiruthuraipoondi Tirumarugal Tiruvarur Valangaiman Ammapet Thanjavur Pattukkottai Avadayarkoil Aranthangi Madukkur	Sirkali Nagapattina Kodavasai Koradachery Kottur Vedaranyam Muthupet Budalur Thiruvaiyar Orathanadu Thiruvidai- marudur Papanasam Sethubava- chatram Peravurani

Source: Technical Bulletin No.5/69 IADP - Thanjavur.
Soil having pH below 6.0 is classified as acidic. Acid soils generally occur in high rainfall areas due to continuous washing down of bases. Often they are found in red, laterite and lateritic and old alluvium soils. Pre-dominant clay minerals of acid soils are kaolinite, hydrous mica and illite. In general, these soils are low in organic carbon, available phosphorus and potassium, having low cation exchange capacity and exchangeable cations. In acid soils, oxides of iron and aluminium get dissolved which in turn reacts with the applied soluble P₂O₅ and become phosphates of iron and aluminium. These are precipitated and are not available to plants. This is known as phosphorus fixation. So, generally crops do not respond to applied water soluble P₂O₅ when grown in acid

soils. Naturally, the yields are poor. In such soils, citric acid soluble phosphorus application is recommended. Acidity can be corrected by application of lime. Applied lime reacts with dissolved iron and alumina which get precipitated as hydroxides. The harmful effect of these toxic elements are thus nullified. Lime can be applied in the form of Calcium Carbonate. The recommended dose is given below:-

Table-6

Soil pH	Lime (kg. of Calcium Carbonate per hectare)	Soil pH	Lime (kg. of Calcium Carbonate per hectare)
5.9	1138	5.4	3975
5.8	1700	5.3	4538
5.7	2263	5.2	5100
5.6	2838	5.1	5650
5.5	3400	5 and 5.0	6238

Lime should be applied as basal dressing at least a week before fertiliser application. Another manner of counter-acting acidity, is to add large quantities of farm yard manure to the soil. Farm yard manure contains ingredients capable of complexing iron and aluminium and temporarily making them inactive. When sufficient farm yard manure and adequate fertilisers are added, it is possible to get good yield from crops grown in acid soils. Hence, application of farm yard manure, calcium carbonate and proper fertilisers every year for every crop in sufficient quantities are very essential to improve the returns from crops raised in acidic soils.

Alkalinity

Soils having a pH above 8.5 and containing a high percentage of exchangeable sodium (above 15%) are called alkaline soils. Growth of plants in such soils are highly restricted. In Thanjavur district, fortunately, only a small area is affected by alkalinity. Block-wise distribution is given below:-

Table-7

Above 10%	6 to 10%	1 to 5%
Peravurani	Sirkali Orathanadu Thiruvonam Sethubavachatram Madukkur	Sambanarkoil Mannargudi Nidamangalam Kottur Thiruthuraipoondi Vedaranyam

Alkalinity develops in soils due to poor drainage. The soluble salts come up from the sub-soil region by percolation and get deposited on the surface. These salts are not easily washed and become very harmful for the crops grown there. Alkalinity can be corrected by the application of gypsum. The recommended dose is given in Table-8 below. In calcareous soils, gypsum may be applied from pH 9.0 onwards. In non-calcareous soils gypsum at 2.5 tonnes/hectare is recommended for the pH range from 8.5 to 9.0. Beyond pH 9.0, the dose is the same for both calcareous and non-calcareous soils. After gypsum application, flooding and leaching out of the salts is recommended. When electric conductivity is above 1.0, drainage should be improved.

Table-8

pH	Gypsum tonnes per hectare
8.5 to 9.0	2.5
9.1	3.5
9.2	4.5
9.3	5.5
9.4	6.5
9.5	7.5
9.6	8.5
9.7	9.5
9.8	10.5
9.9	11.5
10.0	13.75

Salinity

This occurs in soils which are subjected to salt water incursions. In Thanjavur district, salinity is mainly found in Talanayar and Vedaranyam blocks which are situated near the coast and are affected by tides. Following table gives the block-wise distribution of salinity. (Table-9). Washing of saline water from the field and use of fresh water for irrigation is the remedy for removing salinity. Saline and alkaline soils can be reclaimed by adopting the following methods:-

- Dig trenches 2 1/2' x 2' width all around the field
- If the field is large, divide into plots of 20 to 30 cents and dig parallel trenches as above
- Connect the drainage channel to the main drain and ensure its perfect working condition
- Form bunds of 1' height all around the plot to hold water and help internal drainage.

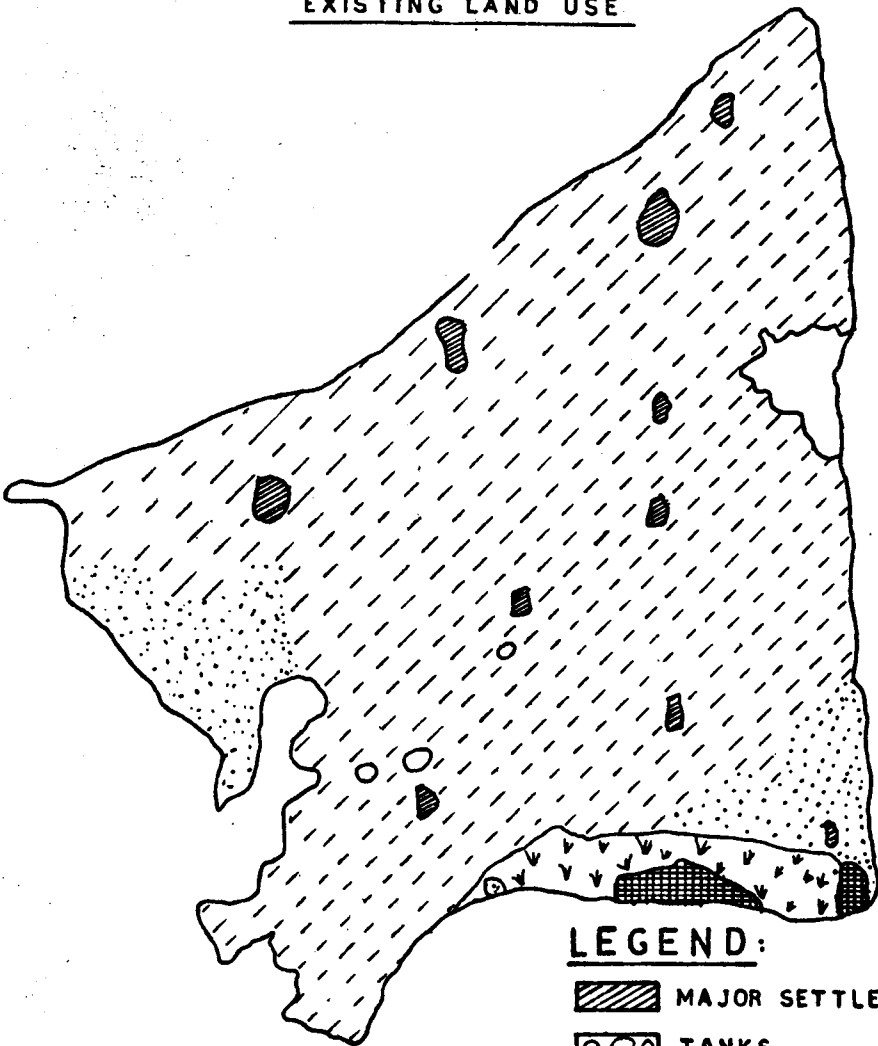
Table-9

Above 10% saline soils	6 to 10% saline soils	1 to 5% saline soils
Talanayar Vedaranyam	Kollidam Muthupet Nagapattinam Tirumargual Peravurani Aranthangi	Sirkali Nidamangalam Kottur Kivalur Tiruvarur Tiruvida maradur Valanginam Papanasam Orathanad Tiruvonam Pattukkottai Avadayarkoil Sethubavachatram

- (e) i. For saline soil, broadcast gypsum uniformly at 2.5 tonnes/hectare to prevent possible rise in exchangeable sodium due to raising of salts.
- ii. For alkaline soils, apply the calculated quantity of gypsum. Use gypsum of 65 to 75% of purity and powder of 60 to 80 mesh fineness.
- (f) Use country plough, cage wheel or a puddler to incorporate gypsum and flood the field with salt free water upto 6" to 9" depth.
- (g) Allow water to stand at least two days and drain by percolation, prevent surface drainage.
- (h) Subsequently, flood the field 3 to 4 times and repeat the process.
- (i) Analyse the soil again for EC and pH and at Soil Testing Laboratory to see the extent of reclamation.
- (j) Grow Daincha and plough it insitu at flowering stage.
- (k) Apply heavy quantities of F.Y.M., or green leaves tank silt for 3 or 4 years to reclamation.
- (l) Use superphosphate

THANJAVUR DISTRICT

EXISTING LAND USE



LEGEND:

-  MAJOR SETTLEMENTS
-  TANKS
-  DRY LANDS
-  RESERVED FOREST
-  SWAMP AREA.
-  WET LANDS

SOURCE:
I . A . D . P THANJAVUR

- (m) Ensure perfect working condition of drainage to prevent reaccumulation of salts.
- (n) Use only saline and alkaline resistant paddy varieties like PVR-1.

2.1.2 Land use and Cropping Pattern

The total area of Thanjavur district is 9,68,265 hectares of which 6,34,500 hectares are brought under cultivation, i.e. 65 per cent of the district is cultivated. For the State as a whole, the percentage is only 45.28. The size of the holdings in the district is given below:-

Table-10
Size of Holdings (1970-71)

Size of holdings	No.	%	Area in 1000 hectares	%
Upto 1 hectare	498193	71.53	169.6	26.73
1 to 2 hectares	102934	14.78	137.3	21.64
2 to 4 "	44069	6.33	129.2	20.36
Above 4 hectares	51256	7.36	198.4	31.27
Total	696452	100.00	634.5	100.00

Source: District Collectorate (Planning)

From the above table, it is clear that great majority (71.53%) of the holdings are below one hectare, but contributes only 26.73% of the total area. 31.27 per cent of the lands are held by landlords owning more than four hectares who contribute only 7.36% of the total number of holdings. Another important drawback of the district for better production is absentee landlordism. Even if the size of the holding is big enough, land owners live in towns while the

cultivation is carried out by tenants. With the implementation of Land Reform Act, it is expected that absentee landlordism will totally disappear from the district.

Cropping Pattern More intensive techniques of cultivation is adopted in Thanjavur district than are found in the rest of Tamil Nadu because of the limited land resources and ever increasing demand for food for the growing population. The cropping pattern for the whole district is given in the following table.

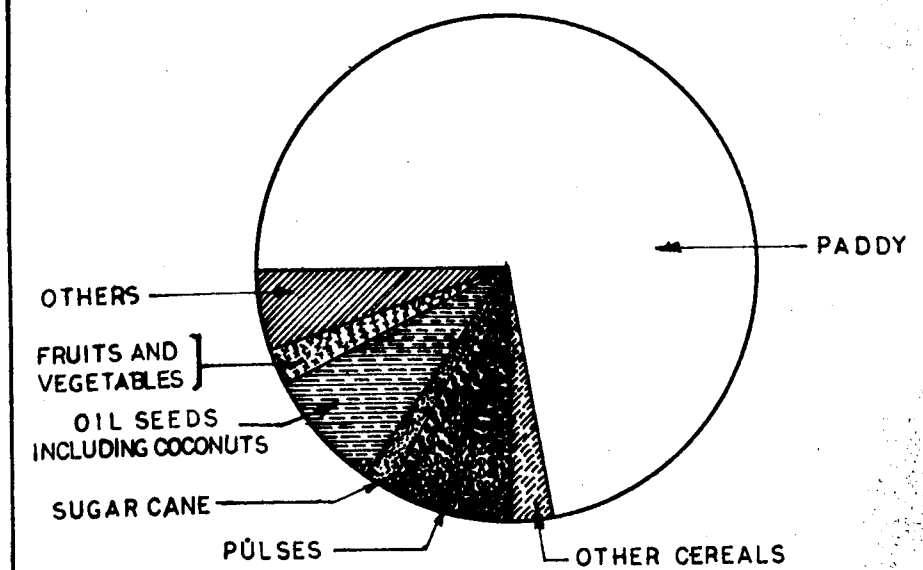
Table-11
Cropping Pattern - 1970-71

Sl. No.	Name of Crop	Gross area in hectare		Production in tonnes	
		Irri-gated.	Total	Irri-gated.	Total
(1)	(2)	(3)	(4)	(5)	(6)
<u>I. Paddy</u>					
	(i) Paddy-I	478802	507857	--	820220
	(ii) Paddy-II	140972	141689	--	218480
	(iii) Paddy-III	117	117	--	190
	Total Paddy	<u>619891</u>	<u>649663</u>	<u>--</u>	<u>1038890</u>
<u>II. Cereals</u>					
	(i) Cholan	1081	1804	1120	1490
	(ii) Cumbu	159	970	220	530
	(iii) Ragi	1728	2617	2240	2850
	(iv) Maize	1939	2612	--	2900
	(v) Other cereals	<u>29</u>	<u>10940</u>	<u>--</u>	<u>10780</u>
	Total Cereals	<u>4936</u>	<u>18943</u>	<u>3580</u>	<u>18550</u>

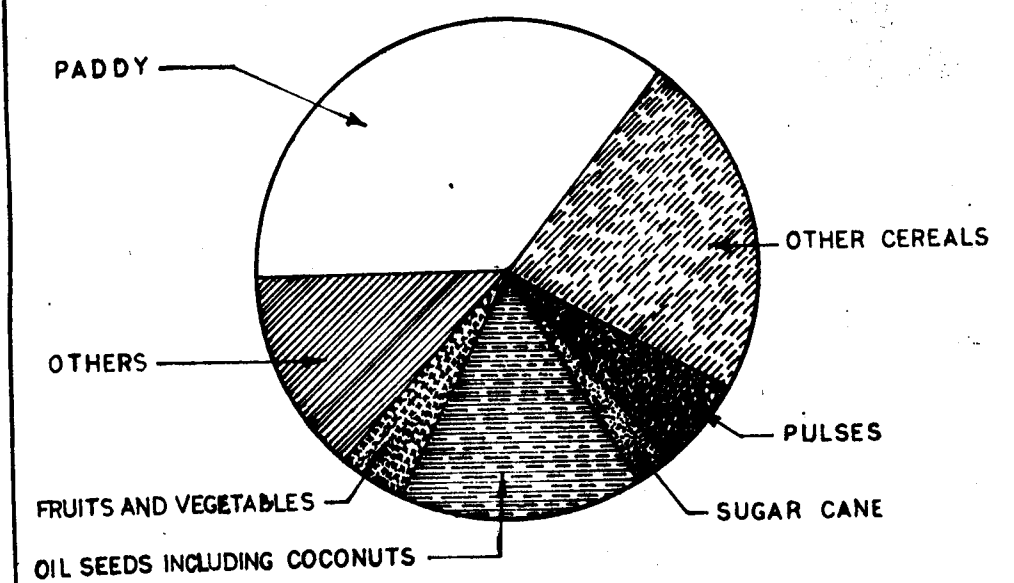
contd....

CROPPING PATTERN

THANJAVUR DISTRICT



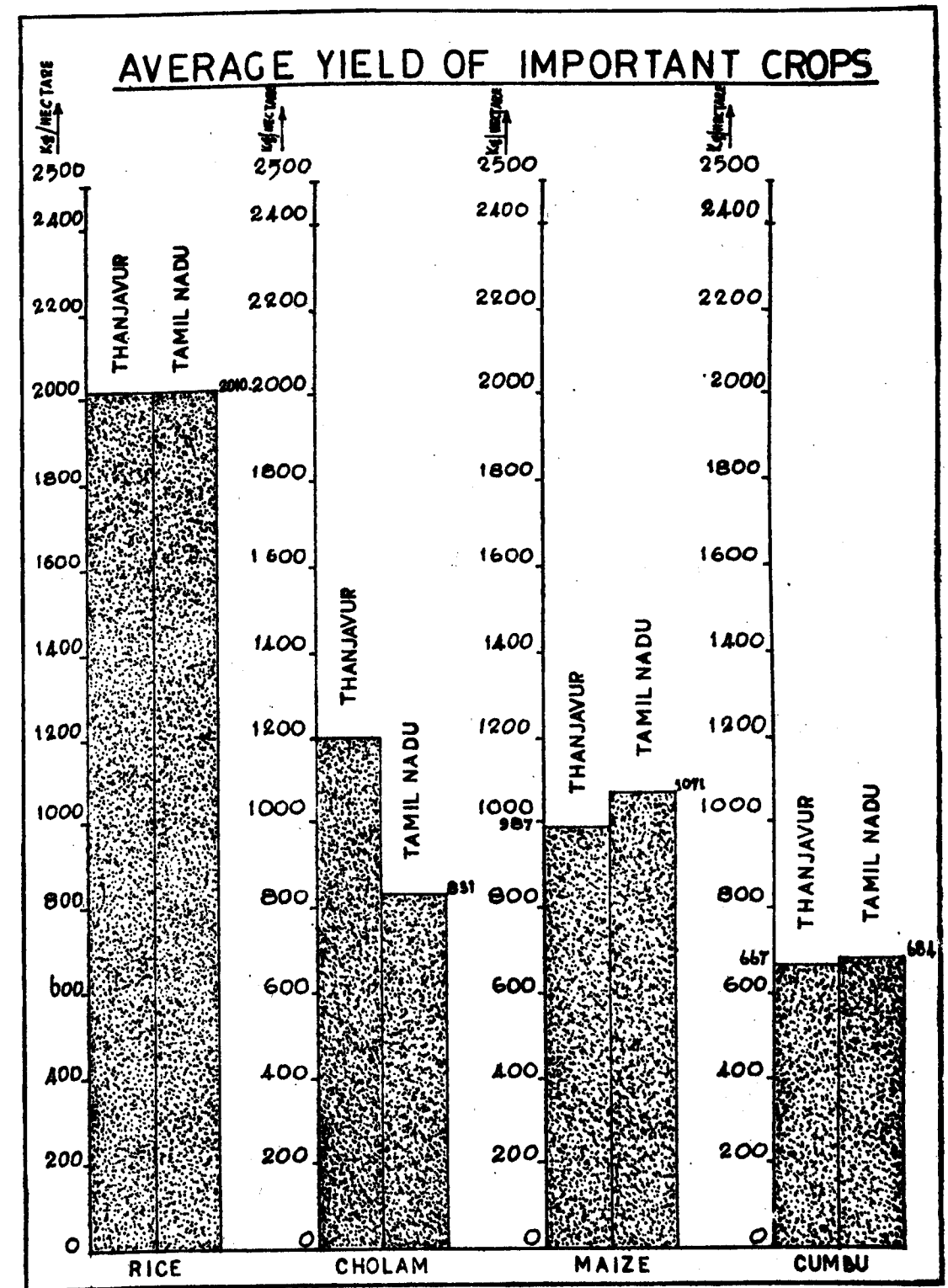
TAMIL NADU



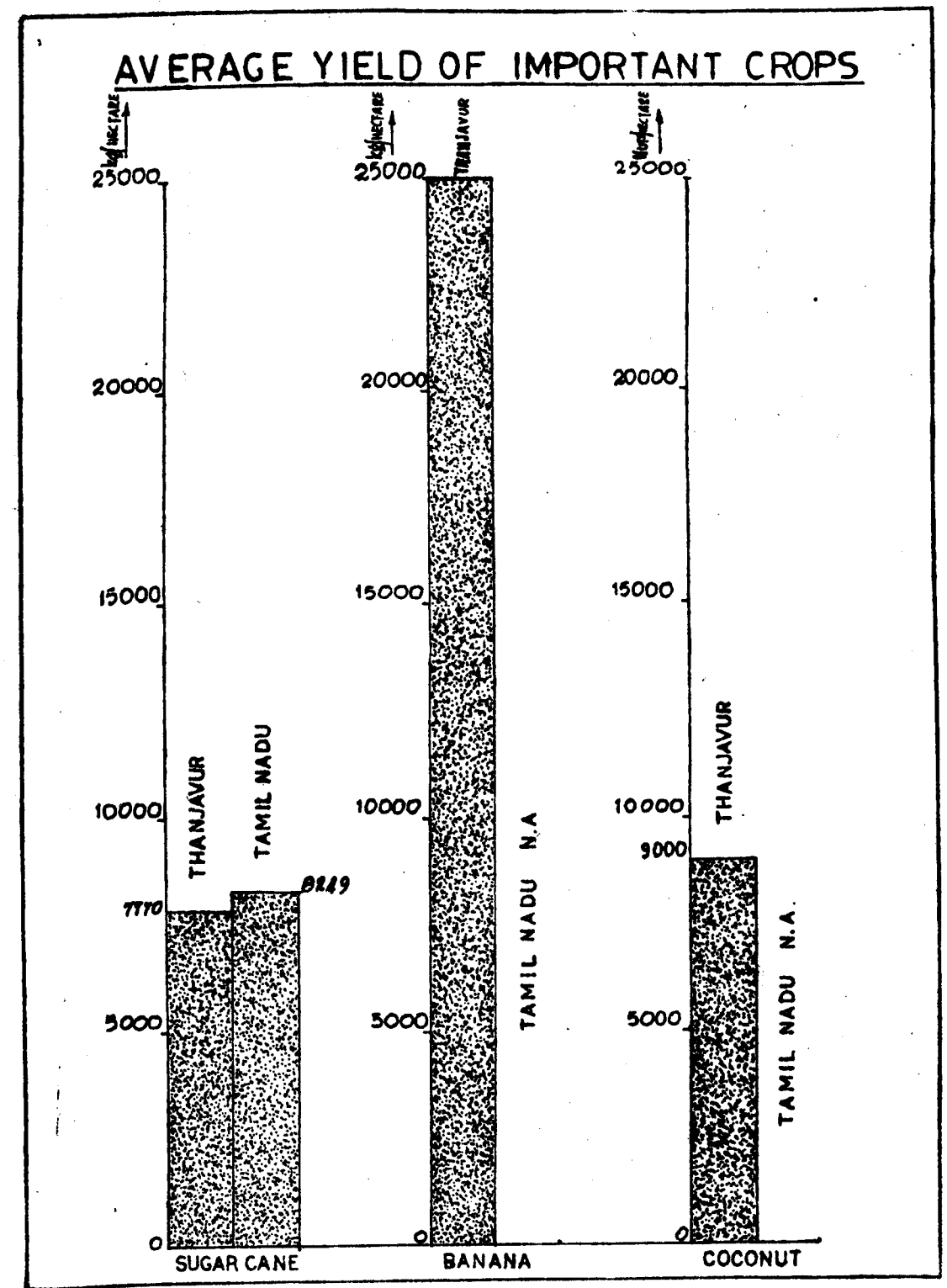
(1)	(2)	(3)	(4)	(5)	(6)
III. Pulses					
	(i) Bengal-gram	2	41	--	20
	(ii) Green-gram	2	36700	--	8000
	(iii) Red-gram	7	1328	--	600
	(iv) Black-gram	1	35946	--	7770
	(v) Other pulses	3	268	--	80
	Total Pulses	<u>15</u>	<u>74283</u>	<u>--</u>	<u>16460</u>
IV. Fruits & Vegetables					
	(i) Chillies	1899	1938	--	1670
	(ii) Other condiments and spices	596	1056	--	1990
	(iii) Sugarcane	5727	5727	--	417990
	(iv) Banana	--	4598	--	105780
	(v) Onions	115	121	--	990
	(vi) Other fruits and vegetables including root vegetables	5028	12734	--	28200
V.	Other food crops	6311	6753	--	3000
	Total Food Crops (I to V)	<u>638791</u>	<u>770119</u>	<u>--</u>	<u>1633520</u>
VI. Non-Food Crops					
	(i) Gingelly	70	5876	--	1800
	(ii) Groundnut	15147	43164	--	31300
	(iii) Coconut	719	18538	--	211745
	(iv) Cotton Desi	28	39	--	90
	(v) Tobacco	624	624	--	680
	(vi) Other non-food crops	<u>2258</u>	<u>59762</u>	<u>--</u>	<u>N.A.</u>
	Total Non-Food Crops	<u>18846</u>	<u>128003</u>	<u>--</u>	<u>N.A.</u>
	Total Food and Non-Food Crops (I to VI)	<u>657637</u>	<u>898122</u>	<u>--</u>	<u>N.A.</u>

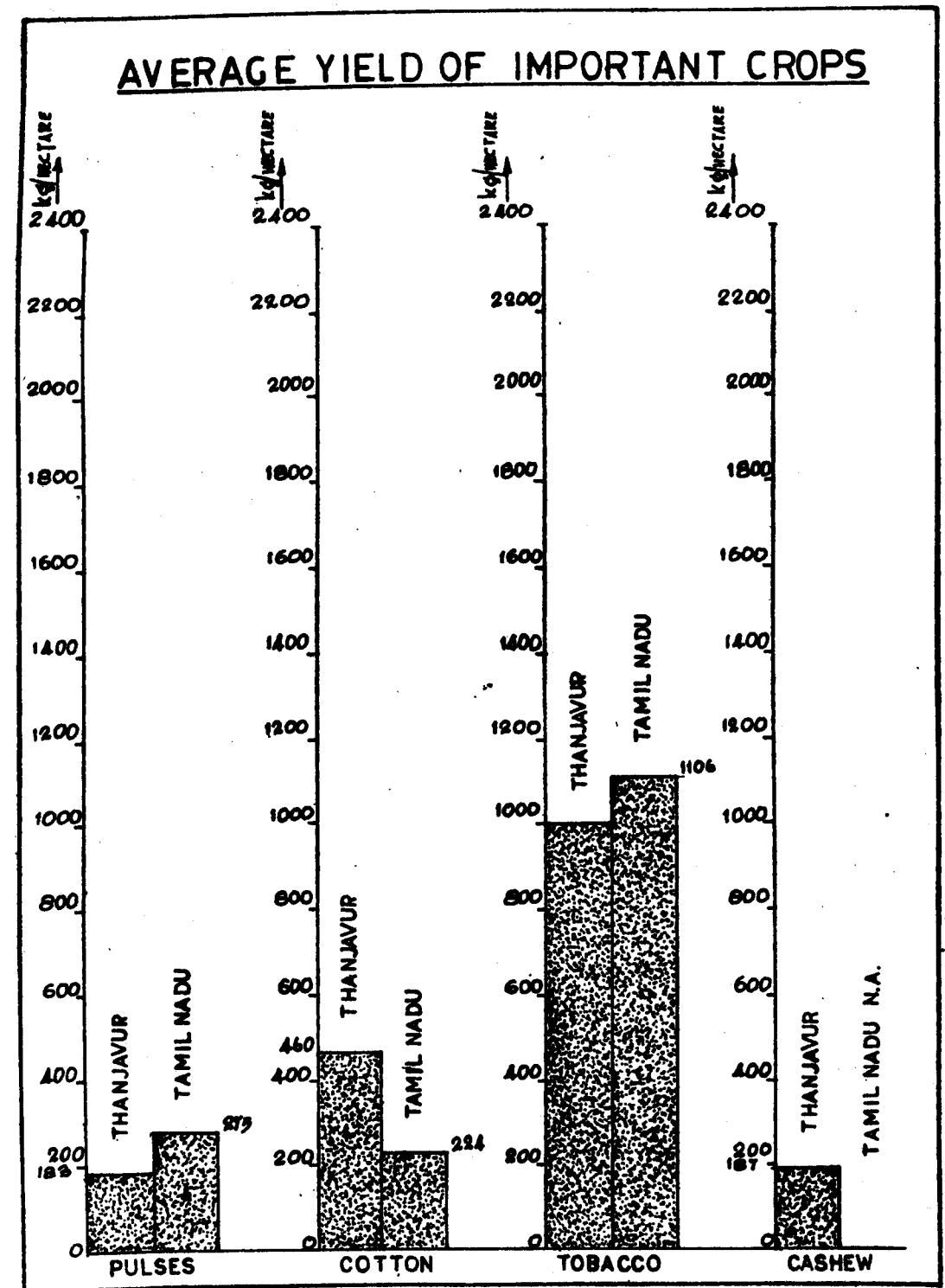
Source: District Collectorate (Planning)

N.A. = Not Available.

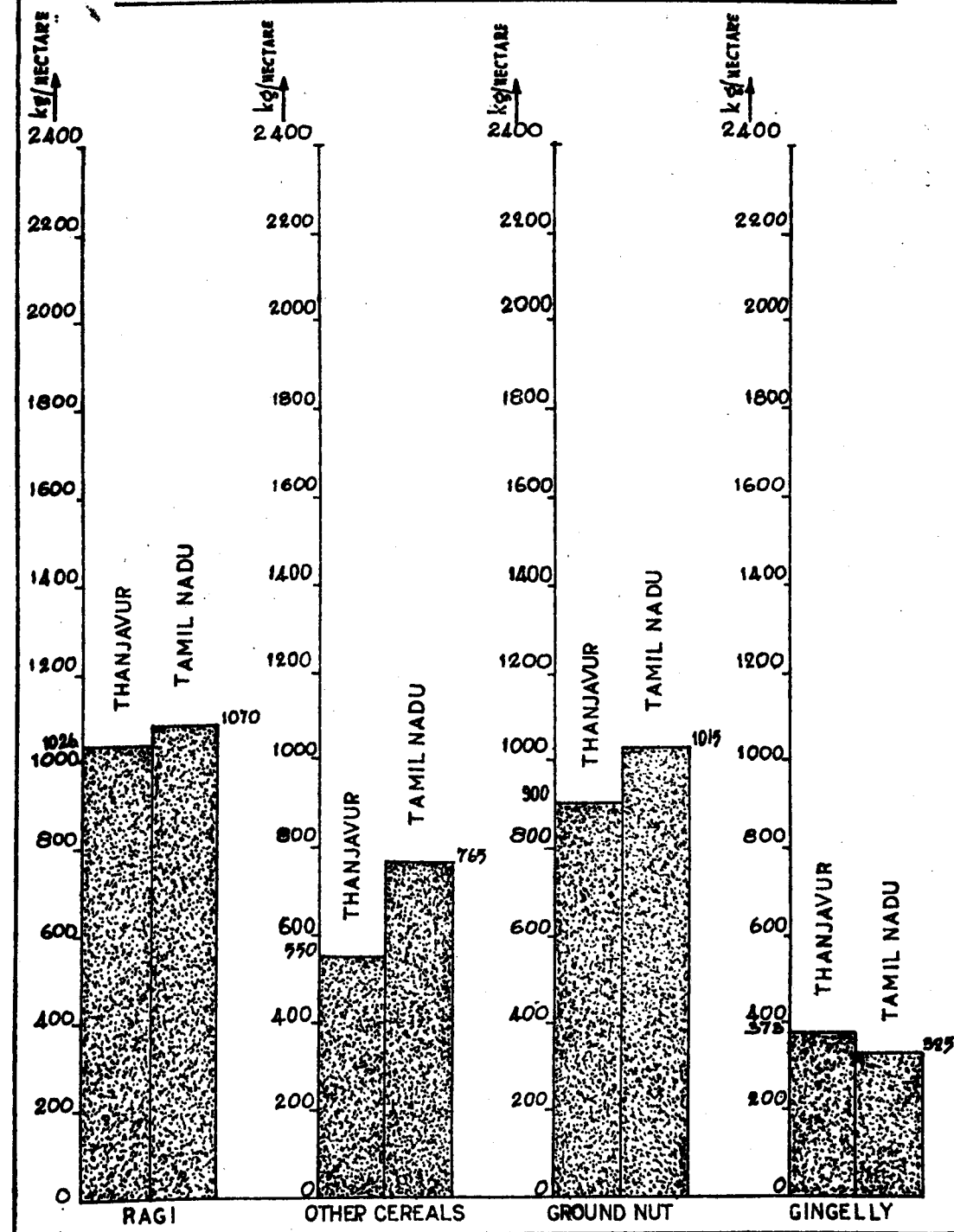


264





260 AVERAGE YIELD OF IMPORTANT CROPS



Paddy occupies more than 80% of the area. Next in importance is groundnut occupying an area of 43164 hectares. Sugarcane and banana come in the third place. Coconut is a major plantation crop in the district in an area of 18538 hectares. Paddy is grown in the wet lands while groundnut is mainly grown as a dry land crop. Sugarcane is cultivated in garden lands and wet lands. There are six agricultural divisions in the district.

2.1.2.1 Thanjavur Division

Consisting of Thanjavur and Orathanad taluks. The cropping pattern is as follows:-

Table-12

Name of Crop	Area in hectares		Total
	Irrigated	Dry	
1. Paddy - Kuruwai	33094		95135
Samba	39714		
Thaladi	22326		
2. Cumbu	4	302	306
3. Maize	4074	1572	5646
4. Hybrid maize	--	78	78
5. Ragi	940	486	1426
6. Varagu	--	8839	8839
7. Vegetables	--	268	268
8. Tapioca	--	58	58
9. Onion	24	--	24
10. Chillies	125	14	139
11. Coriander	--	80	80
12. Tamarind	--	51	51
13. Betel vine	--	326	326
14. Groundnut	5664	10885	16549
15. Gingelly	10	789	799
16. Coconut	49	980	1029
17. Sugarcane	1100	1	1101
18. Black-gram	3	171	174
19. Green-gram	--	1518	1518
20. Red-gram	0.4	1252	1252
21. Banana	--	983	983
22. Mango	--	536	536
23. Cashew	--	6779	6779

Paddy, sugarcane and groundnut are the major irrigated crops of the area. Groundnut is also raised as a dry crop in an area of 10,885 hectares. Pulses, coconut and cashew are the other important dry crops. Thanjavur division has got both old delta and new delta areas. Cashew plantations are seen in the dry tracts of the division. Banana is grown in the padugai lands as a perennial crop. An area of 1,029 hectares have coconut plantations of which only 419 hectares are irrigated. This division receives rainfall ranging from 1200 to 1400 mm; except in Budalur and parts of Thiruvaiyaru where the rainfall is only 900 mm. Sowing seasons for different crops are as follows:

Table-13

Name of crop	Month of sowing	Month of harvestin
1. Paddy - Kuruvai	May - Nursery	Sept., October
Samba	July	December
Thaladi	Aug.- Nursery	February
2. Ragi-irrigated	June	September
3. Varagu	September	January
4. Red-gram	June	January
5. Green-gram	February	April
6. Black-gram	February	April
7. Cotton	January	May/June
8. Groundnut - irrigated	February	June

Groundnut, green-gram, black-gram and cotton are raised as catch crops in rice fallows. Groundnut mixed with green-grams and varagu with red-gram are sown as major

mixed crops in dry lands. Common rotation in the division are:

- (a) Paddy - Paddy - Groundnut
- (b) Paddy - Paddy - Black-gram
- (c) Paddy - Paddy - Green-gram
- (d) Paddy - Groundnut - Ragi

The average income of each group is as follows:

Table-14

Rotation	Cost of cultivation Rs.	Receipt Rs.	Net Profit Rs.
1. Paddy-paddy-pulses	936	1941	1005
2. Paddy-paddy-cotton	1326	2973	1647
3. Paddy-paddy-groundnut	1367	2655	1288
4. Paddy-groundnut-maize	1672	3007	1335
5. Paddy-pulses	407	918	511
6. Paddy-groundnut	913	1956	1043

Paddy-paddy-cotton gives the maximum net profit of Rs.1647/- followed by paddy-groundnut-maize and then paddy-paddy-groundnut. In wet lands, it is advisable to have two crops of paddy and then one crop of cash crop in places where irrigation facilities exist. This will serve the dual purpose of increased foodgrain production and increased income for farmers. In Orathanadu taluk in six firkas, there are only 18 wells now being used for irrigation. The underground water potential is fairly good, and it is estimated that 11234 numbers of additional wells can be sunk in this taluk; majority of the wells in Uluvur and Tondarambattu firkas. Once these wells are sunk,

summer crops can be taken without any risk, and Kuruwai sowing can be done without depending upon canal waters. Cotton, groundnut and maize can be successfully cultivated both in rice fallows and also in dry lands. In Thanjavur taluk, 1900 wells are to be sunk in Thanjavur and Modigai firkas additionally which will be an additional source of irrigation. Thus, in the whole division, 12,234 nos. of additional wells can provide irrigation for at least 61,170 hectares mainly as supplementary source. Thanjavur division is the best area for diversified cropping. A variety of crops can be raised in this area.

2.1.2.2 Nagapattinam Division

Consisting of Nagapattinam and Nannilam taluks, covering the following Panchayat Unions:

- | | | |
|-----------------|--------------|----------------|
| a) Kivalur | b) Tiruvarur | c) Tirumarugal |
| d) Nannilam | e) Kodavasal | f) Koradachery |
| g) Nagapattinam | | |

This division lies in the old delta area with northern portions having the Kalathur series of soils and southern portions having Kivalur series of soils. There are saline patches in Nagapattinam and Kivalur blocks. The coastal area has got sandy soil. It is a heavy rainfall area with an annual precipitation of 1200 to 1400 mm. The cropping pattern of the division is given below.

