NORTH WESTERN ZONE – STATUS REPORT

1. GEOGRAPHICAL DISTRIBUTION

The North Western Zone comprising the revenue districts of Dharmapuri, Salem and Namakkal (excluding Tiruchengode taluk) and Perambalur taluk of Perambalur district is situated between 11 and 12°55' north latitude and 77° 28' and 78° 50' east longitude. It is completely land locked, covering an area of 16,150 Sq.km. equivalent to 12.4 per cent of the State area.

Physiography

The zone can be broadly divided into three geographical tracts:

(i) Part of the tableland (which includes Karnataka State). It is an undulating plateau, 600 to 1000 m above MSL. Studded with rocky patches in the North and East and dense jungles in the South and West. The greater part of Hosur and Denkanikotta taluks and a small portion of Krishnagiri taluk lie in this tract (Fig.1).

(ii) Extension basin intermediate between the Karnataka tableland and the plains, 350-660 m above MSL. This tract comprises roughly the taluks of Krishnagiri, Palacode, Dharmapuri, Pennagaram, Harur and Uthangarai and Pappireddipatti.

(iii) Tract below 350 m above MSL. It can be divided into two portions by the watershed between the Cauvery and the Vellar river systems, with the taluks of Attur, Rasipuram and Namakkal on the east and Salem, Omalur and Mettur on the west

Besides the above three tracts having differential altitudes, the high plateau on the north, dotted with groups of hills, the second line of ghats to the south and east of Dharmapuri district, the Shervaroy hills surrounded by a circlet of hillocks of varying elevations (1372-1463 m) in Yercaud taluk, the Kalrayans of Attur and another group of hills constituting the Kollimalai and a few isolated hills and ridges scattered over the Southern taluks of Namakkal,. Rasipuram, Attur and Sankari, along with the valleys and rolling topography contribute to the characteristic physiography of the Zone.

Of the total geographic area of 17.31 lakh ha, 8.01 lakh ha (46.3%) are cultivated. The area under forest is 4.86 lakh ha. representing 28.1 per cent of the area. Barren land and cultivable waste represents 5.8 per cent of the total area (Table 1).

Table 1. Land Use Pattern

Dharmapuri District Taluk		Total geographical area	Forest	Barren and uncultivable land	Land put to non-agriculture use	Cultivable waste	Permanuent and grazing lands	Miscellaneous tree crops and groves	Current fallows	Other fallow lands	Net area sown
Krishnagiri	ha	144904	21619	9998	11821	2278	2701	1571	22031	2110	70775
	%	-	(14.9)	(6.89)	(8.15)	(1.57)	(1.86)	(1.08)	(15.20)	(1.45)	(48.84)
Uthangarai	ha	65141	18291	1284	3816	354	460	803	9375	1736	29022
	%	-	(28.07)	(1.97)	(5.8)	(0.54)	(0.70)	(1.23)	(14.39)	(2.66)	(44.55)
Palacode	ha	38436	12249	1219	1326	136	392	348	669	251	21846
	%	-	(31.86)	(3.17)	(3.4)	(0.35)	(1.01)	(0.90)	(1.74)	(0.65)	(56.83)
Pennagaram	ha	113027	63128	7007	3335	1870	1016	567	837	457	34808
	%	-	(55.85)	(6.19)	(2.95)	(1.65)	(0.89)	(0.50)	(0.74)	(0.40)	(30.99)
Dharmapuri	ha	85190	22594	2521	9152	682	1520	163	2226	2599	43733
	%	-	(26.52)	(2.95)	(10.74)	(0.80)	(1.78)	(0.19)	(2.61)	(3.05)	(51.33)
Harur	ha	144281	45021	5593	15083	4687	2985	619	19419	1820	49054
	%	-	(31.20)	(3.8)	(10.4)	(3.24)	(2.06)	(0.42)	(13.45)	(1.26)	(33.99)
Pappireddipatti	ha	40751	15798	1487	1369	329	97	25	3460	193	18993
	%	-	(38.76)	(3.66)	(3.3)	(0.80)	(0.23)	(0.06)	(6.0)	(0.47)	(46.60)
Hosur	ha	95946	21146	10259	4244	1047	2533	1299	6188	1026	48204
	%	-	(22.03)	(10.69)	(4.42)	(10.09)	(2.6)	(1.35)	(6.4)	(1.06)	(50.24)
Denkanikotta	ha	198899	110762	5948	4485	3838	3251	1431	9449	2371	57364
	%	-	(55.68)	(2.9)	(2.2)	(1.92)	(1.63)	(0.71)	(4.75)	(1.19)	(28.84)
Dharmapuri Dt Total	ha	926575	330608	45316	54631	15221	14955	6826	72654	12565	373799
	%	-	(35.68)	(4.89)	(5.89)	(1.64)	(1.61)	(0.73)	(7.84)	(1.35)	(40.34)

Table 1 Contd. Land Use Pattern (In Ha)

Salem Dt. Taluk		Total geographical area (1)	Forest (2)	Barren and Uncultivable land (3)	Land put to non agricultural use (4)	Cultivable waste (5)	Permanent and grazing lands (6)	Miscellaneous tree crops and groves (7)	Current fallows (8)	Other fallow lands (9)	Net area sown (10)
Attur	ha	168591	45947	23805	10439	1192	4258	1158	641	162	80989
	(%)	-	(27.2)	(14.1)	(6.2)	(0.7)	(2.5)	(0.7)	(0.4)	(0.1)	(48.1)
Mettur	ha	77715	15811	3231	15352	1750	14	793	1435	-	39329
	(%)	-	(20.3)	(4.2)	(19.8)	(2.2)	(0.02)	(1.0)	(1.88)	-	(50.6)
Omalur	ha	66646	15353	2968	6296	1182	320	551	5290	1026	33660
	(%)	-	(23.0)	(4.5)	(9.4)	(1.8)	(0.5)	(0.9)	(7.9)	(1.5)	(50.0)
Salem	ha	97591	23334	6820	8845	818	705	475	3927	2820	49847
	(%)	-	(23.9)	(7.0)	(9.1)	(0.8)	(0.7)	(0.5)	(4.0)	(2.9)	(51.1)
Sankari	ha	71720	2219	4667	5240	422	528	214	910	720	56800
	(%)	-	(3.1)	(6.5)	(7.3)	(0.6)	(0.7)	(0.3)	(1.3)	(1.0)	(79.2)
Salem District											
Total	**ha**	482263	102664	41491	46172	5364	5825	3191	12203	4728	260625
	(%)	-	(21.28)	(8.60)	(9.5)	(1.11)	(1.20)	0.66)	(2.53)	(0.98)	(54.04)

Table 1 Cont. Land Use Pattern

Namakkal Dt Taluk		Total geographical area	Forest	Barren and Uncultivable land	Uncultivable land put to non agricultural use	Cultivable waste	Pasture land	Miscellane-ous tree crops and groves	Current fallows	Other fallow lands	Net area sown
		(1)	**(2)**	**(3)**	**(4)**	**(5)**	**(6)**	**(7)**	**(8)**	**(9)**	**(10)**
Namakkal	ha	131122	15510	6976	11676	3640	1042	321	18874	2477	70607
	%	-	(11.8)	(5.3)	(8.9)	(2.8)	(0.8)	(0.2)	(14.4)	(1.9)	(53.9)
Paramathi	ha	52384	-	671	4101	225	16	15	13138	477	33741
	%	-	-	(1.2)	(7.8)	(0.4)	(0.13)	(0.1)	(25.1)	(0.9)	(64.4)
Rasipuram	ha	81748	30393	5256	5719	1474	1418	1640	3029	797	32322
	%	-	(36.8)	(6.4)	(7.0)	(1.8)	(1.8)	(2.8)	(3.7)	(1.0)	(39.5)
Namakkal Dt Total	**ha**	322636	52717	13475	28709	7815	2487	2248	40962	7646	166577
	%	-	(16.33)	(4.17)	(8.89)	(2.42)	(0.77)	(0.69)	(12.69)	(2.36)	(51.63)
Perambalur	ha	57372	7114	572	7213	2467	11	272	5921	3895	29907
	%	-	(12.39)	(0.99)	(12.57)	(4.3)	(0.01)	(0.47)	(10.30)	(6.7)	(52.12)
North Western Zone Total	**ha**	1731474	485989	100282	129512	28400	23267	12265	125819	24939	801001
	%	-	(28.06)	(5.79)	(7.47)	(1.64)	(1.34)	(0.70)	(7.26)	(1.44)	(46.26)

2. CLIMATE

The climate in the zone ranges from semi arid to sub-humid with frequent occurrence of drought. Four distinct seasons viz., Winter (January-February), Summer (March-May), South West Monsoon (June-September) and North East monsoon (October-December) occur in this zone. The hottest months are March, April and May.

RAINFALL

The mean Annual Rainfall of the North Western Zone is 877.6 mm. The zone enjoys the rainfall from both South West and North East monsoon seasons. The contributions by Winter, Summer, South West and North East monsoon are 1.5, 17.5, 46.4 and 34.6 per cent respectively (Table 2). The Annual rainfall of Dharmapuri district varied from 773 to 978 mm. The Mean Annual rainfall of the 906 mm for the district was received in 41 rainy days. The highest rainfall of 981 mm was received in Harur taluk followed by 978mm in Denkanikottai. While the lowest rainfall of 773 mm was received in Uthangarai taluk. The taluks Uthangarai, Palacode and Pennagaram received medium rainfall of 650-900 mm. The other taluks Dharmapuri, Harur, Krishnagiri, Hosur and Denkanikottai received higher rainfall of more than 900mm per year. The South West monsoon, North East monsoon, Winter and Summer rains contribute 47.9, 34.2, 1.4 and 16.5 per cent to the annual rainfall respectively though the quantum and distribution may vary between seasons and places within the District.

The annual rainfall of Salem district varied from 792 to 968 mm. The mean annual rainfall of the Salem district is 858 mm. The highest rainfall of 968 mm was received in Salem taluk while the lowest rainfall of 792 mm was received in Sankari taluk. Taluks Attur, Mettur, Omalur and Sankari received a medium rainfall of 650-900 mm. The South West monsoon, North East monsoon, Winter and Summer rains contribute 45.9, 30.0, 1.1 and 17.7 per cent to the annual rainfall respectively.

The annual rainfall of Namakkal district varied from 678.4 to 957.5 mm. The mean annual rainfall of the district is 840.0 mm. The highest rainfall of 957.5 mm was received in. Rasipuram taluk, while the lowest annual rainfall of 678.4 mm was received in Paramathi taluk. All the taluks in the district received medium rainfall of 650-900 mm except Rasipuram. The percentage contribution by the various seasons was 43.1 per cent in South West Monsoon, 34.4 per cent in North East monsoon, 2.5 per cent during winter and 20.0 per cent during summer. The mean annual Rainfall of Perambalur taluk in 940.2 mm. The contributions by the South West, North East, Summer and Winter are 43.6 %, 37.5%, 17.4% and 1.5% respectively.

TEMPERATURE

The maximum temperature ranges from 20 to 42°C and minimum from 10 to 31°C. Being an interior region the diurnal range of temperature is large particularly in the dry and hot seasons. The minimum temperature at Hosur, Denkanikota, and Krishnagiri in variably goes below 14°C. In high elevation taluks of Hosur and Denkanikottai where the elevation ranges from 660 to 960 m above MSL, a minimum temperature of 10-18°C

prevails for a longer period of five months from October to February. These conditions favour the cultivation of sub temperature crops in the Zone.

HUMIDITY

In general the taluks on the Northen part of the zone have high relative humidity. whereas the Southern taluks have relatively lesser atmospheric humidity. The evapotranspiration is very high. The driest months are January and February.

CLOUDINESS

Sky is generally clear or lightly clouded from January to middle of April. The cloudiness increases there after and skies remain generally clouded from mid-June to mid-December.

WIND

From October to March wind blows generally from North Easterly and Easterly directions. South Westerly and westerly winds predominate from May to September. The wind speed is least in September-October with a secondary minimum in May. The Primary and Secondary rainfall maximum also coincide with the low wind speed

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Table 2. Mean Seasonal Rainfall (mm) Of North Western Zone

Taluk	Winter (Jan-Feb)		Summer (Mar-May)		South West monsoon (Jun-Sep)		North East monsoon (Oct-Dec)		Mean Annual Rainfall (mm)
	mm	%	mm	%	mm	%	mm	%	
Dharmapuri	18.2	1.9	156.6	16.7	455.4	48.7	305.7	32.7	936
Pennagarm	14.1	1.6	183.4	21.3	374.4	43.5	287.8	33.6	860
Palacode	12.7	1.4	131.2	14.8	437.8	49.4	305.4	34.4	887
Harur	19.9	2.0	141.3	14.4	432.9	44.1	387.2	39.5	981
Uthengarai	9.8	1.3	99.9	12.9	404.6	52.3	258.8	33.5	773
Krishnagiri	12.2	1.3	134.0	14.6	457.0	49.8	314.6	34.3	918
Hosur	6.3	0.7	148.9	16.3	441.8	48.5	313.8	34.5	911
Denkanikottai	8.0	0.8	207.0	21.0	461.0	47.2	302.0	31.0	978
Mean Dharmapuri District	12.7	1.4	150.3	16.3	433.1	47.9	309.4	34.2	906

Table 2. Contd. Mean Seasonal Rainfall (mm) Of North Western Zone

Salem Dt. Taluk	Winter (Jan-Feb)		Summer (Mar-May)		South West monsoon (Jun-Sep)		North East monsoon (Oct-Dec)		Mean Annual Rainfall (mm)
	mm	%	mm	%	mm	%	mm	%	
Attur	6	0.7	141	16.9	344	41.1	346	41.3	837
Mettur	7	0.9	148	18.1	333	40.6	331	40.4	819
Omalur	10	1.1	151	17.3	452	51.7	261	29.9	874
Salem	8	0.8	161	16.6	525	54.3	274	28.3	968
Sankari	16	2.0	155	19.6	333	42.0	288	36.4	792
Mean Salem District	9.4	1.1	151.2	17.7	397.4	45.9	30.0	35.3	858
Namakkal District									
Namakkal	24.2	2.7	167.6	19.0	389.1	44.0	303.4	34.3	884.3
Paramathi	18.1	2.7	137.9	20.3	265.0	39.1	257.4	37.9	678.4
Rasipuram	18.9	2.0	197.9	20.7	443.5	46.3	297.2	31.0	957.5
Mean Namakkal District	20.4	2.5	167.8	20.0	365.9	43.1	286	34.4	840
Perambalur	12.7	1.5	150.5	17.4	377.5	43.6	325.0	37.5	940.2
Mean of North Western Zone	13.0	1.5	153.7	17.5	407.5	46.4	303.4	34.6	877.6

3. SOIL

The North Western Agro-climatic Zone shows considerable diversity in soil types. The major soil types occurring in the zone are 1) Red non-calcareous, 2) Red-Calcareous 3)Alluvial 4 Black soil 5) Hill soil 6) Forest soil 7) Saline/alkali soil. Of these major area comes under red non-calcareous and red calcareous soils.

Red /brown non- calcareous soil is predominant in the North-Western Zone occupying 62.6 per cent followed by Red/Brown calcareous soil with 30.5 per cent. Black and alluvial soil contribute a meager 5.6 and 1.3 per cent respectively.

The district-wise area under different soil series and short description of each series are presented in tables 3 to 10. In Dharmapuri district, Red/brown non-calcareous soil is predominantly present, occupying 85.6 per cent area (623323 ha.). It is followed by Red/brown calcareous soil with 9.7 per cent and black soil (4.2%). No alluvial deposits occur in this district. The taluks come under Red/brown non-calcareous soil type are Dharmapuri, Krishnagiri, Palacode, Pennagaram, Hosur and Denkanikotta. The calcareous soil types are under Dharmapuri and Krishnagiri taluks

Total area under Salem District in different soil series is 3.47 lakh hectares of which Red Non-Calcareous soil is predominant occupying 66.3% of the area. The next comes the Red calcareous soil type with 29.3 per cent followed by Black (3.8%) and Alluvial deposits(0.6%). The taluks with non-calcareous soil type are Attur, Mettur, Omalur and Salem. Sankari taluk has predominantly occupied with calcareous soil type.

