

SOUTHERN ZONE – STATUS PAPER

REGIONAL RESEARCH STATION, ARUPPUKOTTAI

General description of the Southern Zone

The Southern zone is situated between 8 and 10 55° N latitude and 77 and 79 50° E longitude. It is bounded on the north by Tiruchirapalli and Pudukottai districts of cauvery delta zone, on the South by Kanyakumari district of heavy rainfall zone and the Indian Ocean, on the east by Bay of Bengal and on west by Kerala and part of Madurai district of the western zone. This zone comprises of flat plains and intermittent hills at varying altitudes ranging upto 700 m high. The topography is undulating with the gradient sloping towards the east.

The southern zone consists of Tirunelveli, Virudhunagar, Ramanathapuram, Thoothukudi, Sivagangai, Madurai (Tirumangalam, Madurai South, Madurai North and Melur taluks) and Dindigul (Natham and Dindigul taluks).

The southern region of the southern zone is gently sloping to undulating and the general slope is towards east. The western ghats outline the western side of the region and the Bay of Bengal the eastern side. Western ghats raising to a maximum of 1800 metres elevation falls under denudation hill. The important rivers of the region viz., Tambiraparani, Arumanadhi, Nambiar and Vaipar have their watershed (catchment) on the western ghat hills. The north eastern region of the southern zone is a plateau lying with a gentle slope towards the coast in the eastern side. A few hillocks in the northern and western parts of the region are also noticed. The maximum elevation is 700 m. The major river systems are Vaigai, Manimuthar, Sarguni, Gundar and Arjuna Nadi. All the rivers are dry in most part of the years. Vaigai and Manimuthar have reservoirs suited to store and regulate the flow.

This zone can be broadly divided into three geographical regions.

- i) Coastal plain stretching from Pudukottai to Kanyakumari with elevation below 10m above MSL: It comprises the coastal districts of Sivagangai, Ramanathapuram, Thoothukudi and Tirunelveli. This region is covered with saline coastal alluvium and river alluvium as well as sand dunes (Teri lands).
- ii) An undulating plateau, 100-200 m above MSL: This plateau comprises of Sivagangai and Virudhunagar districts excluding the coastal plain and mid portions of Virudhunagar and Thoothukudi districts. The soils comprise of red sandy, river alluvium, red and black soils.
- iii) The Central undulating plateau, 200-1000 m in elevation: It forms the western part of the southern zone, part of Dindigul, Madurai, Virudhunagar, Thoothukudi districts. This region is covered with red sandy soils, red loam soils, black soils and lateritic soils.

I.Geographical Distribution of Area (ha)

1. Virudhunagar district

Sl. No	Name of taluk	Forest	Barren & uncultivable land	Land put to non agrl. Use	Cultivable waste	Permanent pastures & grazing land	Tree and Miscellaneous grooves	Current fallow	Other fallow	Net area sown	Total geographical area
1	Virudhunagar	-	20	6465	196	-	119	3822	16265	16726	43613
2	Aruppukottai	-	487	7758	850	28	372	10833	7542	35335	63205
3	Tiruchuli	139	182	13771	290	50	32	9837	13622	17661	55584
4	Kariapatty	-	676	6325	3595	29	121	10630	535	13168	39895
5	Sattur	-	1922	7018	1065	270	1297	18474	5026	14253	49324
6	Sivakasi	-	65	8208	1100	180	183	3736	32032	12166	57670
7	Srivilliputhur	12282	436	10405	1044	242	151	8553	5611	23057	61781
8	Rajapalayam	14184	522	7795	192	5	2394	4761	6144	17254	53251

2. Ramanathapuram District

Taluk	Forest	Barren & Uncultivable land	Land put to non agri. Purpose	Cultivable Waste	Permanent pasture	Land under trees & thopes	Current fallows	Other fallows	Net Area sown	Total
Ramnad	0	2002	21292	1252	0	5392	795	7403	29363	77499
Rameswaram	1325	0	3840	0	0	2816	49	0	1018	9048
Thiruvadanai	346	2526	12667	1324	402	572	4579	17717	41328	81461
Paramakudi	0	32	17190	413	21	6390	8248	9193	32307	73794
Mudukulathur	0	0	6576	333	16	2941	1705	4707	23345	39623
Kamuthi	0	31	9119	914	4	417	5591	12193	29578	57847