Table-15

(area in hectares)

Name of Crop	Irrigated	Dry	Total
1. Paddy - Kuruwai	34711	-	34711
Samba	59609	76	59685
Thaladi	27650	-	27650
Total Paddy	121970	76	122046
2. Hybrid cholan	24	-	24
3. Cholan	10	-	10
4. Ragi	20	-	20
5. Vegetables	130	-	130
6. Tapioca	64	-	64
7. Beet	70	-	70
8. Chillies	164	-	164
9. Tumeric	24	-	24
10. Tamarind	-	173	173
11. Betel vine	37	-	37
12. Green-gram	-	8430	8430
13. Black-gram	-	3638	3638
14. Gingelly	-	99	99
15. Coconut	1578	-	1578
16. Sugarcane	780	-	780
17. Cotton	80	-	80
18. Groundnut	140	201	341
19. Cashew	-	160	160
20. Mango	-	273	273

The only major crop is paddy cultivated in an area of 1,22,046 hectares, for all the three seasons. Green-gram and black-gram are raised in rice fallows after samba paddy in an area of 12,068 hectares. Cotton is raised in Nannilam taluk as a summer crop in rice fallows in about 40 hectares. Sugarcane is cultivated in an area of 780 hectares only. The common rotation in the division are:

- a) Paddy - paddy - green-gram
- b) Paddy - paddy - black-gram

Crop calendar is as follows:

Table-16

Name of crop	Month of sowing	Month of harvest
I - Paddy - Kuruvai Samba Thaladi	June August Sept.-October	September-October December-January February-March
II - Greengram	January	March
III - Black-gram	January	March
IV - Green manure crops	January	March
V - Cholan	March	June

Kivalur and Kalathur series of soils are very fertile and Kivalur and Nannilam blocks having these soils can be well developed to get maximum yields. Out of 59,685 hectares of Samba paddy lands, only 12,288 hectares are utilised for taking summer crops like pulses and cotton. This condition has to be changed and more areas should be brought under summer crops like groundnut, cotton, maize and pulses. Underground water resources in the firkas of Kunniyar, Tiruvarur, Kivalur (north of Tevur) and Nagapattinam (northern portion) in Nagapattinam taluk are quite good and it is estimated that a total of 2006 wells can be additionally sunk to provide irrigation facilities. In Nannilam taluk, Koradachery and Tirukkannamangai (south of Vettar) can have an additional number of 1548 wells for supplementing the canal irrigation. In the whole division, there is scope for 3554 additional wells which can command a minimum of 14,216

hectares. This can effectively be utilised for raising summer crops. In the dry crops, coconut is a major plantation crop occupying an area of 1578 hectares. The present yields are poor and it is definitely possible to improve the yields. This will be a good source for development of industries based on raw materials from coconut. Along the coastal areas in Nagapattinam, cashew plantations are being raised to cover an area of 8 hectares every year. A maximum of 200 hectares can be brought under cashew plantation.

2.1.2.3 Pattukkottai Division

Taluks - Pattukkottai and Aranthangi

Panchayat Unions: - a) Pattukkottai b) Madukkur
 c) Peravurani d) Sethubavachatram
 e) Aranthangi f) Avadayarkoil

This division is entirely in the new delta area irrigated by Grand Anicut Canal. Avadayarkoil and a portion of Aranthangi Panchayat Union consist of only dry crops. Soils belong to Madukkur, Pattukkottai and Avadayarkoil series. Madukkur and Pattukkottai series have laterite soils and are slightly acidic. These soils are quite suitable for cultivation of cash crops. Alkalinity is found in Peravurani (11 to 15%) and Sethubavachatram (6 to 10%). 6 to 10% of the area in Peravurani is affected by salinity. The cropping pattern is given below:-

Table-17

Name of crop	Area in hectares		
	Irrigated	Dry	Total
1. Paddy - Kuruvai	27912	224	28136
Samba	60124	1675	61799
Thaladi	16091	768	16859
	104127	2667	106794
2. Hybrid Maize	989	506	1495
3. Ragi	412	432	844
4. Varagu	5	1340	1345
5. Vegetables	-	59	59
6. Tapioca	-	41	41
7. Chillies	498	35	533
8. Tamarind	-	59	59
9. Red-gram	0.4	33	33
10. Black-gram	0.4	59	59
11. Horse-gram	-	57	57
12. Groundnut	2749	11119	13868
13. Gingelly	3	1134	1137
14. Cotton	6	151	157
15. Coconut	5	7094	7099
16. Sugarcane	47	-	47
17. Mango	-	206	206
18. Banana	-	86	86
19. Other fruit varieties	-	122	122
20. Cashew	-	73	73

Major crops of this division are paddy, groundnut, hybrid maize, chillies and ragi, irrigated as well as dry. Coconut Research Station is located in Veppankulam, near Pattukkottai and is the only Research Station for coconut in the whole State. Calendar of crops in the division is as follows:-

Table-18

Name of crop	Month of sowing	Month of harvest
1. Paddy - Kuruvai	July	October
Samba	July	January
Thaladi	August	February
2. Groundnut (Irrigated)	January	April/May
Groundnut (dry)	August	November
3. Maize (Hybrid)	Jan.-May	May-August
4. Green manure crops	January	April
5. Ragi (Irrigated)	February	June
Ragi (dry)	August	December
6. Cotton	February	June

Pattukkottai division has got ample potential for development of commercial crops. Multiple cropping scheme is being implemented here with the main object of increasing the production of industrial crops like maize, cotton and sugarcane. In Pattukkottai taluk, Madukkur, Ammanchatram (north-west half) and Perumagalur firkas can have 6228 wells in addition to the existing 21 wells. In Aranthangi taluk, Aranthangi, Arasargulam and Attani firkas, have good underground water potential and it is estimated that 655 numbers of new wells can be sunk. All these will provide ample irrigation facilities and a minimum of 6,550 hectares of land can be brought under irrigation in the dry belt of Aranthangi taluk and 62,280 hectares in Pattukkottai ^{division} ~~taluk~~ can be provided with supplementary source of irrigation.

With better irrigation facilities;

- i) kuruvai sowings can be advanced
- ii) yields can be improved by providing sufficient wettings
- iii) more areas can be brought under summer crops like maize, groundnut and cotton.
- iv) dry lands of Aranthangi taluk can be converted into garden lands where cash crops like sugarcane, sunflower, maize etc. can be cultivated. Raw materials for agro-based industries can be produced in these areas.
- v) Coconut plantations which are at present not irrigated can be brought under irrigation to improve the yields and quality of nuts and open a vast avenue for coconut based industries
- vi) Dry lands of Aranthangi taluk can be converted into orchards of Guava grapes, lime, lemon, sathgudi and other fruit crops.
- vii) Aranthangi taluk is a low rainfall area where the humidity is much less than other areas in Thanjavur district. Some dry areas, where no other crop can be cultivated economically can be converted into Mulberry gardens for sericulture.

2.1.2.4 Mannargudi Division

- Taluks: i) Mannargudi
ii) Tiruthuraipoondi

Panchayat Unions

- i) Nidamangalam
- ii) Mannargudi
- iii) Kottur
- iv) Tiruthuraipoondi
- v) Talanayar
- vi) Vedaranyam
- vii) Muthupet

This division is essentially in the old delta area (Vennar sub-basin). The soils belong mainly to Alathur and Nedumbalam series in Mannargudi and western portions of Thiruthuraipoondi taluk. Melkadu series of soils are found in the middle portions of Tiruthuraipoondi taluk. Coastal areas along Palk Strait have got swamps and mangroove type of forests, which are unfit for cultivation. Deep water paddy is cultivated in water logged areas of Tiruthuraipoondi taluk. This is known as Odu Cultivation. Vedaranyam and Talanayar Panchayat Unions have more than 10% area under salinity. In Talanayar, acidity is found in 11 to 15% of the area. The cropping pattern of the division is as given in the following table:-

Table-19

	Area in hectares		Total
	Irrigated	Dry	
1. Paddy - Kuruvai	26474)	14221	123723
Samba	62820)		
Thaladi	20208)		
Odu	-	1232	1232
Total Paddy	109502	15453	124955
2. Cholan	-	78	78
3. Maize	-	130	130
4. Ragi	-	234	234
5. Green-gram	-	890	890
6. Black-gram	-	1243	1243
7. Chillies	-	296	296
8. Sugarcane	2721	-	2721
9. Banana	-	204	204
10. Lime	-	34	34
11. Mango	-	222	222
12. Cashew	-	12	12

contd....

	Area in hectares		Total
	Irrigated	Dry	
13. Vegetables	104	-	104
14. Groundnut	8	1984	1992
15. Coconut	-	3382	3382
16. Gingelly	-	659	659
17. Tamarind	-	83	83
18. Palmyrah	-	418	418
19. Betel vine	25	-	25
20. Tobacco	-	463	463
21. Casuarina	-	3686	3686
22. Bamboo	-	575	575
23. Tapioca	-	155	155
24. Fruits	-	66	66

Paddy is the major crop. Sugarcane is cultivated in an area of 2,721 hectares under irrigated conditions. Commercial crops like tobacco, sugarcane, groundnut are all grown as rain-fed crop. Since these are tail end areas of the delta, kuruvai sowings are delayed considerably affecting both kuruvai and taladi crops. Deep water paddy is raised in water logged areas. Underground water potential is very high in Mannargudi taluk where 8083 wells can be sunk for supplementary source of irrigation. That means an area of 80,830 hectares can have assured water supply for successful cultivation of a variety of crops. More area can be brought under sugarcane, existing coconut gardens can be irrigated well to increase production of nuts.

Table-20
Crop Calendar

Name of Crop	Month of sowing	Month of harvest
1. Paddy - Kuruvai	June-Nursery	October-November
Samba	July-Nursery	January
Thaladi	Sept.-Oct.Nursery	February-March
2. Groundnut	December	March
3. Maize	March	June

Common rotations:

1. Paddy - paddy - green-gram
2. Paddy - paddy - black-gram
3. Paddy - groundnut
(Samba)
4. Paddy - paddy - maize

2.1.2.5 Mayuram Division:

Taluk: Mayuram, Sirkali

Panchayat Unions: Mayuram, Kuttalam, Sembanar Koil,
Sirkali, Kallidam.

This division is in the old delta having mainly the Kalathur and Padugai series of soils. The area is highly fertile and can produce record yields if managed properly. Banana is grown in the padugai lands as a perennial crop. Horticultural crops like mango and vegetables are cultivated. A mango variety known as 'Pathari' is famous in the district and fetches good price in the market. The cropping pattern of the division is as given in the following table.

Table-21

	Area in hectares		Total
	Irrigated	Dry	
1. Paddy - Kuruvai	30336	48	30384
Samba	45830	-	45830
Thaladi	18066	-	18066
Total Paddy	94232	48	94280
2. Cholan	216	46	262
3. Cumbu	100	346	446
4. Red-gram	26	3	29
5. Black-gram	-	3574	3574
6. Green-gram	-	3859	3859
7. Chillies	243	-	243
8. Turmeric	27	1	28
9. Tamarind	-	116	116

contd....

	Area in hectares		Total
	Irrigated	Dry	
10. Sugarcane	322	-	322
11. Cotton	22	-	22
12. Betelvine	50	-	50
13. Palmyrah	53	69	122
14. Tobacco	29	-	29
15. Gingelly	-	1038	1038
16. Groundnut	675	363	1038
17. Castor	-	218	218
18. Coconut	232	784	1016
19. Banana	161	583	744
20. Mango	106	245	351
21. Lime	51	42	93
22. Vegetables	251	53	304

Paddy is the main irrigated crop. Pulses are grown as dry crop. There are eleven rivers to provide irrigation for this division. Coconut is an important plantation crop. The yields can be considerably improved by better cultivation practices. Paddy can give massive returns by providing proper irrigation, fertilisers and plant protection measures. Under ground water potential is very high and it is possible to sink 13,688 wells in addition to the existing number of 2875 wells in the division.

Table-22
Crop Calendar

Name of crop	Month of sowing	Month of harvest
1. Paddy - Kuruvai	June - Nursery	October
Samba	July - Nursery	December-January
Thaladi	Sept.-Nursery	February
2. Black-gram	January	March
3. Green-gram	January	March

Common rotations in this tract are:

1. Paddy - paddy - green-gram
2. Paddy - paddy - black-gram
3. Paddy - paddy - cotton
4. Paddy - paddy - groundnut
5. Paddy - groundnut

Groundnut is raised as a summer crop in rice fallows after Thaladi as well as Samba. Perennial banana, an important crop, is grown as a dry crop in Padugai lands. Further improvements in the existing pattern of cultivation and marketing of banana is possible.

2.1.2.6 Kumbakonam Division

Taluks: Kumbakonam and Papanasam

Panchayat Unions: Kumbakonam, Papanasam, Tiruvidaimarudur, Tiruppandal, Ammapet, Valangaiman.

This is one of the thickly populated areas with paddy and banana as the main crops. Soils belong to Kalathur and Padugai series. Kalathur series are highly fertile and high yields can be obtained from paddy. Perennial banana is cultivated in the Padugai lands.

Table-23
Cropping Pattern

	Area in hectares		Total
	Irrigated	Dry	
1. Paddy - Kuruvai	34000	-	34000
Samba	38000	-	38000
Thaladi	32000	-	32000
	<u>104000</u>	<u>-</u>	<u>104000</u>

contd.....

	Area in hectares		Total
	Irrigated	Dry	
2. Cholan	213	-	213
3. Cumbu	42	-	42
4. Maize	324	-	324
5. Ragi	756	-	756
6. Vegetables	911	-	911
7. Tapioca	-	14	14
8. Onion	17	-	17
9. Chillies	122	-	122
10. Turmeric	60	-	60
11. Tamarind	-	111	111
12. Betel wine	292	-	292
13. Red-gram	-	37	37
14. Black-gram	-	2454	2454
15. Green-gram	-	1102	1102
16. Groundnut	345	1303	1648
17. Gingelly	27	757	784
18. Castor	4	34	38
19. Coconut	-	2414	2414
20. Cotton	20	-	20
21. Sugarcane	3601	-	3601
22. Green manure	-	1604	1604
23. Mango	-	404	404
24. Banana	-	2418	2418
25. Lime	9	-	9

Paddy, ragi and sugarcane are the most important irrigated crops; while banana and coconut are the important dry crops. Black-gram, green-gram, cotton etc. are raised in rice fallows and are cultivated as dry crops. The cropping calendar is as follows (Table-24).

The common rotations are:

1. Paddy - paddy - black-gram
2. Paddy - paddy - green-gram
3. Paddy - paddy - cotton PRS-72

Table-24

Name of Crop	Month of Sowing	Month of harvest
1. Paddy - Kuruvai	June - Nursery	October
Samba	July - Nursery	January
Thaladi	Sept.- Nursery	February
2. Vegetables	July	December
3. Cholan - dry	July	December
4. Groundnut - dry	July	December
5. Gingelly - dry	July	December
6. Castor - dry	July	December
7. Cotton - PRS-72	February	May
8. Black-gram	December	March
9. Greengram	December	March

Underground water potential is found to be quite high in Papanasam as well as Kumbakonam taluks and already there are a number of filterpoint tubewells in the area. It is estimated that another 17,523 nos. of wells can be sunk in addition to the existing wells. By this, 1,75,230 hectares more can have supplementary source of irrigation. If this is achieved, timely operation can be carried out for kuruvai and subsequent crops to get higher yields.

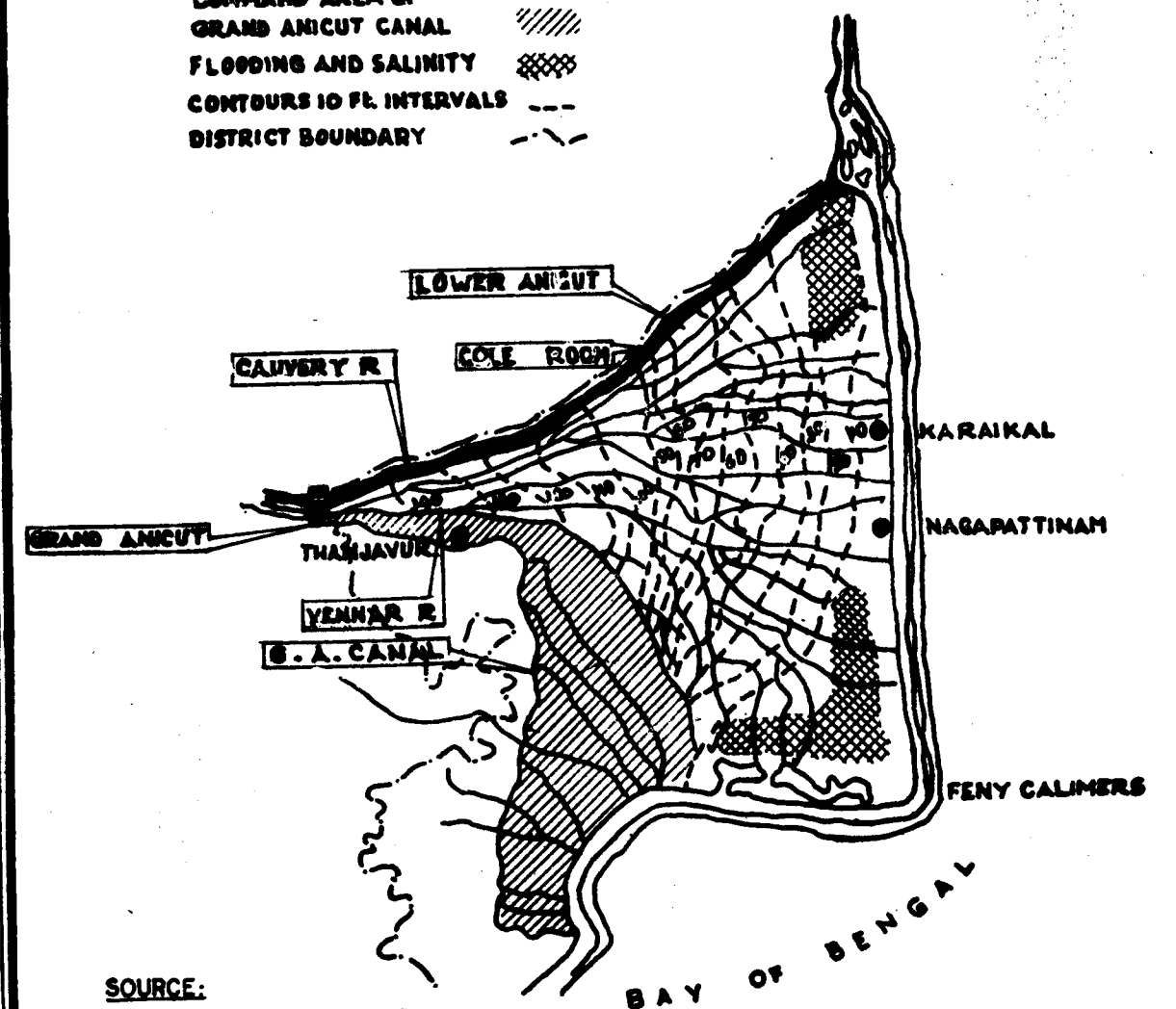
2.2

Irrigation

Thanjavur district has got the maximum irrigation facilities when compared to other parts of the State. Nearly 83.5% of the net area sown is irrigated while for the whole State, the percentage is only 41.3. Following table gives the area under irrigation source-wise:-

FEDO - FACT IRRIGATION IN THANJAVUR DISTRICT,

RIVERS AND CANALS
COMMAND AREA OF
GRAND ANCUT CANAL
FLOODING AND SALINITY
CONTOURS 10 FT. INTERVALS
DISTRICT BOUNDARY



SOURCE:
I A D P. THANJAVUR

Table-25

Source of Irrigation	Total anicut area
(i) Government canals	4,70,787
(ii) Private canals	572
(iii) Tanks	30,559
(iv) Tube wells	170
(v) Sole irrigation other than tube wells	8,047
(vi) Supplementing other sources of irrigation	4,359
(vii) Other sources such as springs, canals etc.	451
(viii) Total, excluding areas irrigated / open by wells supplementing other sources of irrigation (item vi)	5,10,586
(ix) Area irrigated more than once	1,36,754
(x) Total gross area - cropped - irrigated (viii + ix)	6,47,340

Source: I.A.D.P. Thanjavur.

Based on the irrigation source, the whole area can be broadly divided into two zones:-

2.2.1

Old Delta:

Irrigated by Cauvery, Vennar and the tributaries. This is roughly 3.6 lakh hectares consisting of the taluks of Thanjavur (north), Papanasam, Kumbakonam, Mayuram, Sirkali, Nannilam, Nagapattinam, Thiruthurai poondi and eastern portions of Mannargudi. The head of this delta is at the Upper Anicut, 16 kilometres

west of Tiruchirapalli, where river Cauvery divides into two branches. The northern branch is Coleroon which is a flood carrier and flows along the northern boundary of Thanjavur district. The southern branch, Cauvery is the main source of irrigation. Cauvery again divides into two near the Grand anicut, 28 kilometres below the Upper Anicut. These branches are known as Cauvery and Vennar having regulators at their head. Cauvery and Vennar divide and sub-divide into a number of tributories which provide the means of irrigation for the entire old delta. The main branches of Cauvery are Kodamuruthy, Arisilar, Veerasholam and Vikramanar. The main branches of Vennar are Vettar, Vadavar, Korayar, Paniniar, Pandavayar and Vellayar. There are regulators in all the rivers for distribution of water.

2.2.2 New Delta:

From the grand anicut, a canal was excavated under Cauvery-Mettur Project in 1933. This was intended for irrigating the upland tracts of Thanjavur, Mannargudi and entire Pattukkottai taluks. This is Grand Anicut canal and irrigates roughly an area of 1.2 lakh hectares (3lakh acres) known as new delta. There are altogether 36 main rivers totalling 1600 kilometres and 29,881 channels totalling 24,000 kilometres serving the delta below the Grand Anicut. The whole district can again be sub-divided into five zones as detailed below:-

2.2.2.1 Zone-I

Consists of Budalur, Thiruvaiyaru, Thanjavur, Papanasam, Kumbakonam, Thiruvicaimaradur, Thiruppanandal, Kuttalam and Mayuram Panchayat Unions. These are closer to main source of irrigation and 76% of the area is canal irrigated. The zone is of clay soil.

2.2.2.2 Zone-II

Consists of the following twelve Panchayat Unions: Ammapet, Valangaiman, Nidamangalam, Koradachery, Kodavasal, Thiruvavur, Keevalur, Tirumarugal, Nannilam, Sembanarkoil, Sirkali and Kolliam. This is situated in the east and south-west of Zone-I and comes under old delta and covers 30% of the district area.

2.2.2.3 Zone-III

Nagapattinam, Thiruthuraiipoondi, Thalanayar, Vedaranyam and Muthupet Panchayat Unions form this zone. These five coastal blocks are situated in the south-east of the district. The land is situated in low lying areas and hence drainage is a problem. Cyclones and storms hit these areas and hence rice yields are generally poor.

2.2.2.4 Zone-IV

Orathanad, Mannargudi, Kottur, Madukkur, Sethubava- chatram and Pattukkottai Panchayat Unions constitute this zone. These are mainly in the new delta area and accounts for 25% of the district. 82% is irrigated from canal. 10% by tanks and wells. In rice fallows, groundnut is grown as a second crop. Coconut is also of considerable importance

particularly in the sandy areas. Casuarina is cultivated as a rotation in sandy areas. This zone has ample potential for agro-based industries. Details are given in section 2.3 dealing with Cropping Profile.

2.2.2.5 Zone-V

Thiruvonam and Avadayarkoil and Aranthangi areas. These are mainly uplands and dry tract. Comparatively less productive because no perennial source of irrigation is available. Tanks and tubewells form the sole source of irrigation. Minor cereals, groundnut and cashew are grown here.

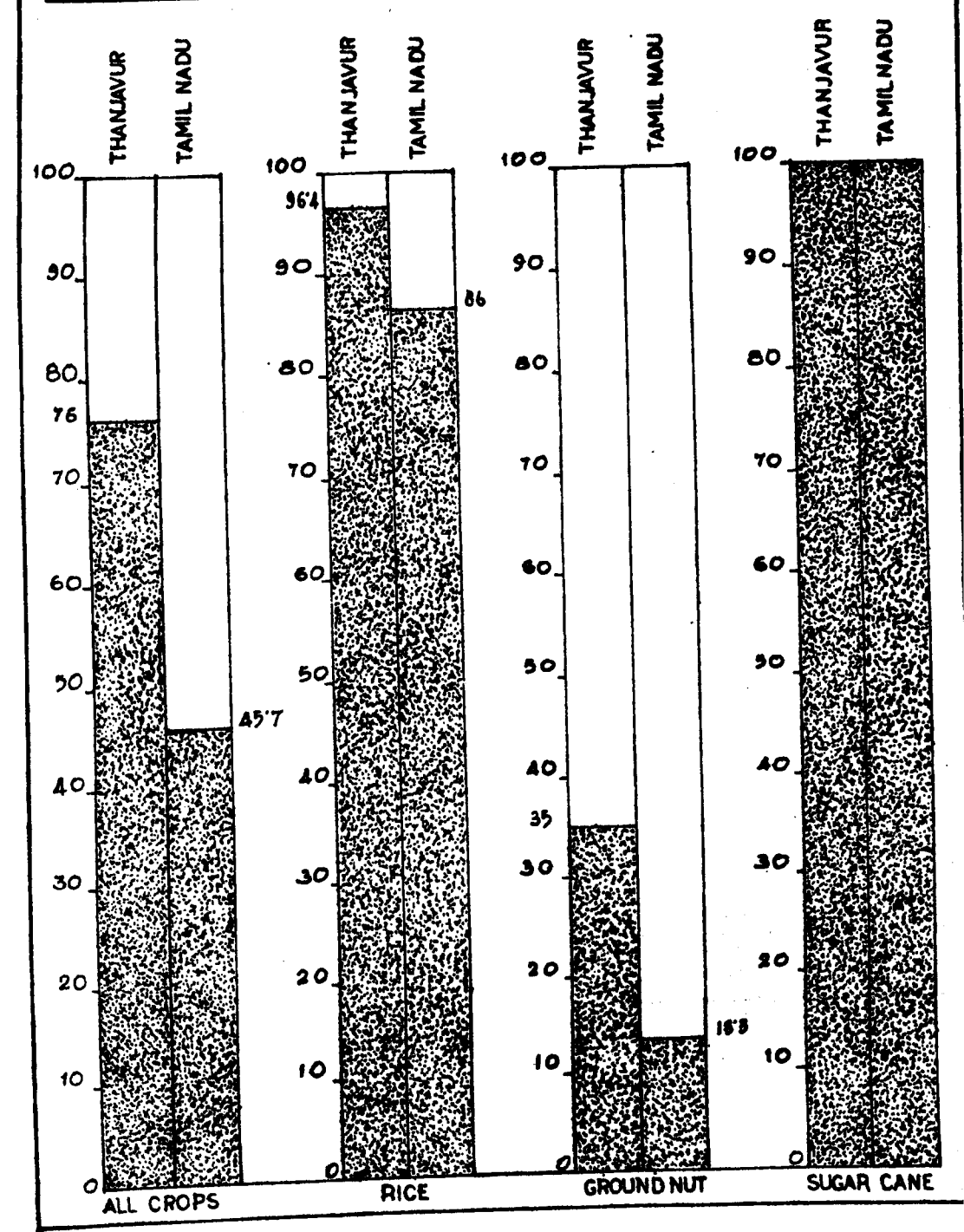
Area under different crops irrigated are given in the table below:-

Table-26

	Gross area irrigated in hectares	Rain fed in hectares	Total in hectares
<u>1. Cereals</u>			
Paddy I (Kuruvai & Samba)	478802	29055	507857
Paddy II (Thaladi)	140972	717	141689
Paddy III	117	-	117
Cholan	1081	723	1804
Cumbu	159	811	970
Ragi	1728	889	2617
Maize	1939	673	2612
Other cereals	29	10911	10940
Total Cereals	624827	43779	668606

contd....

GROSS IRRIGATED AREA AS % OF GROSS CROPPED AREA.



	Gross area irrigated in hectares	Rain fed in hectares	Total in hectares
2. Pulses			
Bengal-gram	2	39	41
Green-gram	2	36698	36700
Red-gram	7	1321	1328
Black-gram	1	35945	35946
Other pulses	3	265	268
Total Pulses	15	74268	74283
3. Food crops			
Chillies	1899	39	1938
Other condiments & spices	596	460	1056
Sugarcane	5727	-	5727
Banana	-	4598	4598
Onions	115	6	121
Other fruits and vegetables including root vegetables	5028	7706	12734
Other food crops	6311	442	6753
Total food crops (1+2+3)	644518	131298	775816
4. Non-Food crops			
Gingelly	70	5806	5876
Groundnut	15147	28017	43164
Coconut	719	17819	18538
Cotton improved	-	-	-
Cotton Desi	28	11	39
Tobacco	624	-	624
Other non-food crops	2258	57504	59762
Total Non-Food Crops	18846	109157	128003
Total food and non-food crops	663364	240455	903819

2.2.3 Problems of irrigation in Thanjavur District

In Thanjavur district, assured irrigation from Mettur Dam is only for the period from June to January.

Water is released from Mettur Dam only in June, that too depending upon the storage position. Sowing of 1st crop of paddy (Kuruvai) depends upon this supply. In normal years, the water is released in early June. If it is delayed, sowings are also delayed particular in the tail end of Cauvery system. Late sowings will lead to late transplantation of Kuruvai. Normally, Kuruvai harvest comes off in September which coincide with the N.E. Monsoon rains. Heavy rains damage the matured crop both in quantity and quality. Labour charges are also high resulting in increased cost of production. The second crop of paddy (Thaladi) is also delayed if transplanted in November, the seedlings are damaged in heavy rains and the whole area is flooded for long time due to lack of drainage, particularly at the tail end regions. Further in the months of January and February, the crop suffers from lack of water at the maturity stage. The sum total is poor yields. The third problem is sowing of summer crops in rice fallows are delayed and get postponed to February-March. The crops suffer from drought and yields are reduced considerably. To avoid these adverse conditions, farmers prefer to go in for Samba (long duration paddy) or Udu cultivation fallowed by any one of the pulses or gingelly or green manure. Sometimes, the lands are kept fallow. Thus, farmers avoid risk with

the net result of double crop paddy lands reverting to single crop lands. This tells upon the total paddy production of the district. Here the problem can be solved by digging filter point tubewells in places where there is sufficient underground water. These tubewells can supplement the canal irrigation thereby enabling the farmer to carry out his seasonal operations in time without waiting for the canal water. Kyruvai can be harvested in August-September and Thaladi can be transplanted in September-October before the heavy rains of North-Eastern Monsoon. There will not be problem for water towards the maturity stage. Summer fallow crops can be sown in time. Thus, production can be considerably increased. Sheikh Sulaiman (1972) in his thesis on "Investment on filter point tube-wells in Mayuram Block of Thanjavur District - An Economic Appraisal" concludes that:

- (i) there exists possibility for increasing the crop production by changing the cropping pattern and cropping intensity through provision of filter point irrigation facilities;
- (ii) the resources can be efficiently used for longer periods without wastages and there is provision for increasing the resource productivity;
- (iii) the income level can be increased by filter point investment; and
- (iv) farmers can boldly take up investments on filter point tubewells because of their high repaying capacity.

Agricultural Refinance Corporation, Thanjavur, has got the following schemes for digging filter point tube-wells.

2.2.3.1 Filter point & tube-well investments

A. Taluks: Thanjavur (north), Papanasam, Mayuram, Nannilam, Kumbakonam, Sirkali.

Area of description: Cauvery sub-basin

Investment: (i) 500 filter points
Pump: 5 H.P. Centrifugal (guide-line)

(ii) 1000 Shallow tube-wells
(depth 50 M)

Pump: 5 H.P. Centrifugal (guide-line)

B. Taluks: Mannargudi, Thiruthiraiipoondi, Nagapattinam

Area of description: Vennar sub-basin
(Vadapathu mangalam - aquifer)

Investment: 2000 filter points
Pump: 5 H.P. Centrifugal (guide-line)

C. Taluks: Those mentioned in A & B.

Investment: 4000 electric pump sets
Pumps: 5 H.P. (guide-line)

D. Taluks: Orthanad, Pattukkottai

Area of description: New Delta sub-basin
(Salyamangalam aquifer)

Investment: 90 medium tubewells (Depth 60 M)
Pump: 5 H.P. Centrifugal (guide-line)

Spacing for tube-wells and filter points in sedimentary areas:

(i) For a tube-well, an annual minimum withdrawal of 1,30,000 M³ is required. This will result in a spacing range of 500 m to 1000 m for tube-wells.

- (ii) For a filter point, the minimum withdrawal should be 70,000 M³ and a maximum depth of 6 m. This would result in a spacing range of 200 m to 600 m for filter points.

To avoid risk of flooding and good use of irrigation water, the lending banks endeavour to apply an appraisal criteria, viz. irrigation of a minimum of 10 hectares for each tubewell and 5 hectares for each filter point. The following table gives the total outlay and expected achievement till June 1973.

Table-27

Total outlay: Rs.5.91 crores to be implemented before June '75.

	Filter Points	Shallow tube-wells (depth 50 M)	Medium tube-wells (depth 60 M)
Expected achieve- ment till June, 1973	2000	1000 (Thanjavur district) & 2500 (South Arcot district)	90 (Thanjavur district) & 500 (S. Arcot district)
Expected achieve- ment from July 1973 to June 1974	2500		
Expected achieve- ment from July 1974 to 1975	2500		

Note: Split up figures for shallow and medium tube-wells are not available

Source: Project Officer, Agricultural Refinance Corporation, Thanjavur.

Loans:	(i) Filter point	- Rs.	4,250/-
	(ii) Electric motors and pumpset for existing wells	- Rs.	3,500/-
	(iii) Shallow tube-wells (50 M depth)	- Rs.	9,700/-
	(iv) Medium tube-wells (60 M depth)	- Rs.	11,000/-
			<u>Rs. 28,450</u>

The scheme is implemented through Seventeen Co-operative Land Development Banks.

Repayment terms:

		<u>Period of repayment</u>	<u>Interest</u>
Filter points	-	7 years	9%
Shallow tube-wells	-	9 years	9%
Medium tube-wells		9 years	9%

For small farmers, the period of repayment is 12 years for filter point and 15 years for shallow and medium tube-wells. It is expected that there will be positive responses from the farmers to utilise the opportunity fully. Once the target is achieved, the area that can be brought under irrigation will be as follows:-

Table-28

<u>Area of description</u>	<u>Investment</u>	<u>Minimum area to be irrigated</u>
A - Thanjavur North - Papanasam, Mayuran, Nannilam, Kumbakonam, Sirkali	5,000 filter points	25,000 hect.
B - Mannargudi, Thiruthurai, raipocandi, Nagapat- tinam	2,000 filter points	10,000 hect.
		contd....

C - Taluks in A & B	4,000 electric pumps in the existing wells.	20,000 hect.
D - Orthanad and Pattukkottai	90 medium tube-wells (depth 60 M)	900 hect.
		<u>55,900 hect.</u>

It may be specifically noted that the irrigation will be of a supplementary nature in most cases to assist the farmers in carrying out timely operations of Kuruwai crop. This will enable them to raise three crops (two paddy and one cash crop in summer). Intensive propaganda is required to convince the farmers, particularly the small farmers, about the benefits of utilising the loan facilities. It is expected that there will be good responses and the target is completely achieved by June 1975. In that case, 55,900 hectares area in Thanjavur district can be made^a highly productive source for producing industrial raw materials like oil seeds, pulses, sugarcane and fibres. The groundwater potential of the deltas of Thanjavur district is given in the Appendix. In most of the areas, the water potential is high enough for tapping. From the table, it is seen that dry lands in Zone-V (Aranthangi and Pattukkottai taluks) can be provided with irrigation facilities by digging a number of wells. This area is highly potential for raising cash crops, if proper irrigation facilities are provided.

2.2.3.2 Soil conservation scheme

As far as Thanjavur district is concerned, this forms part of improving the irrigation facilities. The existing pattern of irrigation in Thanjavur district as practised by farmers is allowing water from field to field by flooding. There are no separate irrigation and drainage channels for individual fields independently. The bunds are zig-zag and fields are not even. So, there is a lot of waste of irrigation water. During the rainy season, due to lack of proper drainage, water accumulates resulting in flooding for many days. This adversely affects the crop. Fertiliser application is a problem because of field to field irrigation. To rectify the above defects, there is a scheme for soil and water conservation in the district. The objects of the scheme are:

- (i) to strengthen the bunds of fields
 - (ii) to provide individual channels for each field and
 - (iii) the new channel will be used for drainage also.
- This will enable the farmers to use the minimum amount of water required and thus economise water. The field will have maximum controlled condition and fertilisers can be applied in proper time. This will enable them to increase the yields. As a pilot project, an area of 350 acres was selected in Chithamalli Village of Mannargudi taluk and implemented the scheme there. The results were very impressive and many farmers in the district desired to have similar schemes in their fields. Now, there are two sub-divisions in the district with headquarters at Thanjavur. The

following table gives the target and achievement of the sub-divisions:-

Table-29

Division	Target for each division per year	Area of Operation	Achievement so far-from 6-8-1969 onwards
I	840 hectares	Thanjavur Papanasam	3400 hectares
II	1000 hectares	Kumbakonam Mannargudi Tiruthurai Mayuram Nannilam Nagapattinam Pattukkottai Aranthangi	

Division II was started only in January 1972 and hence the work is only in the initial stages in this division.

Financial implication

Expenditure:

Central Government	-	60%
State Government	-	15%
Subsidy	-	25% (10% State Government 15% Central Government).