The Namakkal district has predominantly higher area under Red calcareous soil type with 59.1 per cent, followed by red Non-Calcareous type with 22.9% area, 11.5% under black soils and 6.4 per cent under Alluvial deposits. The taluks under calcareous oil are Namakkal, Paramathi and Thiruchengodu. Rasipuram has major soil type of non-calcareous. Senthamangalam and Yerumaipatti are with predominantly black soils.

Perambalur taluk of Perambalur district has the highest percentage of soil as Red calcareous (96.4) followed by black soil (3.6%). Alluvial soil representing 1.3% of the total soil area is distributed in Paramathi and Kabilarmalai blocks of Paramthi taluk and Sankari and Edapadi blocks located along the banks of Cauvery and Manimutharu rivers.

In the above major soil types, saline and alkali soil also occur in the sizable proportion in the zone. Totally 1.7 lakh hectares of area is affected by high salinity and alkalinity. Out of this 0.2 lakh ha is under Non-Calcareous type and 1.5 lakh ha under calcareous type. Area-wise data revealed that Salem district has the highest area (0.72 lakh ha) under saline and alkalinity followed by Dharmapuri(0.5 lakh ha) and Perambalur taluk(0.4 lakh ha).

Table 3. Distribution of soil series in Dharmapuri District

S.No.	Name of the soil series		Dharmapuri district extent	Dharmapuri Taluk extent	Denkanikotta Taluk extent	Harur Taluk extent	Hosur Taluk extent	Krishnagiri Taluk Extenmt	Palacode Taluk Extent	Pennagaram Taluk Extent	Uthangarai Taluk Extent
1.	Vannapatti	ha	440982.93	37424.06	3949.97	99949.36	6024.19	117041.50	60734.50	57111.00	58748.35
		%	60.57	49.05	4.15	81.33	6.33	83.28	84.93	95.86	87.71
2.	Hosur	ha	125170.55	-	65886.00	-	59177.59	-	107.00	-	-
		%	17.18	-	69.70	-	62.18	-	0.14	-	-
3.	Dharmapuri	ha	33818.64	27336.46	-	3290.68	-	-	2598.50	593.00	-
		%	4.65	35.83	-	2.68	-	-	3.64	0.99	-
4.	Krishnagiri	ha	26326.50	-	-	-	-	23402.50	741.00	-	2103.00
		%	3.62	-	-	-	-	16.72	1.03	-	3.14
5.	Kelamangalam	ha	20520.73	-	7277.10	-	13243.63	-	-	-	-
		%	2.82	-	7.65	-	13.92	-	-	-	-
6.	Toppur	ha	20311.32	10672.68	336.51	3386.80	-	-	4401.00	1329.00	185.33
		%	2.78	13.99	0.35	2.76	-	-	6.16	2.24	0.27
7.	Salem	ha	17664.88	-	12289.59	-	3092.52	-	965.00	545.00	772.77
		%	2.43	-	12.93	-	3.24	-	1.34	0.91	1.15
8.	Harur	ha	14031.66	-	-	10468.90	-	-	-	-	3562.76
		%	1.93	-	-	8.52	-	-	-	-	5.32
9.	Sonnepuram	ha	10308.11	-	-	-	10308.11	-	-	-	-
		%	1.4	-	-	-	10.84		-	-	-
10.	Mattagiri	ha	8674.93	-	5345.55	-	3329.38	-	-	-	-
		%	1.19	-	5.62	-	3.49	-	-	-	-
11.	Nattam	ha	3356.32	865.14	-	521.18	-	-	1970.00	-	-
		%	0.46	1.13	-	0.42	-	-	2.76	-	-
12.	Jayapuram	ha	2975.28	-	-	2975.28	-	-	-	-	-
		%	0.41	-	-	2.42	-	-	-	-	-
13.	Mariampatti	ha	2303.78	-	-	2303.78	-	-	-	-	-
		%	0.32	-	-	1.67	-	-	-	-	-
14.	Sulakkarai	ha	14.98	-	-	-	-	-	-	-	1614.98
		%	0.22	-	-	-	-	-	-	-	2.41
		Total	72460.61	76298.34	95084.72	122931.62	95175.42	140444.00	71517.00	59578.00	66987.19

Table 4. Short Description of soil series of Dharmapuri district

S.No.	Soil Series	Description	Extent in hectares	Limitation
1	Vannapatti	Yellowish red to red, loamy sand, moderately deep to deep, medium textured, neutral in reaction, medium in potash, non-calcareous.	440983 (60.57)	Poor water holding capacity. Low Cation Exchange Capacity. Low in Organic atter content. Subjected to moderate to severe erosion. Low in Nitrogen and hosphorous.
2.	Hosur	Dark brown to reddish brown, sandy clay loam, deep to very deep, acid to neutral reaction, medium to heavy textured, non-calcareous.	125171 (17.18)	Acid in reaction. Low in C.E.C. Low in Organic matter content. Subjected to sheet and gully erosion Low in Nitrogen and phosphorous.
3.	Dharmapuri	Black, clay loam, very deep, heavy textured, insitu soils, calcareous.	33819 (4.65)	Moderatly alkaline in reaction. Low in organic matter. Subjected to moderate erosion. Low in Nitrogen and Phophorous.
4.	Krishnagiri	Greyish brown, sandy loam very deep, heavy textured, neutral to alkaline in reaction, calcareous.	26327 (3.62)	Alkaline in reaction. Medium in salt content Low in Organic matter content Subjected to moderate erosion. Low in Nitrogen and phosphorous.
5.	Kelamangalam	Brown to very dark greyish brown, sandy clay loam deep to very deep, heavy to light textured, neutral to alkaline in reaction, non-calcareous.	20521 (2.82)	Imperfectly drained. Alkaline in reaction Low in C.E.C. Low in Organic matter content Subjected to moderate erosion. Low in fertility status.
6.	Thoppur	Dark brown, sandy loam very deep, medium textured, neutral to alkaline in rection, calcareous.	20311 (2.78)	Moderately Alkaline in reaction. Low in organic Matter content. Subjected to moderate to severe erosion. Low in fertility status.
7.	Nattam	Dark greyish brown, sandy loam very deep, medium textured, calcareous.	3356 (0.46)	Slow permeability Imperfectly drained. Moderate by alkaline to strongly alkaline.Low in organic matter content. Subjected to moderate erosion. Low in fertility status.
8.	Salem	Dark reddish brown, loamy sand deep to very deep, medium textured, acid to neutral reaction, non-calcareous.	17665 (2.43)	Acid in reaction. High salt content. Low in C.E.C. Subjected to moderate to severe erosion. Low in fertility status.

Table 4 Contd.

9.	Harur	Dark brown to dark greyish brown, silty clay loam deep to very deep, calcareous.	14032 (1.93)	Moderatly Alkaline in reaction. Low in organic matter content. Subjected to moderate erosion. Low in Nitrogen and Phosphorus.
10.	Sonnepuram	Brown, sandy loam deep to very deep, medium textured, non-calcareous.	10308 (1.42)	Moderatly acidic in reaction. Low in C.E.C. Low in organic matter content. Subjected to sheet and gully erosion. Low in Nitrogen and Phosphorus.
11.	Mattagiri	Reddish brown to brown soils, sandy loam very deep, medium textured, acid to neutral reaction, non-calcareous.	8675 (1.19)	Medium acid in reaction. Low in C.E.C. Low in organic matter content. Subjected to sheet and gully erosion. Low in Nitrogen and phosphorus.
12.	Jayapuram	Very dark grey, clay very deep, medium to heavy textured, calcareous.	2975 (0.41)	Alkaline in reaction. Low in organic matter content. Subjected to moderate erosion. Low in fertility status.
13.	Mariampatti	Dark brown, sandy clay loam shallow to moderately deep, light to medium textured, neutral to alkaline in reaction, calcareous.	2304 (0.32)	Shallow to moderately deep moderately alkaline, low in Cation Exchange Capacity. Low in organic matter. Low in nitrogen & phosphorous.
14.	Sulakkarai	Dark brown to very dark grey soils, sandy loam shallow to moderately deep, light textured, neutral to alkaline in reaction, calcareous.	1615 (0.22)	Shallow to moderately deep in depth. Low in C.E.C. Low in organic matter content. Subjected to severe sheet erosion. Low in fertility status.

Table 5. Distribution Of Soil Series In Salem District

S.No	Name of the Soil series	Salem Dt ha (%)	Attur ha (%)	Mettur ha (%)	Omalur ha (%)	Salem ha (%)	Sankari ha (%)	Yercaud ha (%)
1.	Irugur	153069 (29.41)	62678 (37.18)	46083 (59.30)	37630 (56.4)	-	13616 (18.35)	-
2.	Tulukkanur	70892 (13.62)	15122 (8.97)	3275 (4.21)	12134 (18.21)	5496 (5.63)	39204 (54.66)	-
3.	Salem	48499 (9.38)	-	-	-	48355 (49.54)	144 (0.20)	-
4.	Periyanaickenpalayam	21776 (4.08)	21776 (12.92)	-	-	-	-	-
5.	Ooty	20470 (3.93)	-	-	-	-	-	20470 (53.49)
6.	Somayyanur	13721 (2.65)	-	2863 (3.68)	818 (1.23)	9150 (9.37)	791 (1.10)	-
7.	Pilamedu	11113 (2.13)	8129 (4.82)	137 (0.18)	1500 (2.25)	1794 (1.84)	-	-
8.	Chittalandur	9709 (1.88)	-	-	-	-	9709 (13.54)	-
9.	Mallur	7385 (1.48)	-	272 (0.35)	1773 (2.66)	5945 (6.09)	-	-
10.	Kombuthukki	4690 (0.90)	-	-	-	-	-	4690 12.25)
11.	Yercaud	2280 (0.44)	-	-	-	-	-	-
12.	Upparapatti	2136 (0.41)	-	136 (0.17)	-	-	1956 (2.73)	-
13.	Mallasamudram	1941 (0.37)	-	-	-	-	1941 (2.71)	-
14.	Chavadiparai	1713 (0.33)	-	1227 (1.58)	-	-	863 (1.20)	55 (0.14)
15.	Nayalur	55 (0.01)	-	-	-	-	-	
16.	Soil association	10722 (2.07)	-	-	-	-	-	10772 (28.16)
17.	Forest and Miscellaneous land type	140309 (26.96)	60886 (36.1)	23722 (30.53)	12791 (19.19)	26851(27.53)	3951(5.51)	-
Total		168591(100)	77715 (100)	66649 (100)	97591(100)	-	-	-

Table 6. Short Description Of Soil Series Of Salem District

S.No	Soil Series	Description	Extent in ha	Limitation
1.	Irugur	Strong brown to yellowish red, Loamy sand, single grained to sub angular blocky, moderately deep, loose to slightly hard, friable to slightly firm, moderately rapid permeability, clear smooth boundary, neutral reaction, Non calcareous.	1,53,069 (29.41)	Low water holding capacity, how Cation Exchange Ccapacity subjected to moderate erosion.
2.	Tulukkanur	Red soil, fine texture, moderately deep, moderate medium sub angular blocky, sticky and plastic, moderately slow permeability, clear smooth boundary, storngly alkaline, caleareous.	70892 (13.62)	Medium water holding capacity and Cation Exchange Capacity susjected to slight erosion.
3.	Salem	Red, fine loamy deep, moderate medium sub angular blocky, slightly sticky and plastic moderately rapid permeability, clear smooth boundary, neutral and non calcareous.	48499 (9.33)	Low water holding capacity & Cation Exchange Capacity, moderate erosion.
4.	Periyanaickenpalayam	Very dark grey, fine loamy, deep, moderate medium angular blocky, sticky and plastic moderately slow permeability, gradual wavy boundary, high water holding capacity & Cation Exchange Capacity, Calcareous	21776 (4.08)	Moderately alkaline, slight erosion.
5.	Ooty	Dark reddish brown, coarse loamy, very deep, moderate medium sub angular blocky, sticky and slightly clear smooth boundary, slightly acidic, high water holding capacity, non calcareous.	20470 (3.93)	Moderate Cation Exchange Capacity.
6.	Somayyanur	Dark brown, fine loamy, very deep, moderately medium sub angular blocky, slightly sticky and slightly plastic, moderately slow permeability, clear smooth boundary, mildly alkaline high water holding capacity and high Cation Exchange Capacity, calcareous.	13721 (2.65)	Moderate erosion, medium Cation Exchange Capacity and Medium water holding capacity.
7.	Pilamedu	Very darrk greyish brown, fine very deep , were medkum angular blocky, sticky and plastic, slow permeatbility, ubrupt smooth boundary, high water holding capacity and Cation Exchange Capacity, calcareous.	11113 (2.65)	Moderately alkaline, moderate Erosion.
8.	Chittalandur	Dark brown,coarse loamy, moderately deep, weak medium sub angular blocky, slightly sticky, rapid permeability clear smooth boundary, calcareous.	9709 (1.88)	Moderately alkaline, low water holding capacity, Low CEC,slight Erosion.

Table 6 Contd.

9.	Mallur	Dark grcyish brown, fine loamy, very deep, medium sub angular blocky strong, sticky and plastic, clear smooth boundary, high water holding capacity calcareous.	7385 (1.48)	Moderately alkaline, low CEC slight erosion.
10.	Kombuthukki	Dark brown to reddish yellow, fine loamy, very deep, weak medium sub angular blocky, slightly sticky and plastic, moderately rapid permeability, clear smooth boundary, moderately rapid permeability, high CEC, non calcareous.	4690 (0.90)	Medium acid medium water holding capacity, moderate erosion.
11.	Yercaud	Dark reddish brown, fine loamy, moderate medium sub angular blocky, sticky and plastic, moderately slow permeability, clear wavy boundary, non calcareous, high water holding capacity.	2280 (0.44)	Slightly acidic medium CEC,slight erosion.
12.	Upparapatti	Dark brown alluvial soil, fine loamy, very deep, weak coarse sub angular blocky, sticky and plastic, rapid permeability, clear smooth boundary, calcareous.	2136 (0.41)	Mildly alkaline medium water holding capacity, low CEC.
13.	Mallasamudram	Dark brown, fine loamy, moderately slow weak medium sub angular blocky, slightly sticky and plastic clear wavy boundary, moderately, slow permeability, calcareous.	1941 (0.37)	Storngly alkaline,medium water holding capacity, medium CEC.
14.	Chavadiparai	Red soil, coarse loamy, deep, granular, clear smooth boundary, slightly sticky and plastic, rapid permeability, mildly alkaline non calcareous.	1713 (0.33)	Low water holding capacity, medium CEC, moderate erosion.
15.	Nagalur	Dark reddish brown, fine, very deep, moderate coarse sub angular blocky, sticky and plastic, clear smooth boundary, moderately slow permeability, medium acid, high CEC, non calcareous.	55 (0.01)	Medium water holding capacity.