The total amount spent is divided among the beneficiaries of the scheme and 75% is collected along with kist. The rest of 25% is subsidy borne by Central (15%) and State Governments (10%). Rate of interest changes from year to year. The practical difficulties in implementing the scheme are:

- (i) one or ~~maximum~~ two months in an year (April and May) are available for carrying out the work, because during the rest of the period, there will be standing crop in the field.
- (ii) On an average, only 3500 hectares are covered in an year and to cover the whole delta of nearly 6 lakh hectares, it will take at least twenty years.
- (iii) Intensive propaganda is required to convince the farmers.

It will be for the benefit of the State if more funds are allotted for the scheme so as to complete the scheme in another five years. By this, the loss due to floods and drought, particularly in the tail-end areas, can be avoided. Farmers can effectively utilise the controlled conditions in the field for fertiliser application and getting maximum returns out of it.

2.3 Crop Profile

2.3.1 Paddy (Rice):

Thanjavur district is the rice bowl of Tamil Nadu and contributes 25% of the total quantity of rice produced in the State. Rich alluvial soils and Cauvery irrigation system have made the area ideal for rice cultivation. A broad zonal classification of rice producing districts of Tamil Nadu is given in the following table:

Table-30

Zone	District	Area under rice (% to total area in the State)	Rice output (% to total output of the State)	Mean annual rainfal in m.m.
A	Thanjavur	24	25	957.5
B	Chingleput S.Arcot N.Arcot Trichy Madurai	36	34	960.0
C	Ramanathapuram Tirunelveli	31	31	590.0
D	Salem Coimbatore	9	10	600.0

Source: M.A.J. Vol. 58 - No.7 (1971)

Thanjavur district occupies the most important position in the table. No other district is contributing so much percentage to the total area and production of the State. Net area under paddy cultivation is 6.0 lakh hectares. Of this, 1.30 lakh hectares are double-crop wet lands making gross area under paddy to 7.30 lakh hectares. Thus, the cropping intensity is 125 per cent and paddy alone contributes to 87.3% of the total cultivated area of the district. Traditionally, rice cultivation is done in Thanjavur district in three seasons in a year;

1. Kuruvai - May-June to Sept.-October
2. Samba - July to January-February
3. Thaladi - September to February-March.

The following table gives the cultivation cycle:

Table-31
Paddy cultivation cycle

Season	Nursery	Transplanta- tion	Harvest	Remarks
1) Kuruvai	May-June	July	Sept.- October	{short dura- tion varie- ties upto 105 days duration.
2) Samba	Mid July to Mid Sept.	Mid Sept. to October	3rd week of Jan. end of Feb.	Long dura- tion single crop paddy
3) Thaladi	Sept. to Mid Oct.	November and December	Late Feb. March	Medium duration varieties grown after Kuruvai harvests.

Kuruvai cropping is entirely dependent upon the release of water from the Mettur Dam. Normally, water is released in June. If the storage position in Mettur Dam is not very satisfactory, water will be released only after getting sufficient inflow from catchment areas which also depends upon the arrival and intensity of South-west monsoon. Transplantation is done in July and the crop gets the benefit of South-west monsoon rains to the extent of 30 to 40 mm per month till mid October. Short duration varieties like Karuma (CO33) Kanchi (CO34) and Karikalan (ADT 29) are raised in Kuruvai season. Delay in release of water affects

the Kuruvai paddy and planting is delayed with subsequent delay in harvest. Harvest coincides with heavy rains of North-east monsoon in October. The produce is thus damaged both qualitatively and quantitatively. It is reported that the primary factor which has profound influence on the area of Kuruvai sowings is the date of opening of Mettur Dam. It is seen that nineteenth June is the right time for opening and delay even by a day has resulted in significant decrease in area. A shrinkage in area from 1.30 lakh hectares to 1.00 lakh hectare is experienced by a delay within a critical period of 32 days. Farmers prefer to plant long duration varieties like CO25 in July so that the crop is not affected by heavy rains of October which will be the time of harvest for late planted short duration varieties of Kuruvai. Thus, virtually double crop lands get reverted to single crop lands with the net result of reduction in the total production of paddy. Generally, Kuruvai yields are higher than that of Samba and Thaladi. Average yield is 3095 kg./hectare. In Samba season, long duration varieties like CO25 and ADT8 are planted. The sowing season is July-August and transplanting is done in September. The crop gets the benefit of both South-west and North-east monsoons and is not damaged by the heavy rains of October-December. Flowering and ripening occurs in the fair weather of January-February. Average yield of Samba paddy is 2890 kg./hectare. The grain is fine and fetches good price. Thaladi is the second crop raised after Kuruvai harvest in September-October. Delayed harvest of Kuruvai will delay the

transplantation of Thaladi and the crop is affected by heavy rains and floods in the early stages of growth (just after transplanting). The crop comes to maturity in February. Medium duration varieties like Ponni, IR20, IR8, Jaya etc. are raised during the Thaladi season. Average yields are 1710 kg./hectare, perhaps the lowest for all the three seasons. In all cases, the average yields can be considerably increased and can reach the level of 5 tonnes/hectare under proper management. The important factors of improving paddy production are discussed below:

.3.1.1 Seeds

A well established Paddy Research Station at Aduthurai is the key for successful introduction of high yielding paddy varieties in the district. There are fourteen seed farms in the district to multiply nuclear seeds and supply to farmers. The total seed distribution in Thanjavur district for the past eleven years is given in the table below:-

Table-32
Paddy seed distribution

Year	Quantity of seeds distributed in tonnes
1962-63	1797
1963-64	4628
1964-65	8100
1965-66	9859
1966-67	7691
1967-68	11248
1968-69	7898
1969-70	5923
1970-71	3732
1971-72	3806
1972-73	3608

Good quality seed is the primary requirement of a good paddy crop. IADP has been very successful in supplying quality seeds as is evident from the table. Total area under paddy is 7.3 lakh hectares and at the average seed rate of 45 kg/hectare, the total quantity of seeds required is 32850 tonnes. The total quantity of good quality seeds distributed during 1971-72 is only 3608 tonnes. Hence, there is ample scope for multiplication and distribution of quality seeds by enterprising private agencies. This will be a very profitable proposition.

2.3.1.2 Input of fertilisers

Recommended dose of fertilisers in terms of N P K is given in the table below:

Table-33

Fertiliser dose in terms of N P K - kg./hectare

Season	Basal dressing (both deltas)			Top dressing (Old delta)			New Delta		
	N	P	K	N	P	K	N	P	K
(1)	(2)			(3)			(4)		

1) Kuruwai

i) Kuruwai									
CO33	37.5	37.5	37.5	40.0	0	0	60	0	0
				(two equal doses)			(three equal doses)		
ii) IRS & Jaya	75.0	62.5	62.5	50.0	0	0	100	0	0
				(single dose)			(two equal doses)		
iii) IR20	50	37.5	37.5	50.0	0	0	50	0	0
				(single dose)			(two equal doses)		

/contd..../

(1)	(2)	(3)	(4)
2) <u>Samba</u>			
i) CO25	35 52.5 35 35	0 0 35	0 0
ii) IR8	75 62.5 62.5 50	0 0 100	0 0
		(single dose)	(two equal doses)
iii) Ponni	37.5 37.5 37.5 37.5	0 0 50	0 0
	(Old delta)	(single dose)	(two equal doses)
	50 37.5 37.5		
	(New Delta)		
3) <u>Thaladi</u>			
i) IR-20	50 37.5 37.5 50	0 0 50	0 0
		(single dose)	(two equal doses)
ii) Ponni	50 37.5 37.5 50	0 0 50	0 0
		(two equal doses)	(two equal doses)
iii) Annapurna			
(Culture			
28) 75	37.5 37.5	-	-

Following table gives the fertiliser consumption in terms of N P & K for the past fourteen years and season-wise consumption of pool and non-pool fertilisers for 1970-71 and 1971-72.

Table-34

Consumption of fertilisers - season-wise

<u>Pool</u>					
Type of fertiliser	Year	Kuruvai	Samba	Thaladi	Total
Amm. Sulphate	1969-70	10414	2861	2428	15703
	1970-71	3216	2617	1193	7026
	1971-72	4084	1369	1886	7339
Urea	1969-70	13394	4209	731	18334
	1970-71	5579	3196	251	9626
	1971-72	6261	6117	819	13197
D.A.P.	1969-70	5572	235	-	5807
	1970-71	5041	386	3	5430
	1971-72	6963	1049	69	8081

Non-pool

Private firms & T.C.M.F.

Type of fertiliser	Year	Upto Sept.	Oct.- Dec.	January- March	Total
Amm. Sulphate	1970-71	7624	2908	1339	11871
	1971-72	5923	1595	365	7883
Urea	1970-71	10980	4423	2163	17566
	1971-72	7186	5265	922	13473
Complex	1970-71	1914	627	245	2786
	1971-72	1238	910	714	2862
Mixtures	1971-72	1976	3217	1321	6514
Super- Phosphate	1970-71	12504	1888	1192	11584
	1971-72	10045	3125	389	13559

Table-35
Off-take of fertiliser in M.T.

Year	Amm. Sulphate	Superphosphate	M.O.P.	Per hectare consumption		
				N	P	K
1959-60	17000	12000	-	4.5	2.5	-
1960-61	17460	13574	55	5.5	2.65	-
1961-62	20940	17687	191	5.5	3.75	-
1962-63	23326	28422	323	6.75	6.25	-
1963-64	29020	34748	779	7.75	7.25	-
1964-65	41890	45562	1347	11.25	9.95	-
1965-66	64037	33907	1209	18.75	8.00	-
1966-67	74127	32568	1405	24.0	7.75	-
1967-68	89334	59819	2379	25.5	13.75	-
1968-69	94737	66789	2710	27.0	15.25	-
1969-70	105028	73236	4965	30.62	21.88	-
1970-71	119755	83400	9381	35.77	22.22	-
1971-72	137715	98075	13585	41.08	23.40	-
1972-73	154316	99202	14186	46.75	24.02	-

From the tables, it is clear that the off-take of N P & K are definitely on the increase. This is mainly due to the meritorious work of the staff of Intensive Agricultural District Programme in Thanjavur district. Introduction of high yielding varieties also has a tremendous impact. In fact, fertiliser consciousness suddenly developed among the farmers with the massive success of high yielding varieties of crops. The average rate of consumption is only 45 kg. of

nitrogen and 24 kg. of P_2O_5 per hectare when compared to the departmental recommendation of 100 kg. of N and 50 kg. of P_2O_5 . Consumption of potash fertilisers is very little and according to studies conducted by IADF, use of potassic fertilisers as an accepted practice is yet to gain proper momentum. All the above said factors have adversely affected the yields, particularly that of high yielding varieties. Average yields as shown in the histogram is only 2.5 tonnes/hectare, while the new promising strains are capable of giving yields upto 5 tonnes per hectare.

2.3.1.3 Plant Protection

That is an equally important agronomic practice as fertiliser application. Prophylactic measures like pre-treatment of seeds, timely spraying and dusting with plant protection chemicals as recommended in the packages of practices for different seasons have to be strictly followed both in the nursery and main field, particularly so in the case of high-yielding varieties. The extension work done by IADF has caught the imagination of the cultivators and many of them are taking possible measures against pest attack. Here again, the availability of chemicals, equipment and technical advice are very essential. Even if expert technical advices are available, the availability of the right type of chemicals and equipment at the right time are problems. Table below shows the quantities of pesticides distributed by IADF in Thanjavur district.

-: 166 :-

supply societies attached to it. This Federation handles about 4,500 litres of milk per day. There are 88 milk supply societies in the district affiliated to the Federation.

- 2.7.2.6 Any scheme for improving the milk yield of cattle population, cannot succeed unless there is a radical improvement in the availability of quality fodder. Many Municipal Towns in this district have sewage water which can be utilised for establishing farms to provide fodder at subsidised rates to rural cattle owners. Breed improvements also will have to be taken up along with the fodder development programme.

2.7.3 Strategy

Cattle development assumes much importance in any strategy for development of Animal Husbandry. Development of cattle in an intensive manner requires that a number of pedigree breeding bulls be made available for distribution to various sub-centres in the district. The live-stock farms will have to be suitably expanded and strengthened to support the Intensive Cattle Development Project and Key Village Scheme programmes. The Orathanad farm should therefore be strengthened by providing more herds. Since this farm is also inadequate to meet the growing needs of this district, establishment of one more farm similar to the Orathanad farm is recommended. The ideal location for such a farm is Mayuran.

- 2.7.3.1 A crash programme for milk production may be undertaken in the district. Along with development of dairy industry in the Public and Co-operative Sectors, private sector dairy industry also should be encouraged. Greater attention for raising fodder crops is necessary so that the average milk production per cow can be increased considerably. The Tamil Nadu Dairy Development Corporation proposes to adopt an integrated approach to the problem of

IR8 and IR5, the amount was Rs.380/- because of high level of fertiliser consumption. Annually, about five crores of rupees are distributed to the ryots as short term loans. The Co-operative Central Banks, one at Thanjavur and the other at Kumbakonam, prepare annual credit limits for each and every member of village primary Co-operative Societies in advance of the season, keeping in view the package of practices recommended by IADP staff. Based on these credit limits, withdrawals are made and disbursements effected just before the agricultural season by the Village Credit Societies. These societies carry stocks of fertilisers with them, obtain seeds and pesticides from the Agricultural Depots and distribute them against the kind component of the loan provision. A study by IADP point out the following features:-

- i) ryots availed loan only once, i.e. before Kuruwai cultivation though they were entitled for a second loan for Thaladi cultivation subject to the condition that they clear 50% of the first loan;
- ii) the quantum of loan paid to the tenant cultivators was comparatively less than that of the owner cultivators;
- iii) in almost all the societies, the issue of kind portion of loan is not generally being insisted by the societies while the loanee gets high cash portion of the loan in full and thus he is free to take any amount of the kind portion of credit allotted to him; and
- iv) the loanee is bound to repay the loan in kind, i.e. in terms of produce, but in practice, this did not generally take place. Even if some of the loanees sell their produce to the society, the sale proceeds are not adjusted against the loan. The price of the produce is paid and the loan amount recovered separately.

After the introduction of IADP in Thanjavur the number of cultivators availing cash and kind portion of short term credit has appreciably gone up. It is also reported that the recovery of credit issued every year by the Central Banks is of a high order in the past two years which has enabled the Banks and the Multi-purpose Co-operative Societies to advance loans in an efficient manner. The quantum of short term crop loans issued year-wise from 1960-61 to 1970-71 is given a in the following table:-

Table-37

Year	No. of Societies	No. of members	Amount-Rs.
1960-61	182	76153	1481670
1961-62	291	105891	5604633
1962-63	372	136262	8734770
1963-64	601	224071	12738524
1964-65	946	415379	15066700
1965-66	1045	442839	11859000
1966-67	1093	393000	24866566
1967-68	565	324000	35213227
1968-69	573	391873	45106939
1969-70	573	391873	39894000
1970-71	573	391873	58437921
1971-72	573	391873	78987000
1972-73	573	391873	95003383

Cultivators who do not avail the kind portion of the credit have got the following reasons:-

- i) Non-availability of required quantity and type of fertilisers in the society
- ii) Certain types of fertilisers were not sold in loose quantities in the societies and hence small land holders could not get their small requirements.

- iii) Cumbersome procedures
- iv) The requirement of fertilisers was based more on the personal judgement of a few farmers and hence they did not avail the entire kind portion of short term credit earmarked for them.
- v) The location of the society is far away from fields.
- vi) Delay in supply of fertilisers by the society.

In spite of the availability of credit facilities through Co-operative Societies, Thanjavur farmer seems to prefer money lenders and pawn-brokers. Only one-fourth of the requirements of the farmers in the district is met by the Co-operatives. Commercial Banks have entered the field recently and it is hoped that farmers will utilise these credit facilities to the fullest extent possible and escape from the clutches of money lenders and pawn-brokers.

2.3.1.5 Agricultural labour

There are three peak seasons in agriculture in Thanjavur district. June-July is the season for Kuruvai planting, immediately followed by Samba season in August-September. October-November is the planting season for Thaladi. Kuruvai operations are started as soon as water is released from Mettur Dam. If this is delayed, the time available for Kuruvai plantings is shortened. Similarly, delay in harvest of Kuruvai affects the time available for cultivation of Thaladi plantings. A total of 2 lakh hectares of Kuruvai are planted in June-July and its harvesting operations are done in October-November, side by side, ploughing and transplanting

of Thaladi are to be done. For this, Thanjavur labour is not sufficient. Thanjavur has 75 labourers per 40 hectares against 134 in Trichy, 126 in South Arcot and 113 in Ramanathapuram districts. So, during peak seasons, labour from Ramanathapuram district are brought for completing the operations in time. In Thanjavur, half of the agricultural workers are landless labourers, while for the whole State, the percentage is only 30. This often leads to labour unrest resulting in violent clashes. In 1968, the Commission appointed by Government recommended the following uniform wage structure for farm workers:

	<u>Recommended wage rate</u>	
	Men for 8 hrs.	Women for 7 hrs.
Ploughing, levelling etc.	Rs.3.00	--
Transplanting, weeding etc.	--	Rs.1.80
Off-season work	Rs.2.50	Rs.1.75
Harvesting	6 litres out of 54 litres of paddy harvested or 11 per cent.	

This recommendation was accepted and labour troubles were set at rest by its implementation. Hence to avoid delay and consequent reduction in yields due to labour scarcity, more of mechanised farming can be thought of to fit in with the conditions available there.

2.3.1.6 Yield

Paddy yield in Thanjavur district is on par with the State average (ref: Histogram). Yields are maximum

in Kuruvai followed by Samba and Thaladi. In fact, Intensive Agricultural District Programme in Thanjavur district has two important schemes to increase the yields from one hectare of paddy field. These schemes are quite successful as is evident from the figures available.

- i) Converting single crop samba lands into double crop lands so that instead of one long duration variety, two medium duration crops or one short duration and one medium duration crop are raised. The per acre yield is thus doubled. The following table gives the progress made in this process.

Table-38
Double Cropping Programme

Year	Area in lakhs of hectares			Total
	Kuruvai	Thaladi	Samba	
	I Crop	II Crop	(Single crop)	
Traditional	1.20	1.08	3.60	5.88
1967-68	2.08	1.29	2.90	6.27
1968-69	2.00	1.36	3.04	6.40
1969-70	2.04	1.55	3.12	6.71
1970-71	2.05	1.52	3.13	6.70
1971-72	2.04	1.60	3.00	6.64
1972-73	2.05	1.63	3.03	6.71

It is seen that the increase in the total area under paddy from the traditional area is 0.92 lakh hectares within a period of four years. This was made possible by the conversion of single crop wet lands into double crop areas. Thus, an increase of 2.3 lakh tonnes (@2.5 tonnes/hectare) of paddy has been achieved during this period.

ii) High Yielding varieties Programme: Local varieties are being gradually replaced by high yielding varieties. ADT27 was first introduced in 1967-68. This variety recorded a yield of 3937 kg./hectare which is one and half times higher than that of the traditional varieties. Being shorter in duration, it was accepted strain for Kuruvai season and the local varieties like ADT3, ADT7 and ADT20 have practically disappeared. In 1967-68 as against previous years, there were four to six lakh tonnes of additional paddy to be handled during the season because of cultivation of ADT27 in Kuruvai season. The present recommendation is as follows:-

Kuruvai	-	ADT 27, Karuna
Samba	-	CO25, IR8, Jaya, Ponni, IR20
Thaladi	-	IR20, Ponni, Annapurna

Table below gives the progress under High Yielding Varieties Programme:

Year	Total area under paddy	Area under HYV	Strain
1968-69	6.396	2.27	ADT27, CO25
1969-70	6.712	5.16	ADT27, CO25, IR8, IR5
1970-71	6.692	5.58	ADT27, IR8, IR5, Karuna, CO25
1971-72	6.704	6.22	ADT27, Karuna, IR8, Ponni, IR20
1972-73	6.708	6.14	--Do--

From the table, it is clear that practically the entire area is covered by HVV. This is a commendable success. All these high yielding varieties are capable of producing yields upto 5 tonnes per hectare under good management. Yield per hectare for the three seasons in selected holdings in IADP area is given below:-

Table-40

	Yield in kg./hectare			Increase in kg./hectare in 1970-71 over 1960-61
	1960-61	1965-66	1970-71	
Kuruvai	2440	2612	3095	655
Samba	2280	2370	2890	610
Thaladi	1283	1495	1710	427

The table indicates the steady increase in yields of all the three seasons during 1960-61 to 1970-71. Kuruvai yield is due to introduction of high yielding variety of ADT27. With IR20, Karuna, Karikalan and other new varieties, it is expected that higher yields are achieved within the next decade. Total production of paddy in the district for the last three years is given below:

Production in lakh tonnes:-

1969-70	.. 1,028,160
1970-71	.. 1,302,000
1971-72	.. 1,359,000

There is an increase in the production of paddy and it is mainly due to the better farming practices adopted by the farmers.

2.3.1.7 Paddy disposal and Marketing Seasons:

Paddy arrivals in the market starts with the harvest of Kuruvai crop. These stocks are quickly disposed of because of the heavy rains of October-November. At the time of harvest, the moisture level is 22% and drying to 14% moisture level is a difficult problem. Only about 2 to 3% is retained for seed purpose. Samba paddy comes to market in February and marketing continues till May; the peak period is February-March. Since it is a finer variety and has better consumer value, only about 4 to 5 lakh tonnes out of nine lakh tonnes produced, comes to the market. This is consumed by the urban people of neighbouring districts. Thaladi produce comes to market slowly and it fetches better price to the farmers. Nearly 50 per cent of the total production comes to the market. In September-October, nearly 2 lakh tonnes are marketed. The second peak market disposal occurs during February-March after Samba and Thaladi harvest. Marketing is handled by State Civil Supplies Department through Food Corporation of India (FCI), Thanjavur Co-operative Marketing Federation and licensed millers and agents. FCI has got 40 centres for procurement of levy paddy. Following figures give the procurement by FCI from 1966 onwards:

Table-41

Year	Paddy purchased by FCI - tonnes
1966	2354
1967	88536
1968	120359
1969	238050
1970	129279
1971	21159*
	7000

* Purchased in Open Market when compulsory levy was lifted.

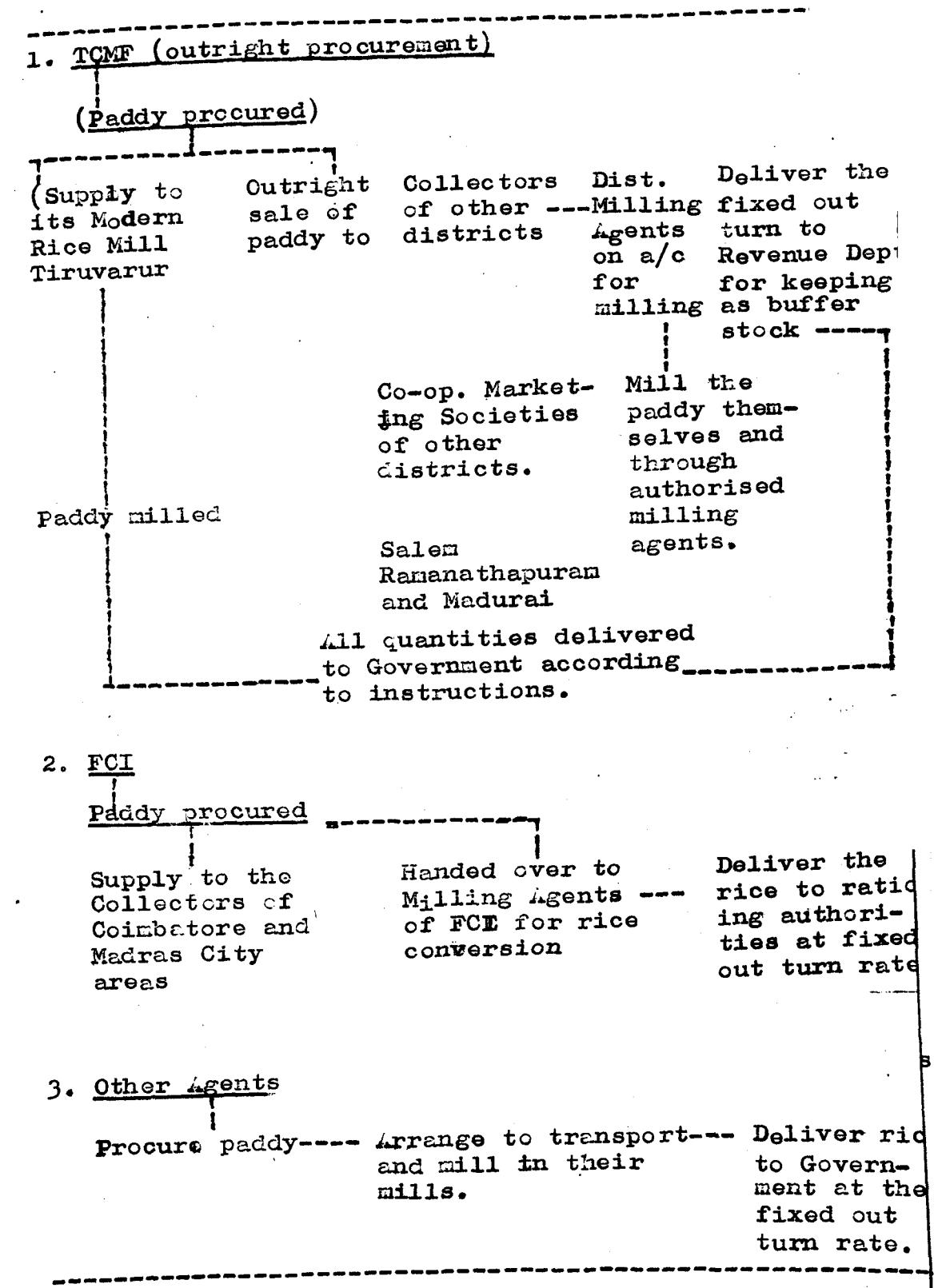
Thanjavur Co-operative Marketing Federation (TCMF) markets paddy through the Co-operative Marketing Societies at Taluk Headquarters. It has got a giant modern rice mill at Tiruvarur. 350 wholesale licensed millers are also in the field with a number of agents. A list of godowns maintained by the different marketing agencies is given below:-

Table-42

FCI	Tamil Nadu Ware- Housing Corpn.	Central Warehouse Corporation	Co-opera- tives
(Total capacity 6500 tonnes)	(2000 tonnes capacity)	(1,03,500 tonnes capacity)	
Thanjavur Mannargudi Thiruvandar- koil Sembanarkoil	Nagapattinam Mayuram Thanjavur Tiruvarur	Ten godowns	625 located in various parts of the dis- trict.

The procurement system followed by TCMF, FCI and other agents (private and government) is sketched below:-

Table-43



Modern Rice Mills at Tiruvarur has got the following facilities:-

- i) Mechanical drying instead of sun drying
- ii) Paddy cleaning and silo storage with complete mechanical handling
- iii) Improved par boiling unit
- iv) Modern rice milling

Mechanical drying facilities are particularly useful for Kuruwai produce because sun drying is not possible during the rainy season. Secondly, the paddy gets uniformly dried. For other reasons also, the ripe ear-heads need not be left in the field for proper drying. The loss by keeping it in the field is estimated to be 10 to 15 per cent of the paddy production due to shedding and destruction by rodents and birds. Silo storage in upright concrete structures with a capacity of 7200 tonnes was planned in view of the paddy procurement seasons and the paddy storage requirements to run the mill for at least 300 days at full capacity. Silos are fitted with conveying equipment and are operated mechanically. Drying and silo facilities represent 75% of the total investment. Improved par-boiling unit is capable of completing the parboiling within four hours and twenty minutes as against 60-70 hours for parboiling in conventional system. Parboiled paddy can be dried in the mechanical drier within 3 hours while in conventional system it will be 30 to 40 hours depending upon the weather. Rice milling is done to produce almost an odourless variety and it is now possible to produce good quality parboiled rice even in monsoon weather. The idea of setting up a

modern rice mill was to give an additional outturn of four to five percent of rice and it was expected to produce about 2000 tonnes extra rice every year and if all the marketable surplus of paddy of Thanjavur district was processed through such mills, Madras City's total requirements could be easily met by Thanjavur district.

Capital cost of the Modern Rice Mill of TCMF

(Rs. in lakhs)

1. Rice mill unit	4.77
2. Mill building, storage tanks, transport lorries etc.	3.53
3. Silo, accessories, conveying equipment etc. two driers	28.00
4. Scalper	0.20
5. Parboiling facility	1.70
	<u>38.20</u>

Contribution to capital funds were as follows:

(Rs. in lakhs)

1. Members' share capital	3.00
2. Tamil Nadu State Government's contribution to capital	7.80
3. Loan from National Co-operative Development Corporation	23.45
4. Subsidy	3.95
	<u>38.20</u>

2.3.1.8 Advantages of milling in Modern Rice Mills

According to studies conducted at Modern Rice Mill, Tiruvarur, there is a net saving of Rs.8.43 (after meeting the cost of chemicals) on the cost of daily

operation as the result of treatment as compared to double steaming process (in the ordinary mills). Secondly, there is a reduction in the loss of the kernel material in the new method and an increase in the yield of rice upto 1.8% bringing an extra earning of Rs.225.76 to the miller for processing 200 bags of paddy in a day. Thirdly, the rice bran obtained from Modern Mills contain 20% oil. The oil can be extracted and marketed very profitably. The following statements give the benefits of modern rice milling.

Table-44

Comparison between 'Cold Soaking with Sodium Chromate 0.05% level' and 'Double Steaming Process (Control) (routine method followed)'

Sl. No.	Particulars	Cold soaking with sodium chromate 0.05% level (Modern Rice Milling)	Double steaming process (control routine method followed)
		(3)	(4)
1.	Weight of Raw Paddy (100 bags)	5.626 T	5.553 T
2.	Moisture of Raw Paddy (By air oven)	11.8%	11.2%
3.	Wt. of raw paddy on zero moisture basis	4.962	4.931
	Date of soaking	6.9.72	6.9.72
	Date of steaming	9.9.72	9.9.72
5.	Soaking period	74 hours	74 hours
6.	Polished rice on zero moisture basis	3.421 T	3.303 T
7.	Moisture of polished rice (By air oven)	13.0%	12.7%
/contd..../			

(1)	(2)	(3)	(4)
8. Out-turn of polished rice on constant moisture basis i.e. on 15% moisture basis	71.4%		69.7%
9. Out-turn of polished rice on raw paddy	69.9%		68.1%
10. Out-turn of rice on zero moisture basis of paddy and rice	68.9%		67.0%
11. Smell of polished rice	Nil		Pronounced mal-odour
12. Smell of Bran	Nil		-do-

Table-45

Economics of Double Steaming as compared with cold soaking with Sodium Chromate at 0.05% level - conducted at Sree Veeyar Rice Mill under the control of Food Corporation of India.

(For every 100 bags of paddy procured)

Sl. No.	Particulars	Cold Soaking with Na ₂ CrO ₄	Double steaming process (Routine method followed)	Difference
(1)	(2)	(3)	(4)	(5)
		Rs. Ps.	Rs. Ps.	Rs. Ps.

I. FIRST STEAMING

a) Labour charges for drawing paddy from godown, steaming and soaking in tank

8 50

b) -Do- except steaming

5 00

/contd.../

(1)	(2)	(3)		(4)		(5)	
		Rs.	Ps.	Rs.	Ps.	Rs.	Ps.
c)	Cost of husk for (preparing steam 10 bags of husk at 50 ps. per bag)			5	00		
d)	Husk feeding	-		2	12		
e)	For fireman	-		0	70		
f)	Cost of castor oil as lubricant for steam pump	-		0	45		
g)	Cost of Na ₂ CrO ₄ - 2.8 kg.	8	40				
		<u>13</u>	<u>40</u>	<u>16</u>	<u>77</u>	<u>3</u>	<u>37</u>
II. <u>SECOND STEAMING</u>							
	For all operations	19	89	19	89		
III. <u>DRYING</u>							
	Spreading paddy in yard, drying and transporting to huller hall	9	00	9	00		
IV.	COST OF BUILDING	12	80	12	80		
V. <u>MISCELLANEOUS</u>							
	Management, lease amount, maistry, chaff removal etc.	28	00	28	00		
		<u>83</u>	<u>09</u>	<u>86</u>	<u>46</u>	<u>3.37</u>	<u>(A)</u>

/contd...../

- 82 -

(1)	(2)	(3)	(4)	(5)
<u>RETURN</u> (for 100 bags of paddy)				
1) Polished rice obtained (at 15% moisture basis)		4.017 T	3.868 T	
2) Broken obtained		0.010 T	0.017 T	
3) Cost of rice @ Rs.77.40 per Q. (As per Tamil Nadu Government rate)		Rs.3109.16	Rs.2993.83	
4) Cost of Broken @ 35/- per Q.		3.50	5.95	
5) Cost of Bran (20 bags at Rs.3/- per bag)		60.00	60.00	
6) Cost of husk (16 bags @ Rs.50 per bag)		8.00	8.00	
TOTAL RETURN		3180.66	3067.78	112.88 (E)

Total saving plus extra
earning through cold
soaking with chromate
treatment at 0.05% level
for 100 bags of paddy
processed (A+B) 116.25

-do- for 1 T of rice produced (A+B)/4 = Rs. 29.06

Note: The margin of profit will be still higher if the
rice is sold under the Central Pool or Open Market
rate.

2.3.1.9 Solvent Extraction Plant (Rice Bran Oil Extraction Unit)

Attached to the Modern Rice Mill, Tiruvarur, a solvent
extraction plant to extract oil from rice bran was
started in December 1968. The bran from Modern Rice
Mill is used to extract 20% of the oil. The capital

outlay is given below:-

Initial Capital	-	Rs.12 lakhs	
		(Rs.9.71 lakhs - machinery and boilers)	
		(Rs.3.01 lakhs - land and building)	
Working Capital	-	Rs.18 lakhs (Rs.1.5 lakhs p.m.)	
<u>Staff</u>		<u>Rate</u>	
Monthly paid employees - 30		Shift boys - Rs.400/-p.m.	
(skilled and unskilled)		Operator - Rs.300/-p.m.	
Office Staff - 5		Helper	
(includes one manager)		(unskilled) - Rs.120/-p.m.	
Contract labourers	-	40	(Rs.1/- for every tonne)

The bran is converted into pellet form and fed into the extraction unit where the solvent is circulated for two hours with the help of steam pump at constant temperature of 55° C. to 60° C. The oil solvent mixture will be sent to distillation column. The bran will be given 3 or 4 washings with solvent each for a period of two hours to bring down the oil content of bran below 1%. The oil is separated, purified and sold out. The output of oil per year is 600 tonnes, which can fetch a price of Rs.20 lakhs at a rate of Rs.3500/- per tonne. The price of oil for the last three years is given below:-

		<u>Per tonne</u>
1971	-	Rs.3200/-
1972	-	Rs.3500/-
1973	-	Rs.4000/-

2.3.1.10 Practical difficulties experienced by the Oil Extraction Unit

The monthly requirement of bran is 750 tonnes of which the unit gets only 600 tonnes. Only 200 tonnes are available for the modern rice mill. This bran contains 20% oil. The rest of 400 tonnes are purchased from Trichy.. This is known as sheller huller bran and contains only 9% oil. The operation is purely seasonal. Bran will not be available in August-October and during this period, groundnut oil is extracted from de-oiled cakes instead of rice bran. On enquiries, it was reported that Food Corporation of India is starting one small unit of Rs.7 lakh investment and with a capacity of 15 tonnes processing per day in Sembamarkoil near Mayuram. Rice bran oil is used in the manufacture of soap and whatever is produced in Thanjavur Co-operative Marketing Federation (TCMF) is purchased by Tata Oil Mills at Cochin. This unit can be profitably run by private entrepreneurs who can get good rice bran in the season and utilise the machinery for extraction of oil from other oil cakes like groundnut, sunflower and gingelly. One expelling unit can also be added so as to expel oil from copra, groundnut etc. and then utilise the cake for further extraction. It is reported that an expeller unit to handle 8 to 10 tonnes of copra will cost only Rs.60,000/- This can also be used to expel oil from groundnut, gingelly and sunflower at the rate of 5 to 7 tonnes per day. The de-oiled cakes can be used for cattlefeed, though there is

a consumer resistance for these cakes. It can be overcome with proper propaganda and explanation. Modern Rice Mill and Oil Extraction Units have ample scope in improving the marketing of rice and rice bran oil in Thanjavur district.

2.3.1.11 Conclusions

Though Thanjavur district is the home land of paddy cultivation, the remarkable improvements were brought about in the production only after 1961-62 with the implementation of Intensive Agricultural District Programme. The following figures give the full story:

Area new brought under double cropping	- 0.824 lakh hectares
Additional production on this score	- 2.06 lakh tonnes
Additional production due to adoption of scientific farming	- 5.58 lakh tonnes
Additional grain for the State	- 7.64 "
Additional income for farm labourers in Thanjavur district	} - Rs. 3.09 crore
Additional income derived by farmers in Thanjavur district	
	- Rs.42.68 crore

Still there is scope for improving the yields and income. The present average yield is only 2.5 tonnes per hectare, the fertiliser consumption is only 45 kg. N and 23 kg. P₂O₅ per hectare against the recommended dose of 100 kg. N and 50 kg. P₂O₅. The new high yielding varieties are capable of producing yields upto

5 tonnes per hectare and on enquiries, it is found that an average yield of 4 tonnes per hectare can be achieved at an annual growth rate of 8 per cent. Modern Rice Mills with rice bran oil units for every Panchayat Union should be the future set up for the district. Rice husk from such rice mills, not utilised for fuel, can be utilised for extraction of carbon. Agro-service centres to supply good quality seeds and other inputs, hiring out of agricultural machinery, plant protection equipment etc. are very paying propositions. These centres can provide ample employment opportunities for skilled and unskilled workers.

2.3.2 Sugarcane

It is only a minor crop in the district. The total area under sugarcane is only 5945 hectares of which 4929 hectares are irrigated crop. The blockwise distribution of sugarcane area is given below:

Table-46

Sl.No.	Panchayat Union	Area in hectare	Production in tonnes
1	Thanjavur	59	6000
2	Budalur	64	3720
3	Thiruvaiyaru	123	20400
4	Orathana d	57	5700
5	Kumbakonam	518	18130
6	Tiruppanandal	389	29175
7	Tiruvidaimarudur	374	13090
8	Papanasan	362	N.A.
9	Armapet	86	N.A.
10	Valangaiman	217	N.A.
11	Pattukkottai	6	144
12	Sethubavachatram	3	7

/contd.../

Sl.No.	Panchayat Union	Area in hectare	Production in tonnes
13	Madukkur	26	529
14	Peravurani	5	13
15	Aranthangi	8	170
16	Kuttalam	193	17900
17	Mayuram	107	9800
18	Sembanarkoil	97	7275
19	Sirkali	35	2625
20	Kollidan	39	2412
21	Nagapattinam	4	N.A.
22	Tiruvavur	139	11120
23	Kivalur	32	560
24	Nannilam	250	N.A.
25	Kodavasal	85	N.A.
26	Tirumargual	24	N.A.
27	Koradacheri	198	15840
28	Mannargudi	1454	103125
29	Kottur	537	53700
30	Nidamangalam	66	8250
31	Tiruthuraiipoondi	187	N.A.

From the table, it is seen that Mannargudi division has got the maximum area under sugarcane. The average yield is 72.3 tonnes per hectare of cane or 7770 kg. in terms of gur. The State average is 84.72 tonnes or 8249 kg. in terms of gur. CO419 and CO449 are the important varieties cultivated in the area. Recent studies conducted have shown that CO6304 (cross between CO419 and CO605) is a better variety which can yield 115 tonnes of cane per hectare with a duration of 170 days. It can yield 6.2% sugar. Planting can be done from October to April. Cost of cultivation of sugarcane is Rs.4500/- per hectare for newly planted area and Rs.4000/- for a ratoon crop. Two ratoon crops can be taken. At present

there is one sugar factory at Vadapathimangalam near Mannargudi which gets sugarcane from the nearby areas. The daily crushing capacity of the mill is 1200 tonnes. It employs 375 persons and the value of annual output is 35 million ruppees. Sugarcane is an important cash crop which can supply raw materials for major industries like sugar factory and distillery. Jaggery is produced in cottage industry in all sugarcane growing areas. In Thanjavur district, there is possibility for increasing the area under sugarcane in the new delta. More sugar factories can be established there.

2.3.3 Groundnut

Groundnut is an important dry crop of the district. It is also cultivated as a summer crop in rice fallow. Total area is 38,000 hectares of which 15,147 hectares are raised under irrigated conditions while an area of 23,000 hectares is under rain-fed conditions. As a dry crop, groundnut is mixed with green-gram and sown in June-July. Where there is irrigation facilities, groundnut is rotated with paddy and maize. Thanjavur and Pattukkottai divisions have got the maximum area under groundnut. 10,884 hectares in Thanjavur and Orathanad taluks, 11,119 hectares in Pattukkottai and Aranthangi taluks are cultivated with dry crop of groundnut. The dry crop is sown in August and harvested in November. Irrigated crop is raised in January after the harvest of ~~Samba~~ paddy. The production for the last three years is given below:-

<u>1969-70</u> (in tonnes)	<u>1970-71</u> (in tonnes)	<u>1971-72</u> (in tonnes)
29,410	38,800	34,400

Average yields work out to 900 kg/hectare. The State average for 1971-72 is 1075 kg/hectare. There are regulated markets in the district where groundnut can be brought and sold. Hence marketing is not a problem in the district. There are two small units in Thanjav where groundnut oil is extracted engaging a total number of 19 workers. IADP have programmes to bring more area under groundnut, particularly rice fallows. New varieties like TMV 9 (short duration) and TMV 10 (medium duration) can be cultivated to get 30% more yield. TMV9 has got a partial dormancy. This prevents loss due to sprouting at the time of maturity. TMV 10 has got 54.4% oil content and 77.7% shelling out turn. All other field crops in the district are of very minor importance and hence are not discussed here.

2.3.4 Perennial crops

Banana In Thanjavur district banana is cultivated in the Padugai lands along the riverside as a perennial crop. Padugai lands exist in large areas of Kumbakonam and Mayuram divisions. Total area is 4800 hectares. Padugai banana is not irrigated and in fact drainage is a problem in these lands during rainy season. The banana plantations in Padugai are of a perennial nature. No regular cultivation is done in these lands. Hence bananas in all stages of growth can be seen. Poovan

and Monthan are the two varieties occupying 90 per cent of the total area. Rasathali and Peyan are grown in small pockets. November to February is the peak period of harvest. The harvested produce is marketed locally. On an average, an annual net income of Rs.1250/- to Rs.1750/- per hectare is obtained from these banana plantations.

Cavendish Banana This is cultivated in ^{an} area of 120 hectares under irrigated conditions in garden lands of Sembanarkoil Block in Mayuram taluk. The market for cavendish is Bangalore and the whole produce is taken to Bangalore. The average annual profit is Rs.6250/- to Rs.7500/- per hectare. Cavendish banana is cultivated under irrigated conditions and hence scientific cultivation is possible in these areas. The duration of the crop is 11 to 12 months when compared to Poovan and Rasathali which take 13 months for maturity. Frequent irrigation can help to reduce the duration to a small extent. Bangalore is the market for cavendish banana, but because of good arrivals from Maharashtra State at a competitive price now-a-days marketing has become a problem for the Thanjavur farmer who cultivates dwarf cavendish. Hence, it is reported that cavendish is being gradually replaced by Neudron for which Kerala State and cities like Madras, Bombay provide good market. In Trichy district, banana cultivated under wet land conditions give a marginal net profit of Rs.3750/- to Rs.5000/- per hectare. This is far higher than that from Padugai bananas. The Central Banana Research Station at Muthurai are conducting a series

of experiments in banana cultivation. It was from this Station that the following two new strains were released:

1. XX Robusta - a semi tall mutant of dwarf cavendish
2. Kanchikala - a culinary variety which can give a bunch weighing upto 40 kg. as against 16 kg. given by local Monthan.

In the wet lands of Tiruvarur, the production of leaves constitute 65% of the total income from bananas. Banana trials here have shown that this can be increased by 35% by adoption of improved cultural and manual practices, besides increasing the fruit yield by 700 kg. per hectare. This will bring an extra profit of Rs.1600/- per hectare over that of local cultivation. On enquiries, it has been found that the pseudo-stem which can be utilised for pulping is available in plenty during the period November-February. On an average, 1500 banana bunches are cut daily during this period. The pseudo-stem of one banana plant will weigh 25 kg. The daily availability will be 25 tonnes of pseudo-stem. The straw of late Kuruvai paddy will be unfit for cattle feed. This will be available in October-November. These waste straw and the pseudo-stem can provide raw material for a paper pulp unit.

2.3.5 Coconut

Coconut occupies the next place to paddy in Thanjavur agriculture. It is grown in an area of 16517 hectares of which only 719 hectares are under irrigated condition. The division-wise area is given below:-

Table-47

Division	Area in hectares
1. Pattukkottai	7098
2. Mannargudi	3382
3. Kumbakonam	2414
4. Nagapattinam	1578
5. Thanjavur	1029
6. Mayuram	1016
	<u>16517</u>

Pattukkottai and Mannargudi are having the maximum area under this crop. There are three nurseries in the district to supply 2 lakh seedlings to be planted in 800 hectares and thus increase the area under coconut plantation. There is one Coconut Research Station at Veppankulam near Pattukkottai engaged in various research programmes connected with coconut cultivation. Scientific cultivation is not practised much in these areas and hence the average yield is only 45 nuts/palm per year. The peak period of production is May-July. Unlike Kerala, there are only six pluckings in an year and ten months old nuts are harvested. This tells upon the keeping quality of the nuts. A large quantity of produce are transported to Madras and marketed there. Because of early harvest, the nuts will have lesser storage quality. There is no coconut oil mill working in the district to extract oil on a commercial

scale. On the other hand, coconuts from Muthupet area are sent to Tuticorin for oil extraction there. Coconut husk is the raw material for coir and allied products. There are two coir mills at Kumbakonam and one at Adirampattinam. Coconut yields should be increased to provide raw materials for the above-said industries.

Present total production @ 45 nuts per tree and 175 trees per hectare	)	126000000 nuts
The husk yield (every 1000 nuts give) 85 kg. husk	)	1500000 kg. husk

Studies conducted at Central Coir Research Institute, Kalavoor reveal that unlike Kerala, in Thanjavur, only dry husk is available. Again the yield of fibre is much less. It is only 85 kg/1000 husks while in Kerala, the green husks give a yield of 100 kg. fibre for every 1000 husks. The yields can be improved by proper manuring and cultivation practices. The package of practices to be adopted is as follows:-

1. Three ploughings in an year at two months interval (July-August; October-November and January-February)
2. Fertiliser application at the following dose:

Nitrogen	-	600 gms/tree
Phosphorous	-	160 gms/tree
Potash	-	600 gms/tree
- These are to be applied as a single dose in October-December.
3. Raising cover crop: Calapagonium muconoides is recommended. The cover crop can be cut and applied just before fertiliser application.
4. Irrigation during the summer months of March-May
5. Plucking 11 months old nuts, instead of the present practice of harvesting 10 months old nuts. All these practices will help to increase the yield

to a level of 70 nuts/tree and the number of pluckings can be increased to 8 or 9. The total expenditure for these operations will be only Rs.6/- per palm.

The net profit by adopting these operations will be Rs.3750/- per hectare. Under the package scheme for coconut development, IADP, Thanjavur has selected a 400 hectare block in Adirampattinam area in 1963-64. The package of practices mentioned were adopted and as a result, 25% increase in yield was recorded. In addition to the above scheme, a loan-cum-subsidy scheme for purchase of fertilisers and chemicals is also functioning. Their rate of loan is given below:-

Rate per acre

- | | | |
|--|----|--|
| i. Those owning one acre or less (100 per cent subsidy) | .. | Rs. 100/- as subsidy |
| ii. Those owning more than one acre and less than 5 acres (50 per cent loan and 50 per cent subsidy) | .. | Rs. 80/- as loan and Rs. 90/- as subsidy |
| iii. Those owning more than 5 acres (100 per cent loan) | .. | Rs. 180/- as loan |

The loans and subsidies are given for the first three years. Long term loans are also given for establishment of new plantations. A sum of Rs.300/- per acre is given. The loan is recoverable from eleventh year onwards in five equal annual instalments. Farmers of Thanjavur district can utilise all these facilities and improve the yields by 75% and thus provide raw materials for coconut based industries.

2.3.6 Cashew

Dry tracts of Thanjavur division has got the major area of cashew plantation in the district. It is also found in small areas in Pattukkottai and Nagapattinam divisions. The division-wise area is given below:

Thanjavur	..	6779 hectares
Nagapattinam	..	241 "
Pattukkottai	..	73 "

Total	..	<u>7093 hectares</u>

The Forest Department maintains a total area of 367 hectares in the reserve forests of Udayamarthandapuram, Puthupattinam, Avanam and Komapuram in the district. The average yields obtained are as follows:-

Nuts	..	187 kg./hectare (250 trees per hectare)
Cashew apple	..	3740 kg./hectare

From 187 kg. nuts, 45 kg. of kernels can be obtained. Thanjavur cashew kernels fetch very good price and hence there is ample potential to increase the income from this produce. Cashew apple can be utilised for making soft drinks like cashew apple syrup as well as hot drinks like cashew wine. It is reported that 60% of juice can be extracted from cashew apple for further processing into drinks. At present, cashew apple is wasted. There is one unit of Cashew Factory known as Tamil Nadu Cashew Factory at Gandarvakottai engaging seventy persons. 30 bags of 80 kg. each is handled every day. The factory works for six months in an year. There are individual families engaged in processing the nuts in small quantities. Factories for

processing nuts on a bigger scale can be started if the present marginal yields are improved. IADP, Thanjavur, suggests the following packages of practices for improving the yields:-

1. The present flowering is January-February. Stirring of soil in June-July will give one more crop in September-October.
 2. Application of fertiliser at the rate of 100:60:0 kg. N P & K per hectare as a single dose in September-October.
 3. Three sprayings with a mixture of one fungicide and an insecticide:
 - (i) 1st spraying - September-October
 - (ii) 2nd spraying - January-February (at the time of flowering)
 - (iii) 3rd spraying - At the second wave of flowering
- There are three consecutive waves of flowerings:
- (i) first wave - 20 days
 - (ii) second wave - 20 days
 - (iii) third wave - 20 days

Rainfall during flowering adversely affects the crop. The harvest period starts by March and continues upto first week of June. It is expected that by the adoption of the above said practices, the yields can be doubled. Moreover, the second crop in September-October can assure supply of nuts for another three months. Thus the factories can work for more number of days in an year.

A new Cropping Pattern for Thanjavur District

As has been mentioned in earlier sections, Thanjavur has got paddy as the only major crop. It occupies 87.3% of the total cultivated area. Cash crops like sugarcane and groundnut totally occupy only 10% of the total cultivated area. Paddy is a food crop and naturally it has less industrial potential. Unless a change is brought about in the existing cropping pattern, a major industrialisation programme for agro-based industries in Thanjavur district cannot be thought of. IADP in Thanjavur has been quite successful in increasing the yields from paddy lands and are hopeful of attaining an annual growth rate of 5 per cent for paddy yields in the coming years. Side by side in Pattukkottai division, a pilot project of multiple cropping scheme is being implemented. The main idea of the scheme is to utilise the rice fallows for cultivation of cash crops like pulses, ragi, groundnut, maize etc. The following is the programme:-

Period of the Project: 1971-74

Total project area : 18,000 hectares in 335 villages of Pattukkottai Division.

<u>Categories</u>	<u>Area in hectares</u>
1) Double crop paddy lands	18,000
2) Single crop lands with medium duration varieties	14,000
3) Single crop paddy ^{lands} with long duration varieties	44,600
4) Garden lands	1,000
5) Dry lands	10,400

[illegible]

- NOTE:-
PADDY IS COMMON IN ALL REGIONS.

Category-I

Existing cropping pattern

(1) Paddy - Paddy - Groundnut and Gingelly	2,000 hectares
(2) Paddy - Paddy - Fallow	16,000 hectares
Total	18,000 "

Proposed Scheme

Paddy - Paddy - Groundnut (CO33 (Ponni) TMV 2 or TMV 7 Karuna) or Pulse crop Baisakhi mung (With available moisture)	5,600 hectares
---	----------------

Category-II

Existing cropping pattern

Paddy - Groundnut - Maize	2,800 hectares
Paddy - Groundnut - Fallow	11,253 hectares
Total	14,053

Proposed Scheme

Paddy - Groundnut - Gingelly Maize or Rai	2,700 hectares
---	----------------

This is to increase the cropping intensity by 25%.

Category-III - Single crop paddy lands

Existing cropping pattern:

Paddy - Gingelly (CO 25)	3,600 hectares
Paddy - Fallow (CO 25)	41,000 "

Proposed scheme

Paddy - Gingelly, groundnut or (Pomni) Baisagi (Green gram) 7,000 hectares

This is to increase the cropping intensity by 21%.

Category-IV - Garden lands

Existing cropping pattern:

Groundnut - Chillies - Fallow 1,000 hectares

Proposed scheme

Groundnut - Chillies (8 ft. spacing) 400 hectares
Maize 1 row maize with
8 row of chillies.

Category-V - Dry lands

Existing cropping pattern

Groundnut - Fallow 10,400 hectares

Proposed Scheme

Groundnut - Gingelly or Horsegram 2,100 hectares

Thus, a total area of 18,700 hectare to be brought under multiple cropping in three years and increase the existing cropping intensity from 126% to 146%.

<u>Year-wise Target</u>	<u>Target in hectares</u>	<u>Achievement in hectares</u>
1st year - 1971-72	6000	4000
2nd year - 1972-73	6000	
3rd year - 1973-74	5000	

Scheme-wise target for 1972-73 is given below:-

	<u>Total</u>	
Scheme-I	2,000 hectares	Paddy-Paddy-Groundnut 1500 hect -do- -do- Gingelly 500 hect

- :100: -

Scheme-II	1000 hectares	Paddy-Groundnut-Gingelly			
					600 hect.
		-do-	-do-	- Maize	200 hect.
		-do-	-do-	Ragi	200 hect.
Scheme-III	2000 hectares	Paddy-Gingelly (Ponni)			1000 hect.
		-do-	Groundnut		800 "
		-do-	Pulses		200 "
Scheme-IV	150 hectares	Groundnut-Chillies			50 "
			Ragi		
		-do-	-Chillies		
			Maize		50 "
		-do-	- Chillies		
			Red-gram		50 "
Scheme-V	850 hectares	Groundnut - Gingelly			
					800 "
		-do-	- Horsegram		50 "

The details pertaining to achievements for 1972-73 were not available at the time of collecting the data. Pattukkottai division was selected because of its special features.

(i) The soils are well drained and are well suited for a variety of crops

(ii) Well developed infrastructure is available in Pattukkottai region.

The successful implementation of the scheme calls for layout of demonstration plots to convince the farmers of its superiority over traditional farming and impress upon them the increased income from such projects. Coimbatore district with its variety of soils and varieties of crops has a well developed economy in

agriculture, well developed agro-based industries like cotton mills, sugar industry, jaggery making and foundries. In Thanjavur district also, there are certain areas which are quite potential for large-scale cultivation of crops like sugarcane, cotton, tapioca, groundnut, mesta, agathi, flowers, etc. Hence, based on the survey conducted in agricultural sector of the district, the following cropping pattern is suggested with the idea of industrial development of the region. In preparing the scheme, maximum care has been taken to avoid any substantial reduction in area and production of paddy. Pattukkottai taluk is the best area for growing commercial crops. Hence a changed cropping pattern to include sugarcane, mesta and agathi is suggested.

I. West Thanjavur

Table-48 gives the newly suggested cropping pattern for the four Panchayat Unions of Pattukkottai, Peravurani, Sethubavachatram and Madukkur. If this can be achieved, this area will become the main industrial belt of Thanjavur district. Table-49 gives the comparisons of area and production of important crops in the existing cropping pattern with that of the new cropping pattern suggested.

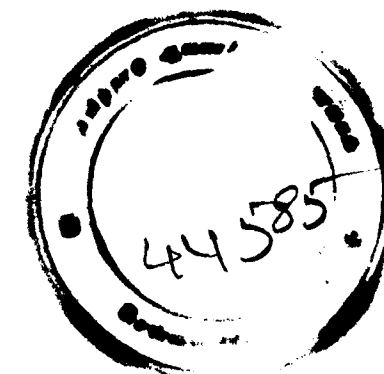


TABLE-48

I - West Thanjavur

Sl. No.	Name of Panchayat Union	Existing Cropping Pattern	Cost of Cultivation	Net Income	New Cropping Pattern	Expected cost of cultivation	Anticipated net Profit
1.	Pattulakottai Peravurani Sethubavachatram Madakkur	<u>Wet lands</u> 1. Paddy - Paddy - fallow or pulses 2. Paddy - Groundnut - fallow or maize	2290 2283 or 3083	2513 (1) 2608 (2) or 3908	Paddy-paddy-Chillies Maize Sugarcane 2 years and Paddy-paddy-groundnut 1 year	3090 8000 <u>2762</u> <u>10762</u> for 3 years	6000 10000 <u>4138</u> <u>14138</u> for 3 years
		<u>Garden Lands</u> 1. Groundnut-Chillies	1938	2000			
		<u>Dry lands</u> Groundnut - fallow	1938	938 (3)	Mesta-groundnut (shortduration)	1938	1938
		Coconut		2000 (4)	Coconut-inter cropped with Agathi	1200	4000

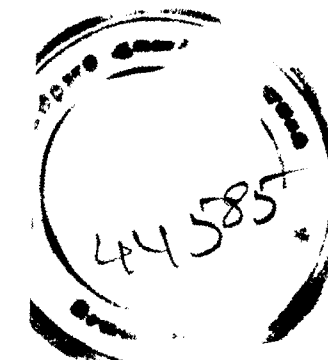


Table-49

Sl. Crop No.	Existing area in hect.	Cropping pattern Production in tonnes	New Cropping Pattern Area in hectares	Production in tonnes
1 Paddy	66,223 (Gross)	1,74,974	10,000 (in rotation 1)	60,000 (at 3 T/hect per season)
			35,000 (in rotation 2)	140,000 (at 4 T/hect)
			(Once in 3 yrs.)	(Once in 3 years)
2 Maize	741	800 (approx.)	10,000 (in rotation 1)	30,000 (at 3 T/hect)
3 Chillies	435	450 (approx.)	10,000 (in rotation 1)	10,000 (at 1 T/hect)
4 Sugarcane	39	3900 (approx.)	35,000 (in rotation 2)	3,500,000 (100 T./hect)
			Twice in 3 yrs.	Twice in 3 yrs.
5 Groundnut	1123	17834	35,000 (once in 3 yrs.)	35,000 (1 to./hect. once in 3 yrs)
6. Mesta	-	-	10,000 (in rotation 3)	10,000 dry fibre (1 tonne dry fibre/hect.)
7 Agathi	-	-	4,000	8,000 (once in 2 yrs)
8 Coconut	4167	14583	4,165	4,165,000

In the new cropping pattern, the peak seasons of activity will be as follows:

	Sowing and Planting	Harvest
Paddy - Kuruvai	May - June	Sept. - October
Samba	July - August	Jan. - February
Thaladi	Oct. - November	Jan. - February
Sugarcane	Nov. - January	Feb. - March
Maize	Jan. - February	April - May
Groundnut in rice fallows (TMV2, TMV7 or POLI)	Jan. - February	May - June
Groundnut in Mesta area (TMV 10)	Nov. - Dec.	April - May
Mesta	May - June	October-November

Since mesta is a new introduction for large-scale cultivation, a pilot project of 100 acres cultivation may be introduced in any of the villages now under multiple cropping scheme. It is suggested that mesta is tried in the garden lands where now the rotation is groundnut chillies. Since mesta crop is only six months' duration and can be grown under rain fed conditions also, its cultivation can be extended to dry land areas where the present cropping is groundnut alone. In dry lands, deep water wells have to be sunk to provide irrigation for the succeeding groundnut crop after mesta as is suggested in the new cropping pattern. Two seed farms should be started in Pattukkottai and Madukkur to supply seeds for large scale cultivation. A brief note on the agronomical aspects of mesta crop is given below. Mesta is traditionally grown for fibre, which is a close substitut

for jute. This crop being versatile in its adaptability can be cultivated in a wide range of soils. In Africa, Europe and American Countries, mesta is now cultivated for providing raw material for paper production. It is in this role that mesta appears to hold much promise. In Tamil Nadu, trials were conducted in 1971 with mesta and it was found that AMV-1, a strain evolved at Mesta Research Station at Amadla valasa in Andhra Pradesh has grown upto a height of 12 feet which is a fairly good growth. Even now, mesta is cultivated in all districts of Tamil Nadu for domestic requirements of ropes and for the sake of leaves for culinary purposes.

Varieties: There are two species of mesta under cultivation:

- (i) Hibiscus Cannabinus (Kenaf)
- (ii) Hibiscus Sabdariffa (Roselle)

Hibiscus Cannabinus varieties which when sown in June comes to harvest by October. A subsequent crop can be taken as a winter crop. Hibiscus Sabdariffa is a very hardy crop which can withstand prolonged drought and therefore is preferred as a pure rainfed crop.

Season Both species can be sown in April-May to get maximum yields under irrigated conditions. Under rainfed conditions, it is sown during the last week of June. Hibiscus Sabdariffa can also be grown in the off-season between January-August if irrigation is possible. Therefore the following strains can be grown under the conditions shown below:-

(i) For April-May sowing	- Hibiscus Cannabinus EC 583 or AMC 108	can be harvested in October and a winter crop can be taken.
(ii) For June sowing (under irrigated conditions)	- Hibiscus Sabdariffa AMV-1	can be harvested in October.
(iii) For rice fallows Jan.-Feb. sowing	- AMV-1	Can be harvested in July-August.

Cultivation for the three seasons is the same, except that irrigation is an additional requirement. Varieties AMV-1 (Hibiscus Sabdariffa) and AMC 108 (Hibiscus Cannabinus) are the most suitable varieties for getting largest dry matter per hectare and hence best for paper making.

Cultivation details:

1. Pre-sowing: The land has to be ploughed repeatedly 3 to 4 times to bring it into fine tilth free from clods. With the last ploughing superphosphate at 40 kg. P_2O_5 and MOP at 40 kg. K_2O per hectare has to be incorporated along with 20 kg. N as Ammonium Sulphate. The sowing can be done either by broadcast method or by seed drill. If the latter method is to be adopted, the distance between row to row must be 30 cms. The seed rate for broadcast crop will be 10 kg. for Hibiscus Sabdariffa and 15 kg. for Hibiscus Cannabinus.

2. Post-sowing: The field has to be weeded and hoed after 20 days and again after an interval of 20 to 30 days to keep the plots free from weeds. Thinning has

to be done at the time of first weeding to give a spacing of 10 cms. from plant to plant. A top dressing of Ammonium Sulphate one month after planting at 20 N has to be given (100 kg. per hectare).

3. Harvesting: The harvesting has to be done when the plants are in greenpod stage in the case of Hibiscus Cannabinus and at 50% flowering stage in Hibiscus Sabdariffa. The plants have to be cut at ground level and the plant left in the field for two or three days to shed their leaves. This can be done ^{or} even when the soil is dry. There is a second method/harvest, which is uprooting the whole plant. This is done when there is sufficient moisture in the soil. The advantages of uprooting are that the root ends also give fibres which add to the total fibre yield and the farmer gains to that extent. Uprooting helps in loosening up the soil and the sowing of the next crop is made easy. Later, they are bundled into 20 cms. to 30 cms. diameter bundles and taken to retting tanks. Along with each bundle of mesta sticks, a few plants of either sunhemp or dincha may be bound up as it will hasten retting. Bundles are kept erect in water for 3 to 4 days and later laid flat at a platform and weighed down with stones so as to keep the sticks submerged completely under water. Retting will be completed in 12 to 15 days and the fibre has to be extracted and dried.

4. Retting: Retting is a process which is the result of the action of micro organisms in the presence of water. During this process, the fibres located in

the bark get freed from the other adjacent tissues as the pectins, gums and other miscellaneous matter get removed. The bundles of "Mesta" are taken to the tanks and arranged at a platform in the water by placing the bundles side by side. This platform is then covered up with some green matter like paddy straw banana leaves, etc. if readily available, otherwise no covering is used. The platform is weighed down by the placement of the clods of earth, logs or stones. But the majority of the growers use only clods of earth as it is readily available. When there is pressure on space, two to three layers of the bundles are arranged on platforms one over the other, but the sticks in the layers being at right angles to the ones in the adjacent layers. After two or three days, the platform sinks down due to absorption of water by the plant tissues. The retting "process" is complete when the fibre tissues come off the stem as a continuous ribbon without breaking and without much effort. The duration of retting depends on many factors; chief among them are the temperature and the pH of water. During the hotter months, the process is very much hastened up and in the cold season it is delayed. Either too high or too low a pH will retard retting. The pH which is conducive for the growth and multiplication of micro organism is ideal for retting. The process can be hastened by providing substances like Ammonium Sulphate and Bone meal, which stimulate the growth of micro organisms. Retting is also quicker if the bundles are of a depth of 6" to 9" below the water surface. The mesta sticks are not of uniform

thickness, the basal portions being thicker and more woody compared to the tops. Hence the process of retting will be quicker in the top region than in the lower portions. Therefore, it would be necessary that in order to have uniform retting, the low-portions should be given an earlier start. For this purpose, the sticks should be kept erect in the water for 4 to 5 days and put horizontally. This will enable the lower stems to ret properly having an earlier start. This operation known as half steeping is essential to avoid over retting of the top portion which is common when the whole stem is immersed. By half steeping, the quality of the fibre improve considerably as the ribbon of fibre is of union strength throughout its length.

5. Fibre Extraction: After the retting is complete (the stage when the retting is complete is judged by the ~~case~~ with which the bark separates from the wood) fibre is extracted. Considerabl ~~care and~~ experience is required to find out the proper stage. Fibre is extracted from the sticks by pulling out the fibre by hand. Mostly women undertake this work. The bundles are brought to the bank. The women sitting on the ground take a handful of sticks each time and remove the fibre from each of the stick at the bottom and after collecting all the ends, jerk off the fibre from all the sticks collectively. The fibre, thus, collected is washed in water by men labourers and then dried on ground. As the washing and drying have to be completed by the evening, the

extraction is done usually in the mornings. But this method is inherent with certain defects. While jerking the fibre collectively, some fibre remain sticking to the wood. As the extraction is done on ground, the fibre is not clean. The wages for extracting the fibre is paid on exchange basis, i.e. the labourers take the sticks in exchange for the fibre extracted and the labourers do not bestow much attention for clean extraction; they are more in a hurry to collect as many sticks as possible, without much caring for proper extraction of the fibres. For proper production, the plants after harvesting are to be left in the field for 3 to 4 days to permit the shedding of leaves and also drying so that the moisture is lost and the weight is reduced which facilitates easier transport. The plants can be bundled up before transporting.

6. Yields: Mesta being a rainfed crop and as the cultivators are poor and do not supply any fertiliser to the crop, the average yield of fibre per acre is round about 400 kg. only. However, with adequate fertiliser application, double the yields, i.e. 800 kg./acre have been obtained in most of the demonstration plots and on large scale areas of over 5 acres in farmers' holdings. As regards dry matter (air dry basis) yield upto 15 quintals per acre are expected normally but 30 quintals per acre can be possible with irrigation and adequate manuring.

The dry matter yields can reach 10 tonnes per acre. The seed yields have ranged between 100 kg to 150 kg. per acre. This crop has been developed with special emphasis on the vegetative growth rather than on seed production and hence the seed yield is low compared to other crops. (Literature collected from Shri Appa Rao, P., Plant Breeder, Mesta Research Station, Amadala valasa P.O., Andhra Pradesh).

III. Avadayarkoil and Aranthangi:

Aranthangi taluk is essentially a dry taluk receiving only 900 mm rainfall in an year. Major portion of paddy area is single crop wet lands covering an area of 29563 hectares. Second crop is taken only in 4,556 hectares in Aranthangi Panchayat Union area. Deep borewells can be dug in this taluk to provide irrigation facilities. According to available figures, a total of 757 borewells can be dug in the firkas of Attani, Arasargulam and Aranthangi. This can irrigate an area of 7,570 hectares of land. Based on this information, the following cropping pattern is suggested.

	<u>Area in hectares</u>
I Paddy-paddy-pulses ..	20,000 hectares
II Sugarcane for 2 years and 1 year under paddy-paddy-groundnut ..	9,000
III Mesta - Cotton (Rainfed) (Irrigated) ..	5,000

Tables-50 and 51 give a comparison of the existing area and production and the anticipated area and production in the new cropping pattern and the economics.

TABLE-50

-:112:-

II. AV/DYARKOIL AND ARANTHANGI

Existing Cropping Pattern	Cost of Cultivation	Net Income	New Cropping Pattern	Expected cost of production	Anticipated net profit
1) Paddy - Paddy - Fallow or Maize	936	1005	(i) Paddy-Paddy-Pulses	936	1005
2) Groundnut - Fallow	375	375	(ii) Sugarcane (for two years) Paddy-Paddy-Groundnut (for one year)	8000+ 2762	10000+ 4138
				<u>10762</u> for three years	<u>14138</u> for three years
			(iii) Mesta - Cotton (Irrigated)	2600	2000

Table-51

Sl. No.	Existing Cropping Pattern		Anticipated new cropping pattern		
	Crop	Area in hectares	Production in tonnes	Area in hectares	Production in tonnes
1	Paddy	35955	88669	20000 (All H.Y. varieties)	70000 (3.5 tonnes/hectare)
				9000 (once in three years)	45000 (once in three years)
2	Sugarcane	-	-	9000 (Twice in every 3 years)	900000 tonnes cane (Thrice in 3 years)
3	Groundnut	6050	3278	9000 (once in three years)	9000 (at 100 kg./hectare) (Once in three years)
4	Cotton	-	-	5000	4000 (at 800 kg./hectare)
5	Mesta	-	-	5000	5000 (1000 kg./hectare)
6	Pulses	-	-	20000	10000 (500 kg./hectare)

Cotton, sugarcane and mesta are commercial crops which can provide raw materials for the cotton ginning unit, sugar mill and paper mill.

III. Thanjavur and Orathanad Taluks

Thanjavur and Orathanad taluks have large areas under dry and garden lands. Here, the irrigation facilities can be improved by digging more number of deep bore-wells. 17,193 wells can be sunk additionally in these two taluks to irrigate an area of 1,71,930 hectares. This area can be converted into a centre for production of commercial crops to provide raw materials for agro-based industries. The following tables (Table-52 and 53) give a comparison of area and production of different crops and the economics under existing cropping pattern and the new cropping pattern.

IV. Kumbakonam, Tirupanandal, Tiruvidaimarudur, Papanasam, Ammapet, Valangaiman

The changed cropping pattern can change the present mono-crop system into multiple cropping system to produce industrial raw materials. The following tables (Table-54 and 55) give a comparison of the existing area and production with the new cropping system and the economics in each pattern.

TABLE-53

Sl. Crop No.	Existing Cropping Pattern Area in hectares	Production in tonnes/annum	Proposed Cropping Pattern Area in hectares	Production in tonnes per annum
1. Paddy	95135	225823	(i) 25000 (in rotation 1) (ii) 30000 (in rotation 2) (iii) 4000 (in rotation 3) (iv) 4000 (in rotation 4)	100000 (at 4 tonnes/hect.) 120000 (Once in 3 years) 16000 16000 132000 every year 120000 once in three years. 3000000 (twice in 3 yrs.)
2. Sugarcane	1101	87120	30000 (twice in 3 yrs)	
3. Groundnut	16549	27578	25000 (in rotation 1) 30000 (in rotation 2) (Once in 3 years) 4000 (in rotation 4) 5000 (in rotation 5) 6000 (in cashew plantations)	25000 30000 4000 5000 6000 70000 (of which 30000 is once in three years)

/contd..../

--:117:-

Table-53 contd...

4. Maize	5724	1831	4000 (in rotation 4)	8000
5. Varagu	8839	117380	2000	1500
6. Cotton	-	-	4000 (in rotation 3)	2400
7. Tapioca	58	N.A.	5000 (in rotation 5)	3000
			500 (in Padugai)	150000 (at 30 tonnes/hect.)
8. Pulses	2944	3235	4000 (in rotation 3)	4000
9. Cashew	6779	1220 (187 kg/hect.)	6779	2934 (at 300 kg/hect.)
10. Coconut	983	6881000 (175 tonnes/hect.) 7000 nuts/hect.	983	9830000 (at 1000 nuts/hect.)
11. Agathi	-	-	900	1800 (once in two years) (2 tonnes/hectare)

Table-54

Sl. No.	Existing Cropping Pattern	Cost of cultivation Rs./hect.	Net Income Rs. per hect.	New Cropping Pattern	Expected cost of cultivation Rs./hect.	Anticipated net profit Rs./hect.
1.	Paddy-Paddy-Pulse Black-gram Green-gram	2290	2513	1. Paddy-Paddy-Pulses	2290	2513
				2. Sugarcane for two years and one year paddy-paddy-sunflower	8000 2400	20000 2700
					1024000 (for 3 yrs.)	22700 (for 3 yrs.)
				3. Groundnut-cotton-maize with red gram	3937	3937
				4. Coconut intercropped with Agathi	1200	4000
				5. Padugai banana intercropped with tapioca	1600	4000
				6. Groundnut-cotton-sun flower	3437	4000

Table-55

Sl. Crop No.	Existing Cropping pattern		Proposed cropping pattern	
	Area in hectares	Production Tonnes/annum	Area in hectares	Production tonnes/annum
1. Paddy	104000	N.A.	32000 (in rotation 1) 30000 (in rotation 2)	224000 210000 (Once in three years) 2400000 (Thrice every three years)
2. Sugarcane	3601	270075 (Approx.)	30000 (Twice every 3 years in rotation 1)	
3. Groundnut	1648	1648 (Approx.)	2000 (in rotation 3)	2000
4. Sunflower	-	-	2000 (in rotation 6) 30000 (in rotation 2) (once in three years) 2000 (in rotation 6)	2000 42500 (Once in 3 yrs) 2500
5. Cotton	small area		4000	2400 (Kapas)
6. Pulses	3593	N.A.	32000 (in rotation 1) 2000 (in rotation 3)	16000 1000
7. Maize	324	160 (approx.)	2000	3000
8. Tapioca	14	N.A.	2000 (In Padugai Bananas)	40000 (20 tonnes per hect. approx.)

contd....