Table 7. Distribution Of Soil Series In Namakkal District And Perambular Taluk Of Perambalur istrict

S.No	Name of the Soil series	Namakkal Dist ha (%)	Namakkal Taluk ha (%)	Paramathi ha (%)	Rasipuram ha (%)	Tiruchengode ha (%)	Perambalur ha (%)
1.	Irugur	28220 (8.07)	3356 (2.56)	-	24864 (30.42)	-	-
2.	Tulukkanur	134196 (38.38)	33629 (25.65)	43076 (82.23)	-	57491 (68.11)	-
3.	Pilamedu	30930 (8.8)	25449 (19.41)	325 (0.62)	5156 (6.30)	-	71480 (59.32)
4.	Somayyanur	4599 (1.3)	4397 (3.35)	-	202 (0.25)	-	-
5.	Upparapatti	10968 (3.1)	4042 (3.08)	6926 (13.22)	-	-	-
6.	Pallipalayam	6292 (1.8)	-	-	-	6292 (7.45)	-
7.	Mallasamudram	1294 (0.3)	-	-	-	1294 (1.53)	-
8.	Chittalandur	11654 (3.3)	-	-	-	11654 (13.80	-
9.	Pichanur	550 (0.1)	-	-	550 (0.67)	-	-
10.	Palladam	10097 (2.8)	-	-	10097 (12.35)	-	-
11.	Palathurai	8178 (2.3)	1634 (1.25)	-	6544 (8.01)	-	-
12.	Vellalur	20934 (5.9)	19651 (14.99)	433 (0.83)	850 (1.04)	-	-
13.	Hill soils	49922 (14.1)	30674 (23.39)	-	19248 (23.55)	-	-
14.	Kallagudi	-	-	-	-	-	43635 (36.22)
15.	Periyanacikenpalayam	-	-	-	-	-	4311 (3.61)
16.	Soil associations	6663 (1.0)	1549 (1.18)	650 (1.24)	4464 (5.46)	-	-
17.	Miscullaneors land type	974 (0.2)	-	974 (1.86)	-	-	-
18.	Forest & water bodies (unsurveyed)	24200 (6.0)	6742 (5.14)	-	9773 (11.95)	7685 (9.11)	-
	Total	349671 (100)	131123 (100)	52384 (100)	81748 (100)	84419 (100)	119429 (100)

Table 8. Short Description Of Soil Series Of Namakkal & Perambalur District

S.No	Soil Series	Description	Extent in ha	Limitation
1.	Irugur	Dark red, moderately deep fine loamy, moderately medium sub-angular, blocky, sticky & plastic, clear smooth boundary, rapid permeability, non saline non-calcareous, neutral.	28220 (8.07)	Moderate erosion.Medium water holding capacity and medium Cation Exchange Capacity.
2.	Tulukkanur	Dark red, moderately deep, loamy skeletal, moderately rapid permeability, moderate medium sub-anglular blocky, slightly sticky abrupt smooth boundary calcareous and non saline mildly alkaline.	134196 (38.38)	Moderate erosion. Low Cation Exchange Capacity.Medium water holding capacity.
3.	Pilamedu	Dark grey to black; strong coarse sub angular blocky, sticky and plastic, clear smooth boundary; very deep, fine texture, high water holding capacity, slight erosion, calcareous & non saline moderately alkaline, high Cation Exchange Capacity.	30930 (08.84)	Slow permeability
4.	Somayyanur	Reddish brown, fine loam, very deep, moderately medium sub-angular blocky, slightly sticky, clear smooth boundary, moderately rapid permeability, calcareous, non saline, neutral.	4599 (1.30)	Moderate erosion, medium Cation Exchange Capacity and Medium water holding capacity.
5.	Upparapatti	Dark reddish brown, coarse, sub-angular blocky, slightly sticky, very deep fine texture, moderately rapid permeability, high water holding capacity, calcareous, non saline, moderately alkaline, high Cation Exchange Capacity.	10968 (3.14)	Moderate erosion.
6.	Pallipalayam	Dark brown, weak blocky, clear smooth boundary, very deep, fine loamy, moderately rapid, per -meability non calcareous, non. salinity, mildly alkaline,	6292 (1.80)	Moderate erosion. Medium water holding capacity.Medium Cation Exchange Capacity.

Table 8 Contd.

7.	Mallasamudram	Dark brown, coarse sub angular blocky, sticky clear smooth boundary, very deep, fine texture, high water holding capacity, high Cation Exchange Capacity calcareous.	1294 (0.30)	Saline soil, slow permeability slight erosion, very strongly alkaline.
8.	Chittalandur	Dark brown, clear smooth boundary, dark brown, single grained, clear smooth boundary, moderately deep, loamy, moderate rapid permeability, non calcareous, non saline, neutral.	11654 (3.3)	Low water holding capacity, moderate erosion, medium Cation Exchange Capacity.
9.	Pichanur	Dark reddish brown, medium crumb, slightly sticky and plastic, clear boundary, very deep, coarse loamy, rapid permeability, non calcareous, non saline, mildly alkaline.	550 (0.10)	Medium water holding capacity, moderate erosion, medium Cation Exchange Capacity.
10.	Palladam	Dark brown, strong coarse, sub angular blocky sticky and plastic, clear wavy boundary, moderately deep, fine loamy, moderately rapid permeability, calcareous, non saline, moderately alkaline.	10097 (2.80)	Medium water holding capacity medium Cation Exchange Capacity, moderate erosion.
11.	Palahurai	Reddish brown deep, coarse loamy, moderate medium sub angular blocky, sticky and slightly plastic, clear smooth boundary, coarse loamy, rapid permeability, calcareous, non saline mildly alkaline.	8178 (2.3)	Medium water holding capacity, medium Cation Exchange Capacity, moderate erosion.
12.	Vellalur	Dark red, medium sub angular blocky, gradual smooth boundary, moderately deep, coarse loamy, rapid permeability, non calcareous, non saline, neutral.	20934 (5.81)	Medium water holding capacity, low Cation Exchange Capacity, medium erosion.
Perambalur Taluk				
1.	Pilamedu	Dark greyish brown, profile depth extending to more than 112 cm, neutral to moderately alkaline, calcareous	71480	Moderate sheet erosion.
2.	Kallakudi	Dark grey to very dark brown, more than 150 cm deep in profile, clay loam to clay, sub soil is silty clay to clay, mild to strongly alkaline, calcareous.	43635	Subjected to sheet erosion.
3.	Perianaickanpalayam	Black soil, clay to clay loam, mild to moderately alkaline, moderate to slow permeability, calcareous.	4311	Moderately alkaline, slow permeability.

Table 9. Soil Types Of North Western Zone

District		Red/Brown		Black	Alluvial	Total ha.
		Non-Calcareous	Calcareous			
Dharmapuri District	ha	623323	70920	33819	-	728062
	%	(85.6)	(9.7)	(4.7)	-	-
Salem District	ha	230776	101707	13054	2136	347673
	%	(66.3)	(29.3)	(3.8)	(0.6)	-
Namakkal District	ha	61358	158364	30930	17260	267912
	%	(22.9)	(59.1)	(11.5)	(6.4)	-
Perambalur Taluk of Perambalur District	ha	-	115115	4311	-	-
	%	-	(964)	(3.6)	-	-
Total North Western Zone ha		915457	446106	82114	19396	1463073
	%	(62.6)	(30.5)	(5.6)	(1.3)	-

Table 10. Extent Of Saline/Alkali Soil (ha) In North Western Zone

District	Sline/Alkaline Reaction			Total ha.	% of the total extent of the District
	Red/Brown Non-calcareous	Red/Brown Calcareous	Black		
Dharmapuri District	20521	32658	-	53179	7.3
Salem Distirct	-	70892	1941	72833	20.9
Namakkal District	-	1294	-	1294	4.8
Perambalur Taluk of Perambalur District	-	43635	-	43635	-
Total	20521	14879	1941	170941	-

4. CROPS CULTIVATED, AREA COVERED, VARIETIES POPULAR AND THEIR PERFORMANCE

I. Area, Production and Productivity of Principal Crops

1. Paddy occupies 1.29 lakh ha in this North Western Zone representing 10.9 per cent of the total area under cultivation with an annual production of 4.93 lakh tonnes. Dharmapuri district has major area (46.9%) and production (40.8%) in the Zone under paddy. The average productivity of the paddy is 4 t/ha in the zone and 4.6 t/ha in Namakkal district followed by Salem (4 t/ha) and Dharmapuri (3.3 t/ha) (Tables 11 to 13).

2. The area under sorghum is 1.43 lakh ha accounting 12% of the total area of the zone with a production of 1.7 lakh tonnes. The Namakkal district has 42.8% of the area followed by Salem (40%) and Dharmapuri (17.2%). The production was high (40.6%) in Salem followed by Namakkal (36.5%). The average productivity of the zone is 1266 kg/ha.

3. Ragi occupies next highest area among millets in the zone with one lakh ha (8.7%).Of which about 83.5 per cent are under Dharmapuri district with total production of 1.5 lakh tonnes(82.7%). The average productivity of the zone is 1862 kg/ha.

4. Samai has 0.45 lakh ha in the zone representing 3.8% of the area. Out of this, 87.9% of the area is under Dharmapuri district, the production being 33456 tonnes(88.9%). The average productivity is 784 kg/ha for the zone and 836 kg/ha for the Dharmapuri district.

5. Horsegram occupies major area(7.5%) followed by blackgram (4.1%), redgram (2.9%) and greengram (2.3%). Dharmapuri district has major area under horsegram (0.72 lakh ha) and Salem in blackgram (0.22 lakh ha) and greengram (0.1 lakh ha). The average productivity of the horsegram, blackgram and greengram for the zone is 451, 725 and 727 kg/ha.

6. Among the oilseeds, Groundnut has major area of 2.11 lakh ha. representing 17.1 per cent. The area is almost more or less similar in the three districts viz. Dharmapuri (35.9 %), Salem (29.6 %) and Namakkal (34.6%). The total production is 3.62 lakh tonnes and Dharmapiri and Namakkal Districts each contribute 35.2% to the total production. The productivity of the zone is 1720 kg/ha. For Namakkal, Salem and Dharmapuri, it is 1748, 1721 and 1691 kg/ha. respectively. Other oilseed crops such as gingelly(0.21 lakh ha.), sunflower (0.06 lakh ha.) and castor (0.25 lakh ha.) are being cultivated in pockets throughout the zone.

7. Cotton crop has 0.33 lakh ha in the zone representing 2.8% of the area. of which Salem and Dharmapuri represent 89.5% of the area and 10.5% by Namakkal district.

The production of is 62727 tonnes of lint for the zone with 43.1% from Dharmapuri and 45% from Salem and 11.8% from Namakkal district. The productivity of cotton for the zone is 333 kg of lint/ha.

8. Sugarcane enjoys 0.45 lakh ha representing 3.8% of area in the zone. Dharmapuri district has major area (57.5%) followed by Namakkal (22.7%) and Salem 19.8%). Total sugarcane production is 48.7 lakh tonnes for the zone with contribution of 47.5% by Dharmapuri, 28% by Namakkal and 24.5% by Salem districts. The average productivity is 118.9 t/ha for the zone. For Dharmapuri, it is 89.5 t/ha . Salem and Namakkal have the highest productivity of 133.6 t/ha.

9. The species and condiments such as coriander ,chillis, turmeric are being cultivated in small portions throughout the zone.

10. Vegetables are grown in 0.24 lakh ha in the zone Dharmapuri and Salem district representing 44.0 and 40.1% respectively.

11. Tapioca which is the major dryland crop of the zone, occupies 0.59 lakh ha, representing 4.9 per cent of the area . Dharmapuri and Salem districts represent 33 and 37.8% , while Namakkal district represent 23.3% of the area. The total tapioca production in the zone is 21.6 lakh tonnes of which 38.4% is from Dharmapuri, 36.4% from Salem and 25.2% from Namakkal districts. The average productivity of the zone is 43 t/ha. Salem district has the highest productivity of 53.5 t/ha followed by Namakkal (39.7 t/ha) and Dharmapuri (36.4 t/ha).

12. Mango is being cultivated to an extent of 39680 ha occupying 3.3 % of the cultivated area. Dharmapuri district alone has 36656 ha (92.4 %) under mango.Salem has 6.3 % and Namakkal 1.3 % has of the mango area. Total annual production of mango is 36.7 lakh tonnes of which Dharmapuri alone produced 3.5 lakh tonnes (95.3 %). The productivity of the mango is 6815 kg/ha for the zone and for Dharmapuri it is 9545 kg/ha. In Salem and Namakkal the average productivity is 5900 and 5000 kg/ha respectively.

13. The other crops such as potato (0.25 lakh ha), banana (0.28 lakh ha) and onion (0.08 lakh ha) are also under cultivation in the zone in sizable area.

Table 11. Area under principal crops (in ha.)

Sl.no	Crop	Dharmapuri Dt.	Salem Dt.	Namakkal Dt.	Total
1	Paddy	60472 (46.9)	45863 (35.5)	22710 (17.6)	129045 (10.9)
2	Cholam	24658 (17.2)	57236 (40.0)	61229 (42.8)	143123 (12.0)
3	Cumbu	7917 (56.6)	5447 (38.9)	625 (4.5)	13989 (1.2)
4	Ragi	86751 (83.5)	15405 (14.8)	1706 (1.6)	103862 (8.7)
5	Maize	1129 (28.2)	2309 (57.7)	566 (14.1)	4004 (0.3)
6	Varagu	343 (5.8)	5298 (89.8)	261 (4.4)	5902 (0.5)
7	Samai	40014 (87.9)	5165 (11.4)	326 (0.7)	45505 (3.8)
8	Bengalgram	622 (47.0)	540 (40.8)	161 (12.2)	1323 (0.1)
9	Redgram	17041 (49.4)	7522 (21.8)	9927 (28.8)	34490 (2.9)
10	Greengram	8728 (32.5)	9826 (36.6)	8262 (30.8)	26816(2.3)
11	Blackgram	12622 (25.7)	21989 (44.7)	14537 (29.6)	49148 (4.1
12	Horsegram	71795 (80.8)	12377 (13.9)	4663 (5.2)	88835 (7.5)
13	Other pulses	36091 (65.3)	14306 (25.8)	4937 (8.9)	55334 (4.7)
14	Groundnut	75637 (35.9)	62332 (29.6)	72927 (34.6)	210896 (17.1)
15	Gingelly	6932 (33.9)	11453 (56.0)	2066 (10.1)	20451 (1.7)
16	Sunflower	3868 (62.4)	682 (11.0)	1649 (26.6)	6199 (0.5)
17	Castor	5248 (21.2)	7445 (30.0)	12084 (48.8)	24777 (2.1)
18	Cotton	13721 (41.5)	15898 (48.0)	3468 (10.5)	33087 (2.8)
19	Sugarcane	25826 (57.5)	8926 (19.9)	10190 (22.7)	44942 (3.8)
20	Coriander	1252 (63.8)	480 (24.5)	229 (11.7)	1961 (0.2)
21	Chillies(Dry)	1532 (44.7)	1339 (39.1)	555 (16.2)	3426 (0.3)
22	Turmeric	3483 (60.4)	1266 (22.0)	2279 (39.6)	5762 (0.5)
23	Potato	522 (100)	-	-	522 (0.04)
24	Vegitables	10680 (44.0)	9747 (40.1)	3843(15.9)	24270 (0.2)
25	Tapioca	22781 (33.0)	22166 (37.8)	13692 (23.3)	58639 (4.9)
26	Onion	1132 (11.4)	1952 (19.6)	6851 (69.0)	9935 (0.8)
27	Mango	36656 (92.4)	2500 (6.3)	524 (1.3)	39680 (3.3)
28	Banana	1354 (35.5)	1216 (3.2)	1239 (3.3)	3809 (0.3)
	Total	578807	349419	261506	1189732

Table 12. Production of Principal Crops (in tonnes)

S.No	Crop	Dharmapuri District	Salem District	Namakkal District	Total
1	Paddy	201243 (40.8)	186402 (37.9)	105619 (21.4)	493264
2	Cholam	38935 (22.9)	69097 (40.6)	61988 (36.5)	170020
3	Cumbu	18416 (60.8)	10818 (35.7)	1065 (3.5)	30299
4	Ragi	154835 (82.7)	29239 (15.6)	3248 (1.7)	187322
5	Maize	1239 (19.2)	4296 (66.7)	911 (14.1)	6446
6	Varagu	253 (10.7)	1923 (81.2)	193 (8.1)	2369
7	Samai	33456 (88.9)	3914 (10.4)	247 (0.6)	37617
8	Bengalgram	124 (15.8)	250 (32.0)	406 (52.1)	780
9	Redgram	14807 (53.2)	6153 (22.1)	6885 (24.7)	27845
10	Greengram	4739 (24.1)	8763 (44.6)	6163 (31.3)	19665
11	Blackgram	6538 (17.6)	19152 (51.6)	11427 (30.8)	37117
12	Horsegram	31803 (79.8)	6219 (15.5)	2042 (5.1`)	40064
13	Other pulses	7522 (66.0)	2875 (25.2)	999 (8.8)	11396
14	Groundnut	127907 (35.2)	107273 (29.6)	127509 (35.2)	362689
15	Gingelly	3514 (25.8)	8373 (61.6)	1715 (12.6)	13602
16	Sunflower	3538 (57.8)	822 (13.4)	1763 (28.8)	6123
17	Castor	1803 (23.2)	2238 (28.8)	3737 (48.0)	7778
18	Cotton	27047 (43.1)	28290 (45.1)	7390 (11.8)	62727
19	Sugarcane	2311813(47.5)	192629 (24.5)	1361516(28.0)	4865958
20	Coriander	512 (61.9)	261 (31.6)	53 (6.4)	826
21	Chillies(Dry)	1219 (44.4)	1121 (40.9)	407 (14.9)	2747
22	Turmeric	17399 (65.5)	4170 (15.7)	9151 (34.5)	26550
23	Potato	12973 (100.0)	-	-	12973
24	Vegetables	96373 (44.6)	90870 (42.1)	28679 (13.3)	215922
25	Tapioca	828484 (38.3)	786627(36.4)	544052 (25.2)	2159163
26	Onion	9152 (12.1)	16774 (22.2)	49562 (65.6)	75488
27	Mango	349882 (95.3)	14750 (4.0)	2620 (0.7)	367252
28	Banana	53114 (49.8)	26514 (24.9)	27016 (25.3)	106644

Table 13. Average Productivity of Principal Crops (in Kg.)