Table-55 contd...

9.	Agathi	-	-	2000 (in coconut gardens)	4000 (once in two years)
10.	Banana	2418	N.A.	2418	3627000 bunches (1500 bunches per hect.)
11.	Coconut	2414	16898000 (175 trees/ hect. average of 7000 nuts per hectare)	2414 Average 175 trees/hect. 10000 nuts/hect.	24140000

V. East Thanjavur

1- Mannargudi, Kottur, Nidamangalam

<u>Existing Cropping Pattern</u>	<u>Suggested Cropping Pattern</u>
1 Paddy - Paddy - Greengram	1. Paddy - Paddy -Pulses
Paddy - Paddy - Blackgram	2. Sugarcane for two years and Paddy-paddy-groundnut for one year.
Paddy - Groundnut (Samba)	3. Sunflower-paddy-maize
Paddy - paddy - maize.	4. Coconut garden inter- cropped with Agathi
	5. Mesta - groundnut
	6. Padugai bananas inter- cropped with tapioca

The following table-56 gives a comparison of the existing cropping area, yield and the expected area and yield of each crop in the suggested cropping pattern:-

Table-56

Sl. No.	Crop	Existing Cropping Pattern		New Cropping Pattern	
		Area in hectare	Production in tonnes	Area in hectares	Production in tonnes
1.	Paddy	106333	297892	50000 (in rotation 4) 30000 (in rotation) 20000 (in rotation 3)	400000 240000 (Once in three years) 80000
2.	Sugarcane	2058	N.A.	30000 (twice in 3 yrs.)	3000000 (thrice in 3 years)
3.	Sunflower	-	-	20000 (in rotation 3)	30000
4.	Groundnut	2280	4081	5000 (in rotation 5) 30000 (in rotation 3) (once in 3 years)	7500 45000
5.	Maize	45	184	20000 (in rotation 3)	30000
6.	Pulses	2187	11282	50000 (in rotation 1)	25000
7.	Mesta	-	-	5000 (in rotation 5)	5000 dry fibre
8.	Agathi	-	-	777	1554 (once in every two years).
9.	Tapioca	-	-	100	3000

-:12:-

TABLE-57

VI. VEDARANIYAM, MUTHUPET, THALANAYAR,
TIRUTHULLAIPOONDI.

Existing Cropping Pattern	Cost of Cultivation Rs./hect.	Net Profit Rs./hect.	Suggested Cropping Pattern	Cost of Cultivation Rs./hect.	Net Profit Rs./hect.
1. Paddy - Paddy - Fallow	2250	2113	1. Paddy - Paddy - Pulses	2290	2513
2. Paddy - groundnut	2283	2608	2. Jute - Paddy	3000	3000
3. Odu paddy in waterlogged areas	N.A.	N.A.	3. Coconut intercropped with Agathi	1200	4000
4. Coconut					
5. Tobacco					

VI. Vedaranyam, Muthupet, Thalanayar,
Thiruthuraipoondi

New cropping pattern suggested is only to include jute in odu paddy area and intercropping coconut with Agathi for supply of raw material for paper mill. Table-57 and Table-58 give a comparison of the existing area and production with the new cropping system and the economics in each pattern.

Table-58

Sl. No.	Crop	Existing Cropping Pattern		New Cropping Pattern	
		Area in hectares	Production in tonnes	Area in hectares	Production in tonnes
1.	Paddy	68850	N.A.	20000 (Net) (in rotation 1) (3 tonnes per hect. per season)	120000
				30000 (in rotation 2) (3 tonnes per hect.)	90000
2.	Jute	-	-	30000	48000 (1600 kg./ hect.)
3.	Agathi	-	-	3000	6000 (2 tonnes per hect.)
4.	Pulses	-	-	20000	10000 (500 kg per hectare)

Table-59

VII. KIVALUR, TIRUVARUR AND NAGAPATTINAM

Existing Cropping Pattern	Cost of Cultivation Rs./hect.	Net Profit Rs./hect.	New Cropping Pattern	Cost of Cultivation Rs./hect.	Net Profit Rs./hect.
1. Paddy-Fallow	1000	1000	1. Paddy-Paddy-Cotton	3315	3668
2. Paddy-Paddy-Fallow	2200	2113	2. Jute-Paddy-Fulses	3100	4250
3. Paddy-Fulses	1018	1278	3. Cotton intercropped with Jathri	1200	4000
4. Coconut (650)	-	-			

VII. KIVALUR, TIRUVARUR AND NAGAPATTINAM

These Panchayat Unions have only paddy, especially the long duration Samba paddy as the main crop. In the new cropping pattern, jute and cotton are the two crops suggested. Agathi can be raised as intercrop in coconut gardens. Table-59 and Table-60 give the comparison of area and production of the existing cropping pattern with that of the new one.

Table-60

Sl. No.	Crop	Existing Cropping Pattern		New Cropping Pattern	
		Area in hectares	Production in tonnes	Area in hectares	Production in tonnes
1.	Paddy	44309	N.A.	12000 (in rotation 1) per hect. per season)	72000 (at 3 tonne per hect.)
				20000 (in rotation 2) per hect.)	80000 (at 4 tonne per hect.)
2.	Cotton	-	-	10000 (in rotation 1)	6000 (Kapas)
3.	Jute	-	-	20000 (in rotation 2)	32000 (1600 kg. per hect.)
4.	Agathi	-	-	650	1300
5.	Coconut	650	N.A.	650	6500000 nuts (10000 nuts/ hect.)
6.	Pulses	6905	N.A.	10000 (in rotation 1)	5000 (500 kg. per hect.)

--:126:--

Table-61

VIII. NANNILAM, KODAVASAL,
CIRUMARUGAL AND KOLADACCHERI

Existing Cropping Pattern	Cost of Cultivation Rs./hect.	Net Profit Rs./hect.	New Cropping Pattern suggested	Cost of Cultivation Rs./hect.	Net Profit Rs./hect.
1. Paddy-paddy-fallow	2200	2113	1. Paddy-paddy-cotton	3315	3668
2. Paddy-pulses	1018	1278	2. Jute-paddy-pulses	3100	4250
			3. Agathi as intercrop in coconut plantations	1200	4000

VIII. NANNILAM, KODAVASAL, TIRUMARUGAL AND
KORADACHERI

Main crop being paddy in the existing cropping pattern, cotton, jute and agathi are the new introductions suggested. The tables (table No.61 and table-62) give the comparison of the present and newly suggested cropping pattern:

Table-62

Sl. No.	Crop	Existing Cropping pattern		New Cropping pattern	
		Area in hectares	Production in tonnes	Area in hectares	Production in tonnes
1.	Paddy	66219	N.A.	18000 (in rotation 1)	108000 (3 tonnes per hect. per season)
				30000 (in rotation 2)	120000 (3 tonnes per hect. per season)
2.	Cotton	-	-	18000 (in rotation 1)	10800 (600 kg. per hect. Kapas)
3.	Jute	-	-	30000 (in rotation 2)	48000 (1600 kg. per hect.)
4.	Pulses	6065	N.A.	30000 (in rotation 2)	15000 (500 kg. per hect.)
5.	Agathi	-	-	1200 (in coconut plantation)	(2 tonnes per hect. Once in two years)

TABLE-63

-:128:-

IX. MUTTALAM, MAYURAM, SENGUNURNOIL,
SIRKALI AND KOLLIDAM

Existing Cropping Pattern	Cost of Cultivation Rs./hect.	Net Profit Rs./hect.	New Cropping Pattern suggested	Cost of Cultivation Rs./hect.	Net Profit Rs./hect.
1. Paddy-paddy-pulses	2290	2513	1. Paddy-paddy-pulses and sunflower	2290	2513
2. Paddy-paddy-cotton	3315	3668	2. Paddy-paddy-cotton	3315	3668
3. Paddy-paddy-groundnut	3418	3220	3. Jute-paddy-groundnut	3937	5000
4. Paddy-groundnut	2283	2608	4. Banana intercropped with tapioca	1600	4000
			5. Coconut intercropped with Agathi	1200	4000

IX. KUTALAM, MAYURAM, SEMBANARKOIL, SIRKALI
AND KOLLIDAM.

This area is highly productive with paddy and pulses giving good yield. In the new cropping pattern, jute sunflower, and Agathi are the only new crops suggested. The following table gives the comparison of the area and production in the two schemes.

Table-64

Sl. No.	Crop	Existing Cropping Pattern		New Cropping Pattern	
		Area in hectares	Production in tonnes	Area in hectares	Production in tonnes
1.	Paddy	94280	376129	30000 (in rotation 2)	180000 (3 tonnes per hect. per season)
				45000 (in rotation 3)	180000 (4 tonnes per hect.)
2.	Cotton	-	-	45000 (in rotation 3)	72000 (1600 kg./hect.)
3.	Pulses	7433	3716	15000 (in rotation 1)	7500 (500 kg. per hect.)
4.	Sunflower	-	-	5000 (in rotation 1)	5000 (1000 kg. per hect.)
5.	Cotton	22	N.A.	10000	6000 kapas (600 kg./hect.)
6.	Tapioca	-	-	500 (as inter-crop with banana)	1500 (30 tonnes per hect.)
7.	Agathi	-	-	700 (as inter-crop in coconut garden)	1400 (once in two years) (2 tonnes/hect.)

The district as a whole can be thus divided into three major zones:

- I. Sugarcane-Paddy zone
- II. Jute-Paddy and Paddy-Paddy-Cotton zone
- III. Paddy-Groundnut, Groundnut-Mesta and Mesta-Cotton zone.

Sugarcane-Paddy Zone:

Panchayat Unions in the zone are:

Pattukkottai, Peravurani, Sethubavachatram, Madukkur, Aranthangi, Avadayar koil, Thanjavur, Thiruvaiyaru, Budalur, Tiruvonam, Orthanad, Kumbakonam, Tiruppanandai, Tiruvidaimarudur, Papanasam, Ammapet, Valangaiman, Mannargudi, Kottur, Nidamangalam.

- (i) Total area under sugarcane - 134,000 hectares
- (ii) Paddy I - 146,000 (every year) + 134,000 (once in 3 years)
- (iii) Paddy II - 161,000 (every year) + 134,000 (once in 3 years)
- (iv) Cotton - 4,000 in Kumbakonam division

Jute-Paddy zone and Paddy-Paddy-Cotton zone:

Panchayat Unions

Vedaranyam, Muthupet, Thalanayar, Tiruthuraipoondi, Nagapattinam, Kivalur, Tiruvarur, Nannilam, Kodavasal, Tirumargal, Koradacheri, Kuttalam, Mayuran, Sembanar-koil, Sirkali, Kollidam.

- Jute - 125,000 hectares
- Paddy I - 80,000 hectares
- Paddy II - 205,000 hectares
- Cotton - 38,000 hectares

Paddy-Groundnut, Groundnut-Mesta, and Groundnut-Cotton Zone

Panchayat Unions

Pattukkottai, Peravurani, Sethubavachatram, Madukkur, Aranthangi, Avadayarkoil, Thanjavur, Thiruvaiyaru, Budalur, Tiruvonam, Orathanad, Kumbakonam, Tiruppanandal, Tiruvidaimarudur, Papanasan, Annupet, Valangaiman, Mannargudi, Kottur, Nidamangalam.

i) Groundnut in rice fallows	- 133,000 hectares
" in garden lands	- 24,000 hectares
" dry lands	- 6,000 hectares
ii) Mesta - in rotation with groundnut	- 15,000 hectares
Mesta - in rotation with cotton	- 5,000 hectares
iii) Cotton in rotation with Mesta-	5,000 hectares
" in rotation with groundnut	- 4,000 hectares

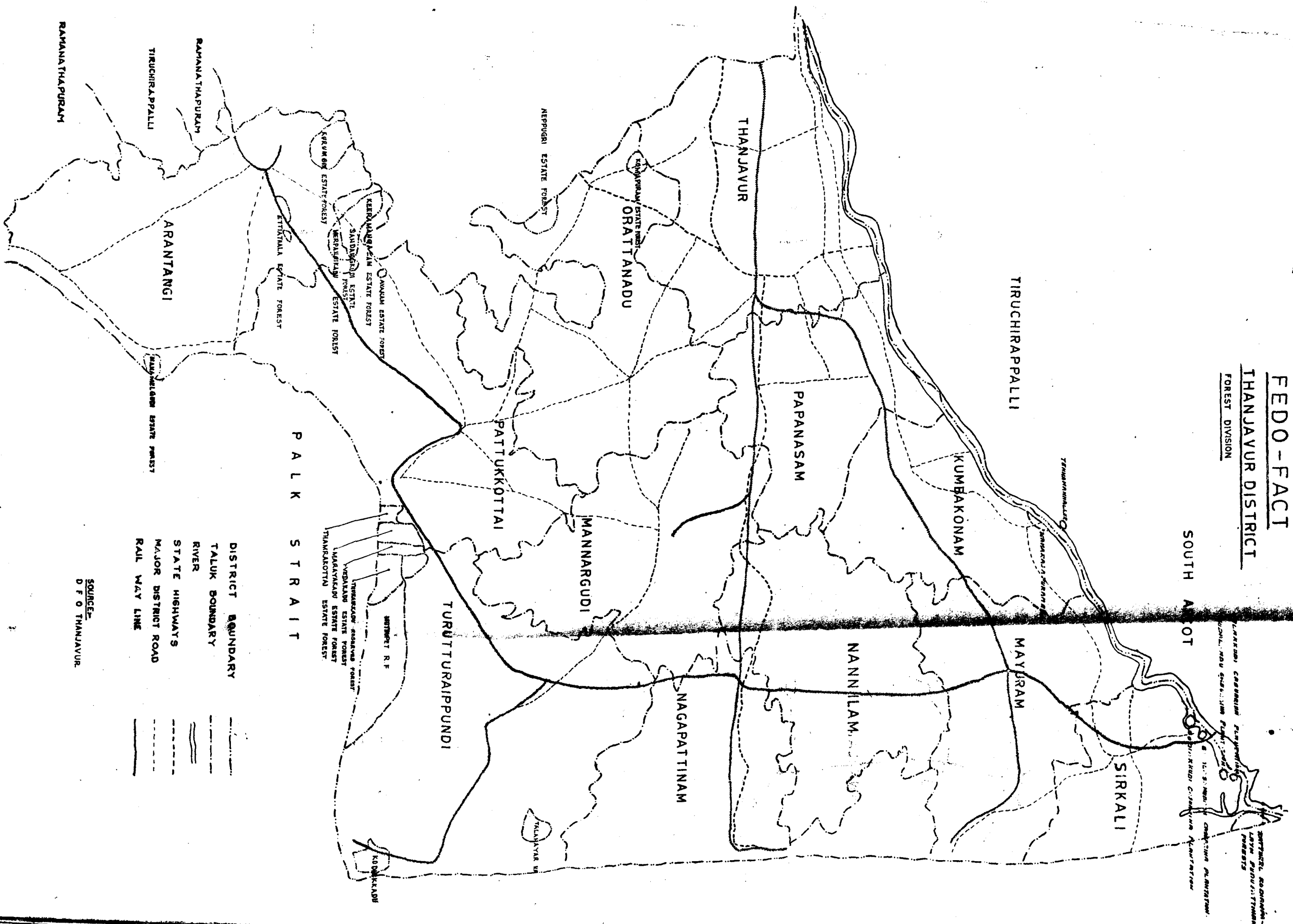
2.5

Forestry

Thanjavur has got only a small area under forests. The area is 23,297 hectares. It is only 2.1% of the total area of the district. Major portion of the forest area is situated in patches along the coast near Vedaranyam. There is no contiguous area of forest as is seen in the map. The forest lands are divided into four groups, viz.

- (i) Reserve forests
- (ii) Reserve lands
- (iii) Ex-zamindari forests and
- (iv) Canal bank plantations.

THANJAVUR DISTRICT
FOREST DIVISION



The following table gives the area-wise details of these classifications:

Table-65

I. Reserve Forest

Sl. No.	Name	Crop	Area in hectares
1.	Kodiakadu	No crops Swamp area affected by sea water incursion	1,844
2.	Thalanayar	-do-	1,236
3.	Muthupet	-do-	6,803
4.	Thuraikadu	-do-	2,636
5.	Kodianpalayam	-do-	74
6.	Avanam	Cashew	36
7.	Udayamarthanda- puram	Cashew	36
8.	Puthupattinam	Cashew in some parts with swamp in other parts	45
9.	Vadakkadu	Swamps with mangrooves	320
10.	Thamarankottai	-do-	530
11.	Nagavelly	Riverbed and water- logged area	39
12.	Komapuram	Cashew	236
13.	Mudalai madu	Casuarina	51
Total			12,885

/contd.../

II. Reserve lands		Area in hectares
1. Alakkudu	Casuarina	183
2. Kattur	Casuarina and some swamp area	109
3. Neppugai	Cashew	387
4. Ettiathalai	Cashew	88
5. Gopalsamudram	Casuarina	171
6. Sodiakudi	Casuarina	107
7. Maravakudi	Swamp with Mangrooves	1,680
Total		<u>2,725</u>
III. Ex-zarindari Forests -		1,705
IV. Canal Bank Plantations -		4,363

The following four types of soils are found in these lands:

Alluvial soil
 Red Ferrugineous soil,
 Regar (black soil), and
 Arenaceous soil.

The average rainfall is 1160 mm of which 65 to 70% is received during the North-East Monsoon period (October-December). The rest is received during South-West Monsoon period and as thundershowers in March-June. Important forest crops of the district are:

- (i) Casuarina
- (ii) Cashew
- (iii) Eucalyptus and
- (iv) Mangrooves.

Except cashew, all the other trees are used as fuel. Cashew nuts are sold every year. In swamps, fishing is practised.

Wild Life Sanctuary: Government has notified an area of 1,844 heotares of Kodaikadu reserve forests and its extension as Point Calimer Wild Life Sanctuary. The animals in this sanctuary are Indian Antelope, Cheeta, Jackal, Wild Pigs and Monkeys.

The revenue from these forests is mainly by sale of casuarina and mangroves for fuel purpose and cashewnuts from the cashew areas. The table given below (Table-66) shows the annual receipts for the period from 1956-57 to 1968-69 from the three main sources of income. From the table, it is seen that casuarina fetches a regular income. Cashew plantations have started yielding from 1963-64 onwards and the income from this source is gradually increasing. Forest Department have got the following programmes being implemented under the twelve year prospective plan.

--:135:--

Table-66

Year	Cashew			Casuarina			Mangrove			Total Receipts Rs.
	Area in hectares	Yield in kg.	Revenue realised	Area in hectares	Yield in Tons	Revenue realised	Area in hectares	Yield in Tons	Revenue realised	
1956-57	-	-	-	-	-	-	-	-	-	-
1957-58	-	-	-	10.40	420	12000.00	410.20	600	14898.00	26898.
1958-59	-	-	-	13.10	440	21200.00	246.10	1210	28575.00	49775.
1959-60	-	-	-	22.80	657	40402.00	263.60	1108	22785.00	63187.
1960-61	-	-	-	18.80	419	29821.00	223.20	483	8346.00	38167.
1961-62	-	-	-	50.89	481	91646.00	247.86	525	11214.00	102887.
1962-63	-	-	-	13.34	113	4015.00	110.88	216	3356.00	7371.
1963-64	113.33	190.45	316.00	17.60	480	24290.00	45.20	510	9455.00	33745.
1964-65	130.33	362.00	1355.00	4.00	121	6000.00	-	-	-	7355.
1965-66	214.05	352.00	1920.00	14.00	285	16100.00	-	-	-	18020.
1966-67	295.19	4943.00	3765.00	12.60	240	19425.00	11.40	108	1301.00	24431.
1967-68	347.66	3612.00	4016.00	23.40	295	20605.00	10.00	134	1805.00	36426.
1968-69	367.66	7417.00	13953.00	18.18	500	35010.00	-	-	-	48963.

Table-67

Sl. No.	Name of Scheme	Area planted upto 1971-72 in hectares	Amount spent in 1971-72 (Rs. lakhs)
1.	Scheme for raising plantations under village forests	690.00	1.63
2.	Raising casuarina plantations	317.76	1.53
3.	Raising plantations along river, canal and lake fringes	565.70	2.53
4.	Raising cashew plantations	994.00	5.40
Total		2567.45	12.09

The detailed programmes of the above-said schemes are as follows:

I - Scheme for raising plantations under village forests

This was a novel scheme called farm forestry introduced in Thanjavur district during the year 1966-67, as a third five year plan scheme. The idea was to convert village promboke lands and tank beds into compact forests so as to increase the resources of fuel, small timber, fodder and green manures. This is a popular scheme in Thanjavur district because even before its introduction, most of the farmers have raised plantations along the margins and

periphery of their own patta lands to meet their local requirements. As per the scheme, Panchayat Union will select the area for planting and Forest Department will carry out the work. On an average, 130 hectares will be taken up annually for planting. That means during the perspective plan period which coincides with the Fifth and Sixth Plans, a total area of 1,560 hectares will be planted at a cost of Rs.3,12,000/- Along with this, plantations raised during the previous years will also be maintained. The scheme provides employment opportunities direct to 5000 male mazdoors and 2000 female mazdoors. These plantations will not give any revenue during the perspective plan period because they will not come up for exploitation at that time.

II - Raising Casuarina Plantations

The object of the scheme is to raise casuarina plantations on the Padugai lands and shore to provide for fuel wood and also to prevent soil erosion along the coast and river banks. Annually 50 hectares will be planted so as to attain a target of 600 hectares at the end of the plan period. The estimated expenditure is Rs.4,02,000/- per annum for 50 hectares at the rate of Rs.670/- per hectare. This excludes planting and resh area maintenance of already planted areas. Casuarina will be cut at the age of 8th year which will regenerate afterwards. This scheme is expected to give employment annually to 7400 persons directly and 2000 persons through agency of contracts.

Revenue

1) Sale of 14,400 tonnes of fuel at Rs.30/- per tonne at Rs.1200/- ¹²⁰⁰ tonnes per year	Rs. 4,32,000.00
2) Sale of pruned side branches 600 tonnes of fuel and 12000 head loads of casuarina cuttings for 12 years at 50 tonnes and 1000 head loads per year at Rs.20/- per tonne of fuel and 0.75 ps. per head load of casuarina twigs	Rs. 21,000.00
Total	Rs. 4,53,000.00 =====

III - Raising plantations along river, canal and lake
fringes

In this scheme, hard wood trees like teak are to be planted along the banks of rivers, canals and lakes to provide timber and prevent soil erosion. The area prescribed is the banks of Vellar and Coleroon rivers. Annually, an area of 500 hectares to be planted so as to cover 6000 hectares at the end of twelve years.

<u>Expenditure</u>	<u>Amount</u>
1) At Rs.500/- per hectares for 6000 hectares which include planting, nursery and upkeep	Rs.30,00,000.00
2) Thinning in Avenue and compact plantation	Rs. 3,00,000.00
Total:	Rs.33,00,000.00 =====

Employment potential

In this scheme, it is expected that 12,000 male and 6,000 female workers will be directly engaged in an year.

<u>Revenue</u>	<u>Amount</u>
1) By sale of 12,000 poles at Re.1/- per pole for 12 years	Rs. 12,000.00
2) By sale of 120 tonnes of fuel (top ends and side branches) at Rs.20/- per tonne for 12 years at 10 tonne per hour	Rs. 2,400.00
Total	<u>Rs. 14,400.00</u>

IV - Raising Cashew Plantations

- 1) Annually an area of 50 hectares are to be taken up for planting so as to bring 600 hectares under cashew by the end of twelve years.
- 2) The improvement of existing cashew plantations to get maximum returns. Under this item, the following items of work are included:
 - (a) Restocking the failed patches with new seedlings;
 - (b) Leasing out annually the right to collect usufructs;
 - (c) Adopting suitable cultural practices like thinning, climber cutting, soil working, clearing the intervening growth and fertilizer application; and
 - (d) Adopting plant protection measures against pests and diseases.

Expenditure

1) Raising cashew over 600 hectares at Rs.300/- per hectare for planting and maintenance	Rs. 1,80,000.00
2) Expenditure on cultural operation in old plantations at Rs.50/- per hectare for 1500 hectares	Rs. 75,000.00
3) Application of fertilisers and pesticides for over 1500 hectares at Rs.10/- per hectare	Rs. 1,50,000.00
Total:	<u>Rs. 4,05,000.00</u>

Revenue

1) Sale of 36 lakh kg. cashewnuts at Rs.2/- per kg. for 12 years at 30,000 kg./year	Rs. 7,20,000.00
2) Sale of felled trees of first second thinning at Rs.200/- per year for 12 years	Rs. 2,400.00
Total:	<u>Rs. 7,22,400.00</u>

Employment potential

Annually 500 men mazdoors directly and 2000 women mazdoors through agencies of contract. Following table gives the financial layout under the Fifth and Sixth Five Year Plans.

From the achievements of 1971-72, it is seen that an area of 2567.45 hectares have been brought under different categories of forest development at an expenditure of Rupees 12.09 lakhs. As has been mentioned earlier, forest products in Thanjavur district are mostly used as fuel wood and hence no

Sl. No.	Project Details	FACT ENGINEERING AND DESIGN ORGANISATION			Foreign Exchange
		Total Layout in Vth and Vith Plans - in lakhs	In Vth Plan -in lakhs- Total	Capital	
I	Village Forests under Farm Forestry (1560 hectares) for fuel wood	3.12	1.56	1.56	
		Employment Potential: 7000 persons per annum.			
II	Plantations along river and canal banks and in strip plantations of timber species (6000 hectares)	3.40	1.70	1.70	
		Employment Potential: 18000 persons per annum.			
III	Plantations along sea shore and Padugai lands. Casuarina - 600 hectares	4.02	2.00	2.00	
		Employment Potential:			
		(i) Direct : 7400 persons per annum			
		(ii) through agency of contract: 2000 " " "			
IV	(i) Cultivation operations over 1500 hectares of cashew plantations	2.25	1.00	1.00	
	(ii) Employment potential:				
	Direct	500 persons per annum			
	Through agency of contract	2000 persons per annum			

major forest-based industries can be started based on the produce available from this district. But adjoining areas of Thanjavur district which form the eastern portion of Trichy district have got some forest areas having Eucalyptus and Bamboo plantations. The details of these forest areas are given below:-

Table-69

Range	Area in hectares		Total
	Existing upto	Prescribed for 1969-78	
<u>I. Eucalyptus Plantation</u>			
(a) Pudukkottai Range (South west of Thanjavur dist.)	2195.66	5397.00	7592.66
(b) Udayarpalayam Range (adjoining Thanjavur and S. Arcot dist.)	286.79	-	286.79
<u>II. Bamboo Plantation</u>			
Udayarpalayam	294.43	-	294.43
<u>III. Grass lands</u>			
Pudukkottai	N.A.	N.A.	91.04
Udayarpalayam	-	-	141.63
<u>IV. Miscellaneous</u>			
(Soil conservation plots, reclamation of eroded areas and fuel regeneration areas)			
Pudukkottai	-	-	49.36
Udayarpalayam	-	-	1579.15

In Pudukkottai range, the programme of planting Eucalyptus for the period from 1969-78 is as follows:

<u>Year</u>	<u>Area in hectares</u>
1969	761
1970	761
1971	686
1972	661
1973	621
1974	466
1975	491
1976	401
1977	379
1978	170
	<u>5397</u>

At present, the existing Eucalyptus hybrid plantations and bamboo plantations are not utilised for supply of raw materials for any industry. Mostly it is used as fuel. District Forest Officer, Trichy, has suggested the starting of one chip board factory in Pudukkottai for which the raw materials will be obtained from the existing Eucalyptus plantations of the Pudukkottai range. The suggested scheme is similar to the one now working in Rajapalayam in Tirunelveli district. The following are the details of the present unit at Rajapalayam.

Chip board manufacture

Products: Chip boards; veneered chip boards, flush doors.

Total capital : Rs.25 lakhs

Machinery: Imported from Czechoslovakia and Germany

Labour employed:	Skilled	..	10
	Unskilled	..	20
	Manager	..	1

Raw material requirement

6 tonnes of Eucalyptus logs of 7 year old plantations for an 8 hour shift in a day.

Final out turn - 2 tonnes of finished chip board/day

Cost of production - 80 ps. per sq. ft.

Market price - 1.80 per sq. ft.

Net profit - Re.1/- per sq. ft.

One tonne of raw wood will yield 12 sheets of 6'x4'x1/2" (wt.26kg.). So, per day production will be 72 sheets of 24 sq. ft. each. The total net profit in an 8 hour shift ~~per~~ will be Rs.1728/- According to the District Forest Officer, Trichy, the existing Eucalyptus hybrid plantations of Pudukkottai can sustain the chip-board factory there. Since Pudukkottai is in the border area of Thanjavur district, the above said factory can be located in Aranthangi taluk of Thanjavur district which is a backward area.

2.6 Fisheries

2.6.1 Fish production has made a substantial contribution to human nutrition and well-being over the years and its contribution in the future will be much more vital in supplying protein to an increasing human population. Fish is also an important foreign exchange earner. The production of fish has therefore to be increased.

2.6.1.1 Thanjavur district with a coastline of 238 kms. stretches from the mouth of Coleroon river bordering the

Table-70

(a) Marine

- | | |
|-----------------------|-----------------------|
| 1. Vanamadevi | 7. Thanjavur |
| 2. Pushpavanam | 8. V.V.R. |
| 3. Kodiakarai | 9. Vettikadu |
| 4. Seruthalaikadu | 10. Thirukattupalli |
| 5. Muthupet | 11. Mannargudi |
| 6. Adirampattinam | 12. Vadavur |
| 7. Eripurakarai | 13. Vadapathimangalam |
| 8. Kollukadu | 14. Serangulam |
| 9. Kallivayalhattam | 15. Devananjeri |
| 10. Mallipattinam | 16. Karahampadi |
| 11. Chinnamunnai | 17. Sekkottai |
| 12. Sethubhavechatram | 18. Mannanjeri |
| 13. Kalumanguda | 19. Rajagiri Head |
| 14. Kattumavadi | 20. Mudikondan Head |
| 15. Gopalpattinam | 21. Arasalar Head |
| 16. Akkarapettai | |
| 17. Keechankuppam | |
| 18. Nambiar Nagar | |
| 19. Somahethan pettai | |
| 20. Nagore | |
| 21. Tranquebar | |
| 22. Vanagiri | |
| 23. Cavery pattinam | |
| 24. Chavadikuppam | |
| 25. Keelamovarkarai | |
| 26. Melamovarkarai | |
| 27. Thirumullai Vesal | |
| 28. Koopaiyar | |
| 29. Madavamedu | |
| 30. Kodiampalayam | |

(b) In-land

1. Naluvathapatty
2. Maravakadu
3. Pattukkottai
4. Arani angai
5. Peramurani
6. Tiruvarur

(c) River

1. Thiruthurai
2. Pettai
3. Thalainayer
4. Keelanthi
5. Thiruvalangadu
6. Korayar
7. Pudukorayar
8. Mulliyar
9. Manniar
10. Kodamurutti
11. Vennar
12. Vettar
13. Koraiyar
14. Arasalar
15. Cauvery
16. Veerasholan
17. Thirumalalarayan
18. Bhavani
19. Villavar
20. Mudikondan
21. G.A. Canals

Source: Director of Fisheries, Madras.

district of South Arcot in the north and touching Ramnad district by the side of the Palk Strait. The continental shelf of 1.9 lakh sq. kms. (approximately) offers vast scope for developing marine fisheries. This district has got 74869 acres of inland water spread area and rivers and channels occupy an area of about 786 miles. The inshore, off-shore and deep sea area off its vast coastline is replete with high unit value yielding commercial fisheries. At present, 107 mechanised boats, 3000 catamarans and about 900 country crafts are engaged in fishing operations in this district.

- 2.6.1.2 This district has about 30 marine fishing centres and about 40 centres covering both inland and rivers as shown in Table-70. The main varieties of fish landed off Thanjavur Coast are Mulletts, Cat fish, Skates and Rays, Sabre fish, Prawns etc. Details of fish landed during 1969-70 and 1970-71 are given in Table-71.
- 2.6.1.3 The inland fish production is estimated for the whole State and therefore, exact figures for this district are not available. However, the Fisheries Department have worked out approximate figures as shown in Table-72.
- 2.6.1.4 There are 151 fish nurseries constructed in 100 panchayats in this district. Among the 100 panchayats, fifteen have got more than one nursery and the rest one nursery each. Thiruvaiyaru has the largest number (8) of fish nurseries. Activities of these nurseries include stocking with hatchlings and

rearing fingerlings for supply to the Panchayats. Details of their location and number are given in Table-73.

Table-71
Details of Fish Landings

	Weight in tonnes	
	1970-71	1969-70
1. Sharks	835	1126
2. Skates and Rays	3039	1385
3. Catfish	3017	3313
4. Sabre fish	1182	177
5. Hilsa	5	7
6. Anchovella	508	808
7. Other Clupeids	387	98
8. Hemirhamphes and below	12	-
9. Flying fish	187	633
10. Perches	873	1578
11. Polynemids	176	253
12. Sciaenids	898	1792
13. Ribbon fish	128	990
14. Caran	137	473
15. Chorinenius	5	14
16. Leognathus	306	-
17. Lactarius	105	309
18. Pomfrets	18	181
19. Mackerels	211	1041
20. Sphyracena	1	-
21. Mulletts	2560	4674
22. Soles	2	-
23. Penacid Prawns	1832	2697
24. Non-penacid prawns	1126	7799
25. Miscellaneous	5098	1
26. Lethrinus	1	-
27. Sillage	12	16
Total	22661	29364
Value - Rs. in lakhs	254.95	330.34

Source: Director of Fisheries.

Table-72

Inland Fish Production (including Rivers)

Year	Production in tonnes	Value in Rupees (lakhs)
1969-70	14,000	14
1970-71	16,000	16
1971-72	18,000	18

2.6.1.5 There is one Induced Garp Spawning Centre located at Karunthattankuai in Thanjavur. Hatchlings are produced to supplement the natural collection of seeds and supplied to Panchayats. They are also raised departmentally to fingerlings and stocked in departmental waters and provincial tanks.

2.6.1.6 Availability of adequate cold storage facilities is a determinant factor for the hygienic preservation of fish. Ice plants and cold storages are functioning at the following centres at present:

Name of Centre	<u>Capacity in tonnes</u>	
	Ice	Cold Storage
1. Thanjavur	2	5
2. Thirumallaivasal	3	2
3. Nagapattinam	2	2
<u>Ice Plants under erection</u>		
1. Agirampattinam	2	-
2. Sethubavachatram	2	-
3. Mathupet	2	-

Table-73
Location of Fish Nurseries

Sl. No.	Location	Number	Sl.No.	Location	Number
1.	Nagapattinam		39.	Marayur	1
	Panchayat Union	4	40.	Seruthaiyur	1
2.	Kivalur	3	41.	Shollampettai	1
3.	Thiruvavur	3	42.	Maharajapuram	1
4.	Koradacheri	3	43.	Manalmedu	1
5.	Kodavasai	2	44.	Villinallur	1
6.	Nannilam	4	45.	E.V.R. Park	1
7.	Thirumarugal	3	46.	Neppattur	1
8.	Thanjavur block	7	47.	Thiruvavur	1
9.	Thiruvaiyaru	8	48.	Allivillagam	1
10.	Budalur	6	49.	Karenpattinam	1
11.	Orathanad	7	50.	Arasur	1
12.	Thiruvonam	5	51.	Erukkur	1
13.	Mannargudi	4	52.	Kungam	1
14.	Kottur	7	53.	Thaneerpandal	1
15.	Needamangalam	7	54.	Agarvattaram	1
16.	Korukkai	1	55.		
17.	Valayapettai	1	56.	Kaliappanallur	1
18.	Kallapuliyur	1	57.	Karuppampalam	1
19.	Sholapuram	1	58.	Vayamedu	1
20.	Krishnapuram	1	59.	Pirandiyakarai	1
21.	Sommangudi	1	60.	Bemini	1
22.	Kurichi	1	61.	Utkamarthan-	
23.	Ukkarai	1		delam	1
24.	Chidambaranatha-		62.	Maruthavanam	1
	puram.	1	63.	Edayar	1
25.	Kullaur	1	64.	Alangudi	1
26.	Shetrapalapuram	1	65.	Nirmalai	1
27.	Tholuthangudi	1	66.	Manakudi	1
28.	Gomal	1	67.	T. Melakkadu	1
29.	Palaiyur	1	68.	Maravakkadu	
30.	Konerirajapuram	1		Ngrth	1
31.	Manuthai	1	69.	Thambikkottai	1
32.	Perunchai	1	70.	Madukur South	1
33.	Malanganallur	1	71.	Alathur	1
34.	Velangudi	1	72.	Siramalkudi	1
35.	Kodaivilagam	1	73.	Mammelkudi	1
36.	Parasalur	1	74.	Avanam	1
37.	Kidarankondan	1	75.	Alivalam	1
38.	Kanjanagaram	1	76.	Peravurani	1

contd.....