S.No	Crop	Dharmapuri District	Salem District	Namakkal District	Average
1	Paddy	3328	4064	4651	4014
2	Cholam	1579	1207	1012	1266
3	Cumbu	2326	1986	1704	2005
4	Ragi	1785	1898	1904	1862
5	Maize	1097	1860	1610	1522
6	Varagu	238	450	739	476
7	Samai	836	758	758	784
8	Bengalgram	199	464	659	441
9	Redgram	869	818	692	793
10	Greengram	543	892	746	727
11	Blackgram	518	871	785	725
12	Horsegram	413	503	438	451
13	Other pulses	208	201	202	204
14	Groundnut	1691	1721	1748	1720
15	Gingelly	507	731	830	689
16	Sunflower	915	1205	1062	1061
17	Castor	344	301	309	318
18	Cotton	335	303	362	333
19	Sugarcane	89515	133613	133613	118914
20	Coriander	336	543	233	371
21	Chillies(Dry)	796	837	733	789
22	Turmeric	4995	3290	4015	4505
23	Potato	24852	-	-	24852
24	Tapioca	36367	53488	39735	43197
25	Onion	8085	8593	7234	7971
26	Mango	9545	5900	5000	6815
27	Banana	39227	21804	21805	27612

II. VARIETIES POPULAR AND THEIR PERFORMANCE

Sl.No	Crop	Varieties	Performance
1	**Rice**	ADT 39	Preferred for Samba and Navarai. Resistant to helminthosporium and blast
		ASD 19	Good during late Navarai season. Susceptible to blast if sown during early Navarai in Dharmapuri District.
		Imp. White Ponni , Paiyur 1	Preferred for early samba season. Susceptible to blast and helminthosporium if sown during late samba and Navarai seasons.
		IR 20	Widely adapted. Good even during late samba season.
		CO 43	Good even during late samba season, but moderately susceptible to Sheath rot. Performs well in Saline/alkali soils.
		IR 50	Preferred for Kar season. Susceptible to blast if sown during late samba and Navarai seasons.
		ADT 43	Preferred for Kar season. Susceptible to blast if sown during late samba and Navarai seasons.
		ADT 42	Good during late samba and Navarai seasons.
		J 13	Preferred for Kar/late Navarai seasons.
		Bhavani	Grown during Navarai season. Performs well even in Alkali soils/droughty conditions. Good for popping.

2.	**Cholam**	Thalavrichan Local	Long duration rainfed photosensitive. Preferred in Dharmapuri Dt.
		Paiyur 1	Long duration rainfed photosensitive preferred in Dharmapuri Dt.
		CO 26	Grain sorghum. Grown in lesser extent in Salem and Namakkal districts.
		CO 4	Redgrain fodder sorghum early maturity, thin stem, highly preferred both under rainfed and irrigated in Salem and Namakkal districts.
		Paiyur 2	Red grain type, grain cum fodder dual purpose. Early maturity. Indented to replace Co 4. Less preferred due to slightly thicker stem than Co 4.
3	**Cumbu**	CO 7, WCC 75, ICMV 221	Good. However the area is declining.
4.	**Ragi**	HR 911, Paiyur 1, GPU 28	All are long duration varieties. Suitable to rainfed cropping in Hosur, Denkanikotta and Pennagaram Taluks of Dharmapuri District and Mechari block of Mettur taluk of Salem district. Recently GPU 28 is spreading due to its tolerance to blast.
		Indaf 5	Medium duration. Preferred for late South West monsoon under rainfed. Good under irrigation during Karthigai and Marghazhi pattam(Oct-Dec.)
		Co 13	Good under irrigated cropping. Preference is less due to small seeded nature.
5.	**Samai**	Paiyur 2	Performance Good. Early maturity. Suitable for samai-horsegram sequence in Dharmapuri district.
		Local	Early maturity, to be replaced with Paiyur 2

6.	**Maize**	Local	Grown as intercrop in Turmeric in Salem and Namakkal districts. Short duration (75 days).
7.	**Redgram**	Local, SAI	Grown as intercrop in rainfed groundnut. Long duration.
		Perennial redgram BSR 1	Grown as border crop in turmeric.
8.	**Blackgram**	TMV 1	Performs will but susceptible to mosaic during summer/early kharif seasons.
		T 9	Preferred for its earliness and uniform maturity. But also susceptible to mosaic during summer/early kharif seasons.
9.	**Greengram**	K 851	Preferred under rainfed. However moderately susceptible to yellow mosaic.
		KM 2	Preferred for irrigated cropping. However susceptible to yellow mosaic.
10.	**Cowpea**	P 152	Highly preferred for its earliness and uniform maturity. Preferred for rainfed pure/inter cropping in groundnut. However susceptible to rust if sown during August, September and October months.
		Paiyur 1	Good for rainfed moderately resistant to rust less preferred due to brick red colour of the grains.
11.	**Horsegram**	Paiyur 1 Paiyur 2 Local(Kurung kollu), Co1	Performance good. All are medium maturity (105-110 days) Mosaic appears only during late sown conditions
12.	**Groundnut**	TMV 2, TMV 7	Preferred extensively for rainfed/irrigated cropping.
		VRI 2	Not preferred for rainfed due to ill filling. Performance good under irrigated condition.
		Local red	Preferred for rainfed. Good filling, drought resistant.

		TMV 1	Spreading. Preferred in Tirchengodu taluk where rainfall is uncertain with prolonged dry spell.
13	**Gingelly**	TMV 3	Preferred both for rainfed/irrigated cropping.
		TMV 4	Good during summer(Feb-March) sowing.
		SPVR 1	Good performance. Preferred for its white colour. Added market value.
14.	**Castor**	SA 1	Long duration. Preferred for mixed cropping in groundnut.
		TMV 5	Medium duration. Preferred for mixed cropping in groundnut.
		GCH 4	Hybrid. High yield. Medium stature.
15.	**Sunflower**	Morden	Early maturity. Preferred for rainfed.
		MSFH 1, BSH 1	Hybrid. High yield. Preferred for irrigated condition.
16.	**Coconut**	Arasampatti Tall	Old plantations. Also preferred for establishing new ones for its good bearing, medium sized nuts and tolerance to drought.
		Hybrid TxD	Preferred to some extent in new plantations. However the incidence of the Rhinoceros beetle is high in hybrids.
17.	**Cotton**	MCU 5	Preferred for both winter irrigated and summer irrigated cropping. Preferred for its extra long staple and good yield.
		Suvin	Preferred for winter irrigated/rainfed in Salem and Namakkal districts. Extra long staple.
		RCH 2, 22, DCH 32, Surabi	Hybrids. Preferred for its high yield. Grown during winter irrigated season.

		LRA 5166, Paiyur 1, MCU 10	Grown both under rainfed and summer irrigated. LRA 5166 is highly preferred due to moderately tolerant to drought.
18.	**Sugarcane**	Co 86032	Preferred for early and mid seasons. High yield and high quality, susceptible to red rot. Occupies 70% of the area
		Co 8021, Co 6304	Area declining replaced by Co 86032. Presently 20% of the area is under these varieties in mid and late seasons.
		MC 707	Very minimum area in Namakkal district. Highly susceptible to red rot.
		CoSi 95071	Early season variety. Area declining due to heavy incidence of smut in ratoon crop.
		CoV 92102	Preferred for mid and late seasons due its high yield and good quality, 15% of the area in Dharmapuri district. Moderately susceptible to red rot.
		Co 86249	High yielding. Medium sugar variety. Moderately resistant to red rot. All season variety. Area declining and replaced by Co 86032.
		CoG 93076	Cultivated in mid and late seasons in Dharmapuri Dt. Area declining due to replacement by Co 86032.
		CoC 99061	Mid and late season variety. Area increasing in Dharmapuri district for its high yield and moderate resistantance to red rot.
19.	**Tapioca**	MVD 1, H 226, 165, Co 3	All are preferred. However all are moderately susceptible to mosaic.
20.	**Tomato**	Pusa Ruby	High yield. Irrigated/ rainfed variety. Majority of the area replaced by PKM 1.
		PKM 1	Highly preferred for its good yield, medium sized fruits, remain green at bottom for several days after picking of fruits making it suitable for long distant transport.

		Paiyur 1	Rainfed. Less preferred due its white coloured fruits though high yielder.
		S 72,41, Varalakshmi, Avinash 2, Challenger 2, Rashmi, Rupali, Suracta	Private company hybrids grown in Hosur and Denkanikotta taluks extensively under irrigated cropping in all seasons.
21.	**Beans**	Premier, Arka Komal(Sel 9), Pusa Parvathi	Grown in Hosur and Denkanikotta taluks during winter season.
22.	**Cabbage**	Golden Acre, Large Solid Late, Drum Head, Early Autumn Giant, Maharani	Grown in Hosur and Denkanikotta taluks during winter season
23.	**Potato**	Kufri Jothi, Kufri Muthu, Kufri Swarna.	Grown in Hosur and Denkanikotta taluks during winter season
24.	**Turmeric**	Local, BSR 1,2	Varieties grown widely. Rhizome rot and nematode incidence are high.
		Ranga, Rashmi, Krishna, Suroma	Hybrids, grown to some extent for its high yield.
25.	**Watermelon**	Arka Manik	Variety grown widely.
		Madhu, Arka Jothi	Hybrids grown to some extent.
26.	**Onion**	Co 1, 2, 3, 4	Aggregate onion grown in Namakkal district.
27.	**Mango**	Totapuri	Widely grown , 60% area under this variety. Regular bearing, good for pulp making, mid variety.
		Neelum	Late variety, 30% area under this variety. Commercial variety.

		Alphanso	Export variety. Best for pulp making. 5% area is under this variety.
		Sendura	Early variety. Good bearing. Commercial variety 5% area.
		Bunganapalli, Salem Bangalora, Rumani, Himmayudin, Malgova	Choice varieties, 5% area.
28.	**Banana**	Poovan, Rasthali, Karpooravalli, Monthan	Poovan occupies larger area in paramathi taluk(in Alluvial soils).
29.	**Betelvine**	Karpoori, Patchaikodi	Karpoori gives good yield.
30.	**Grapes**	Patchthraksha	Adapted to Krishnagiri taluk.
		Anab-E-shahi, Thomson seedless, Bangalore Blue	Performs well in Hosur and Denkanikotta taluks.

5. CONSTRAINTS AND PROBLEMS IN EACH DIVISION

Agro ecological situation I : (Krishnagiri, Palacode, Pennagaram, Dharmapuri, Uthangarai, Harur and Papparapatti Taluks of Dharmapuri District.

RAINFED

SORGHUM

- Lack of high yielding long duration varieties with good quality grain and straw.
- Non-adoption of line sowing due to lack of suitable low cost seed drill.
- Non-application of fertilizers/plant protection measures against pests and diseases.

FINGER MILLET

- Low yield of local varieties; low rate of adoption of improved rainfed varieties like Paiyur 1, HR 911 and GPU 28.
- Lack of information on optimum seed rate, remunerative intercrop and optimum ratios.
- Non-availability of low cost bullock drawn seed drill.
- Non-usage of chemical and bio-fertilizers
- Non-adoption of seed treatment and other plant protection measures; non-availability of varieties resistant to blast.

GROUNDNUT

- Non-adoption of recommend fertilizer usage.
- Low plant population due to sowing behind country plough; suitable lowcost seed drill yet to be developed.
- Low rate of adoption of seed treatment.
- Non-adoption of biofertilizer treatment/pest control measures.

LITTLE MILLET

- Crop raised in skeletal or shallow soil on hill slopes without following any soil moisture conservation measures.
- Low plant population due to inability to complete sowing in optimum moisture for want of adequate draft power.
- Fertilizers hardly used.

PEARL MILLET

- Non-adoption of timely sowing and proper spacing due to want of suitable seed drill.
- Non-availability of suitable agro techniques for raising intercrops.
- Non-adoption of chemical fertilizers due to low cost-benefit ratio and risk involved.
- Non-adoption of control measures against downy mildew and shootfly menace ; resistant/tolerant varieties yet to be developed.

HORSEGRAM

- Non-availability of improved varieties suited to varying sowing dates/different cropping systems.
- Low plant population.
- Non-use of fertilizers/bacterial culture/plant protection measures.
- Lack of genotype with mosaic resistance and non-shattering characters.

IRRIGATED CROPS

RICE

- Low yield in August sown crop/non availability of better cold tolerant varieties.
- Non-adoption of recommended nursery and planting techniques.
- Non-availability of short duration high yielding fine grained variety for December sowing.
- Low yield due to water scarcity in early growth phase.
- Non-adoption of optimum spacing and seed rate, and use of aged planting materials.
- Non-application of P as basal dose

SUGARCANE

- Non-adoption of sett treatment with fungicides, mulching for moisture conservation, detrashing, use of herbicides etc.
- Non-availability of red rot resistant varieties.

FRUIT CROPS

MANGO

- Non development of technology for rainfed conditions.
- Non adoption of improved method of planting, manurial schedule, training and shoot thinning.
- Damage caused by mango hopper, downey and mildew during flowering.
- Lack of regulated market, processing industries, post harvest technology.

TOMATO

- Lack of heat tolerant varieties.

FLOWERS

- Damage due to mites in jasmine, nematodes in corosandra.

Agro ecological situation: 2 & 3 (Hosur and Denkanikotta taluks of Dharmapuri district)

- Non-availability of blast resistant long duration ragi varieties. Thick sowing leading to reduced initial seedling vigour and non-attainments of optimum population.
- Lack of availability of drought tolerant and short duration rainfed types in gingelly.
- High incidence of pests and diseases in vegetable crops like potato, cabbage, beans, radish, etc.
- High pest and disease problem in Chrysanthemum which is a popular commercial flower crop in this area.
- Lack of information on improved cultivation practices for grapes especially Anab-e-shahi and Thomson seedless.
- Development of mango cultivation is handicapped by the inadequate supply of quality grafts especially in export varieties like Alphonso and latest hybrids.
- Lack of improved research/extension support in mulberry cultivation to local farmers.
- Non exploration of integrated forming system as the climatic conditions are ideal for dairy farming and sheep rearing.

Agro-ecological situation 4 : (Salem, Mettur, and parts ofOmalur Taluks for Salem District)

- Lack of improved medium duration ragi varieties suited to seedling transplanting under rainfed conditions.
- Lack of heat resistant rainfed varieties in tomato.
- Lack of varieties/technology for rainfed banana.
- As far as irrigated sorghum is concerned, imbalanced use of fertilizers, non-application of Azospirillum along with FYM, incidence of shootfly earhead bug etc.