77. Sengamangalam	1	89. Kandithampettai	1
78. Marunge/pallam	1	90. Orathanad	1
79. Veppencheri	1	91. Puthur	1
80. Kottur	1	92. Kannukudi	1
81. Thirunellikare	1	93. Thiruvonam	1
82. Adichapuram	1	94. Poovanur	1
83. Palaiyur	1	95. Edannavasal	1
84. Nockiyur	1	96. Moovarakkottai	1
85. Elavanur	1	97. Thalikkottai	1
86. Paniganedu	1	98. Sorumangalam	1
87. Thulasindrapuram	1	99. Alathur	1
88. Ullikkottai	1	100. Olimathi	1

Private Ice Factories are also functioning in Tanjore, Nagore and Nagapattinam. There are no freezing units in this district.

2.6.1.7 Introduction of mechanised fishing vessels, electric equipment such as fish finders and use of synthetic materials have revolutionised the fishing industry rendering it more economical and profitable. But the growth of this industry has been hampered to a considerable extent for want of trained personnel for manning the powered boats. With a view to meeting the demand for trained fishermen, the State Government established Fisheries Training Centres in important coastal districts. The Nagapattinam Centre was established during September 1957 with a capacity to train 50 candidates in a session. This centre has so far trained 574 candidates in 22 batches. This centre caters to the training of fishermen of Tanjore district. Some seats are also reserved for fishermen belonging to Pondicherry. This training

centre imparts training to fishermen in modern methods of fishing, gear technology, navigation and seaanship, running and maintenance of marine diesel engines etc.

2.6.1.8 With a view to increasing the marine fish landings, mechanised boats are being built by the Department of Fisheries at the Departmental Boat Building Yards. One such boat building yard is located at Nagapattinam. This yard, established in 1964 with a capacity to manufacture 40 mechanised boats per annum has so far produced about 250 boats. At present, this yard is capable of turning out 30 footer boats only which can operate at a distance of about 10 to 15 miles. Boats are distributed by lots (Under hire purchase agreement) direct to members of Co-operative Societies who should be fishermen by caste or repatriates. The cost of a boat varies from Rs.50,000/- to Rs.75,000/- depending upon the type/brand of engine fitted with. The employment strength of the yard is 138.

2.6.1.9 In order to provide berthing facilities for the mechanised boats, fishing harbours and landing jetties are absolutely essential all along the coast. A fishing harbour has been developed at Nagapattinam. This harbour on the Kodavayan river was constructed by the State Public Works Department and handed over to Fisheries Department in 1967. The harbour provides berthing facilities and safe anchorage to the fishing

boats of the department, fisheries co-operatives and other private bodies.

- 2.6.1.10 There are sixty Fishing Co-operatives operating in the district. About 51 Societies are located in the coastal area alone and the rest of them located in inland area including the Marketing Federation at Tanjore. There are about 10,000 members covering all the Co-operative Societies located in this district.

2.6.2 Review

- 2.6.2.1 With a coast-line of about 238 kms., Thanjavur district has an edge over other coastal districts in boosting the production of marine fisheries. Inland fishing in this district has not been exploited fully. During 1969-70, the average fish production per coastline km. for the State was 150 tonnes while it was 123 tonnes for Thanjavur district. During 1970-71, the average fish production per coastline km. was 161 tonnes for the State and 95 tonnes for this district.

- 2.6.2.2 Tamil Nadu with a coastline of about 1000 kms. produces on an average about 150,000 tonnes of marine fish per annum representing about 17% of the total landings in the country. Thanjavur district with a coastline of about 238 kms. forming about 29% of the State coastline, accounts for only about 17% of marine fish landings in the State. A major factor for the slower rate of fish production is under exploitation of marine resources, meagre infra-structural facilities such as fishing harbours, mechanised boats, landing and berthing facilities etc.

2.6.2.3 Even though Nagapattinam Fishing Harbour has been developed for utilisation by the mechanised boats, due to varying depths near the river mouth, this harbour would become fully operative only if the river leading from the harbour upto the river mouth is dredged periodically and constant depth of 6' is maintained. This harbour is not serviceable at present due to silt blocking of the river mouth. A scheme is under way to dredge the river and also to obtain a marine dredger for this purpose to be utilised periodically. Survey work has been completed for providing jetties for the mechanised fishing boats at Kodiakkarai, Malliapattinam, Kaveripattinam and Thirumullaivasal. Already, boats are operating in the sheltered bay in Malliapattinam. There are proposals to construct a RCC landing jetty at Kodiakkarai at a cost of Rs.28 lakhs, a RCC landing jetty at Malliapattinam at a cost of Rs.25 lakhs, construct a jetty each at Kaveripattinam and Thirumullaivasal at a cost of Rs.7 lakhs and Rs.9 lakhs respectively. Action is also being taken to survey the following places for providing Fishing Harbour and jetties, by a special harbour engineering team:-

1. Arcottuthurai (Thopputhurai)
Near Vedaranyam
2. Eripurakarai (Near Adirampattinam)
3. Thirumullaivasal (Near Sirkali)

2.6.2.4 As far as Tanjore is concerned, it was revealed that large fishing stocks are available off its vast coastline and all that is needed is a proper

machinery to provide the required infrastructural facilities. One of the reasons for the rather slow progress in increasing the fish landing is the shortage of mechanised boats. Several applications for boats are put in the waiting list due to non-availability of boats and unless this is remedied, the catch will continue to remain stagnant. Fishing harbours and landing jetties are absolutely essential for operating the mechanised boats and therefore adequate facilities will have to be provided for this also. Availability of facilities for preserving the catch is another matter which should receive utmost attention. Since fish is one of the most perishable food-stuffs, increased landings would warrant provision for establishment of adequate facilities for preserving the catch. Establishment of modern packing and storage facilities is also an essential requirement. Fishing as an industry is at its infancy in this district. Therefore proper and effective measures should be taken to exploit the marine and inland fishery resources to the fullest extent. Along with this, application of fishery management techniques is quite essential for obtaining maximum returns from fish and fish products.

- 2.6.2.5 Our investigations based on the discussions we had with experts of CMFRI and of the State Fisheries Department has revealed that there is abundant scope for oyster farming off Tanjore coast. Measures may therefore be taken to survey the area by an expert group with a view to identifying the suitable areas

for oyster development. Edible oysters are in high demand in foreign countries and therefore this will enable to earn valuable foreign exchange.

- 2.6.2.6 The State Fisheries Department have approved a scheme submitted by the Tanjore District Fisheries Co-operative Federation for establishment of a boat building yard at Malliapattinam with ARC's financial assistance. The capital outlay of the project is estimated at Rs.94.35 lakhs of which seventy five per cent will be financed by ARC. This project to be commissioned by the Federation envisage construction of a boat building yard at Malliapattinam and establishment of an Ice Plant and Cold Storage to help preservation of fish for marketing. The boat building yard will be planned to facilitate the construction of a minimum of 20 nos. of 30' or 32' boats at a time and the annual capacity will be in the order of about 40 boats. The boat construction programme for the yard will be as follows:-

	30'	32'
1st year	20 Nos.	
2nd year	20 nos.	20 nos.
3rd year	<u>10 nos.</u>	<u>30 nos.</u>
	<u>50 nos.</u>	<u>50 nos.</u>

- 2.6.2.7 There is only one Fisheries Training Centre located at Nagapattinam. Even though, this centre is expected to cater to the needs of the whole district, due to lack of proper encouragement and incentives, most candidates undergoing training happen to be from the surrounding areas only. It has also been revealed that the present

financial assistance allowed by the Government is quite inadequate for the students. Hostel facility provided for accommodation of the trainees is also insufficient. Measures may, therefore, be taken to streamline the training scheme inter alia, giving more consideration to practical aspects rather than mere theoretical knowledge.

2.6.2.8 It has been revealed that there exists very good scope for chank fishing off Tanjore coast. The present collection is only very meagre and in 1970-71 total collection from this district amounted to approximately 2 lakh only. The Indian chank market is located in West Bengal and it has been estimated that consumption of chanks in that State alone amounts to 40 lakhs per year. Bangla Desh is yet another market for chanks. Concerted efforts should therefore be taken to collect maximum available quantity of chanks from this coast. A survey may be made to identify areas off Tanjore coast for chank fishing.

2.6.2.9 Pond culture has been the pre-dominant method of supply of fresh water fish as food. The Fisheries Department maintains a few tanks at present which is used exclusively for induced carp spawning purposes. Some of the tanks like the one at Muthupet is already silted and it should be desilted for use. Since there is abundant scope for inland fishery development in the district, adequate steps should be taken for the proper maintenance of the existing tanks and also for construction of more number of fish farms and nurseries for the production of fingerlings and

establishment of induced spawning centres to produce hatchlings.

- 2.6.2.10 The technological station of Nagapattinam carries out research on preparation and properties of fish oil, fermented fishing products, production of fish sansagge etc. Experiments on the improvements to the quantity of crude/liver oil and on packing fish on aluminium foils are also being conducted by this station.

/shark

- 2.6.3 Industries which can be set up in Thanjavur District based on fish and fishery products

- 2.6.3.1 Prawn flake manufacturing unit

Prawn flake is a product that can be prepared from minced prawn meat mixed with starch and other ingredients in suitable proportions, steamed and then dried after cutting into desired sizes and shapes. When fried in edible oil, the product swells up and becomes very crisp.. Protein content of prawn flake is about 15-20%. The method for the preparation of prawn flake has been developed by the Central Institute of Fisheries Technology. An outline of the method is given below:-

Preparation of prawn flake:

Composition:

Peeled and deveined prawns	- 1 kg.
Corn flour	- 1 kg.
Sugar	- 10 gms.
Salt	- 30 gms.
Water	- 1.7 litres.

Method

- (1) Blend the prawns with water thoroughly in a meat blending machine
- (2) Add the corn flour, salt and sugar to the blended prawn and mix well
- (3) Keep the uniformly mixed mass for 1 1/2 hours to 2 hours (preferably at refrigerated temp.)
- (4) Pour the mass in dishes to a height of 2 cms. and cook in steam for 30 to 45 minutes.
- (5) Cool thoroughly
- (6) Cut in the form of flakes having a thickness of 1 to 1.5 mm.
- (7) Dry the flakes in the sun or in an artificial dryer (temp. 55 to 60°C.)
- (8) Pack suitable lots of the dried product in sealed polythene bags.

Permitted colours can be incorporated if needed at the time of mixing the other ingredients with the blended prawn to get the desired colour.

Location: This unit can be located at Nagapattinam.

2.6.3.2 Manufacture of leather goods from shark skin leather:

The skin which is very tough can yield a good quality leather which compares very well with any other good quality leather. This leather can be used for the manufacture of shoes, hand-bags, straps etc. and many other fancy items. Method for producing good quality leather from shark skin include peeling off the skin from the fresh shark, rubbing the skin to good quality leather after tanning. The tanned skin can be put to a variety of uses. A tannery of this kind can be located in Thanjavur.

2.6.3.3 Frozen breaded fish sticks manufacturing unit

Consumer acceptance of fish sticks in countries like U.S.A. is reported to be so widespread. Fish sticks are uniformly shaped pieces of fish dipped in batter breaded and frozen in consumer sized packages. In foreign countries, they are packed both in pre-cooked and uncooked forms. The pre-cooked slices can be easily prepared for serving at home. For preparation of frozen breaded fish sticks, the Institute of Fisheries Technology has worked out the method which is given below:-

1. Only fresh fish is to be used. Wash the fish thoroughly so as to remove blood, slime etc. Take fillets from the fish in convenient sizes. Remove the skin from the pieces. Also remove the bones.
2. Freeze the fillets in the form of slabs in convenient lots in the usual way.
3. The slabs of fish are then sawed into sticks of uniform size. The size can be $1\frac{1}{3}" \times 3\frac{3}{4}" \times 2\frac{1}{2}"$.
4. While still frozen, give the sticks a coating of batter. (Prepare the batter by the method given at the end of this note). Allow the excess of batter that may adhere to the sticks to drain off.
5. Then give to the battered sticks a coating with breading mixture. (Coarse dry bread powder containing 1% salt and 0.5% mono-sodium glutamate).
6. After breading, pack the sticks in suitable lots in polythene paper and then in moisture-vapour proof cartons.
7. Store the product at the temperature of 0°F or below.

Preparation of batter.

Composition

Maida	25	parts by weight
Egg powder	3	parts by weight
Condensed Milk	5	"
Butter	3	"
Salt	0.5	"
Mono sodium glutamate	0.5	"
Sodium bicarbonate	1.0	"
Water	62	"

Thoroughly mix the ingredients except water to get a uniform mixture. Add the water to this mixture with constant stirring till the whole mass becomes uniform. Store the batter at refrigerated temperature. This unit can be located at Malliapattinam.

2.6.3.4 Fish meal plant

Fish meal is a valuable protein feeding stuff with high contents of digestible protein, vitamins and minerals. Generally, fish meal is produced from fish which cannot be economically utilised by other means, fish unsuitable for human consumption and fish wastes such as heads, offal, trimmings etc. from the fish processing industry. The main source of raw material for the product is the miscellaneous fish landed all along the sea coast by mechanised fishing boats and country crafts and also the wastes from fish canning and freezing industries. The Indian Institute of Foreign Trade in their study of Fishery Development and export prospects has stated that the real problem with regard to the manufacture of fish meal is not one of non-availability of raw material itself but of

difficulty in organising the collection of raw materials at the points of availability at comparatively cheaper rates. In the case of plants of large capacity, preservation and transport of raw material required for the plants from the scattered fish landing centres poses a difficult problem. It is, therefore, advisable to set up fish meal plants of comparatively small capacity at selected centres. One fish meal plant with a capacity of 10 tonnes per shift is recommended to be located at Vedaranyam and another with 2 tonnes capacity can be located at Thirumullaivasal.

2.6.3.5 Bacteriological Peptone from trash fish:

Peptone is an essential ingredient in the preparation of different types of culture media in bacteriological work. At present, the requirement of this product in our country is met mainly by import. Good quality peptone can be prepared from the trash fish. The method for manufacture of peptone can be had from the Central Institute of Fisheries Technology. This unit can be located in Tranquebar.

2.7

Animal Husbandry.

2.7.1

Animal husbandry is one of the significant sectors promising immense potentialities for development in this district. Livestock population of this district as per 1966 census are given in Table-74.

Table-74
Livestock population as per 1966 census

Category	Number
(1) <u>Milch animals</u>	
(a) Cows	164376
(b) Buffaloes	76450
(c) Draught Cattle	11778
(d) Goats and Sheep	587642
(e) Others	51
Total	840297
(2) <u>Cattle</u>	
(a) Males over 3 years	7779
Total	7779
(3) Females over 3 years	
(a) In milk	164376
(b) Dry and not calved even once	72317
	236693
(4) Youngstock	202526
(5) <u>Buffaloes</u>	
(a) Males over 3 years	17923
(b) Others	9132
	27055
<u>Females over 3 years</u>	
(c) In milk	75850
(d) Dry and not calved even once	84433
(e) Others	66116
Total	226399

(6)	Total Buffaloes	969520
	Total Bovine (cattle and buffaloes)	1223074
		=====
(7)	<u>Other animals</u>	
	(a) Sheep	179914
	(b) Goats	393524
	(c) Horse and Ponies	787
	(d) Pigs	12990

2.7.2 The quality of indigenous cattle available in Thanjavur district is very poor. Inadequacy of pasture land and scarcity of fodder crops have been attributed as the reasons for this state of affairs. Under the key village scheme, the Animal Husbandry Department has been looking after supply of pedigree bulls and opening of veterinary institutions for the improvement of cattle wealth in Thanjavur district.

2.7.2.1 There are 3 artificial insemination centres and 42 veterinary dispensaries in this district as given in Table-75. There is only one Veterinary Dispensary-cum-Key Village Centre located at Thirukattupalli.

Table-75

A.	<u>Veterinary Dispensary-cum-Key Village Centre</u>	
	1. Thirukattupalli	
B.	<u>Veterinary Dispensary (Artificial Insemination Centre)</u>	
	1. Aranthangi	
C.	<u>Veterinary Hospital</u>	-do-
	1. Kumbakonam	
D.	<u>Veterinary Dispensary</u>	-do-
	Mayuram.	
E.	<u>Veterinary Dispensaries</u>	
	1. Vallom	
	2. Sengipatti	
	3. Orathanad	
	4. Thiruvonam	
	5. Thiruvaiyaru	
	6. Pattukottai	
	7. Adirampattinam	
	8. Madukkur	
	9. Peravurani	

10. Perumagalur
11. Minimisal
12. Kivalur
13. Karunganii
14. Valivalam
15. Vaipoor
16. Paralam
17. Thirumarugal
18. Koradachery
19. Kodavasal
20. Pampadaiyur
21. Thirupanandal
22. Nachiyankoil
23. Adhothuai
24. Papanasam
25. Thiruvonamangalam
26. Annampet
27. Saliamangalam
28. Kiley
29. Sembanarkoil
30. Kuthalam
31. Konerirapuram
32. Sirkali
33. Thiruvengadu
34. Kollidan
35. Lakshmengudi
36. Nidamangalam
37. Vaduvur
38. Kottur
39. Thiruthuraipeondi
40. Vedaranyan
41. Thalanyar
42. Muthupet.

2.7.2.2 A livestock farm has been set up at Orathanad with a view to improving the quality of cattle stock in the district. This farm started functioning in 1954. The breeds maintained by this farm and the strength of female stock are as follows:- (as on 31.3.1972)

Table-76

Breed	Cows	Heifers above one year	Total
1. Murrah	132	96	228
2. Sindhi	136	91	227
3. Umbalacherry	50	33	83
4. Sindhi X Umbalacherry	62	28	90

The main object of the farm are to produce and supply good quality seed bulls to the villagers to enable them to produce and supply good quality milk. It was also intended to demonstrate to the public the latest live-stock husbandry as also the value of farm yard manure and poultry manure. The farm covering an area of 103 hectares embraces all aspects of livestock, namely the promotion of better quality dairying, poultry and piggery and has annexes at Eachenkottai and Konkkai villages, covering an area of 544 hectares and 200 hectares respectively. The farm of Eachenkottai has about 150 pigs for supply of good quality pork.

2.7.2.3

The total meat production in the Tiruchirappalli and Thanjavur region has been estimated at 94 lakh kilograms. Separate figure for this district is not available. Out of the total production, 85 per cent was mutton and 15 per cent beef and others. Bulk of the slaughtering was done by private agencies. Hides and skins available in the district are salted and sent to tanneries in Tiruchirappalli and Dindigul. The merchants are stationed at important collection centres like Aduthurai and Mannargudi.

- 2.7.2.4 Thanjavur offers good scope for development of poultry. Total number of poultry birds in the district by 1970-71 was 1025169. Eggs produced in the district during the year 1970-71 was roughly estimated at 36 million. Assuming that 20 per cent of the eggs were not available for consumption being retained for hatching, the total quality of eggs available for consumption in the district was about 25 million. A great deal remains to be done to improve the quality of the poultry in rural areas. The Poultry Extension Centre at Orathanad is actively engaged in this respect. The unit started with 100 birds in 1955, has increased its stock to about 13000. From 1968-70 up to the end of 1971 a total of 6.45 lakh eggs were produced in this farm. During this period, it was stated, that 1.41 lakh eggs were set for hatching and 92 thousand chicks were hatched. Of these 28,500 were sold to farms for breeding and 33,000 to the public. The poultry extension centre at Orathanad is mainly catering to the requirements of birds of the various departmental institutions and Panchayat unions in Thanjavur, Trichy and South Arcot districts.
- 2.7.2.5 Milk is absolutely essential for the growth of the young and for the welfare of the human race. The processing and sale of milk and its products can be developed into a big industry with considerable employment potential. The total milk production in the district was of the order of 67 lakh litres valued at Rs. 53 lakhs. Out of the total milk production, only a small quantity is collected and distributed through organised societies. There is only one Co-operative Milk Production and Marketing Federation at Thanjavur, with a number of milk

supply societies attached to it. This Federation handles about 4,500 litres of milk per day. There are 88 milk supply societies in the district affiliated to the Federation.

- 2.7.2.6 Any scheme for improving the milk yield of cattle population, cannot succeed unless there is a radical improvement in the availability of quality fodder. Many Municipal Towns in this district have sewage water which can be utilised for establishing farms to provide fodder at subsidised rates to rural cattle owners. Breed improvements also will have to be taken up along with the fodder development programme.

2.7.3 Strategy

Cattle development assumes much importance in any strategy for development of Animal Husbandry. Development of cattle in an intensive manner requires that a number of pedigree breeding bulls be made available for distribution to various sub-centres in the district. The live-stock farms will have to be suitably expanded and strengthened to support the Intensive Cattle Development Project and Key Village Scheme programmes. The Orathanad farm should therefore be strengthened by providing more herds. Since this farm is also inadequate to meet the growing needs of this district, establishment of one more farm similar to the Orathanad farm is recommended. The ideal location for such a farm is Mayuram.

- 2.7.3.1 A crash programme for milk production may be undertaken in the district. Along with development of dairy industry in the Public and Co-operative Sectors, private sector dairy industry also should be encouraged. Greater attention for raising fodder crops ~~and~~ ^{will} the average milk production per cow can be increased considerably. The Tamil Nadu Dairy Development Corporation proposes to adopt an integrated approach to the problem of

providing infants to the producer. This will include veterinary care including vaccination, dairy extension farming advice and assistance for fodder cultivation, supply of cattle feed, breeding facilities etc. This district may be brought under the purview of this scheme. The milk supply co-operatives spread over the district may be activated. Out of the 88 milk Co-operatives attached to the Thanjavur District Milk Production and Marketing Federation, only 22 Societies are arranging milk to the Federation at present. Hence the need for activating the co-operatives.

2.7.3.2

Poultry keeping as a business proposition has enormous scope for development in Thanjavur. With better infra-structural facilities and extension machinery, this industry could be organised on scientific lines so as to make a significant contribution to the income of the people. One Hatchery Complex can be set up in Sirkali with a hatching capacity of 50,000 to 75,000 eggs. This Hatchery Complex envisages dissemination of scientific poultry management techniques besides collection and incubation of eggs on a large scale. This complex should also be capable of manufacture and supply of balanced poultry feeds, improved marketing facilities for eggs and poultry meat, strict breeding of high quality chicks and imparting intensive training in poultry farm management to interested poultry farmers. The capacity of feed compounding factory can be 10 tonne feed per day to begin with. Infrastructural facilities like adequate provision of supply of pullets, feed and extension service should also be ensured for the success of this project. Apart from this Central Hatchery Complex, there is need for the establishment of one Poultry Extension Centre for every Panchayat Union in the district.

2.7.3.3 Sheep Breeding Co-operative Societies should be established in selected centres in the district. There is no sheep farm located in this district and therefore there is ample scope for establishing a sheep farm in Tanjore district. The piggery farm attached to the Orathanad Farm also should be strengthened.

2.7.4 List of suggested industries in Tanjore district based on Animal Husbandry.

- (1) Pork Processing Plant - Location - Orathanad
- (2) Poultry Dressing Plant - Location - Sirkali
- (3) Cold Storage Plant (for storage of eggs)
(Capacity - 3 to 5 lakhs) - Location - Kumbakonam.
- (4) Deep Freeze Chambers (For storing Pork, Mutton, Poultry meat etc.)
Location - Tanjore.
- (5) Feed Mixing Units - (for preparation of Poultry and cattle feeds)
Location - Sirkali.
- (6) Semen Banks - Three Banks to be set up in Tanjore District.
Locations:- Aduthurai, Thirukkattupalli and Kattur.
- (7) Slaughter House - Location: Tanjore
- (8) One Tannery - Location . Pattukottai
- (9) One unit for the manufacture of Lactose and Ice cream-cum-Cheese making unit - Location - Tanjore.
- (10) One pasteurisation Plant (Capacity - 10,000 litres per day)
Location: Kumbakonam.

2.8. AGRICULTURAL DEVELOPMENT PROGRAMME - 1974 to 1983:

2.8.1 Digging bore-wells:

In order to implement the new cropping pattern tapping all the possible sources of underground water is very essential. The average ~~rainfall~~ of the district is 1000 mm per annum and hence there is definite possibilities for the tapped water getting replenished by the rains. The following table gives the total number of wells to be dug in the three sub-basins.

Table - 77

Sl. No.	Sub-basin	Exist- ing wells	Addl. no. of wells to be sunk	Total	Recommen- ed spacing in metres
1.	<u>Cavery sub-basin</u>				
	Taluks Thanjavoor, Papanasam, Kumbakonam, Mayuram, Sirkali, Nannilam.	8102	43095	51197	200 to 300
2.	<u>Vennar sub-basin</u>				
	Mannargudi, Nagapattinam, Nannilam.	399	11637	12036	200 to 400
3.	<u>New Delta:</u>				
	Thanjavoor, Papanasam, Mannargudi, Orathanad, Pattukkottai, Aranthangi	268	35611	35879	200 to 300
Total:		8769	90343	99112	

Top priority should be given for new delta area and Cauvery sub-basin where ^{the} sugarcane is the major cash crop suggested. Moreover, the existing commercial crops will be benefited to a very great extent and virtually the yields can be doubled.

Financial outlay:

Average investment - Rs.8,000/- per well
 Total for 90343 wells - Rs.72 crores (approx.)

This may be carried out in three phases (5 years each) in the order of priority.

2.8.2 Agro-service Centres:

Quality seeds, fertilisers, pesticides and plant protection equipment and agricultural machinery for hire, should be available for the farmer in time from the agro-service centres. This is an ambitious project but is very essential in an agricultural district like Thanjavur. To start with, one agro-service centre for every Panchayat Union and every Municipality is suggested. Each centre should be able to cater to the needs of 2000 ha of field crops in its premises. There are 36 Panchayat Unions and 7 Municipalities in the district. Hence, 43 numbers of agro-service centres. The financial layout of each centre is given below:

		<u>Rs. in lakhs</u>
I - Capital Investment	..	2.720
II - Working capital	..	36.807
Total:		<u>39.527</u>

	Rs. in lakhs
Income through sales and service ..	38.0200
Profit without deducting interest on Capital ..	1.2130
Interest on capital at 9% rate ..	0.2448
Net Profit ..	0.9682

(Details are given in the following statement)

Financial layout:

I - Capital	Amount Rs. in lakhs
i) Rat proof godown to store 20 tonnes of seeds at a time (space - 50 Sq.m. - Rs.120/Sq.M)	0.06
ii) Godown to store 2000 tonnes of fertilisers at a time - 200 Sq.M (0.75 C.M./tonne) at Rs.100/Sq.M.	0.20
iii) Pesticide godown to keep chemicals and plant protection equipments - 50 sq.M. - Rs.100/Sq.M.	0.05
iv) Office room - 20 Sq.M - Rs.100/Sq.M.	0.02
v) Cost of land - 0.05 ha at Rs.50,000/ha.	0.03
vi) Four tractors with trailer and other accessories - Rs.50,000/unit	2.00
vii) Five sprayers (power) and five dusters (power) at Rs.3,000/- each	0.30
viii) Tractor shed	0.06
Total:	2.72

II - Working Capital	Rs. in lakhs
i) Cost of 20 tonnes certified seed (50 kg/ha) - Rs.1250/Tonne	0.250
ii) Fertilisers (900 Kg/ha) 3600 tonnes at Rs.1000/Tonne	36.000
iii) Pesticides (5 Kg/ha) - 2 tonnes - Rs.10,000/Tonne	0.200
iv) Establishment charges - Rs.1000/- p.m.	0.120
v) Maintenance of machinery, buildings etc. (Lump sum)	0.100
vi) Depreciation on capital investment at 5% for Rs.2.74 lakhs	0.137
Total:	<u>36.807</u>

Returns:

I - Sale of seeds - 20 tonnes Rs.2000/Tonne	0.40
II - Fertilisers - 3600 Tonnes at 3% commission	37.08
III - Sale of pesticides with 10% commission	0.20
IV - Tractor hire charges at Rs.25/hour - 200 days at 4 hours per day	0.20
V - Hire charges for plant protection machinery	0.12
Total:	<u>38.000</u>
Net returns	<u>1.2930</u>
Interest on capital at 9% rate	<u>0.2448</u>
Net Profit	<u>0.9482</u>

Commercial banks are the best agencies to advance loans to good entrepreneurs. Indian Overseas Bank is the lead bank for the district and they are the right people to take up the scheme.

Fertiliser and pesticide firms can actively co-operate and give top priority in supply for these centres. Once it is implemented successfully, the entire cultivated area in the district can be brought under the scheme easily.

Total investment for 43 centres:

Capital	-	1.18 crores
Working capital	-	15.829 crores

Working capital in terms of fertilisers and chemicals can be supplied by firms through banks. Hence the actual requirement of cash will be only 20.21 lakhs.

This scheme has good potential in improving the growth rate in the agricultural sector, and will also help to commercialise agriculture in the district.

2.8.3 Seed Farms for sugarcane and mesta:

(a) Sugarcane:

Under the new cropping pattern, an area of 1,34,000 hectares are to be brought under sugarcane cultivation, as against the existing 5997 hectares. Under the existing conditions, it may not be possible for the farmers to get enough seed material for such a large area.

Hence it is suggested to open model farms of 50 hectares each in the following centres:

I. Pattukkottai

II. Thanjavur

III. Kumbakonam

Each centre can provide as a model for the proposed rotation of sugarcane for two years and one year for paddy - paddy-groundnut or pulses. It can be started attached to a seed farm so that good seed material can be supplied to farmers willing to take up the cultivation.

Financial requirement for each unit will be as follows:

<u>Capital investment:</u>		<u>Amount</u>	
		Rs. in lakhs	
i) Cost of 50 hectares of wet lands (Rs. 40,000/ha.)	..	20.00	
ii) Farm Machinery and plant protection equipments	..	1.00	
iii) Office buildings and store	..	0.75	
Total:		21.75	=====

<u>Working Capital:</u>	<u>Amount</u> Rs. in lakhs
i) Cost of cultivation for sugarcane Rs.4000/ha for 50 hectares including all inputs	2.0000
ii) Maintenance of Farm Machinery buildings (Lump sum)	0.2000
iii) Depreciation on capital investment at 5% rate	0.0880
iv) Establishment charges Rs.1500 p.m.	0.1800
Total:	<u>2.3680</u>
Value of produce - Rs.100/Tonne (Yield at 100 tonnes/ha)	<u>5.0000</u>
Gross Profit	<u>2.6320</u>
50% of Interest on capital investment @ 9%	<u>0.9800</u>
Net profit	<u>1.6520</u>
Total for three farms	
Investment - Capital	65.2500
Working capital	<u>77.040</u>
Total:	<u>142.290</u>
Net profit for the three units	<u>4.9560</u>

Value of the produce is taken as Rs.100/- per tonne in view of the prevalent high prices for sugar and jaggery.

This coupled with the already existing package unit at Vadapathimangalam can bring about considerable improvement in area and cultivation of sugarcane in Thanjavur district.

2.8.3.1 Mesta:

Location: Pattukkottai
Aranthangi

Though cultivated in a small scale, mesta can be considered as a new introduction in the district. The suggested area is 15,000 hectares in Pattukkottai and Aranthangi taluks.

Seeds are available only in small quantities and hence it is necessary to organise seed farms either in State Seed Farms or in private holdings under seed farm conditions.

The seed rate for one hectare is 12 Kg. Hence the total requirement for 15,000 hectares will be 180 tonnes of seeds. One hectare of mesta will yield 250 Kg. seeds. Hence, an area of 720 hectares are required to supply the required quantity of seeds.

To start with, two seed farms of 50 hectares each can be organised at Pattukkottai and Aranthangi.

Side by side, demonstration plots of one ha. each may be organised in 10 locations in each taluk, by subsidising the use of inputs up to Rs.500/ha.

The financial outlay will be as follows:

Seed Farms -

<u>Capital investment</u>	<u>Rs. in lakhs</u>
1. Cost of 50 hectares dry and garden lands at Rs.10,000 per ha.	5.00
2. Farm machinery (Lump sum)	0.20
3. Farm buildings	0.60
Total:	5.80

Working capital:

i) Cost of cultivation for 45 ha. at Rs.750/ha.	0.3375
ii) Depreciation on farm machinery and buildings	0.0200
iii) Maintenance of buildings and machinery (Lump sum)	0.0500
iv) Establishment charges	0.0120
Total:	0.4195

Value of produce - 1125 Kg. fibre per ha. at Rs.90/quintal	0.4556
Net Profit	0.03610

The second crop is groundnut in 10,000 hectares and cotton in 5,000 hectares. These crops will fetch enough income to compensate for the interest on capital. Hence the annual income will be much more than what is now obtained from the dry lands of the locality. Mesta fibre can be utilised for paper pulping along with Agathi to be taken as intercrop in cocoanut gardens.

	<u>Amount</u> Rs. in lakhs
Total investment for two Seed Farms of 50 hectares each	12.4390
Capital	11.6000
Working Capital	0.8390
Total:	12.4390
Annual net income from mesta	0.0722
Annual net income from 50 hectares of cotton at Rs.2,500/ha.	1.2500
Annual net income from 50 hectares of ground-nut at Rs.950/ha.	0.4750
Total:	1.7972
Interest on ^{50% of} capital at 9%	0.5600
Net Profit for 100 ha.	1.1372

Cost of cultivation of mesta per hectare

	<u>Am. in Rs.</u>
I. <u>Preparatory cultivation</u>	
3 ploughings with 15 pairs at Rs.6/pair	90.00
II. <u>Seeds and sowing</u>	
Cost of seed - 12 kg/ha.	25.00
Sowing - 2 men	4.00
	28.00

	<u>Amount in Rs.</u>
III. <u>Manures and manuring:</u>	
F.Y.M.-12 cartloads at Rs.4/cart load	48.00
Transport and application at Rs.1.50 per cart load	18.00
	<u>66.00</u>
Fertilisers - cost and application	200.00
	<u>266.00</u>
IV. <u>After cultivation</u>	
Weeding and hoeing - 60 women at Re.1/- per head	60.00
2nd weeding - 50 women at Re.1/- per head	50.00
	<u>110.00</u>
V. <u>Harvesting</u>	
i) Cutting the plants - 25 men at Rs.2/- each	50.00
ii) Bundling and stacking 12 men at Rs.1.50 per man	18.00
	<u>68.00</u>
VI. <u>Retting</u>	
Half steeping - 5 men	7.50
Full steeping - 8 men	12.00
	<u>19.50</u>
VII. <u>Extraction of fibre</u>	
Extracting by hand 100 women at Re.1/- each	100.00
Cleaning and drying of fibre 5 men at Rs.2/- each	10.00
Carting and baking	25.00 (Lump su
	<u>135.00</u>
Grand Total:	<u>717.50</u>

In South India, jute can be cultivated under irrigated conditions. The two species of jute are:

- 1. Corchorus capsularis
- 2. Corchorus poliotorius.

The comparison of the two species is given below:

<u>Corchorus capsularis</u>		<u>Corchorus poliotorius</u>
Sowing	- Between March and April	After 15th April, but before May end.
Harvest	- July - August	Sept. - October

Toleration to water logging

Can tolerate waterlogging and is preferred in wet lands in March - July season followed by paddy

- Varieties: JRC - 212
 D - 154
 JRC - 321

Since in Thanjavur district, jute is a new introduction, an observation trial can be conducted in a 5-hectare plot near Vedaranyam. The cultivation details of jute as is done in the jute belt area of West Bengal is given below. This may be a guidance for an observation trial.

Jute cultivation

Sowing season	-	April - June
Land preparation	-	Plough to fine tilth, after each ploughing laddering is done to level the lands. Break up clods, collect weeds and compress soil slightly.
Liming	-	7 to 15 quintals of lime to be applied in acid soils one and a half months before sowing.

Seed treatment -- Treat seeds with Agrosan GN at 5 to 8 gms. per Kg. of seed, ten minutes before sowing.

Manuring:

FYM - 5 to 8 tonnes/ha.
N - 20 Kg.
P - 20 Kg.
K - 20 Kg.

Mix all fertilisers thoroughly with the soil when the land is finally prepared.

Sowing:

For white jute	-	JRC - 321	6 to 8 Kg./ha.
		JRC - 212	
Tossa jute	-	JRO - 632	4 to 6 Kg./ha.
		JRO - 620	

Sow in rows of 90 cms. spacing with hand seed drill to a depth of 15 to 20 cms. See that there is enough moisture in the soil to ensure good germination.

Sowing time:

White jute - Early March to early April.
Tossa jute - May to June.

Weeding:

Intercultivation is done to stimulate vegetative growth after three weeks from sowing. A spacing of 7 to 10 cms. between plants is to be maintained. Hoeing with wheel hoe after each hand weeding is necessary.

Top dressing:

20 kg Nitrogen is to be supplied in two equal doses as follows:

- i) after 1st weeding
- ii) 10 to 15 days after 1st top dressing.

Follow each top dressing with hoeing. While applying the fertilisers, mix it with four to five tonnes of soil for uniform distribution and avoiding leaf scorch.

In the case of white jute, a non-lodging variety, double the dose of fertilisers is to be applied to get higher yields.

Pests and diseases:

- 1) Field crickets - which damage the seedlings.

Remedy:

Dust Aldrex 5% at 20 Kg/ha. in the soil at the time of land preparation. Spray Aldrex 50-WP at 1 Kg. in 500 litres of water for one hectare if the pest affects the standing crop.

- 2) Indige caterpillar, stem weevil and semilooper

Preventive sprayings with Endrin 20 EC at 670 to 840 ml/ha in 450 to 560 litres of water at 15 days interval, are recommended.