Agro-ecological Situation 5 : (Attur taluk of Salem district)

- Non-availability of adequate quantities of certified seeds in groundnut due to low multiplication ratio and low plant population due to non-adoption of recommended seed rate/seed treatment.
- Incidence of pests and diseases in cotton in both winter and summer seasons.
- Non-availability of high yielding drought tolerant rainfed/irrigated tapioca varieties/hybrids with resistance to phoma disease.

Agro-ecological Situation 6 : (Sankari and parts of Omalur taluk of Salem district, Namakkal and Rasipuram Taluks of Namakkal district)

- Non-availability of rice varieties better than IR 20 and Ponni suitable for late samba season with tolerance to brown plant hopper.
- High incidence of pests and diseases in long and extra long staple cotton.
- Lack of improved medium staple cotton varieties with resistance to stem weevil and whitefly.
- Lack of high yielding drought resistant semi spreading and spreading varieties of groundnut. Lack of appropriate agronomic practices for spreading type groundnut variety.

Agro-ecological situation 7 : (Paramathi taluk of Salem district)

- Lack of improved short duration sorghum varieties with thin stem and high juicy content for fodder purpose.

Agro-ecological situation 8 : (Erumapatti and Sedamangalam taluks of Namakkal district)

- Non-availability of improved seed, in Kodo millet as the farmers raise only local cultivars with poor yield.
- Non-availability of improved variety in coriander.
- Stem weevil and whitefly menace in cotton.
- Finger millet yields are low due to brakish water and problem soils.

Agro-ecological situation 9 : (Parts of Attur taluk of Salem district and Perambalur taluk of Perambalur district)

- Lack of drought tolerant Makkattai type of sorghum varieties.
- Lack of availability of improved/pure seeds of chillies as a rainfed crop.
- Lack of superior varieties in bengalgram.
- Loss of yield and quality in tapioca due to mosaic incidence.

Agro-ecological situation 10 : (Alluvial soil-parts of Kolathur, Idapadi, Sankari of Salem district and parts of Paramathi and Mohanur of Namakkal district.

- Banana yields are affected due to imbalanced use of fertilizers and infection caused by banana wilt and nematodes.
- Lack of red rot resistant varieties in sugarcane. Lack of technology for single budded nursery planting.

- Non-availability of appropriate technology in turmeric to manage weeds, water and nutrients from the time of sowing to sprouting as the time taken for establishment is longer. Quality of seed rhizome is affected by pests and diseases due to longer storage period.

Agro-ecological situation 11 : (Saline and Alkali Soils - Parts of Krishnagiri, Kaveripattinam, Magudanchavadi, Rasipuram and Namakkal)

- Lack of conjunctive use of irrigation water.
- Lack of information on cropping systems for problem soils.
- Lack of credit support from public sector for reclamation work

GENERAL

- Undulating topography with uncertain rainfall
- Exposure to soil erosion
- Shallow, coarse textured soil with low fertility and poor water retention capacity.
- Lack of marketing facilities for mango, tomato etc.
- General poverty of dryland farmers.

Agrl.Engineering Constraints

- Development and testing of prototypes of improved need based tools/implements to be taken up.
- Efficient, low cost and simple in construction implements are needed.

Livestock Constraints

- Lack of programme for large scale improvement of local breeds.
- Indiscriminate sale and movement of graded livestock into the neighbouring States of Karnataka and Andra Pradesh.
- Lack of institutional and development support to provide better transfer of animal husbandry technology to farmers.Inadequate veterinary health care.
- Ecological imbalance and inadequate forage resulting from uncertain rainfall.
- Nutritional deficiencies in feeds and fodders.

6. TECHNOLOGIES DEVELOPED
A. REGIONAL RESEARCH STATION, PAIYUR

CROP IMPROVEMENT

- A high yielding medium duration super fine **rice variety Paiyur 1** was released for general cultivation during 1981. Maturing in 140-145 days, it is best suited for early Samba (June – July) and Navarai (November – December) seasons of this zone. It gives an average yield of 5904 kg of grain and 8.6 tonnes of fodder per hectare. The grain yield increase was 14.3 per cent over Bhavani and 39.2 per cent over Kitchidi Samba. Besides higher yield, it is endowed with super fine quality rice with better cooking qualities.

- A high yielding long duration **ragi variety Paiyur 1** was released during January 1984 for general cultivation in the rainfed areas of this zone. It matures in 115-120 days. It gives an average grain yield of 1800 kg/ha with an increase of 18 per cent over Indaf 5 and 35 per cent over traditional local types. Besides higher yield, it has other desirable attributes like open panicles, more number of fingers with tolerance to environmental stresses.

- A long duration photosensitive thalaivirichan **sorghum Paiyur 1**, hybrid derivative of Co 19 x Co 24, was released for general cultivation during 1991. Maturing in 145-150 days, it has recorded a mean grain yield of 971 kg of grain and 9.35 tonnes of fodder per hectare. It has given 15 per cent increased grain yield over Co 19. It possesses sweet juicy stem and translucent pearly white grains. It has high level of tolerance to important pests and diseases.

- A dual purpose **redgrain sorghum variety Paiyur 2** was released for general cultivation during 1995. It is a pure line selection from germplasm accession IS 15845 and matures in 90-95 days. It is suitable for Kharif and Rabi seasons of Salem district. It recorded a grain yield of 2119 kg/ha and fodder yield of 8789 kg/ha. It has given 61 per cent increased grain yield and 36 per cent increased fodder yield over Co 4. It is relatively tolerant to downy mildew, rust and charcoal diseases.
- A high yielding **samai variety Paiyur 1,** a pure line selection from Santhur local was released during 1987. It gives 873 kg of grain yield per hectare, the yield increase being 20 per cent over Co 2. It matures in 105-110 days and withstands early season drought. It also gives higher straw yield (2.6 t/ha) as compared to Co 2 (1.9 t/ha).

- A short duration high yielding **samai variety Paiyur 2,** a pure line selection from PM 295, was released in 2000. Maturing in 80-85 days, it recorded a grain yield of 744 kg/ha. The increase in yield was 9.4 and 23.2 per cent over Co 3 and Paiyur 1 respectively. Being shorter in duration, it can be fitted well in the existing double cropped rainfed situation of North Western Zone where samai is widely cultivated.

- A high yielding **greengram variety Paiyur 1,** pure line selection from Kaveripattinam local was released during 1986. On an average, it gives 742 kg of grain yield per hectare. It has recorded 11 per cent increased yield over Co 4. It is tolerant to yellow mosaic and best suited for intercropping in rainfed ragi and cotton crops.

- A high yielding **cowpea variety Paiyur 1,** pure line selection from VM 16, was released during 1985. Maturing in 85-90 days, it has given an average grain yield of 760 kg/ha. It has recorded 15 and 16 per cent increased grain yield over C 152 and Co 3 respectively.

- A high yielding **horsegram variety Paiyur 1,** pure line selection from Mettur local, was released during 1988. It gives an average grain yield of 642 kg/ha with an increase of 15 per cent over Co 1 and 34 per cent over local. It matures in 105-110 days and is best suited for raising as second crop under dryland situation. The variety is tolerant to yellow mosaic and root rot diseases.

- A high yielding **horsegram variety Paiyur 2**, developed through gamma irradiation of Co1, was released during 1998. It matures in 100-105 days. It has given an average grain yield of 879 kg/ha with an increase of 19.6 and 26.8 per cent over Paiyur 1 and Co 1 respectively. This variety is tolerant to yellow mosaic. The protein content is 19.3%.
  Being 5 to 7 days shorter in duration as compared to Paiyur 1 and Co 1, it can be fitted well in the existing double cropped situations such as samai-horsegram, groundnut-horsegram and ragi - horsegram.

- A high yielding **sesame variety Paiyur 1,** hybrid derivative of the cross Si 2511xSi 2314, was released during 1990 for summer irrigated cropping. It matures in 90-95 days. On an average, it gives 644.kg of seed yield per hectare registering 14.3 and 13.8 per cent yield increase over Co 1 and TMV 3 respectively. It has also excelled the other standard variety TMV 4 by 9.1 per cent. It is also resistant to powdery mildew.

- A high yielding short duration **niger variety Paiyur 1,** developed through mass pedigree selection from comp II, was released in 1997 for cultivation in Hosur and Denkanikotta taluks of Dharmapuri district and hilly areas of the State. It matures in 90 days. It has recorded a mean seed yield of 259 kg/ha as compared to 215 kg/ha recorded by the local, the yield increase being 20 per cent. This variety is resistant to powdery mildew and Alterneria. Earlier by 20 days as compared to local (115 days) is the special feature of this variety. It possesses bold seeds with high oil content of 44.6 per cent as compared to 39.4 per cent in the local.

- A high yielding medium staple **cotton variety Paiyur 1** was released during 1981 for general cultivation under rainfed condition in this region. It is a hybrid derivative of the cross MCU 10 x SRT 1. It has recorded a mean yield of 1173 kg of kapas per hectare. Compared to LRA 5166 and MCU 10, this variety has recorded 7.0 and 15.0

per cent higher kapas yield respectively. Its ginning out turn is 37.1 % and span length is 27.9 mm as against 36.7 % and 27.2 mm for LRA 5166 and 35.8 % and 27.7 mm for MCU 10. The mean holo length is 26.3 mm. The variety matures in 145-150 days and is resistant to bacterial blight and alterneria leaf spot diseases.

CROP MANAGEMENT

RICE

- Addition of gypsum at 50% of its requirement, green manure or FYM or Pressmud 15 t/ha and zinc sulphate at 25 kg/ha has improved the yield of rice crop in sodic soils of Krishnagiri Reservoir Project ayacut areas.

- Pre soaking of rice seeds in zinc sulphate 1% solution for 12 hours and shade drying (seed hardening) before sowing has induced cold tolerance.

- Application of neem cake blended Urea can be done at basal + tillering or as basal for getting higher grain yield in rice.

- Transplanting of aged seedlings reduced grain yield in rice. However, planting four to six seedlings/ hill with a spacing of 20x15cm has recorded maximum grain yield up to 56 days age beyond which a closer spacing of 20x10cm has recorded highest grain yield.

- The application of 100% soil test based (STB) NPK + 20% extra Nitrogen registered increased grain and straw yield of rice to the tune of 9.2 and 14.5% over 100% STB-NPK application.

- Multiple and relay cropping in wet land condition revealed that rice with bhendi (or) vegetable cowpea can be raised as bund crop. If South West monsoon fails leading to delay in release of water in canals, sweet potato, cotton and onion is the best crop sequence. If seasonal condition is favourable, rice-rice-sunflower can be followed.

- Incorporation of composted coirpith (or) Farm Yard Manure along with recommended inorganic fertilizers recorded the highest grain and straw yields of rice-ragi crop sequence. It indicated that composted coirpith, could be a viable alternate organic source for FYM.

- The yields in wet seeding of rice by manual broadcasting (5.72 t/ha) and wet seeding by drum seeder (5.66 t/ha) were almost similar to traditional transplanting practice (5.58 t/ha).

- Application of Anilophos, Pretilachlor and Butanil to direct seeded rice recorded the maximum grain yield of 5.44 t/ha each.

- Application of 100% soil test based (STB) NPK with an additional dose of 20% extra-N to rice during winter season has registered the highest grain and straw yields of 5165 and 6219 kg/ha.

- Application of pressmud enriched with zinc to rice (mixing of 25 kg/ha of $ZnSo_4$ with 125 kg/ha of pressmud incubated for a period of one month prior to application) recorded the maximum grain yield of 7284 kg/ha, with yield improvement of 46.1% over control.

- Application of 150 kg N/ha in four splits of 6.25 t/ha of green manure/green leaf manure has registered the highest grain and straw yield of 6.8 and 6.5 t/ha respectively in ADT 43 rice.

- Application of 75% NPK along with Azospirillum, Phosphobacteria, Bluegreen Alage and Azolla has registered 6855 kg/ha of grain yield in rice.

- Chemical sprays done at tillering and boot leaf stages had induced cold tolerance in Paiyur 1 rice. Zinc Sulphate 0.5% plus Urea 1% spray registered maximum leaf area. Foliar spray of DAP 2% plus Urea 1% recorded maximum grain yield.

RAGI

- 'N' application up to 80 kg/ha during normal rainfall year and up to 60 kg/ha during other seasons found to increase rainfed ragi yield. Split application of N, ie. half at sowing, half at 20-30 days after sowing (or) full dose of N top dressed at 20-30 days after sowing increased the grain yield.

- Ragi inter-cropped with greengram at 4:1 ratio recorded the highest income of Rs.2374/ha followed by 6:1 ratio (Rs.2239/ha) and 8:1 ratio (Rs.2127/ha) against pure crop of ragi (Rs.1991/ha).

- Azospirillum either as seed treatment or furrow application in rainfed ragi after sowing saves N dose from 25-50% with a grain yield increase of 175 kg/ha.

- Transplanting of rainfed ragi was superior over direct sowing and 21 days seedlings recorded highest mean yield of 1721 kg/ha and 18 days old seedling was superior to 28 and 35 days old seedlings.

- Soaking finger millet seeds in CCC 5 ppm (or) cattle urine 10% solution (seed hardening) has given increased grain yield of 12 to 15% over un soaked dry seeds. The cost of chemical (CCC) used for pre-sowing soaking seeds works out to Rs.1/- and the profit due to increased grain yield to Rs.150/-.

- On rainfed ragi, foliar spraying of Ethrel 200 ppm on 45th and 65th day after sowing was found to enhance maturity of the crop by one week as compared to control. The plots sprayed with Ethrel registered 1925 kg of grain and 4000 kg of straw/ha as compared to control with 1225 and 3200 kg/ha of grain and straw respectively.

- An integrated nutrient management study revealed that addition of tank silt/ black soil at the rate of 80 t/ha accounted for marked increase in the yield of ragi (Paiyur 1) from 1270 kg/ha to 1880 kg/ha . Further the addition of tank silt/ black soil had a very good residual effect on horsegram by increasing the yield from 360 kg to 600 kg/ha. Besides, it also improved the soil organic matter content, CEC, WHC and fertility of the soil.

- Integrated weed management practice for rainfed direct seeded ragi revealed that post emergence application on the 10th day, either 2,4-D Na salt or 2,4- D Ethylester at 0.5 kg/ha recorded higher yield of 1.62 and 1.64 t/ha respectively.

- Application of 50 kg N/ha in two splits at sowing and 20-30 DAS, with 20 kg P_2O_5 as enriched FYM at sowing was superior to top dressing of N at 25-30 DAS and P_2O_5 applied as straight fertilizer at sowing in rainfed ragi..

- Delay in rainfall onset can be managed with sowing of short duration ragi culture DPI 2011 (95 days), while with normal onset of monsoon Paiyur 1 (110 days) can be followed. The intermittent dry spell can be over come by incorporation of composted coirpith (5t/ha), random tie ridging and soil mulching with blade harrow.

- Application of RIF + EFYM to ragi – horsegram / cowpea crop sequence recorded the highest grain yield and net income of 1558 kg/ha and Rs.4747/ha respectively.

SORGHUM

- Raising cowpea, Paiyur 1 as intercrop in paired rows of sorghum Co 19 is more remunerative.

- Application of 12.5 t/ha of FYM + 8kg/ha of Azospirillum + 90kg N/ha to rainfed sorghum recorded 70% increased yield over control.

- Application of Azospirillum and phosphobacteria along with 75% of the recommended level of N & P registered more grain yield in sorghum Paiyur 1 .

- Seed hardening of sorghum with neem cake extract (soaking neem cake one part with four parts of water overnight and decanting) recorded significantly higher grain yield (1102 kg/ha) and harvest index with a cost benefit ratio of 1: 2.3.

- Rainfed red soils of North Western Zone are poor in soil moisture retention and fertility. Application of tank silt at 100 t/ha along with FYM 10 t/ha and recommended NPK maintain higher crop yield in major crops like sorghum, ragi and groundnut.