Mite:

Spray lime sulphur solution (1 to 49 parts of water) at 500 litres/hectare and dust lime sulphur in the proportion of 3:1 - 20 Kg/ha.

Diseases:

Stem rot, root rot, and seedling blight can be checked by regularly adding lime in acid soils. Add potassic fertilisers and remove plant debris like stubbles of previous crop. Provide good drainage.

Nematodes:

Soil application of nemagon at 7.5 to 9 litres/ha.
Early sowing is recommended for longer growth and long fibres.

Harvest:

The right time of harvest is the small pod stage.
Earlier harvesting will give better quality of fibre, but yields will be low.

The harvested seeds are to be tied in bundles of 18 to 20 cms. diameter each. Thick and thin plants may be bundled separately. Leave the bundles standing in the field for two or three days to let the leaves shed. This will prevent the fibre from getting a dark colour.

Steeping and retting:

Ret in shallow canal or river with slow running and clear water. If not, two metre deep tanks are quite suitable.

Keep the jute bundles standing in 30 to 60 cms. deep water for three or four days before the entire bundle is steeped. This ensures uniform retting. Cover steeped bundles with water weeds, jute sticks or some leguminous plants like daincha or sunhemp. This will accelerate retting. Weigh the bundles down, 10 cms. below the surface carefully so that the bottom should not touch the clay at bottom of the tank. Retting is best done when the temperature of water is between 31 and 30°C and it may be completed within a fortnight. If temperature gets cooler, retting gets prolonged.

Extraction and drying of fibre

Extract fibre gently from each reed separately to get cleaner jute fibre with minimum waste. Beating of fibres with wood-sticks should be avoided as it spoils the quality.

Dry the extracted fibre over a bamboo frame or thick wire frame or a clean surface in mild sun for two or three days. The fibre loses its lustre and strength by too much exposure to hot sun.

This can double the present yields. The present yield is 11 to 13 quintals/ha.

As an experimental measure, the following scheme is suggested.

Paddy	Pulses (Grams)	Jute(Tossa jute)	H.Y.Paddy								
J	F	M	A	M	J	July	A	S	O	N	D

<u>Economics</u>	<u>Cost of cultivation</u>	<u>Gross income</u>
Jute - Paddy - Pulses	- 950-1000-100	1950+2560+600
<u>Net profit</u>		
1000+1560+500 = 3160		

Two observation trials in 5 hectare plots can give an idea on the suitability of jute cultivation in Vedaranyam and Talanayar blocks. Seeds may be supplied free of cost and fertilisers and pesticides at a subsidised rate.

This may work out to Rs.1000/- per hectare. Total amount required for the two trials will be Rs.10,000/-.

If successful, seed farms can be organised in the two blocks for production of seeds and distribution through Agro-service centres.

2.8.3.3 Cotton:

Cotton is already cultivated in rice fallows and hence does not require any stress.

The requirement is ginning factories for ginning the kapas and taking the lint and seeds. The seeds from ginning factories can be supplied for sowing.

Following are the locations for ginning factories, suggested.

		<u>No. of units</u>
1. Thanjavur	..	1
2. Aranthangi	..	1
3. Kumbakonam	..	1
4. Mayuram	..	1
5. Tiruvarur	..	1
6. Nannilam	..	2
Total:		<u>7</u>

The total quantity of kapas that will be available in each location if the new cropping pattern is implemented is given in the following table:

1. Thanjavur	..	2400 Tonnes
2. Aranthangi	..	4000 "
3. Kumbakonam	..	2400 "
4. Mayuram	..	6000 "
5. Tiruvarur	..	6000 "
6. Nannilam	..	10800 "

2.8.3.4 Sunflower

It is a short duration variety of oil seed suitable for any type of soil and climate. Because of its short duration (91 days) and less requirement of irrigation, sunflower is recommended as a ~~cash~~ crop in rice fallows of Thanjavur district. Already progressive farmers of the district are cultivating this crop and getting good returns.

In the new cropping scheme, it is suggested as a ~~cash~~ crop in rice fallows and a total area of 27,000 hectares every year and 30000 hectares once in three years are to be brought under sunflower in summer months.

A brief note on sunflower cultivation is given below:

In Tamil Nadu, the area under sunflower is negligible and it is proposed to extend its area considerably during the next decade. Trials indicate that it comes up well both under rainfed and irrigated conditions. In rainfed areas, average yield is 300 to 400 Kg. and under irrigated conditions 800 to 1000 Kg/ha. The duration of the crop is only 85 to 90 days. Oil content is 45 to 50%.

Cultivation details:

Bring the land to fine tilth; incorporate farm yard manure at the rate of 12 cart loads per ha.

Apply the following fertilisers as basal dressing.

Superphosphate - 190 Kg/ha.

Muriate of potash - 112 Kg/ha.

Seeds - Variety - Koilpatty-1 Seed rate: 10 Kg/ha.

Seed treatment:

Soak the seeds in brassical solution (a product of EID Parry) or mix with Agrosan GN at 5 gms./Kg of seed.

Sowing:

The seeds may be sown (dibbled) in rows 1 $\frac{1}{2}$ ' apart. Two seeds may be sown in each hole. The interspace between plants in a row may be 6". Wider spacing of 2' x 9" can also be adopted to get large sized flower. Often seeds germinate within four days.

After cultivation:

One weeding is required fifteen days after sowing. Urea at the rate of 75 Kg/ha is to be applied as top dressing immediately after weeding.

Plant protection measures:

One or two prophylatic sprayings with Endrin and fungicide are recommended to prevent pests and diseases.

Irrigation:

One or two irrigations will be required.

Flowering:

The crops come to flowering one month after sowing. The opened flowers are best pollinated by honey bees and apiary can be a side industry where sunflower is cultivated.

Flowers mature within 40 days after opening and they droop. This is the optimum time for harvest.

Harvest:

The flowers can be plucked and spread on threshing floors. The seeds are taken from the dried flowers and can be crushed in expellers for oil.

Yields - Average yield - 800 Kg/ha.
Oil content - 40%
Oil yield - 320 Kg/ha.

Sunflower oil is edible and least harmful from health point of view. The de-oiled cake which is rich in protein, can be utilised for manufacture of food products like biscuits.

Cost of cultivation: Amount
Rs./ha.

Preparatory cultivation:

I - 6 ploughings	..	75.00
II - Bunding - 20 men at Rs.3/day	..	60.00

Seeds and sowing:

i) Cost of 10 kg. seeds at Rs.2/kg	..	20.00
ii) Seed treatment	..	1.50
iii) Sowing - 25 women at Rs.2/-	..	50.00

Manure and manuring

F.Y.M. - 12 tonnes	..	60.00
Fertilisers	..	300.00
Application charges - 4 men	..	12.00

After cultivation:

Seeding once - 25 women	..	50.00
-------------------------	----	-------

Plant protection:

Cost of pesticides and sprayings	..	40.00 (lump sum)
Irrigation	..	175.00 (lump sum)
Harvesting and processing	..	50.00
Total:		893.50

-189-

Yield	-	800 Kg/ha.
Value	-	Rs.1600/- at Rs.2/- per Kg.
Net Profit	-	Rs.700/-

It may be noted that sunflower is recommended only as a ~~cash~~ crop in rice fallows and the above-said income is obtained within a short period of 100 days.

Agricultural department have laid out a series of demonstrations to popularise sunflower cultivation. An area of 1.5 lakh hectares are to be brought under sunflower by the end of the VIth Plan throughout the State. For this, large quantities of seeds are required. The proposal is to multiply seeds in the Govt. Farm at Kudumianmalai in Trichy district.

It is expected that Thanjavur farmers will utilise the opportunities very well and make sunflower cultivation a regular feature in their cropping pattern.

Rs.10,000/- may be set apart every year for supply of seeds at subsidised rates.

2.8.3.5 Agathi:

In the new cropping pattern, the suggestion is to grow Agathi as an intercrop in cocoanut gardens, throughout the district. Agathi is a legume and will add to the fertility status of the soil and thus help to improve the cocoanut yields.

It is a raw material suitable for paper pulp and hence is of great economic importance. Sun Paper Mills at Tirunelveli have produced newsprint from Mesta and also from a combination of mesta and agathi.

Cultivation of agathi is nothing new to a Tamil Nadu farmer. For the supply of raw material for paper industry, the loppings should be done once in two years. The average yields that can be obtained is 2 tonnes/ha. It will be a supplementary income to a farmer owning cocoanut gardens.

Intensive propaganda and demonstration plots in the cocoanut belt of Thanjavur district are very essential for achieving the target of 13,000 hectares.

For demonstration plots, Rs.5,000/- may be given every year for supply of seed materials.

2.8.3.6 Cashew:

As has been mentioned earlier, cashew yields can be doubled by adopting the package of practices recommended by the Agricultural department.

Present yield - 187 Kg/ha.

Cost of package of practices in one hectare of
Cashew Plantation - Average Stand/ha - 125

	Rs.
1. Clearing jungle growth ..	15
2. Soil working around the plants	15
3. Cost of fertilisers at 1 Kg Mixture/tree ..	100
4. Application of fertilisers ..	25
5. Spraying pesticides ..	25
Total:	180

By this, the yields can be brought to 364 Kg/ha.

It is within the limit of the farmers to adopt the above-said practices and double the yields. Ground-nut as an inter crop is suggested in 6000 hectares of cashew. Being a leguminous crop, it will improve the soil fertility. The pods can fetch a good income for the farmer.

An additional sum of Rs.20,000/- may be set apart for giving loans and subsidies for cashew farmers, every year.

2.8.3.7 Paddy:

In the new multiple cropping pattern, gross area under paddy has been reduced to 5.04 lakh hectares from the present 6.50 lakh hectares. The main idea was to increase the area under cash crops for industrialisation of the district.

But, the dwindled area of paddy should not result in a reduction in production. On the other hand, the yield per hectare has to be considerably increased to make up the loss in total area.

In preparing the cropping pattern, single crop paddy lands have been selected for multiple cropping and in rotations where two crops of paddy is recommended once in three years. In the existing set up, there will be three crops of CO25 in three years, while in the new scheme, two crops will be taken in three years with high yielding varieties like Karuna, Jaya etc. This will definitely give yields higher than CO-25.

In all cases, it is expected that farmers will adopt cultivation of high yielding varieties and get higher yields than what they get now by adopting the recommended package of practice.

5 hectare demonstration plots in all panchayat unions with the new cropping pattern should be organised every year.

<u>Financial layout:</u>	<u>Amount</u> Rs. in lakhs
--------------------------	-------------------------------

Cost of one demonstration with subsidy of Rs.1,000/- per hectare for inputs	.. 1.80
---	---------

36 demonstrations of 5 hectare plots - Rs.5,000/- each.

2.8.3.8. Tapioca:

There are 5000 hectares of padugai bananas where at present, there is no intercropping. These banana gardens, which are high level silt lands, are quite suitable for tapioca cultivation.

Tapioca is an important tuber crop which is cultivated both under irrigated and rainfed conditions. Padugai lands are not irrigated and hence tapioca can be tried as an inter crop. The area suggested is only 3100 hectares. If successful, it can be very well extended to the whole of Padugai lands.

A new hybrid variety No. H.165 released from the Central Tuber Crops Research Institute, Trivandrum is a promising early variety. Trials in Tapioca Research Station at Salem indicate that H. 165 is a promising variety. It is also known that H. 165 can be harvested in the 8th month to get well-developed tubers. Average yields of 20 tonnes/ha. can be obtained under unirrigated conditions. Thus a total of 62,000 tonnes of tapioca tubers can be obtained from this crop. This will be an additional income for the farmer.

The optimum needs of tuber crops, based on dietary pattern at 85 gms. roots and tubers per adult per day for the present population of 411.43 lakhs in Tamil Nadu is 15 lakhs tonnes while the present production is only 6.44 lakh tonnes (Dept. of Horticulture, Tamil Nadu Agricultural University, Coimbatore). Hence, whatever quantity of tubers produced will never be an excess.

Under rainfed conditions, the cost of cultivation is Rs.750/- to Rs.800/- per hectare. The returns will be Rs.4000/- (for 20 tonnes at Rs.200/- per tonne).

Season of planting - ~~May~~ - June planting
(Adipattam) will suit the area.

H. 165 can be harvested in January when there will be enough moisture in the soil for pulling out the tubers.

Method of planting:

At Tapioca Research Station, Salem observation trials were conducted on different methods of planting and it was found that ridge method cultivation gave 21% increase over the bed method of cultivation. Hence this method can be adopted.

Observation trials can be laid out in a few selected areas, by supply of tapioca settu free of cost.

This involves only a small additional financial commitment. A lump sum of Rs.10,000/- may be set apart every year for this scheme.

2.8.3.9 Cocoanut:

16,000 hectares of cocoanut gardens in Thanjavur district require considerable improvement for production of raw materials for cocoanut-based industries.

This can be achieved only through intensive propanganda and demonstration plots. Already Agricultural Department are giving all possible guidance to the farmers. It is up to them to take the advices and adopt the package of practices.

The present yield of 40 nuts per tree can be increased to at least 60 nuts by adopting the departmental recommendations.

Oil mills and fibre industries can be thought of only if the present yields are improved.

2.8.3.10 Maize:

36,000 hectares are to be cultivated with maize in rice fallows. The two high yielding varieties viz. Deccan Maize and Ganga-5 are capable of yielding 6000 to 7000 Kg/ha.

Ganga-5 is of shorter duration (90 to 95 days) and can be cultivated in rice fallows after the harvest of 2nd crop.

Cost of cultivation	..	Rs.850/-
Gross income (Rs.450/- per tonne) for 5 tonnes	..	Rs.2250/-
Net Profit		Rs.1400/-

Demonstration plots of 5 hectares each in 50 centres with free supply of seeds and subsidy for fertilisers up to Rs.300/- per hectare may have to be laid out as a show-piece for farmers.

Total amount received for 50 demonstrations every year at Rs.1500/- per centre Rs.75,000/-.

Every year, fresh seeds have to be made available. In the case of Ganga-5, the flowering should not coincide with hot weather period and the sowing cannot be delayed beyond January-February.

2.8.3.11 Insecticide Formulation Unit:

Cultivation of high yielding varieties and adopting scientific farming methods call for timely plant protection measures. Hence the demand for insecticides will be increasing.

Two formulation units are suggested to meet the demand.

Location: Thanjavur in West Thanjavur
Mayuram in East Thanjavur.

Products: BHC Dust (5 and 10%) - 25 tonnes/month
Emulsion concentrates (20%) - 200 litres/month

Raw materials - Except Endrin and machinery, all other raw materials are available indigenously.

Investment for each unit	Fixed Capital	..	Rs.1.75 lakhs
	Raw materials	..	Rs.1.05 ,,
	Wages	..	Rs.0.11 ,,
Total:			Rs.3.00 lakhs

Employment - Technical - 6
Non-Technical - 13

Through extensive propaganda and liberal financial aids, the area proposed under each crop have to be achieved within 10 years.

Table-78

Financial layout of Agricultural Development Programme

	<u>1974 to 1978</u>	<u>1979 to 1983</u>
I. Digging borewells:		
i) New Delta and Cauvery sub-basin	62 crores	-
ii) Vennar sub-basin	-	10 crores
II. Agro Service Centres	0.59 crores for capital and (79.0 crores for working capital every year)	0.59 crores for capital and (80 crores for working capital every year)
III. Seed and Demonstration Farms:		
1. Mesta	11.60 lakhs capital and 0.84 lakhs working capital	0.84 lakhs working capital
2. Sugarcane	80.25 lakhs capital and 55 lakhs working capital every year	55 lakhs working capital every year
3. Jute - Two trial cultivations	Rs.10,000/- every year for three years	-
Seed Farms - 2 nos.	11.60 lakhs capital and 0.84 lakhs W.C.	0.84 lakhs working capital
4. Cotton ginning factories - 5 units		
5. Sunflower cultivation	Rs.10,000/- every year	Rs.10,000/- every year
6. Agathi	Rs.5,000/- every year	Rs.5,000/- every year
7. Cashew	Rs.20,000/- ,,	Rs.20,000/- ,,
8. Paddy 36 demonstrations	Rs.1.80 lakhs ,,	Rs.1.80 lakhs ,,
9. Tapioca	Rs.10,000/- ,,	Rs.10,000/- ,,
10. Maize - 50 demonstrations	Rs.75,000/- ,,	Rs.75,000/- ,,
11. Insecticide Formulation 2 units (each Rs. 3 lakhs)	6 lakhs (3.50 lakhs fixed + 2.50 lakhs working)	Rs.2.50 lakhs working capital every year.

Expected area and production by 1983 in different crops

Cereals	Area in ha.	Production in tonnes
Paddy-I	226000 (every year) 134000 (once in three years)	678000 (3 tonnes/ha) 536000 (4 tonnes/ha)
Paddy-II	366000 (every year) 134000 (once in three years)	1098000 (3 tonnes/ha) 536000 (4 tonnes/ha)
Maize	36000 (in rice fallows and garden lands)	108000 (3 tonnes per ha)
Pulses	183000 (mainly in rice fallows)	91500 (500 kg/ha)
Chillies	10000	5000 (500 kg/ha)
Tapioca	3100 (in Padugai bananias)	62000 (20 tonnes/ha)
Sugarcane	134000 (twice in three years)	13400000 (100 tonnes/ha)
Groundnut	59000 (every year) 104000 (once in three years)	47200 (800 kg/ha) 83200 (800 kg/ha)
Sunflower	27000 (every year) 30000 (once in three years)	21600 (800 kg/ha) 24000 (800 kg/ha)
Cocoanut	16500	198000000 nuts (60 nuts/tree)
Cotton	42000 (rice fallows) 9000 (garden lands)	33600 (800 kg/ha) 7200 (800 kg/ha)
Mesta	20000	20000 (1 tonne/ha)
Jute	105000	168000 (1.6 tonnes/ha)
Cashew	7093	5282.55 (350 kg/ha)
Agathi	13227	26454 (2 tonnes/ha) once in ten years.

Proposed Agro-based Industries

S.No.	Description	No. of units	Location	Year
I.	Modern rice mills and Rice Bran Oil units in place of conventional mills	13	Taluk H.Qs.	1975
II.	Modern Rice Mills and Rice Bran Oil Units in place of conventional mills	29	Block H.Qs.	1983
III.	Units for carbon extraction from rice husk	13	Taluk H.Qs.	1983
IV.	Sugar mills to crush 2000 tonnes cane/day	4	Pattukkottai Aranthangi Thanjavur Mannargudi	1983
V.	Newsprint Paper Mill based on Agathi and Mesta, 100 tonnes paper per day	2	Aranthangi Pattukkottai	1979
VI.	Jute Mills	2	Thalanayar Kollidam	1983
VII.	Cotton Spinning and Weaving Mill	2	Mayuram Nannilam	1983
VIII.	Malt factory based on Maize	1	Mannargudi	1983
IX.	Protein food units from Pulses and Tapioca	2	Nannilam Mayuram	1983

S.No.	Description	No. of units	Location	Year
X.	Sunflower and groundnut and cocoanut oil extraction units	65	Mannargudi (10 units) Pattukkottai (50 units) Muthupet (5 units)	1983
XI.	Cocoanut fibre extraction units, as cottage industries	10	Pattukkottai Muthupet	1979
XII.	Sea weed industries like Agaragar manufacture	5	Sethubavachathram	1979
XIII.	Cashew nut processing units	2	Thanjavur (1) Gandarvakkottai (1)	1975
XIV.	Cashew apple processing unit	2	Thanjavur (1) Gandarvakkottai (1)	1975

2.8.4 Summary of the Programmes relating to Agriculture, Fisheries and Animal Husbandry

2.8.4.1 Thanjavur district, as has been amply brought out earlier, is an agriculturally intensive district. The economic development of the district, therefore, hinges on intensification of agricultural activities as also diversifying them. The various agricultural programmes to be launched in the district during the next decade are summarised in the table appended. They include development of irrigation facilities from all sources, introduction of new crops, rationalising agricultural activities, development of new and better varieties of seeds, and intensification of cash crops. These programmes will have to be undertaken on a phased basis, during the next ten years. The estimated cost for introducing these programmes will be around Rs.7434 lakhs as fixed capital and Rs.15960 lakhs as working capital per annum. These estimates are based on the going prices of the different factors of production and are likely to shoot up if the inflationary tendencies continue. The value of the benefit accruing from these programmes is worked out to be in the region of Rs.24,000/- lakhs per annum. These programmes will also give rise to employment opportunities for a minimum of 552 in the skilled and professional category and 1,06,250 in the unskilled and semi-skilled category. Aside from this, these programmes will give rise to various forward linking and backward linking activities, in trade, industries, agriculture etc.

2.8.4.2

The programmes relating to fisheries and animal husbandry are also summarised in the tables appended. These programmes are in part the development of basic infra-structure for fishing and in part direct activities for catch and processing. Together, these activities will accelerate the development of the coastal region of the district. The export activities envisaged will help the country earn foreign exchange. The total investment in these programmes is in the region of Rs.253 lakhs. The total catch in the district will increase from 22,661 tonnes to 45,000 tonnes and the value of the catch will increase from Rs.254/- lakhs to Rs.500/- lakhs annually. These programmes will give rise to employment opportunities for 3900 skilled persons and 6200 unskilled workers.

2.8.4.3

The animal husbandry development programme envisaged in the district would involve an outlay of Rs.77 lakhs. These programmes will result in the increase in the quality and quantity of animal products in the district. The additional employment generation will be in the region of 800 persons both skilled and unskilled.

THANJAVUR DISTRICT
AGRICULTURAL DEVELOPMENT PROGRAMME.

-202-

Sl. No.	Programme details	Location Area in ha/ Nos.	Period of imple- mentation	Estimated cost of the programme Rs. in lakhs Fixed. Working-	Estimated cost increase. Direct. Profit of project. Rs. lakhs.	Estimated output Indirect Qty. Value Rs. lakhs.	Estimated additional employment including supervisory staff. Nos.	Unskilled and semi- skilled	Addl. economic benefits like industries and ancillary industries		
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
1.	Digging Borewells	Cauvery Sub-basin New Delta 79706 wells.	1974-to 1979.	6200.00 (approx)	-	Can provide assured irrigation facilities for the existing irrigated areas and also bring under irrigation the dry lands which are not irrigated now.	150	1500	Cultivation of cash crops to provide raw materials for industries		
2.	Digging Borewells	Venmer Sub-basin. 11627 wells.	1979 to 1984.	1000.00 (approx.)	-	-do-	30 (for 5 years)	300 (for 5 years)	Improvement in production of paddy and other crops		
3.	Agro-Service Centres.	48 Nos. (One in every Panchayat Union and Municipality)	1974 to 1984.	110.00	15200.00	139.00	Given under item (9)	172	172	As above.	
4.	<u>Seed Farms And Demonstration Farms:</u>										
(i)	Sugarcane	Kattukkottai Thanjavur Kunkakonam 50 ha. each 3 Nos.	1974 to 1984	81.00	55.00	58.00	3582010 tonnes of cane every year	3522	24	150	Sugar factories, distilleries and allied industries.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
(ii)	Mesta	Pattukkottai Aranthargi 50 ha. each 2 hrs.	1974 to 1984	11.60	0.84	2.33	20,000.00 (dry fibre)	180.00	24	150	Peper Mills based on Mesta and Agathi.
(iii)	Jute	Vedavanjan Kollidam 50 ha. each 2 hrs.	1974 to 1984	11.60	0.84	2.33	160000 Jute fibre	1512.00	24	150	Jute Mills
6.	Cotton ginning factories.	7 units.	1974 to 1984.	12.00	-	-	Given under item (9)	-	70	280	Textile Mills.
6.	Sunflower - seed supply.	Different parts of the dist.	1974 to 1984	-	0.10	-	29000 sunflower seeds	592.00	-	Given under item (9)	Oil Extra- ction Mills cattle feed units and confectiona- ries.
7.	Agathi culti- vation in coconut gardens	Coconut gardens in the district.	1974 to 1984	-	0-05	-	(i) 13274 tonnes of gathi wood. (ii) coconut production 72000000 Rup.	119.00 432.00	-	13274 men & 13274 women.	Peper Mills based on Mesta & Agathi.
8.	Cashew Develop- ment programme	Cashew gardens in the dist.	1974 to 1984.	-	0.20	-	(i) 3956 cashew nuts. (ii) 79120 cashew apple.	79.12	4	1500 men and 1500 women.	Cashew industry, cashew Tenny manufac- ture and allied industries.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)
9.	Paddy and multiple cropping demonstrations	36 (One 1974 to in every 1984 Panchayat Union)		-	1.80	-	(i) 110510 Paddy (ii) 3330 Chillies (iii) 43333 Pulses (iv) 13600 cotton. (v) g.nut 43633	8812.00 133.20 523.60 1028.00 1075.00	36	37000 men and 37000 women	(i) Modern Rice Mills with rice bran oil units. (ii) Protein food manufacturing units.
10.	Cassia Demonstration in Padugai lands	4 (in Padugai lands)	1974 to 1984.	-	0-10	-	62000 tubers.	186.00	2	-	Starch factories
11.	Hybrid Maize Demonstration	50 in rice fallows.	1974 to 1984.	-	0.75	-	105100 (Maize)	340.80	12	-	Malt factory
Total					7434.20	15959.68	201.66	-	24233.72	552	106250

FISHERIES DEVELOPMENT PROGRAMMES

Sl. No.	Programme Details	Location	Period of implementation	Estimated cost of the programme (Rs. in lakhs)	Estimated employment opportunities		Additional economic benefits like Ancillary Industries etc.
					Skilled	Un-skilled	
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
1.	Development of Fishing Harbours	1. Nagapattinam 2. Malliapattinam 3. Point Calmère	1974--'75 to 1983--'84	80	800	1400	This will enable a two-fold increase in marine fish landings in the district by providing facilities for operating a fleet of mechanised boats.
2.	Mechanisation of country crafts and catamarans.	1. To supply about 200 in-board engines to fishermen owning countrycraft. 2. To supply 1500 outboard engines to fishermen owning catamarans	1974--'75 to 1983--'84	30 50	400 1000	200 500	Efficient utilisation of catamarans and country crafts and thereby increase the volume of fish catch. Manufacture of leather from shark skin. Frozen breded fish sticks manufacturing unit.

(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
3.	Freezing plants cum cold storages	1. Malliapattinam 2. Point Calmure 3. Nagapattinam	1974--'75 to 1983--'84	18	60	300	Development of packaging industry.
4.	Cold storages cum Ice Plants	Malliapattinam	1974--'75 to 1978--'79	5	25	35	Fish preservation industry
5.	Pond culture and reclama- tion of tanks		1974--'75 to 1983--'84	45	1500	3000	Inland fishery develop- ment.
6.	Fish seed production and stocking scheme.		1974--'75 to 1983--'84	25	150	750	Development of inland fishery and supply of fresh water fish. Scope for establishment of other ancillary industries like Prawn Flake manufacturing Unit, Fish meal plant, Bacterio- logical peptone for trash fish etc.
				253	3935	6185	

Note: If these programmes fructify, it is estimated that the annual marine fish catch for this district by 1983--'84 would be about 45,000 tonnes valued at Rs.500/- lakhs. Apart from this, the production of inland fish would be about 35,000 tonnes per annum valued at Rs.35 lakhs, approximately.

3.0 INFRASTRUCTURE

3.1

Power

Thanjavur district has no power generating stations. The district gets its supply of electricity from the Mettur and Periar power houses. There are four agencies engaged in the distribution of electricity, viz. 1) The Tamil Nadu Electricity System 2) The Thanjavur Electric Supply Corporation 3) The Kumbakonam Electric Supply Corporation and 4) The Nagapattinam Electric Supply Corporation. At the end of 1970-71, the distribution network consisted of 3049 kilometres of High Tension and 4068 kilometres of Low Tension lines. At the same time, there were 4104 industrial connections (2811 in rural areas and 1293 in urban areas) and 6630 agricultural connections in the district. More than fifty per cent (53) of the electricity sold in the district is used for street lights and domestic purposes, about ^{percent} 35/ for industrial purposes and the remaining 12 per cent for agricultural purposes. All the 34 towns in the district are already electrified. But only about 50 per cent of the villages have so far been electrified. Among the taluks, Nagapattinam with ^{percent} 71/ of the villages already electrified stands first, closely followed by Thanjavur which has got 70 per cent of its villages electrified and Arantangi with barely 18 ^{percent} occupies the last position. The hierarchy is as follows:-

- | | |
|----------------------------|--------------------------|
| 1) Nagapattinam (71%) | (2) Thanjavur (70%) |
| 3) Kumbakonam (68%) | (4) Nannilam (65%) |
| 5) Pattukkottai (56%) | (6) Mayuram (55%) |
| 7) Thiruthuraipoondi (52%) | (8) Papanasam (49%) |
| 9) Sirkali (46%) | (10) Mannargudi (37%) |
| 11) Peruvurani (35%) | (12) Orathanad (31%) and |
| 13) Aranthangi (18%) | |

Under the rural rural electrification scheme, 4483 tubewells have been electrified and 2147 pumpsets energised till the 31st of March, 1971. On the same date, there were 6732 applications pending disposal. It has been proposed to implement the following schemes during the perspective plan period (ie.1972-'84).

1. Establish four new substations at Manalmedu, Karuvilandanathapuram, Mannargudi and Karuppambalam.
2. Electrification of all the villages, hamlets and harijan colonies which are not yet electrified.
3. Energisation of about 16,000 pumpsets.
4. Nationalisation of all the private electricity systems.

.2

Transport

Transport plays a decisive role in economic development. The report of the Task Force on transportation appointed by the State Planning Commission has aptly described it as "one of the key infrastructures of a developing economy" and as a "development catalyst". The report sums up the three main ways in which transport development contributes to economic development thus:-

- 1) Transport enlarges the market and thereby further stimulates economic specialisation.
- 2) Transport helps exploitation of additional resources by making them accessible.
- 3) Transport leads to establishment or expansion of related industries.

An assessment of the transport facilities in Thanjavur district, existing as well as anticipated, is attempted here.

3.2.1

Railways

Thanjavur district may be considered as fairly well-developed in respect of railway facilities - in route kilometrage as well as number of stations. The railway network in the district consists of 511 kilometres of metre gauge railway lines and a total of 110 railway stations. The district accounts for 13.5 per cent of the total railway route kilometrage of the State. The intensity of railway lines per hundred square kilometres in the district is nearly double that in the State as a whole, the figures being 5.25 kilometres for Thanjavur and 2.76 kilometres for Tamil Nadu. In respect of railway lines per lakh of population also, the district stands in a favourable position vis-a-vis the State as a whole: the figures are 13.31 kilometres and 8.72 kilometres respectively. All taluks except Orathanad and almost all commercial and agricultural centres are connected by rail. There are seven railway lines touching the district. Their names and route distances within the district are given below:-

Table - 79

Sl. No.	Name of line	Route distance in Kilometres.
1.	Madras-Rameswaram main line(linking Mayuram, Kumbakonam and Thanjavur)	- 124
2.	Mayuram - Karaikudi	- 172
3.	Nagore - Thanjavur	- 86
4.	Thiruthuraiipoondi - Point Calemere	- 46
5.	Mayuram - Peralam - Karaikal	- 40
6.	Mayuram - Tranquebar	- 30
7.	Nidamangalam - Mannargudi	- 13
Total		: 511

-: 211 :-

There are altogether 110 railway stations including 7 junctions in the district. Thanjavur Junction, Kumbakonam, Mayuram Jn., Nagapattinam, Thiruvarur Jn., Nidamangalam Junction, Sirkali, Mannargudi and Thiruthuraipoondi are the major stations. Orathanad is the only taluk without railway connection. The present metre gauge lines are acting as a great impediment to the through traffic of goods to and from destinations outside the State since it necessitates transshipment at Madras. Therefore, it is essential to convert the metre gauge lines into broad gauge as early as possible. The Task Force on transportation appointed by the State Planning Commission has suggested a phased programme of conversion. The Tiruchi-Thanjavur Regional Plan prepared by the Directorate of Town Planning has recommended the immediate conversion of Tiruchy-Thanjavur, Thanjavur-Nagapattinam and Nagapattinam-Vedaranyam lines on a priority basis.

3.2.2

Roads

Thanjavur district had a total road length of 7138 kilometres as on 31st March, 1971. The percentage share of the district in the State total was 9.7. As compared to nearly 71 percent in the state as a whole only 60 per cent (4201 kilometres) of the roads in the district are surfaced - 56 kilometres cement or concrete, 2112 Kms. black topped and 1941 Kms. metalled. In the case of road facilities also, the position of Thanjavur district is slightly better than the State as a whole. The intensity of roads per 100 square kilometres is 73.3 KM. as against the State average of only 56.8 kilometres. Again there are 185.9 kilometres of roads per lakh of population in Thanjavur district as compared to 179.38 Kms. in the State as a whole. There are

no national highways in the district; but there are two State highways, viz. Nagapattinam - Coimbatore - Gudalur Road and the Perambalur - Manamadurai Road. The classification of roads according to various categories is given below:-

Table - 80

Sl. No.	Category	Length in KMs.
1.	State Highways	163
2.	Major district roads	1577
3.	Other district roads and village roads	917
4.	Panchayat union roads	1677
5.	Panchayat roads	1632
6.	P.W.D. roads	751
7.	Municipal roads	421
	Total	7138

=====

Apart from the two State highways, viz. The Nagapattinam - Coimbatore - Gudalur Road and the Perambalur - Manamadurai Road, the other major roads in the district are Madras - Kumbakonam - Thanjavur Road, Thanjavur - Orathanad Road and Thanjavur - Vedaranyam Road. The administration of roads in the district is looked after by two divisions - one at Thanjavur and the other at Nagapattinam - each headed by an Executive Engineer. All the towns and nearly 90 per cent of the villages in the district are connected by roads either pucca or at least kutcha. Papanasam taluk has the distinction of being the only taluk with all the villages having road connection. The second place is

shared by Mayuram and Thiruthuraipoondi while Thanjavur stands at the bottom. The ranking of taluks according to the availability of roads is as follows:-

Table - 81

Rank	Name of Taluk	Percentage of villages connected by roads
1	Papenasam	100
2	Mayurem Thiruthuraipoondi }	99
3	Pattukkottai	98
4	Mannargudi	97
5	Nannilam	94
6.	Kumbakonam	91
7	Sirkali	90
8	Arantangi	89
9	Peravurani	82
10	Orathanad	80
11	Nagapattinam	74
12	Thanjavur	73

The road system in the district suffers from a number of serious bottlenecks. For example, the present capacity in several sections such as Thanjavur - Sirkali, Grand Anicut - Kumbakonam, Kumbakonam - Tiruvarur, Kumbakonam - Mannargudi, Thanjavur - Nagapattinam, Mayuram - Thiruthuraipoondi and Thanjavur - Thiruvaiyaru is grossly inadequate to meet the traffic requirements. Railway level crossings on even major roads is another handicap besetting the road system in the district. A third

drawback in the present road network is the low accessibility, especially in the case of the interior areas of Thiruthuraipoondi taluk. As on the 31st of March, 1971, the total number of vehicles registered in the district was 4807. Thanjavur district accounts for only about 3.8 per cent of the vehicles registered in Tamil Nadu. The classification of the registered vehicles according to various categories is as follows:-

Table - 82

Sl. No.	Category	Number
1	Motor cars including Station wagons and jeeps	1848
2	Taxi cars	222
3	Stage carriages (bus)	514
4.	Goods vehicles (public and private carriers)	461
5	Tractors and Trailers	76
6	Motor cycles, scooters etc.	1241
7	Others	445
Total		4807

The State Transport Department, the State owned Chozhan Transport Corpn. and a number of private agencies are operating bus services in the district. Thanjavur, Kumbakonam, Nagapattinam, Mayuram, Mannargudi, Tiruvarur and Pattukkottai are the major bus terminals in the district. Since Thanjavur is a deltaic district lying in the cyclone belt, communication becomes a

problem during monsoon. Therefore, it has been proposed to link all villages by the end of the IV Plan and to convert all roads into all-weather roads by the end of the Perspective Plan (i.e. 1984) irrespective of the population served. This is sought to be achieved through improvements such as black topping, widening, construction of culverts, bridges etc. Another scheme proposed for the plan period is effecting improvements to the roads in the Cauvery command Marketing Complex (a Central Sector Scheme under the "Area Development Programme" of Govt. of India with emphasis on market complexes with godown, shops for markets, space for carts and lorries, a drying yard, a mechanical drier and link roads. The scheme covers three districts, viz. Thanjavur, Tiruchirappalli and South Arcot. A total amount of Rs.150 lakhs has been sanctioned for the scheme - Rs.120 lakhs for improving 56 roads and Rs.30 lakhs for constructing 6 markets. Out of this Thanjavur will get Rs.115 lakhs Rs.95 lakhs for 37 road works and Rs.20 lakhs for 4 market complexes. The market complexes proposed are Budalur, Pattukkottai, Kuttalam and Thiruthurai-poondi). The perspective plan also envisages the provision of dustless roads to all town panchayats.