- Application of 75% recommended inorganic fertilizers (RIF) + Bio fertilizer to sorghum – horsegram/ cowpea crop sequence recorded the highest grain yield and net income of 1586 kg/ha and Rs.5314/ha respectively.

SAMAI

- Combined application of 5 t/ha of FYM along with 40:20:0 kg NPK/ha along with seed treatment of azospirillum was found effective in registering the highest grain yield in rainfed samai.

- Application of 6.25 kg ZnSO4/with 12.5 kg FeSO4/ha enriched with FYM registered the highest grain and straw yields of 1375 and 2785 kg/ha respectively.

- Presoaking of samai seeds with potassium-di-hydrogen phosphate at 2% and coconut water at 10% was found to be the best and gave the highest grain yield of 720 kg/ha.

- Technologies developed to get higher yield in samai were, small bunds formation, FYM at 12.5 t/ha. seed hardening, enriched FYM application, biofertilizer and organic fertilizers application.

- Studies on cultural practices in little millet indicated that sowing samai in July to early August ensured higher grain yield under rainfed conditions. Application of 40 kg N and 20 kg P_2O_5 /ha resulted in significant yield increase over farm yard manure alone or no manuring.

MAIZE

- CO 1 can be recommended for rainfed cultivation. An optimum population of 1,10,000 plants/ha (45x25cm) to be maintained for high yield. Application of 60:30:30 kg NPK/ha with Azospirillum inoculation through seed and soil gave good yield from rainfed maize. Further 30 kg P2O5 and 30 kg K2O are to be applied as enriched FYM and nitrogen in two splits as basal and at taselling. Two pockets of Azospirillum for seed treatment and 10 pockets for soil application/ha are to be used. Coirpith @ 10 t/ha was found to be an ideal soil amendment for tannery effluent affected soils. Coirpith gave significantly high grain (2914/ha) and straw yield (6350/ha) of maize (CO .1)

GREENGRAM

- Application of Sulphur 30 kg/ha in the form of gypsum recorded the highest grain yield (1245 kg/ha) and net income of Rs.9708/ha in rainfed greengram..

- Soaking of greengram seeds in single super phosphate (SSP) @ 20 g/kg of seed + 12.5 kg P_2O_5/ha (80% of recommended dose) as SSP through soil application registered the highest grain yield of 1705 kg/ha.

- Application of fluchloralin 1.0 l/ha on 3DAS with one hand weeding recorded the highest seed yield in rainfed greengram.

COWPEA

- Soil application of recommended inorganic fertilizers + 2 percent DAP spray twice (first at flowering and second at 15 days after first spray) found to record the increased growth and yield of rainfed cowpea.

- Application of 75% of P_2O_5 as rock phosphate with phosphobacteria + seed soaking recorded the highest yield of 708 kg/ha, in rainfed cowpea.

- In cowpea, the nodulation status was similar in both bio-mix and combined inoculant of rhizobium and phosphobacteria.

- Application of 1.0 l/ha of fluchloralin on 3 DAS effectively controlled the weeds and recorded the highest grain yield in rainfed cowpea.

HORSEGRAM

- Closer spacing 30x10cm, application of P @ 20 kg/ha and treating Rhizobium for seed resulted in increased yield of 12% over control.

- Presoaking of horsegram seeds with water and cocount water at 10% has increased grain yield by 22 and 20% over unsoaked dry seeds under rainfed condition .

- Studies on the seed treatment, soils and foliar application of Fe & Mo to horsegram variety Paiyur 1 revealed that 0.5% of $FeSO_4$ + 0.10% of Na-Molybdate registered the highest grain yield of 814 kg/ha as against the control (567 kg/ha). Foliar application of Fe & Mo was found to be better than seed treatment and soil application.

- The performance of horsegram was better in groundnut-horsegram cropping sequence compared to samai-horsegram and ragi-horsegram systems. Application of N & P

influences the horsegram yield and basal application of 5 kg N + 10 kg P_2O_5 recorded the highest yield.

- Under rainfed condition, horsegram seeds treated with rhizobium combined with the application of P at 5 kg as enriched FYM/ha increased the grain yield by 51 per cent with a high cost benefit ratio of 1:3.69.

SOYBEAN

- Varieties Co 1 and ADT 1 were found to be suitable for North Western Zone. Maintenance of 3.3 lakh/ha population, sowing during middle of July to first fortnight of September, crop geometry of 30x10 cm spacing, basal application of 20:40:20 kg of NPK/ha, pre-emergence application of herbicide Fluchloralin at 1 kg/ha, seed treatment of 5% sand mixed seeds stored in polythene bags and rhizobial treatment with Rhizobium Japanicum (61 A 76 strain) were beneficial under rainfed conditions.

- In sugarcane- soybean intercropping system, one row of soybean between two rows of sugarcane (10cm spacing) gave an additional return of Rs.1800 to 2000/- per ha.

GROUNDNUT

- An integrated package involving tank silt 100 t/ha + soil test based fertilizer recommendation including biofertilizer + FYM (12.5 t/ha) recorded the highest yield of 1764 kg/ha and net income of Rs.2393/ha in rainfed groundnut TMV 7.

- Studies on micronutrient schedule for rainfed groundnut in Vannapatti soil series revealed that iron enriched FYM (24 kg/ha of Ferrous sulphate with 750 kg FYM incubated for a month) gave 17% enhanced pod yield with a net return of Rs.1832/ha.

- Application of micronutrient mixture to rainfed groundnut @ 12.5 kg/ha rated best with pod yield of 1766 kg/ha with an increase of 27% over control.

- Water spray under rainfed condition on 30^{th}. 40^{th} and 50^{th} day had increased the pod yield significantly. Foliar spray of Zn and Fe is adequate to correct the chlorosis in groundnut.

- Manually operated groundnut decorticator was found to be easy, effective and reduced the labour required for pod opening. Farmers are highly satisfied with these equipment and many are using every year.

COTTON

- Package of practices for rainfed cotton economic fertilizer dose is 75:37:5:37.5 kg NPK/ha for rainfed hirsutum cotton. Optimum spacing is 90x45 cm.

- Gramaxone @ 2.5 lit/ha at 70% boll opening stage is found to reduce 10 days of crop period and hastens boll bursting in irrigated cotton.

- Azotobactor application increased the yield of seed cotton by 44 kg/ha and N at 52.5 kg/ha + Azotobactor gave yield equal to that of 70 kg N/ha thus saving 17.5 kg N/ha.

FODDER CEREAL AND LEGUME MIXTURES

- Under rainfed condition pearl millet as a cereal fodder performs better with 17 t/ha green leaves and straw. Under irrigated conditions, maize (African tall) was found to be good with 25 t/ha of green fodder yield and maize and cowpea in 1:1 ratio recorded 25 t/ha green fodder. Under rainfed conditions however,cumbu and cowpea combination in 2:1 recorded high yield of 39 t/ha.

DRYLAND CROPPING SYSTEM

- Selected cropping systems in dryland: i) Whenever early sowing of samai is taken up then second crop of cowpea can be raised if adequate rains are received during October and November. ii) If summer shower is adequate, gingelly crop can be raised successfully. iii) After gingelly a short duration ragi crop can be raised if adequate rains are received during the months of July-September. iv) If adequate rains are received after the harvest of groundnut, sowing of horsegram, cowpea will be remunerative to the farmers.

- Multiple and relay cropping in dryland : If southwest monsoon fails, the farmer can raise short duration sorghum like Co.24 and among pulses blackgram, greengram and cowpea are more profitable crops.

- Contingency cropping plan for dryland: If Southwest monsoon rain is scanty, growing cowpea and greengram as contingent crop is profitable.

- Integrated nutrient and moisture management for rainfed direct sown Finger Millet, pearl millet and sorghum in North Western Zone: a) Forming furrows between rows thirty days after sowing (b) Incorporation of 12.5 tonnes/ha of composted coirpith (c) Application of 20 kg/ha of P2O5 as enriched FYM (d) Application of 40 kg/ha of Nitrogen in two splits (half basal and half at 30 DAS).

- Mixed Farming. Study to evolve optimum combination of dairy/poultry units for marginal farmers to maximize income and employment revealed that, dairy based mixed farming was profitable and generated more employment. The per day income was Rs.11.80 as compared to 5.25 in pure cropping.

MULBERRY

- Azospirillum isolates AzP1 and AzP2, the Azotobacter isolates AtP1 and AtP3 produced more IAA and fixed more N_2.

- Inoculation of AzP2 performed better than other isolates on mulberry leaf biomass production in Manva 2, MR 2 and S.54 and M5 varieties. Similarly, the Azotobacter isolate AtP4 performed better in biomass production of different varieties of mulberry.

- In sodic soils, A halopraeferens inoculation enhanced growth and yield of mulberry by 63.3% in MR 2 and 51.01% in S.54 variety.

- Azospirillum and Azotobacter inocluation either individually or in combination enhanced the total chlorophyll content (Var MR 2) in leaves. Combination treatment recorded 48% increase over control. Similarly, an increase in total sugar content, N and P contents were observed in leaves due to inoculation.

- Bio-inoculant dosage of 10 packets/ha (2 kg) can be recommended for cutting dipping to ensure the desired population.

- The inoculated strain colonized the mulberry rhizosphere as long as 180 days after planting and this necessitates the application of bio-inoculants at 6 months intervals to ensure the desired population.

- Increase in cocoon weight (up to 29%) and silk weight up to 11.52% was observed by bio-inoculants application.

- Mulberry clones S.54 and Kosen were found to be preferred by the silkworm which was reflected by the larval growth and leaf consumption rate.

CROP PROTECTION

- The loss due to ragi blast disease ranged from 2.4 to 55.7 per cent across season with the means ranging from 13.2 to 29.6 per cent. The fungicide Kitazin has recorded the highest cost benefit ratio of 1:2.53.

- Pelletization of sorghum seeds with Copper sulphate at 5 g/kg of seeds prevents the incidence of smut disease in sorghum.

- Seed pelleting with Chlorophiriphos, Monocrotophos, Phosalone @ 4ml/kg of seed reduced shootfly damage and increased the yield. This is highly suitable for rainfed system. Spraying any one of the chemical pesticides Phosalone 0.1%, Endosulfan 0.1% and Deltamethrin 0.01% reduced stem borer and increased the yield. Dusting Malathion / Endosulfan/ Quinolphos/ Phosalone reduced earhead bug population.

- In horsegram, the yield loss caused by the pod borer Etiella zinchenella was estimated to be 13-19 per cent. Entries C 61, C 48, C 63, DPI 1582, 40 EN 2, EN.8 and 30 EN 14 were observed to support significantly less mite population.

- Dusting of Carbaryl 10% or Endosulfan 4% at 25 kg/ha reduced the pod borer damage significantly in horsegram and increased the yield of grain.

- Spraying two rounds of Endosulfan 0.07% or NPV 250 LE/ha mixed with Endosulfan followed by NPV 250 LE/ha at 10 days later were found effective in reducing the larval damage by Heliothis armigera besides increased grain yield both in redgram and lab-lab.

- In lab-lab, two spray application of Endosulfan 0.07% reduced pod borer population in mochai to the extent of 45.4% followed by NPV + Endosulfan 0.035%. Pod damage was reduced from 21% in control plots to 6.2% in Endosulfan + NPV sprayed plots after two applications. Grain damage was reduced from 19.32% to 5.5%. Yield of healthy marketable green pods without bore holes was 1800 kg/ha in intercropped system (4:1) treated with NPV + Endosulfan, while it was only 358.3 kg in control. Natural parasitism by Bracon hebator on early instar larvea and Carcelia illota on late instar larvae was 12.2% and 7.1% respectively in NPV treated and Neem sprayed plots while at minimal level in insecticide treated plots.

- Groundnut studies on pest dynamics in dryland cropping (Groundnut with lab-lab as intercrop) over two years period showed that the population of leaf folder and leaf miner was reduced in the groundnut lab-lab intercropping system.

- The effect of biological agents, chemicals and plant products on leaf eating caterpillars of groundnut, application of Endosulfan (0.7%) resulted in 30.7% mortality in 24 hrs, which was on par with 15 NPV combination. NPV+NSKE effected 34.2% mortality followed by NPV at half dose plus NSKE. Chlorpyriphos was effective in reducing leaf miner larval population with an average mortality percentage of 62.6% which was on par with monocrotophos (61.3%). This was followed by Dichlorvos (55.5%) and Endosulfan (48.9%). Plant product neem oil @ 3% and NSKE @ 5% caused 35.42 and 34.3% mortality respectively. The least effective chemical was the chitin inhibitor (24.94%).

- Red hairy caterpillar incidence on groundnut was recorded to the extent of 19.4% in unprotected plot, while it was 15.1% in plots treated for preventive control. Leaf miner damage was on the lower side in the plot var. CO 1 sown in normal season with 20:40:20 NPK/ha (86.11%). The damage due to leaf miner was heavy (78.85-94.71%) in the initial stages of crop growth. The flea beetle damage on different treatments ranged from 21.5 to 67.3%. The yellow mosaic virus incidence in the early sown and late sown crop was 7.6% and 8.5% respectively.

- Efficacy of egg/larval parasite on cotton boll worms. The release of parasites (Chelonus blackburni and Bracon) Kirpatricki at 50 and 75/batch reduced the larval population up to 1%.

- Seed treatment with Carbofuran 50 sp. 10 W/W was found to be effective in dry cotton to render protection against sucking pests.

- The crop combination cotton + greengram in paired rows had recorded maximum net returns of Rs.3453/ha with the added advantage of reduced incidence of leaf hopper Amrasa bigutulla compared to sole crop which had the net return of Rs.3145/ha.
- The incidence of downy mildew was scored at Paiyur in 17 grape varieties. Bangalore Blue was found to be moderately resistant while rest of the varieties were susceptible.

- Application of NPV reduces the incidence in early instar of H.armigera in tomato under filed condition.

- The virus culture required can be harvested easily under laboratory condition at a cost of Rs.3.75/ha. The use of NPV and Eucellatoria bryani in the integrated pest management of Heliothis armigera on cotton, pulses and tomato in different seasons would greatly reduce the expenditure towards the cost of chemicals besides preventing toxic residue in food crops. The loss due to borers on fruits, pods and bolls would be minimized.

- Proven efficient natural enemies will be utilized in the integrated pest management in coconut. The larval and pupal parasites of coconut black headed caterpillar can be made as a combined release in a large scale at fortnightly intervals under pesticide free environment. The colonisatioon and its establishment under field conditions have to be noted periodically. The parasites mentioned in crops like cotton, redgram, tomato, mango and groundnut can be mass reared under laboratory conditions and based on the life table and recovery studies it can be field adopted.

- The fungus Verticillium lecanii will be utilized in the integrated pest management in controlling pests of mango.

- Spraying of Phosalone 0.07% (10 DAT) and Verticillium leceanii $21x10^6$ spores/ml at 2.5 ml/lit (15 DAT) will reduce the mango hopper population to an extent of 49.7 and 46.3% respectively.

- The intercrop of cowpea in sorghum (4:1) found to reduce the shoot fly incidence in sorghum and when the seed treatment with Chlorpyriphos 4 ml/kg was combined, it recorded the lowest incidence of 2.7%.

- Spraying Dicofol 18.5 EC was found effective for control of jasmine bud mite Acaria jasmini and spraying of wetable sulphur also has the same effect.
- Soil application of verimiculite 10 t/ha plus Trichoderma viride 100g recorded the lowest incidence of 8.6 root rot disease (Marophomina phaseoli) in horsegram and registered an yield of 57 kg/ha. It is followed by seed treatments with Carbendazim 2 g/kg of seed which recorded an incidence of 9.6% and registered an yield of 545 kg/ha.

- Prophylactic sprays with neem leaf extract 10% thrice viz., before flowering, during flowering and two weeks later reduced the disease incidence of powdery mildew in greengram very effectively (Grade 2.5) and recorded a grain yield of 1530 kg/ha. It was as effective as that of using chemical fungicide Calixcin 0.5%.

- The ragi entries Paiyur 1, TNAU 332, TNAU 568 and TNAU 533 showed resistant reaction while the entries DPI 2084, 2011, 2013, 2004, 19798, 2209, 2072 and HR 374 showed moderately resistant reaction against blast.

HORTICULTURE

MANGO

- Paiyur 1 mango was released during 1992. It is a Neelum clone selected from the village Karukkanchavadi in Dharmapuri district. This variety is dwarf structured with compact canopy suitable for high density planting (400 plants/ha) yielding 9 tons/ha, under rainfed conditions.

- In mango, soft wood grafting techniques for rapid multiplication of promising clones was standardized. Grafting process after June-July resulted in good establishment of the grafts.

- The soils of mango plantations in Dharmapuri district were found to be heterogenous in nature and low in available N, low to medium in available P and medium to high in available K status. The available N and P are found to be high in surface soil than sub surface while the availability of K increased with soil depth. Regarding the nutrition of mango leaves, the young leaves had higher N and K concentration as compared to old leaves whereas the P content was high in old leaves.

- The available N both at flowering and fruiting stage in mango had high correlation with fruit yield and positive relationship existed between the N content of old leaves and fruit yield. The P availability at flowering stage is highly related to fruit yield and P content of old leaves at flowering and fruiting stages contributed much towards the fruit yield. Significant positive relationship existed between available K at flowering stage and T.S.S. of fruits.

- The popular cultivars and varieties available in Tamil Nadu and the near by States were collected and 44 clones are assembled and studied at this station. The varieties released by the other States like Amrapali, Arka Aruna, Arka puneet, Arka Anmol, Rathna, Ko11, Ko22, Mallika, the varieties suitable for export like Alphanso, Banganapalli, Jagdavi Alphanso, Varagambadi Gundu are included in the collections, Besides the early season varieties like Senthura, Peter, the mid season varieties like Bangalora, Salem Bangalora, Mulgova, Alphanso, Jahangir, Baneshan, Himayudin, Khudadad, Kalepod, Rumani, Panchavarnam and the late season varities like Neelum are also included. The varieties with attractive reddish, blush like sorno Jahangir and tastey Neelishan, Neelugova, Petnarasam, Panchathara kalasa, Praba shankar are also

included. Further the cultivars which possess better performance in the local situation like Ervadi Bangalora, Ervadi Neelum, Karukkanchavadi Neelum, are also included. Apart from this, the other types available in the collections are Pacharisi, Starch, Kesari, Kulneelum, Periyakulam 1, Paiyur 1, Virudunagar, Vikrabad, Laddu. A good quality mango cultivar with better yellow colour which is known as Bada Am and a dwart tree of the variety Rumani identified for further improvement. The dwarf Rumani is suggested for high density planting nearly 400 trees per hectare.

GRAPES

- The overall performance of the 12 varieties clearly indicated the uniform performance of Pachadraksha, throughout the years 1986 to 1989 with acceptable TSS range of 16.5° to 17° Brix. In the case of seedless cultivars, Arkavathi has recorded high yield of 21.34 kg/ vine with TSS of 19° Brix.

- In the variety 'Pachadraksha`, pruning the canes with four bud level has given a yield of 200 bunches/vine weighing 26.6 kg/vine followed by three bud level with 167 bunches weighing 21.12 kg/vine.

- The varieties of the Indian Institute of Horticultural Research, Banaglore are assembled. They are Arka Krishna, Arka Trishna, Arka Megestic, Arka Shweta, Arka Chitra, Arka Soma and Arka Neelamani. They are in the Juvenile phase.

- Application of Gibberlic acid at 50 ppm twice, once at the time of Calyptra fall stage and another at the time of pea size stage increased the bunch weight, with loose golden yellow berries.

- Pruning season advanced to March-April and October-November in the Cooler regions of Hosur and Denkanikotta and Thalli, and delayed to May-June and December-January in warmer regions like Krishnagiri, Harur, Palacode, Uthangarai and Dharmapuri taluks. Pruning 3-5 buds and 4 buds is found to be productive in Patchai draksha and Thompson seedless respectively for summer and monsoon seasons. In Anabi-E-Shaki, the crop can be pruned to 6-7 buds in summer crop and reduced to two buds in monsoon crop.

- The incidence of downy mildew was scored at Paiyur in 17 grape varieties. Bangalore Blue was found to be moderately resistant while rest of the varieties were susceptible.

TOMATO

- The elite hybrid derivative x 36 isolated from the cross pusa rubi x Co 3 (Marutham) was released as Paiyur 1 to suit to the agro ecological situations 2 and 4 as rainfed crop in 1988. It flowers early (20-25 days from transplanting), possesses extended harvest period (10-12 plucking) with a yield potential of 32 t/ha. The fruits are

medium in size, round in shape, medium firm, and having high keeping quality. It is suited to rainfed cultivation and distant transport.

- In a study with 48 hybrids, obtained by crossing 12 AVRDC lines with four testers namely Pusa Ruby, Co 3, PKM 1, and Paiyur 1, the hybrids ECC 374859 x PKM, and EC 374855 x PKM, gave fruit yield of over three kg/plant.

- Under irrigated condition, application of 80:60:40 kg N, P_2O_5, K_2O/ha registered 96% increased yield over control while under rainfed conditions, the yield improvement being 57.7% in the red soils of North Western Zone.

- In the integrated nutrient management application of 75% soil test based N under irrigated condition and 100% soil test based N under rainfed condition combined with 12.5 t/ha of composted coirpith registered higher yields.

ANONA

- The conventional Varieties of Anona like Washington, Balanagar, Mankooth, Red Mankooth, Island Gem, Barbados, Pond Apple, Alemoya, Cherrimoya, Aruppukotai 1 are collected and studied. The open pollinated clones available in the rocky hillocks at Kolikovil, Kuppam, Duaraikulam, Varatanapalli, Gurvoinayanapalli were collected. From the initial yield obtained, the trees with fruits of large treade and less seeds are screened for further improvement.

TAMARIND

- The plus trees identified by the Department of Foresty, Tamil Nadu and trees suggested by the lead farmers in places like Dharmapuri, Vellore, Thirupathour, Salem, Erode, Periyakulam area were studied.

- The Tamarind rich in anthocyanin pigments which give the appearance of Beet root red colour to the pulp are being studied. They are available in HC&RI , Periyakulam, Madurai Natham, Kaveripattinam, Therpatti, Guruparapalli, Gundalapatti, Shestharchavadi, Mellore, Rayapalayam and Vokkalari in Karmalika area.

- The high yielding clones assembled so far are PKM-1, Wigam CT 112, RMK-1, SMR-1, (Mellore area), NRP-1, Chengam 141, 142, Denkanikotta 104, Hasanur 1,2,10, Kandukanapalli 102, Thirupathur 145, and Vellore 1,10,13,20,40,59,64.

- The damage to the newly planted young tamarind plants by cattle grazing are minimized to a greater extent by new planting technique. The grafts are trained like a vine by periodic removal of the auxillary buds. The vines are allowed to attain a height of 8-10 feet and planted in the main field with proper propping. Early yield of the main field is achieved by this technique.

COOL VEGETABLES

- In cabbage, variety 'Maharani` produced the highest yield of 111.3 t/ha followed by Hero (91.3 t/ha). In French beans, the variety 'Premier` recorded the highest yield of 17.7 t/ha followed by the varieties Maharashtra local (16.9 t/ha) and Burfist (16.1 t/.ha). These varieties are recommend for the agro ecological situations 2&3 of this zone.

SOCIAL SCIENCES :

- The Socio economic characteristics of ragi growers revealed that nearly 70 per cent of the ragi growers have more than 10 years of experience of ragi cultivation. More than 57 per cent of respondents have income ranging from Rs.2000-4000 and depend on agriculture alone; 59 per cent of the ragi growers had information through radio, 44 percent through newspapers, 68 per cent of the farmers are able to read and write.

- The study on production, pattern, yield gaps and constraints in rainfed ragi crop in Dharmapuri district brought the fact that as one third of the respondents were illiterates, they need to be educated through field demonstrations, on-farm trials and suitable audio-visual aids. Research need to be concentrated to identify high quantity of biomass production type of ragi for agro-ecological zones 1,2 and 3 to provide sufficient grain and fodder which will also promote mixed farming. Being small and marginal farms, cropping intensity suited to self employment need to be worked out. Community sets of radio and television need to be installed in the sub zones to educate the crop production technology of ragi for obtaining high yield.

- Among the selected sugarcane growers, 70 per cent did not adopt COC.671 due to the constraint of lodging, 75 per cent did not follow set treatment, 25 per cent planted less than recommended population, 69.17 per cent did not adopt intercrop, 81.6 percent did not adopt basal application, 61.67 per cent not adopted split doses of N&K, and proper plant protection, 30.83 per cent faced institutional constraints, 28.33 per cent expressed difficulty in supply and services of fertilizer and planting materials.

- The survey conducted at Bargur and Kaveripattinam the blocks of Dharmapuri revealed that the order of training needs as perceived by mango growers are Plant protection (98%), Training and Pruning 70%, Manuring 57%, Land preparation 17%, Selection of varieties 13%, Irrigation 13 %, and Planting techniques 10%. The preferred duration of training was two days (43%) in their own village, (90%), skill oriented training (70%) with nature of peripetetic training (82%).

- The survey conducted at Hosur and Bargur blocks of Dharmapuri district among grape growers revealed that the perceived training needs of the farmers were in the order of Plant protection (95%), Manures and Manuring (80%), Training and Pruning (65%), while erecting pandal, preparation of fields, irrigation, selection of variety, preparation of planting materials ranged from 12-15%. Farmers preferred that

the training to be offered to them should be before crop season (78%) with a duration of one day (63%), in their own village (82%), mainly developing skills (50%) in the field condition (52%).

- Production and marketing of tomato in North Western Zone: Irrigated tomato is cultivated in 77% and dry tomato 23% of the total tomato area. The average cost of cultivation/ha was Rs.4238. Marketing cost of tomato/Q was found to be Rs.12.50/ in Dharmapuri district. It included Rs.5.50/- for preparation to the market (44.00%) Rs.3.66 for transport (29.28%) and Rs.3.34 for market fee (26.72%).

- The study conducted at Sesurajapuram Mini Watershed Project revealed that the easy, low cost technology alone were adopted even after dispensing the programme. In adopting the soil and water conservation measures, the visible and additional benefits as perceived by the respondents were soil pulverization (50.67%), soil moisture conservation (54.67%), good crop growth (44%) and the yield (42.67%). The constraints to continue the recommended technology were hike in diesel cost, increased pest incidence (94.67%) in strip crop and increased credit requirement for gully plugging every year.

- The study on mango production, processing and marketing in Dharmapuri District revealed that 54% of the production and 40% of the mango area in the state is being shared by the Dharampuri District. At present 35,000 ha are under mango cultivation with an annual production of 2 to 2.5 lakh metric tonnes. About 70% production is marketed in inter state trade, 20% in domestic consumption. The net revenue recorded from ten years old orchards of Bangalora and Alphonso varieties are Rs.75,000 and Rs.1,25,000, respectively. There are more than 20 mango processing units and around 1000 containers of pulp are exported to Gulf and European countries. The income generated through mango nursery and mango pulp is more than Rs.200 crore/annum for the Dharmapuri District.

- The findings revealed that majority of the respondents (more than 60%) had adopted the varieties, spacing, pit size, inter-cropping with groundnut and pruning once in a year in mango cultivation practices. In adequate market facilities, high transport cost, lack of transport facilities, lack of technical knowledge, price fluctuation, high cost of labour were the major problems perceived by the farmers.

- The study on IPM Practices for groundnut revealed that more than 50% of the respondents had medium level of adoption of IPM practices followed by 35 per cent at low level and 25 per cent at high level. The major constraints reported by the farmers were lack of adequate knowledge, lack of knowledge on bio-control agents and high cost of labour.

- The study on Training needs of farm women in Integrated Farming System revealed that more than 75% of the respondents expressed their desire for training in various enterprises like farm forestry, horticulture, bee-keeping and fish farming.

- The study on adoption of dry land technology by the farmers in Dharmapuri district revealed that cent-percent of the respondents adopted the practices viz., summer ploughing, pre-monsoon sowing, FYM application and inter-cropping with pulses. About 62% of them have adopted the compartmental bunding in their farm.

- The study on Involvement of farm women in agriculture and allied enterprises revealed that more than three fourths of the respondents involved in agricultural enterprises to the extent of 41-100%, while in allied enterprises viz., horticulture, land, animal husbandry it was 0-40% range among half of the respondents.

- Technology intervention in major horticultural crops and their effect of farming revealed that the technology intervention with respect to variety was 60% influenced by nearest Bangalore market while the Department of Horticulture have recommended Lucknow-49 guava variety, the intervention in pesticide usage is indiscriminate based on the pesticide dealers recommendation.

AGRL.ENGINEERING

1. SOIL AND WATER CONSERVATION

- Sub - surface drainage in KRP ayacut area leached the harmful salts effectively and increased the yield of rice.

- Sprinkler irrigation daily and at 75% ASM level increased the size of heads and yield of cabbage crop.

- A model watershed development project was formulated and implemented in the Natrampalayam village of Dharmapuri district with the financial aid from Indian Bank.

- A linear programming technique to optimize the water use in KRP area was developed and reported for adoption.

- Micro-catchments of 5mx5m to the young mango orchards of the zone, conserve more soil moisture leading to good growth of the young trees.

- Incorporation of composted coirpith @ 12.5 t/ha increased the soil moisture up to 45cm depth and enhanced the yield in groundnut, sorghum and cotton crops.

- Deep tillage coupled with composed coirpith increased the yield of cotton besides the increase in soil moisture retention.
- Run off and soil loss were recorded higher in cotton based cropping system than the other cropping systems in red soil of the zone.

- Drip irrigation systems were installed to grapes, mango and coconut gardens in the station for training the farming community.

2. FARM MACHINERY AND AGRICULUTRAL PROCESSING

- By using Kovai seed drill for sowing groundnut, optimum spacing and plant density of 35 to 40 per m^2 were achieved as against 18-22 per m^2 in conventional method. Seeds germinate 25-30 hours earlier when drill is used.

- Among the primary tillage implements, TNAU plough performed better than country plough in respect of tillage capacity and soil inversion.

- Weeding capacity of star type weeder was better than hand hoe for dryland crops.

- A manually operated ragi cum pulses grader was developed. It grades ragi and pulses at the rate of 150-200 kg/hr. It was released in the year 1994.

- A new Paiyur plough suitable for small draught animals was designed and fabricated. It works like country plough and mould board plough depending on the soil conditions. It covers 110 cents under dry ploughing and 105 cents under puddling in a day of 8 hours. It was released in the year 1995.

- A new spray boom attachable with a rocker or foot sprayer has been developed. It has a weight of 5 kg and can be used easily on tree crops and field crops. It costs only Rs.300/- and by using these 40 per cent of the time and 50 per cent of fluid can be saved.

- A ridge plate attachment to TNAU plough has been designed. It is useful for forming ridges and furrows covering an area of 1.0 to 1.2 ha/day engaging a pair of bullock and an operator.

- A wide swath spray boom has been designed for sugarcane which covers a swath of 5m.

- A low cost seed pelletizer has been designed and developed using condemned 4 wheeler tyre for seed treatment with fungicides and bio-fertilizers. Its' capacity is 50 kg/hr. It can also be used for pelletization of Cenchrus seeds with clay soil.

B. TAPIOCA AND CASTOR RESEARCH STATION, YETHAPUR

TAPIOCA

- In rainfed tapioca cultivation, to mitigate the drought effect, sett treatment with 0.5% KCl, application of pressmud @ 5 t/ha and 1% KCl spray is found to be beneficial

- To reduce the tuber rot incidence, sett treatment with Trichoderma viride (30g/lit for 15 minutes) is recommended.