3.2.3

Ports

The district has got one minor port - Nagapattinam. It is located at the mouth of Kodavayar in the Bay of Bengal and is about 280 Kms. south of Madras. There is no deep sea berth at the port. It is a lighterage port. The main imports are fertilisers, iron ore and steel billets and exports miscellaneous articles such as tobacco, onions, chillies etc. The port is

mainly used for passenger traffic with the Malaysian ports. Details of goods and passenger traffic through the port for the period 1966-71 are furnished below:-

Table - 83

Details of imports into and exports from Nagapattinam Port (1966-'71)

(in tonnes)			
Year	Imports	Exports	Total
1966-67	7,684	14,292	21,976
1967-68	94,434	17,086	1,11,520
1968-69	1,39,753	15,544	1,55,297
1969-70	31,744	12,878	44,622
1970-71	57,148	15,117	72,265

Table - 84

Details of Passenger Traffic through Nagapattinam Port 1966 - '71

Y e a r	Embarked	Disembarked	Total
1966-67	11,611	9,629	20,240
1967-68	12,169	10,027	22,196
1968-69	8,700	8,254	16,954
1969-70	11,705	7,860	19,565
1970-71	13,444	7,568	21,012

The Trichy - Thanjavur Regional Plan has suggested the development of the port in order to enable it to handle an increased volume of traffic. It has also recommended the setting up of a fishing harbour at Nagapattinam.

3.2.4

Inland Water Transport

The Vedaranyam canal is the only inland water way in the district. The canal is 75 kilometres long and connects Vedaranyam and Nagapattinam. The canal is not used for passenger traffic. It is mainly used for the movement of salt from Vedaranyam area to Nagapattinam. The other major commodities moved along the canal are fuel, rice, straw etc. The total volume of goods traffic along the canal comes to only about 5000 tonnes annually. An outlay of Rs.4.90 lakhs for carrying out improvements to the canal has been proposed for the perspective plan period 1972 - 84.

3.3

Education

During 1970-'71, there were 2582 primary schools and 807 secondary schools in Thanjavur district. The share of the district in the State total was 9.9 per cent in the case of primary schools and 9.4 per cent in the case of secondary schools. Of the 2582 primary schools, about 92 per cent (i.e.2275) were rural and the rest (i.e.307)urban. Similarly, out of the 807 secondary schools, nearly 76 percent (i.e.612) were situated in rural areas and the remaining (i.e.195) in urban areas. The total number of students during the year was 496017 in primary schools and 184008 in secondary schools and that of teachers was 13895 in primary schools and 7691 in secondary schools. In 1970-71, Thanjavur district accounted for 13.8 per cent of the primary school students and 5.0 per cent of the secondary school students in the State. The percentage shares of the district were 13.7 and 6.2 in the case of primary and secondary school teachers

respectively. Against the State average of 137 students per primary school, there were 192 students per school in the district. But in the case of secondary schools, the ratio was the same as the State average, i.e. 228 per school. The teacher-pupil ratio was approximately 1:36 in primary schools and 1:24 in secondary schools. The corresponding State average were 1:35 and 1:31 respectively. There are about 20 percent of the villages still without even a primary school. The taluk-wise percentages are as follows:-

Pattukkottai	-	40
Peravurani	-	36
Nagapattinam	-	34
Arantangi	-	28
Papanasam	-	21
Nannilam	-	20
Thanjavur	-	19
Orathanad	-	17
Kumbakonam	-	13
Mannargudi Thiruthuraipoondi	} -	12

3.3.1

Higher Education

There are 10 arts and science colleges and a medical college at Thanjavur. There were 11,758 students and 512 teachers in the arts and science colleges and 1307 students and 176 teachers in the medical college during the year ¹⁹⁷⁰⁻⁷¹. For teachers' training, there is one college, besides 11 schools. Technical training is imparted through two polytechnics at Sirkali and Nagapattinam,

and two Industrial Training Institutes at Thanjavur and Nagapattinam. Other educational/training institutions in the district include an agricultural training centre at Aduthurai, a Music College and 4 colleges for oriental studies.

3.4 Public Health and Family Planning

3.4.1 As on 31st March, 1971 there were 35 hospitals (17 rural and 18 urban), 31 dispensaries, 36 primary health centres and 106 sub-centres in Thanjavur district. The 18 hospitals include the Raja Mirasdar District General Hospital, Thanjavur, the District General Hospital, Nagapattinam and the taluk headquarters hospital. Of the 31 dispensaries, 26 are located in rural areas and the remaining 5 in urban areas. The total number of beds available in all the hospitals and dispensaries was 3753 out of which 2478 were for general diseases and 1275 for special diseases (450 for tuberculoses, 780 for leprosy and 45 for infectious diseases). The district accounts for about 7.5 per cent of the total number of hospitals/dispensaries and 10.2 per cent of the total bed strength in the State. Availability of beds per lakh of population is 98 in the district as against only 90 in the State as a whole. There are four dental clinics in the district. In addition, there were 26 ayurvedic hospitals/dispensaries, 1 homeopathic dispensary and 4 unani dispensaries. The number of doctors in the various indigenous systems of medicine were 5 in ayurveda, 1 in homeopathy and 3 in unani. During the perspective plan period (i.e. 1972-84) it is proposed to carry out the following programmes in the district.

1. Increasing the bed strength of the District General Hospitals at Thanjavur and Nagapattinam to 700. There will be a 20-bed homeopathy wing and a 10 bed sidha wing attached to these hospitals. Besides both the hospitals will be provided with all specialisation services.
2. All the taluk headquarters hospitals will be upgraded as polyclinics. The polyclinics will have a total bed strength of 90 including a 10-bed sidha wing. They will be provided with ambulance, mobile van and specialist service facilities.
3. All the primary health centres will be converted into poly clinic centres with 30 beds and 2 ambulances.
4. Mini health centres will be established at the rate of 10 centres per block either by redesignating the present sub centres and dispensaries or by starting new ones. Each mini health centre will serve approximately 10,000 people.
5. The present National Malaria Eradication Programme will be continued.
6. Two new filaria control units will be started at Thanjavur and Nagapattinam.
7. Re-vaccination for small pox will be continued.
8. Basic health services will be strengthened.
9. Two new leprosy control units will be started.
10. T.B. and Chest clinics will be provided at all taluk hospitals.
11. Kuzhandaikal Kappagams (Bal wadis) will be started at the rate of one per panchayat.
12. The Nutrition Rehabilitation Programme for expectant and nursing mothers will be continued and strengthened.
13. The requisite buildings will be provided to all the health centres.

.2

Family Planning:

The Family Planning Programme in Thanjavur district as elsewhere in the State comprises (1) propaganda among the people of the benefits of a small family (2) providing facilities and personal knowledge about family planning methods (3) supplying contraceptives and (4) providing medical facilities for sterilisation. After the recent re-organisation of the family planning scheme carried out with a view to intensifying family planning efforts, each primary health centre has been provided with an additional medical officer, block extension educator and other para medical personnel. Thus, there are 36 family planning centres in Thanjavur district. Each centre has sub centres at the rate of one for every 10,000 people, manned by an auxiliary midwife. In addition, there are 2 mobile I.U.C.D. teams also. The Task Force on health, family planning, nutrition and sanitation has suggested that the birth rate should be brought down to 25 per 1000 by 1979 and 22 per 1000 by 1984. To attain these rates, the number of sterilisations will have to be 58 couples per thousand population in 1979 and 108 couples per thousand population by 1984, that of I.U.C.D. users will have to be 3 per thousand population in 1979 and 5 per thousand population in 1984 and that of conventional contraceptive users will have to be 15 per thousand population in 1979 and 23 per thousand population in 1984. For achieving these, efforts at family planning education through school and out of school programmes, through the radio, films, posters, hoardings and other audio-visual mass media are to be intensified.

.3

Water supply and sanitation

All the 34 towns and cent per cent of the urban population are already covered by the piped water supply scheme. But the situation is far from satisfactory in the case of rural water supply. Only about 24 per cent of the villages and less than 30 per cent of the rural population has been brought under the piped water supply scheme till the end of 1970-71. There are 32 villages in the district without any source of water - 10 in Peravurani taluk, 8 in Sirkali taluk, 7 in Thanjavu taluk, 2 in Orathanad taluk, and 1 each in Nannilam, Papanasam, Mannargudi, Nagapattinam and Arantangi taluks. All the villages in four taluks, viz. Mayuram, Kumbakonam, Pattukkottai and Thiruthuraiipoondi have at least one assured source of water supply - tap, well, tank, tubewell, river or any others. The water supply policy for the perspective plan period aims at the following things:

1. Provision of drinking water facilities to all villages where they are not available and strengthening them where they are not adequate.
2. Provision of protected water supply to all villages with 200 or more people.
3. Provision of protected water supply to all town panchayats.
4. Additional water supply to all municipalities so as to ensure an average per capita consumption of 25 gallons per day.

.4.4

Sanitation

The perspective plan envisages the introduction of underground drainage in all the urban areas and the conversion of dug earth

to water seal latrines latrines/which will be connected to the town sewers. Further, disposal of human excreta through septic tank or leach and the popularisation of the low cost water seal latrine designed by the Poonamallee Research Institute also are envisaged for the rural areas.

.5

Banking

.5.1

Commercial Banking

Thanjavur district stands third in Tamil Nadu (after Madras and Nilgiris) and thirty-sixth in all-India in respect of population covered by a bank office. The average number of people covered by an office are 27,000 in Thanjavur, 32,000 in Tamil Nadu and 52,000 in all-India (1970-71). The district which accounts for only less than 10 per cent of the State's population has got nearly 13 per cent of the total number of bank offices in Tamil Nadu. As of end May 1971, there were 141 bank offices in the district, operated by 14 banks - 8 nationalised and 6 private. The public sector banks accounted for more than 60 per cent of the bank offices. The Indian Overseas Bank which has the largest number of branches has been declared as the lead bank of the district. Details regarding the various banks functioning in the district and the number of branches operated by them are furnished below:

Table - 85

Name of Bank	No. of branches
<u>A. Public Sector</u>	
1. Indian Overseas Bank ..	20
2. State Bank of India ..	16
3. Indian Bank ..	16
4. Canara Bank ..	8
5. Central Bank of India ..	5
6. Punjab National Bank ..	5
7. Bank of Baroda ..	4
8. United Commercial Bank ..	2
Total	76
=====	
<u>B. Private</u>	
1. Kumbakonam City Union Bank Ltd. ..	21
2. Tanjore Permanent Bank Ltd. ..	18
3. Lakshmivilas Bank Ltd. ..	13
4. Bank of Madurai Ltd. ..	9
5. Karur Vysya Bank Ltd. ..	2
6. South Indian Bank Ltd. ..	2
Total	65
Grand Total	141
=====	

Among the taluks, Thanjavur stands first and Arantangi last with 25 and 3 bank offices, respectively. Thanjavur taluk has got one bank office for every 14,400 people while Orathanad taluk has got one office for only 64,800 people. The 141 branches are spread over 60 centres. Thanjavur which has got 16 offices tops the table followed by Kumbakonam with 13. Mayuram and Nagapattinam have 9 each, Mannargudi and Tiruvarur 6 each, Sirkali 5 and Pattukkottai and Thiruthuraipoondi 4 each; other 69 centres have one bank office each. The Indian Overseas Bank, which has

been declared as the lead bank of the district, on the basis of a fact-finding survey, has identified 20 growth centres for opening new branches. The 20 centres were allotted among 9 banks and branches have been opened in all centres except one. Although Thanjavur has got 11 per cent of the total number of bank offices in the State, the district accounts for only about 7 per cent of the total deposits and 3 per cent of the total advances in Tamil Nadu. Deposits are low mainly because a good portion of the agricultural income generated in the district flows out to the landlords residing elsewhere. The explanation for the low level of advances is that Thanjavur is predominantly an agricultural district and till recently the role of commercial banks in agricultural credit was practically insignificant, if not nil. Under the Package Programme the co-operatives were entrusted with the task of looking after agricultural credit requirements. However, the recent trends of credit as well as advances have been promising; during the last five years deposits have risen by nearly 200 percent while advances have registered an increase of about 300 percent. Thanjavur district occupies the seventh place in respect of deposit mobilisation per bank office and the last but one place in terms of advances made per bank office. The credit-deposit ratio obtaining in the district is far below that in the State and the country as a whole; the figures as on 30th June, 1970 were 55.4 for Thanjavur, 140.3 for Tamil Nadu and 77.2 for all-India. The per capita deposit was only Rs.60 in Thanjavur district as compared to Rs.74 in Tamil Nadu and Rs.96 in all-India and the per capita advance was just Rs.33 in the district as against the State and national averages of Rs.107 and Rs.77, respectively. Among the various centres, Kumbakonam stood first in deposit mobilisation while Tiruvarur topped in respect of advances made. Thanjavur stood second

in both.

3.5.2

Co-operative Banking:

Since Thanjavur is primarily an agricultural district, co-operatives play a crucial role in the economy of the district. The district has got two Central Co-operative Banks, 12 urban Co-operative Banks and nearly 600 primary credit societies. The Thanjavur District Co-operative Central Bank Ltd., Thanjavur and the Co-operative Central Bank Ltd., Kumbakonam are the two central banks functioning in the district. The former has 11 offices including the head office and its total membership is 635 - 512 co-operative societies and 123 individuals and others. The Central Co-operative Bank Ltd., Kumbakonam operates 9 branches and has 686 members - 543 co-operative societies and 143 individuals and others. The 12 urban co-operative banks are located at Kumbakonam, Mannargudi, Mayuram, Papanasam, Tiruthuraiipoondi, Sirkali, Pattukkottai, Tiruvarur and Arantangi. During the decade 1960-70, the number of primary credit societies has increased from 182 to 573 (i.e. by about 215 per cent) while there was only a slight increase of 9 per cent in the medium term credit. (i.e. from Rs.10.78 lakhs to Rs.11.79 lakhs). The growth of short term credit advanced was spectacular; from just Rs.14.82 lakhs in 1960-61, it soared to Rs.498.95 lakhs in 1969-70 or by about 2367 per cent.

3.5.3

Other institutions

As on 30-6-1970, there were 251 post offices offering savings bank facilities in the district. The total number of accounts was 135541 and their value Rs.327.76 lakhs.

The Life Insurance Corporation had canvassed 14498 policies - 7669 rural and 6829 urban - worth Rs.7.41 crores - Rs.3.55 crores rural and Rs.3.86 crores urban. Thanjavur district accounted for 8.94 per cent of the total number of policies - 12.90 per cent of rural and 6.64 per cent of urban - and 7.24 per cent of the total sums assured - 12.96 per cent of the rural and 5.15 of urban - in Tamil Nadu. While in the State as a whole, the percentage share of rural policies (36.64) was far less than that of urban policies, in Thanjavur district, it was more (52.90). Again whereas only 26.77 per cent of the total sums assured in the State was accounted for by the rural areas, in Thanjavur district, the rural areas contributed 47.91 per cent. A sum of Rs.367.05 lakhs was saved in the district upto the end of 1969-70, under the small savings scheme. Out of this, the net addition during the year was Rs.32.23 lakhs. The total amount saved in the purchase of government securities upto 31-3-1970 was Rs.46.56 lakhs. There was a net decrease of Rs.26.44 lakhs during the year. In addition to the above mentioned institutions, there are several non-institutional agencies engaged in money business. They include 372 registered money lenders, 76 registered chit fund organisations and about 1000 registered pawn brokers. More than 50 per cent of the money lenders are concentrated in Thanjavur. The pawn brokers are operating mainly in Thanjavur, Kumbakonam, Mannargudi and Nagapattinam.

6

Markets

There are 26 market centres in Thanjavur district -- 16 urban and 10 rural. The commodities transacted in these markets are mainly agricultural produce like paddy and other cereals, pulses/grams, groundnut, sugarcane, coconut etc. There are market committees/regulated markets in 22 out of the 26 market centres. Paddy, groundnut and coconut are the commodities covered by the market committees/regulated markets. All the 26 market centres have banking, postal, telegraph and telephone facilities and are connected by roads. All centres except Orathanad have railway connection also. Storage facility is available in 19 centres and co-operative marketing societies are functioning in 15 centres. The list of market centres in the district is furnished below:

Urban Centres

- | | | |
|-------------------|-------------------|-----------------|
| 1. Kuttalam | 2. Mannargudi | 3. Sirkali |
| 4. Tiruvarur | 5. Vedaranyam | 6. Nagapattinam |
| 7. Mayuram | 8. Adirampattinam | 9. Ammapet |
| 10. Aranthangi | 11. Muthupet | 12. Thanjavur |
| 13. Kumbakonam | 14. Orathanadu | 15. Papanasam |
| 16. Pattukkottai. | | |

Rural Centres

- | | | |
|--------------------|-----------------------|-----------------|
| 1. Koradachery | 2. Kivalur | 3. Peralam |
| 4. Sembanarkoil | 5. Thiruthuraiipoondi | 6. Nannilam |
| 7. Gandarvakkottai | 8. Madukur | 9. Vallam |
| | | 10. Peravurani. |

All the rural centres and 12 out of the 16 urban centres have got market committees/regulated markets. The four urban centres without market committees/regulated markets are Kumbakonam, Orathanad, Papanasam and Pattukkottai. Koradachery, Gandarvakottai, Madukur, Vallam (all rural), Adirampattinam, Ammapet and Aranthangi (all urban) are the seven centres without storage facilities and Koradachery, Kivalur, Peralam, Sembanarkoil, Madukur, Peravurani (all rural), Kuttalam, Mannargudi, Muthupet, Adirampattinam and Ammapet (all urban) are the 11 centres without co-operative marketing societies.

3.7

Warehousing:

Exact details regarding the number and capacity of warehouses/godowns maintained by the various agencies are not readily available. The Central Warehousing Corporation has got 10 godowns with a total capacity of 1,03,500 tonnes in the district. The Food Corporation of India has godowns at Thanjavur, Mannargudi, Thiruvandarkoil, and Sembanarkoil; their total capacity is 6,500 tonnes. The Tamil Nadu Warehousing Corporation has four godowns at Thanjavur, Tiruvarur, Mayuram and Nagapattinam with a combined capacity of 2000 tonnes. There are 126 co-operative godowns, but their capacity is not known. Neither the number nor capacity of the godowns owned by private agencies are available.

3.8

Population Analysis

The total population of Thanjavur district as per the 1971 census was 3,840,732 - 1,926,043 males and 1,916,265 females - which was roughly 9.32 percent of the State total. The fact

-: 230 :-

that the district which has only 7.48 percent of the total area of the state accounts for 9.32 percent of its population itself is an obvious indication of the comparatively high density of population in the district. For every square kilo metre of area there are 395 persons in Thanjavur district as against only 317 in Tamilnadu. The population of the district registered a growth of 18.33 percent during 1961-71, this is slightly slower than the State average of 22.30 for the same period. Among the Taluks Thanjavur has the largest and Peruvaram Sub Taluk the smallest population. Kumbakonam has the highest density of population and Arantangi the lowest. The Taluk-wise distribution of population in the district is given in the table below:

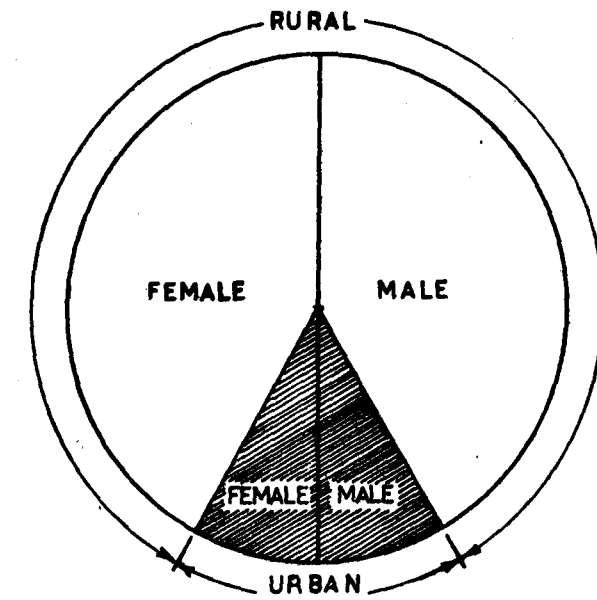
Table - 86

Sl. No.	Name of Taluk	Area in Sq. KM	Population	Density per Sq. KM
1	Sirkali	441.96	212,954	482
2	Mayuram	731.62	415,667	568
3	Kumbakonam	548.61	430,399	785
4	Nannilam	753.02	303,343	403
5	Papanasam	590.73	263,050	445
6	Thanjavur	936.00	438,609	469
7	Orathanad	854.91	227,850	267
8	Mannargudi	780.94	319,768	409
9	Nagapattinam	621.52	322,401	519
10	Thiruthuraiipoondi	1285.05	320,850	250
11	Pattukottai	712.36	263,121	369
12	Peruvaram sub taluk	394.63	120,319	305
13	Arantangi	1039.19	212,401	195
Tanjavur District		9735.00	3840,732	395
Tamil Nadu		130,069.00	41,199,168	317
Percentage of State Total		7.48	9.32	-

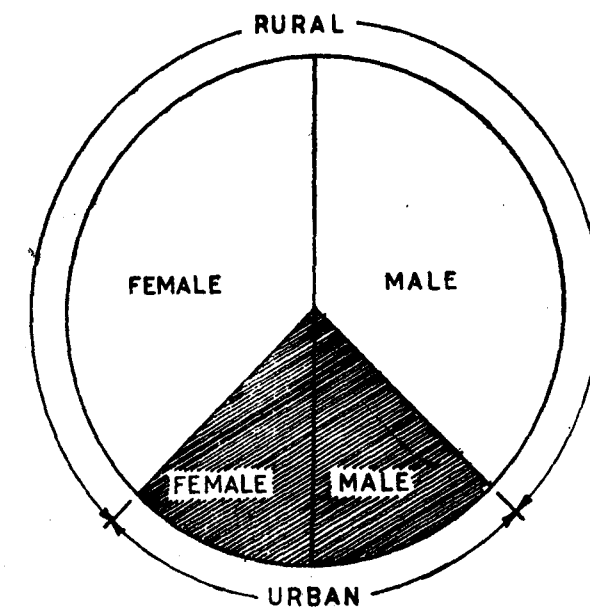
231

RURAL-URBAN COMPOSITION OF POPULATION -SEXWISE-

THANJAVUR



TAMIL NADU



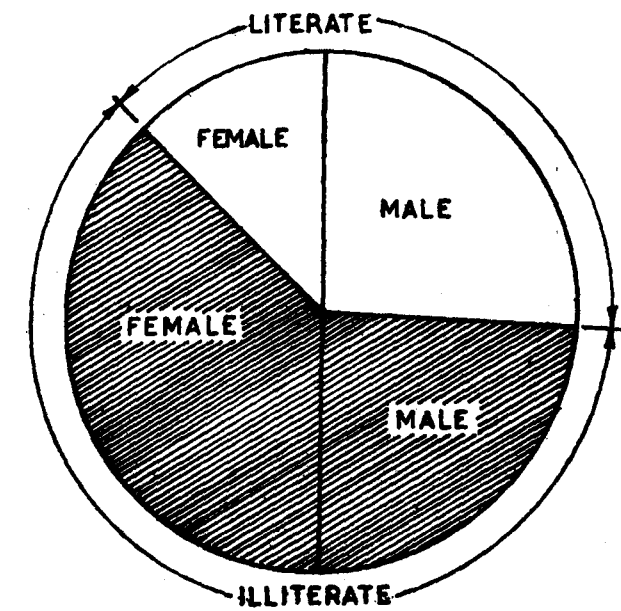
Out of the total population 19,26,043 were males and 19,16,265 were females. In other words there were only 994 females for 1000 males in the district. However this sex ratio is better when compared to the State average of 978 females for 1000 males. Whereas more than 30 percent (30.26) of the population in the state live in urban areas the percentage of urban population in the district is only 20.52. The rural urban distribution of population in Thanjavur district was as follows - 30,52,694 rural and 7,88,038 urban. While the district accounts for 10.62 percent of the rural population of the State its share is only 3.19 percent in respect of urban population. As much as 37.30 percent of the population of Thanjavur Taluk live in urban areas. Kumbakonam has got 34.74 percent and Nagapattinam has got 34.08 percent of their population living in urban areas while Nannilam taluk and Peravurani Sub-taluk has got no urban population at all. The percentages of urban population in the other taluks are as follows:

Pattukottai - 21.21, Mayuram - 21.07, Mannargudi - 20.32, Sirkali - 17.32, Thiruthuraipoondi - 16.41, Papanasam - 16.18, Arantangi - 8.08 and Orathanad - 3.78.

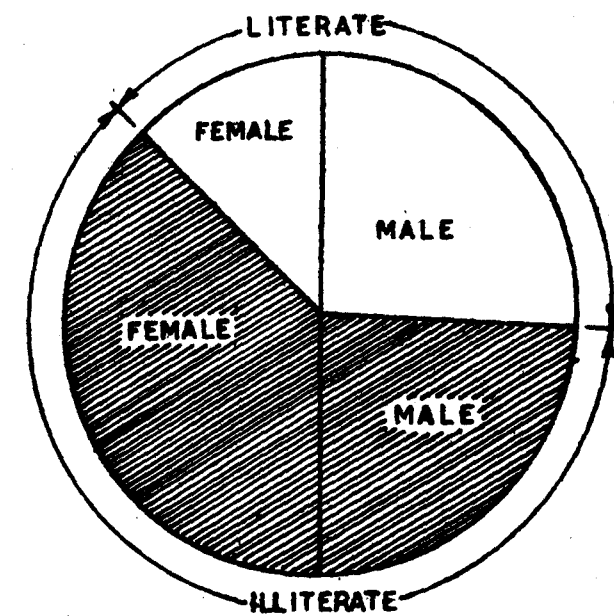
According to the 1971 census there were 848976 persons belonging to the scheduled castes and 1024 persons belonging to the scheduled tribes in the district. There were approximately 22.10 percent and 0.03 percent of the total population respectively, while the percentage of scheduled castes to total population was a little higher than the State average of 17.76 percent that of scheduled castes was far less than the State average of 0.76 percent. Thanjavur district contributed 11.61 percent of the Scheduled Castes and 4.53 percent of the Schedule

LITERATE AND ILLITERATE POPULATION-SEXWISE-

THANJAVUR



TAMIL NADU



tribes in the State. The total number of literates in the district as per the census was 15,23,120 - 10,22,678 males and 5,00,442 females. The percentage of overall literacy- 39.66 - in the district is slightly above the state average of 39.46. As against 51.75 in the State as a whole the percentage of male literacy in the district is 53.10, but in female literacy, the district, with 26.14 percent, lags behind the State average of 26.86. The percentage of rural literacy in the district - 35.75 - is higher than that in the State as a whole (32.13), but in urban literacy the district average is only 54.79 as compared to 56.36 in the State as a whole. The district which accounts for 9.32 percent of the population of the State has got only 6.93 percent of its literates. With 47.00 percent Thanjavur Taluk stands first in respect of literacy while Orathanad with 28.21 percent stands at the bottom. The ranking of taluks according to their levels of literacy is given below:

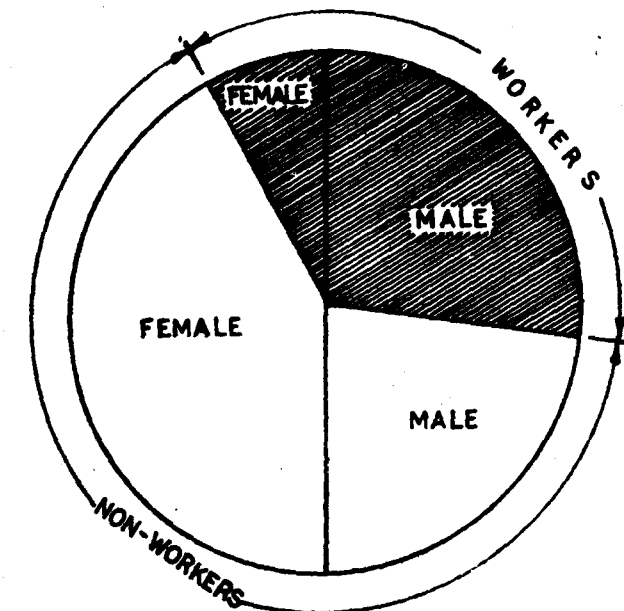
T a b l e - 87

Rank	Name of Taluk	Percentage of literacy
1	Thanjavur	47.00
2	Kumbakonam	44.30
3	Nagapattinam	44.10
4	Nannilam	43.69
5	Mannargudi	40.28
6	Thiruthuraipoodi	40.08
7	Mayuram	39.52
8	Papanasam	37.58
9	Peravurani Sub-taluk	34.43
10	Pattukottai	33.92
11	Arantangi	32.83
12	Sirkali	32.64
13	Orathanad	28.21

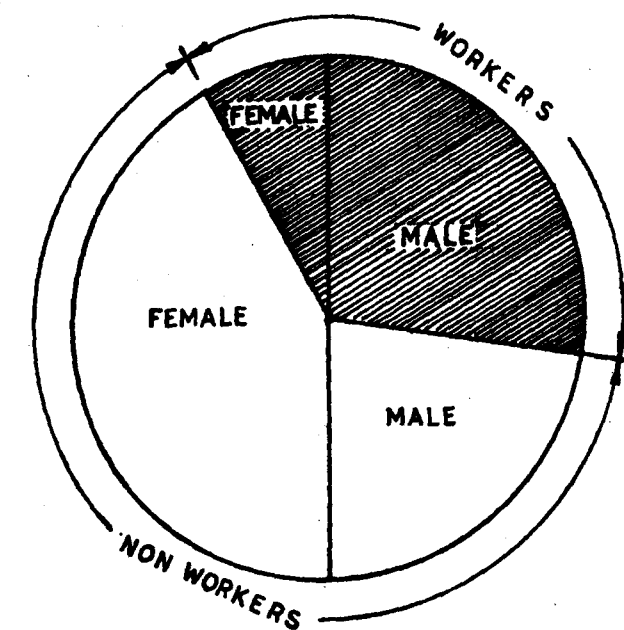
232

WORKERS AND NON-WORKERS-SEXWISE-

THANJAVUR



TAMIL NADU



As against 35.75 percent in the State as a whole only 33.40 percent of the population of the district constitute the working force. As per the 1971 census the total number of workers in the district was 12,82,000 of which 10,68,598 or nearly 83.21 percent were males and the remaining 2,14,311 or about 16.71 percent were females. The male-female distribution of workers in the State as a whole was 79.14 percent males and 20.86 females. As much as 83.51 percent of the workers in the district are accounted for by the rural areas while in the state as a whole only 75.44 percent of the workers are contributed by the rural areas. As against 25.56 percent in Tamil Nadu only 16.49 percent of the workers in Thanjavur come from the urban areas. The share of the district in the total number of workers in the State is 8.51 percent. The percentage of cultivators to total workers in the district (29.18) is slightly lower than the State average (31.26) but that of agricultural labourers to total workers (42.24) is far higher than that in the State as a whole (30.46). The number of cultivators in the district according to the 1971 census was 3,74,324 while that of agricultural labourers was 5,41,919. As compared to 61.72 percent in the State as a whole 71.42 percent of the working force in the district are directly dependent upon agriculture for their livelihood. The detailed classification of workers in the district is given below along with the figures for the State as a whole.

CLASSIFICATION OF WORKERS

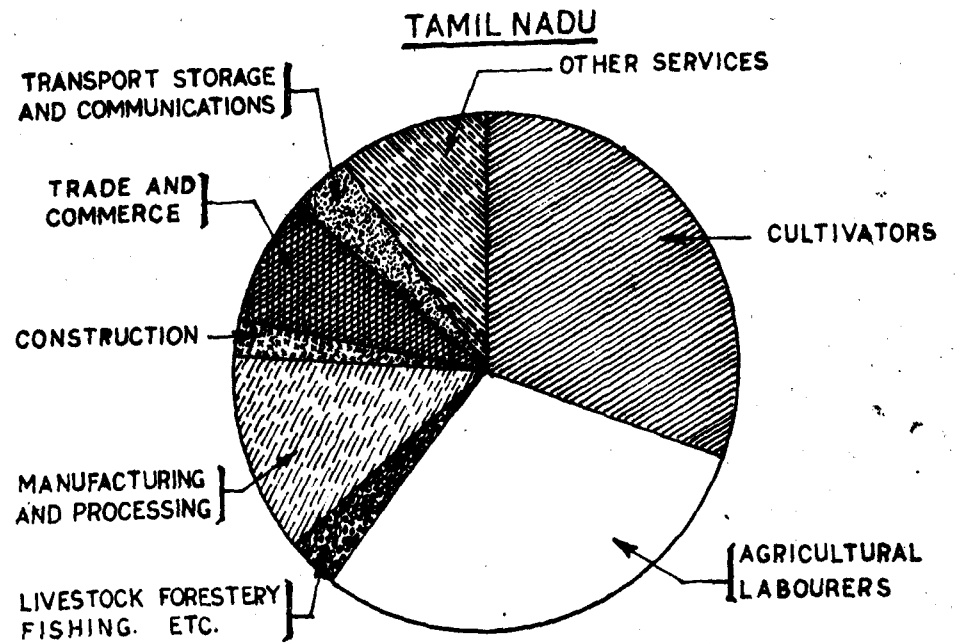
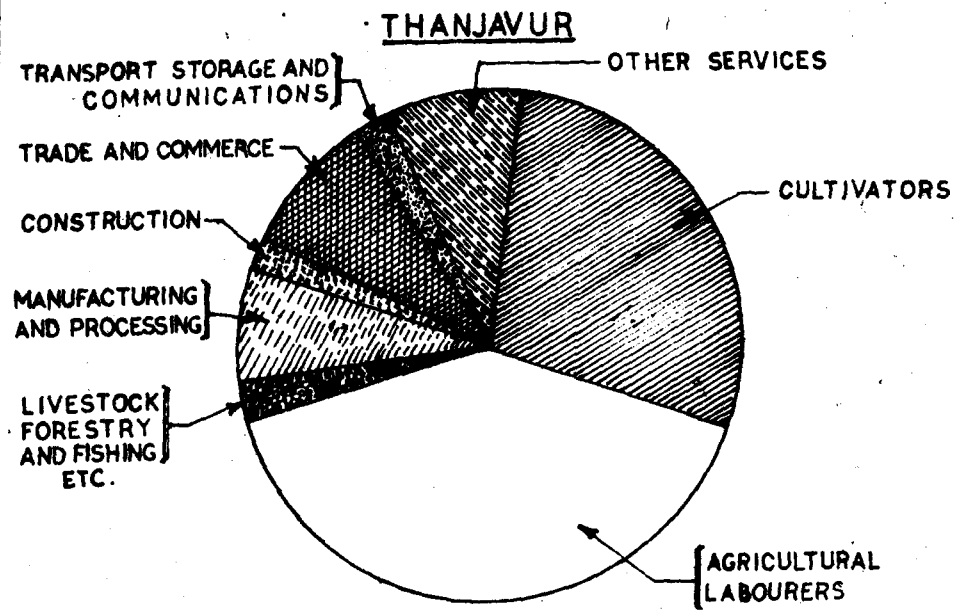


Table - 88

Sl. No.	Category			
	Thanjavur		Tamilnadu	
	No.	%	No.	%
1. Cultivators	3,74,324	29.18	46,07,787	31.26
2. Agricultural labourers	5,41,919	42.24	44,90,065	30.46
3. Livestock, forestry, fishing etc.	25,209	1.96	4,03,295	2.74
4. Mining and Quarrying	385	0.05	50,654	0.34
5. Manufacturing, Processing etc.				
a) Household industry	31,864	2.48	6,69,913	4.54
b) Other than Household industry	53,444	4.16	13,02,424	8.83
6. Construction	13,761	1.07	2,34,235	1.59
7. Trade & commerce	102,609	8.00	11,54,222	7.83
8. Transport, Storage & Communication	23,517	1.83	4,65,657	3.16
9. Other services	1,15,877	9.03	13,63,715	9.25
Total Workers	12,82,909	100.00	14,741,967	100.00

The district contributed 8.10 percent of the cultivators, 12.07 percent of the agricultural labourers, 6.25 per cent of the workers in livestock, forestry, fishing etc, 0.76 per cent of the workers in mining and quarrying, 4.76 per cent of the persons engaged in household industry, 4.10 percent of those engaged in manufacturing other than household industry, 5.87 per cent of the workers in construction, 8.89 percent of those in trade and commerce, 5.05 of

the workers in transport storage and communications and 8.50 percent of the persons engaged in other services.

National Employment Service

During 1970-71 the number of persons registered at the district employment Exchange increased by about 17 percent over the previous year from 23,652 to 27,658. The increase in the various categories however, was not uniform. In fact there was a sharp decline of almost 70 percent in the skilled category; as against 3067 registrants at the end of 1969-71; there were only 952 registrants at the end of 1970-71. The number of registrations increased by about 38 percent in the unskilled category (from 95,44 to 13,148) and by nearly 23 percent in the educated category (from 11,041 to 13,581). As against 3345 placements during 1969-70, 3859 persons were placed in jobs during 1970-71; the rate of growth was more than 15 percent. While the number of skilled and educated persons placed in jobs increased by nearly 23 percent from 509 to 626 and from 2,095 to 2517 respectively, that of unskilled persons declined by about 5.69 percent from 791 to 746. Paradoxically enough, in spite of the magnitude of the problem of unemployment there are some categories in which qualified hands are still in short supply. The district Employment Officer, Thanjavur has reported shortage of workers in the following categories:

- a) Diploma holders in Civil Engineering
- b) Maternity Assistants.
- c) Pharmacists.
- d) Health Assistants
- e) X-ray Assistants
- f) Typists (only Scheduled caste)