- For the management of ICMV, spraying of Dimethoate (1lit/ha)+3% neem oil is found to be effective.

CASTOR

- A new hybrid TMVCH 1 with a duration of 160-170 days and yield of 1280 kg/ha under rainfed condition was released during 1998.

- In addition to normal recommended dose (10:10:45 kg NPK/ha) for groundnut, application of 40 kg N/ha in three equal splits at 30,60 and 90 DAS and 40 kg P/ha as basal for castor is recommended for higher productivity in rainfed groundnut + castor intercropping system.

- Application of metalochlor @ 0.5 kg ai/ha followed by hand weeding on 45^{th} DAS was formed to be a profitable weed management system in rainfed castor.

- To manage the botrytis disease in castor, adoption of a spacing of 90x90 cm, removal of botrytis affected spikes and spraying carbendazim @ 1g/lit. of water before the onset of mansoon and after the cessation of rainfall, followed by application of 20 kg N/ha is recommended.

7. PROSPECTS OF AGRO-BASED INDUSTRIES

1. Mango Pulp Industries

In Dharmapuri district, mango is the predominant horticultural crop and grown in an area of 40,000 ha representing 50 per cent of the total area of the State. The annual mango production of the district is 3 lakh tonnes with a turn over of more than Rs.100 crores. There is good market for mango pulp and hence the area and production of mango is increasing every year in this district. In the pulp processing industries only three varieties namely Alphonso, Raspuri and Totapuri are being used. In this district Totapuri variety alone occupies 60 per cent of the area while Alphonso and Raspuri occupy 5.0 per cent.

Forty percent of Totapuri mango production in this district is being used for processing by the 21 pulp industries situated in this district. The processing capacity of each unit is about 3000 to 5000 tonnes of mangoes in a season of 75 days. The units process about 30,000 tonnes of mango pulp (60,000 tonnes of mangoes in a season) and 90% of the pulp goes for export with an earning of more than Rs.100 crores. The processing units located in the district account for 25% of the mango pulp production in India. More units are being established in this district and in near future the pulp production will reach to the tune of 50,000 tonnes per annum.

2. Utilization of wastes generated in the mango processing industries

Annually more than 25,000 tonnes of mango peel and mango stones are available as bi-products in the mango pulp production units which are mainly go as wastes. Mango stones to some extent are being used for propagation and the remaining are dumped in waste lands creating pollution. Mango peel takes longer time for degradation. After drying for more than six months, the peel is consumed by sheep and goat. There is good prospect to utilise the mango peel for production of pectin, preparation of poultry feed or compost etc.

3. Sugarcane Agro based Industries

In the North Western Zone, three sugar industries viz., Salem Co-operative Sugar Factory, Mahanoor, Dharmapuri District Co-Operative Sugar Factory, Palacode and Subramania Siva Co-Operative Sugar Factories, Harur are functioning. Sugarcane is cultivated in 45000 hectares in this zone with a production of 48 lakh tonnes of cane annually. Eighty five per cent of total cane production is utilised for crushing in the sugar factories for the production of white crystal sugar. The average productivity of sugarcane is 88 tonnes per hectare. Despite lower productivity, North Western Zone is by far the highest sugar recovery region in Tamil Nadu because of the conducive climate prevailing for cane growth. In the year 1999-2000, the average sugar recovery by the factories in the Zone was 10.20 per cent from October to March. Ten lakh white crystral sugar is produced annually. In addition to white sugar, Jaggery manufacuring is another

Agro-based cottage industry located in Karuppur (Salem District), Omalur(Salem District) Papparapatty(Dharmapuri District) and Palacode (Dharmapuri District). Nearly 15 per cent of the total sugarcane production is utilised for the production of Jaggery in this zone. Moreover, the biproducts of the sugar industries are well utilised for various purposes viz., pressmud for organic manuring, Molasses for Ethanol production and Bagasse for paper production and power generation.

4. Tapioca Agro based industries

Tapioca is cultivated both under rainfed and irrigated in 59,000 ha in this region with a production of 22 lakh tonnes of tubers annually. A number of sago factories are in operation in Salem and Namakkal districts of this region. Besides preparation of value added products from Tapioca tubers, the Tippi can be used as poultry feed. Some of the important products being prepared are pelletised cattle feed from tapioca flour, liquid glucose, dextrin, vitamin C, gum, high fructose syrup, maltose, malto dextrins, converted starches and bio gradable plastic from starch.

5. Poultry Feed

Poultry farming is very popular in Namakkal and Puduchatram blocks of Namakkal district. There is good scope for the establishment of small scale industries for preparing poultry feed mixtures using maize bran, groundnut cake, fish meal etc. The utilisation of tapioca bi-products as a component of feed mix also offers scope.

6. Sericulture

The cool climate and proximity to Karnataka State have been responsible for the pursuit of Sericulture in a traditional occupation by the farmers in Dharmapuri district. Mulberry is cultivated in about 5000 ha of which nearly two thirds are covered by assured irrigation. Sericulture offers a much higher rate of returns (estimated at 3 to 4 times) than the traditional cereal crops. It is a gainful and continuous employment oriented occupation. Moreover the income that flows from sericulture is more regular and certain in view of large demand for silk yarn. The Central Silk Board of Government of India has developed infrastructural facilities and established National Silk Worm Seed Farm for the supply of eggs(hybrid types), mulberry cuttings etc. Adequate number of reeling factories have been established for production of silk yarn from cocoons for creating orderly market for cocoons.

7. Value added Products from Samai

There is potential for preparing value added products from the grains of Samai, the crop which is grown in 45,000 ha in marginal and sub marginal lands in the region. The grain goes for preparing biscuits and the biscuits manufacturing industries buy the quality grains at a premium rate from the farmers.

8. Value added products from Castor

Castor is an important crop in the region and mainly grown as an intercrop in groundnut. Castor oil offers greater scope for utilization in the products such as cosmetics, synthetic rayons, plastics, lubricants, paints, varnishes and pharmaeuticals.

9. Coconut based Agroindustry

Coconut is cultivated in an area of 35000 ha in this zone. Apart from coconut oil, scope exists for preparation of coconut flour and coconut water for export/domestic purpose. Raw material is also available for coir industry and several small/cottage industry already engaged in coir making.

10. Korai Mat Weeving Industry

Korai crop cultivation is gaining popularity in Paramathi Taluk of Namakkal district and presently 900 ha is under this crop. Raw material is available in plenty for mat weeving which can be taken up as small scale/cottage industry.

11. Tamarind Based Industry

Tamarind is one of the important tree crop occupying 20,000 ha in this zone. Tamarind fruits are stored in large quantities in five cold storage godowns, each with a capacity of 2500-5000 tonnes,available in Dharmapuri District. Tamarind pulp offers scope for preparation of powder, juice, jam etc. for export. The tamarind seed also offers scope for preparation of starches, gum and cattle feed.

8. Suggestions to alleviate the problems and constraints and improvement of agricultural productivity and production

CROP IMPROVEMENT

1. Rice

- Cold tolerant high yielding rice varieties of 120-130 days duration suitable for late samba (Aug-Sep) season are to be developed.
- Short duration fine grain rice varieties with resistance to blast are required for Navarai season.
- Salt tolerant varieties with 135-140 days duration are required for moderately/strongly saline/alkali soils.
- Hybrid seed production technologies have to be standardized for each agro-ecological situation for popularizing hybrids.

2. Sorghum

- Varieties capable of high grain yield and good quality straw combining other desirable attributes of traditional variety Co 19 such as grain quality, lax panicle, rejuvenation capacity, tolerance to drought have to be developed.
- In respect of red grain sorghum, the breeding programme is to be focussed on development of fodder sorghum with thin stem and high juicy content to replace Co 4 and Paiyur 1.
- Breeding programme should include multiple resistance to shootfly and stemborer.

3. Ragi

- Long duration high yielding genotypes with open or top curved earheads for rainfed situation need to be developed.
- Emphasis is to be given for development of varieties with bold grains having uniform variety of main and basal tillers.
- Rainfed genotype should possess resistance/tolerance to blast.
- Short duration high yielding genotype suitable for various seasons under irrigated cropping are to be developed.
- White coloured ragi genotypes with high protein content also to be considered for specific needs.

4. Samai

- Varietal improvement programme should include early maturity, high yield and high nutrient content in grains for preparing value added products.

5. Pulses

- In redgram, long duration high yielding varieties suitable for inter cropping and to replace the existing SA 1 are to be developed.
- In blackgram, short duration varieties with good hulling and less per cent of hard seeds are required.
- In greengram, breeding programme should include resistance to yellow mosaic and drought to replace K2 and K81.
- In cowpea, short duration rust resistance, vegetable type varieties also to be developed.
- In horsegram, improved varieties suited to various sowing dates/different cropping system are required.

6. Oilseeds

- In groundnut, the local red, coloured bunch variety needs to be improved further.
- Long duration (130-140 days) improved/spreading/semi-spreading groundnut varieties suitable for highly drought prone areas are to be developed.
- Bunch varieties with minimum dormancy of 15-20 days needs to be developed for high rainfall areas.
- In sunflower, high yielding hybrids suitable for particular situation/season are required.
- In soybean, improved varieties should possess, thin seed coat and lesser order besides high yield.
- In castor, varieties/hybrids suitable for intercropping in groundnut needs to be developed.
- Hybrid seed production technology should be standardized for exploitation of hybrids in castor for commercial purpose.

7. Cotton

- Medium staple high yielding varieties are required for summer cropping.
- Hybrids suitable for early sowing, resistant to whitefly, and stem weevil, needs to be developed.

8. Sugarcane

- Varieties resistance to red rot are required for various planting seasons.

9. Tapioca

- New varieties/hybrids of shorter duration with resistance to phoma disease are required.

10. Fruits

- In tomato, location specific, heat tolerant varieties are required for rainfed situation.
- High yielding genotypes with tolerance to spotted wilt disease are required.
- Varieties should posses good keeping quality and suitable for long distant transport.
- In guava, non-seasonal, pink coloured, longer duration, quality varieties are required to overcome glut in the market.
- In mango, regular bearing varieties/hybrids with high juice content suitable for pulp industries are to be identified.
- In tamarind, plus trees with long pods and thick flesh and regular bearing are to be identified and propagated.
- In flowers, nematode resistant varieties should be developed in crosandra and chrysanthemum.

II. CROP MANAGEMENT

- In rice the recommended technology on seed rate, age of seedlings, spacing, no. of seedlings/hill, are to be refined for different situation such as planting of aged seedlings in case of non receipt of rains, ill drained saline/alkaline soils etc.,
- Technology to reduce phosphatic fertilizer application are to be generated.
- The technology for the use of modified urea granules to avoid loss of nitrogen is to be refined.
- The integrated nutrient management, weed management, are to be standardized for various sowing/planting methods recently advocated to reduce the cost of transplanting.

Rainfed Crops

- Optimum fertilizer dose needs to be arrived at for the existing farming conditions involving variety, spacing, moisture regime, intercrops, etc.
- Low cost input technologies with high cost benefit ratio especially for nutrient and weed management are to be identified.
- Augmenting organic farming practices for sustainable agricultural production especially under rainfed situations.
- Recommendations for micronutrient applications for each crop based on deficiency in soil should be developed.

Sugarcane

- The nursery techniques for planting single budded setts should be standardized for maintaining good stand.

Turmeric

- The technology on nutrient management, weed management should be refined as the crop takes longer period for sprouting and growth.

III. CROP PROTECTION

- Research should concentrate on developing resistant/tolerant varieties for stem borer and blast in rice, blast in finger millet; mosaic in greengram and horsegram; shoot webber and powdery mildew in gingely, stem weevil and whitefly in cotton; mosaic and phoma disease in tapioca; stemborer and leaf hopper in mango and nematodes in flowers.
- IPM and low cost technology and ecofriendly plant protection chemicals need to be identified to tackle the major pest and diseases.

IV.AGRICULTURAL ENGINEERING

- The planting and harvesting in rice needs to be mechanized to reduce the cost of cultivation.
- Simple and manually operated farm implements are to be designed for various operations in dryland crops.
- Low cost irrigation systems for fruit trees are to be identified.
- Low cost on-farm processing technologies for tomato and other vegetables are needed.
- Post harvest technology to increase the shelflife of mangoes, tomatoes and other fruits are to be generated.
- Technology for better utilization of mango peel, stones and the byproduct of mango industries are needed. Similarly, technology to produce ethanol from tapioca waste is required.
- Research on soil and water conservation for major dryland / horticultural crops are to be strengthened, since these crops are grown mostly in undulating topography of the region.

9. FUTURE THRUST

CROP IMPROVEMENT

- Development of high yielding rainfed ragi varieties with inbuilt resistance to ragi blast.
- Evolution of high yielding samai varieties with high nutritive value suitable for industrial purposes especially for biscuit making.
- Evolution of high yielding red grain sorghum hybrids with high carotenoid content and less pectin suitable for making poultry feed.
- Development of horsegram genotypes with high yielding coupled with high biomass and harvest index.
- Identification of cytoplasmic male sterile lines in ragi through gametocides and distant hybridization.
- Developing varieties/hybrids of short duration castor with higher productivity, drought tolerance and resistance to pests and diseases.

CROP MANAGEMENT

- Studies on rainfed climatology of the zone and delineating the cropping zones based on rainfall classification.
- Organic farming of eco-friendly agriculture.
- Crop-weather relations for North Western Zone.
- Reclamation of problem soils either partially or totally using agricultural wastes such as coirpith, mango peel etc.
- Improvement of dryland soil structure preventing encrustation by addition of low cost amendments.
- Studies on improving soil fertility by adopting suitable cropping pattern including intercropping of pulses in horticultural crops.

CROP PROTECTION

- Management of major pests and diseases of major horticultural crops of the Zone through chemicals and plant products.
- Study on the occurrence of major pests and diseases in relation to weather parameters in major horticultural crops.
- Testing and Analysis of pesticide residues and their impact on mango pulp.

SOCIAL SCIENCE

- Assessment of horticultural based industries and their impact on growers and economy in the North Western Zone.
- Perspectives of dryland farmers on technological and training needs and cropping mechanisms envisaged in dryland agriculture and allied fields in the North Western Zone.
- Evolving modus operandi for continuous transfer of technology to IVDP villages and assessment of their impact on research agenda.

HORTICULTURE

- Detailed survey on natural mango hybrids available at different locations of Dharmapuri District and their exploitation for commercial propagation.
- Development of specific propagation and management techniques for mango nursery.
- Collection of different ecotypes of tamarind with cluster bearing, large poded, Urigam types and Karnataka genetic stocks and evaluation.
- Evolving manurial schedule for tamarind and mango.
- Evaluation of the close planting of tamarind with canopy manipulation.
- Drip irrigation studies with canopy management of mango.
- Establishment of Ethno-Horticulture crops (Medicinal tree park).
- Development of high yielding genotypes in major vegetable crops of the region.
- Establishment of Research and Analysis Centre for fruits and vegetables at this station.
- Detailed study to increase the shelflife of mangoes during storage prior to processing.
- Developing varieties/hybrids of short duration tapioca with higher productivity and resistance to pests and diseases.
- Studies on cropping systems and integrated management strategies for nutrients and weeds in tapioca.

AGRICULTURAL ENGINEERING

SOIL AND WATER CONSERVATION

- Irrigation water management in ayacut areas of the zone.
- Improved irrigation techniques for limited water supply areas in the zone.
- Rain water harvesting techniques in red soils of the zone.
- Runoff and soil loss studies under different land treatments and under different cropping systems.
- In-situ moisture conservation techniques for improved soil health.

FARM MACHINERY AND AGRL.PROCESSING

- Popularization of all the improved implements developed at TNAU in the North Western Zone of Tamil Nadu.
- Development of need based new implements for the North Western Zone.
- Finding out ways and means to utilize the un-cared agro-industrial waste such as mango peel and coconut coirpith available in the region to produce low cost energy for farm applications.
- Development of simple low cost gadgets for threshing, cleaning and grading of majority of the rainfed crops to improve labour efficiency and to reduce cost of processing.