3. Sivagangai district

Sl. No.		Sivagangai	Manamadurai	Ilayankudi	Devakottai	Karaikudi	Tirupathur	Total
1	Forest	2420	950	12	1924	10030	1959	17295
2	Uncultivable wasteland	412	968	1824	435	1106	2924	7669
3	Land in non Agrl. Action	31388	1151	8675	10694	22982	19224	1004474
4	Uncultivable barren land	4134	2230	828	1972	4349	4068	17581
5	Pasture and grassland	41	105	1738	816	833	247	3780
6	Orchard	1509	2776	50	1393	2384	1980	10092
7	Current fallows	8604	9670	7755	2243	2647	13170	44089
8	Other fallows	34564	14896	11311	5413	5688	7183	79057
9	Net area sown	26005	14409	29589	16292	20712	21482	120489
	Total	109077	57515	53784	41182	70731	72237	404526

4. Thoothukudi district

Land use classification	Kovilpatti	Ottapidaram	Sattankulam	Srivaikundam	Thiruchendur	Thoothukudi	Vilathikulam	Total
Non Agricultural Use	12575	7244	7181	14639	6983	9253	14570	72445
Barren and uncultivable waste	523	8726	2647	5563	649	1349	305	19762
Cultivable Waste	1300	1544	4494	4937	4890	2152	554	19871
Permanent Pastures and other grazing land.	513	998	131	1473	1	1970	46	5132
Lands under misc. Tree crops	1756	3921	2841	2856	243	1680	20926	34223
Current fallows	18569	15073	6042	5601	6301	1981	8025	61592
Other fallow lands	19931	2628	6371	5255	3961	8013	2820	49969
Net area sown	39681	32588	12454	17055	11714	7511	64045	185048
Forest	1258	1093	5971	2116	88	486	-	11012
Total	96,106	73815	49122	59495	34830	34395	111291	459054

5. Tirunelveli District

Taluk	Forest	Uncultivable land	Cultivable Land	Cultivable fallow	Grazing land	Cultivated area	Current fallow	Other fallow	Net area sown	Total
Palayamkottai	836	2193	7760	2861	388	593	1195	9317	5283	30426
Sankarankovil	38	1427	19439	2427	136	828	3737	57192	48830	134054
Tenkasi	10113	1828	11132	3029	411	505	3375	23674	25022	79490
Shencottai	9045	251	3515	176	157	401	20	1277	10487	25329
Sivagiri	19195	1123	6829	844	89	267	864	13358	14321	56890
Ambasamudram	59153	3602	13051	13455	1288	1425	316	5019	21157	11846
Nanguneri	22359	6873	13482	19893	2094	668	3526	12366	13092	94353
Radha-puram	290	8557	12187	17782	2150	4353	1366	31148	9373	87206

6. Madurai District

Taluk	Forest	Barren & Uncultivable land	Cultivable waste	Permanent pastures and other grazing land	Land under miscellaneous tree crops and grooves	Current fallows	Other fallow lands	Net area sown	Total cropped area	Area sown more than once	Total
Madurai North	346	591	429	-	164	1264	3539	20322	26852	6530	38338
Madurai South	59	618	376	-	50	1631	9580	7617	7867	250	29193
Melur	1703	7950	2031	34	78	10197	1324	34997	35867	870	72718
Thiru mangalam	186	1642	343	91	268	6026	5180	11454	11776	322	30840

7. Dindigul district

Name of taluk	Forest	Barren & uncultivable land	Land put to non agrl. use	Cultivable waste	Permanent pastures & grazing land	Tree and Miscellaneous grooves	Current fallow	Other fallow	Net area sown	Total geographical area
Dindigul	4311	5928	16292	3158	200	1622	9320	5902	76903	22752
Natham	27380	959	4498	870	68	130	3888	5231	22752	65776

II. RAINFALL (mm)

1. Virudhunagar district

Months	Virudhunagar	Aruppukottai	Tiruchuli	Sattur	Sivakasi	Srivilliputhur	Rajapalayam
January	25.0	32.4	30.3	28.9	27.9	32.0	35.4
February	16.2	16.8	3.2	18.6	21.3	26.4	34.5
March	20.4	22.4	14.1	26.9	30.5	45.6	37.0
April	72.5	66.1	44.1	65.7	72.2	80.1	87.9
May	73.3	55.2	47.7	55.3	58.2	57.8	58.6
June	29.6	25.5	36.0	10.4	25.4	19.4	18.8
July	41.9	35.3	28.5	24.0	22.6	19.7	17.5
August	80.4	67.7	39.8	45.6	50.1	33.0	45.7
September	89.2	73.4	57.8	59.9	60.3	54.3	38.4
October	169.3	165.6	174.2	173.0	186.4	216.8	239.3
November	144.4	159.3	114.5	158.1	160.8	195.7	193.6
December	61.6	67.7	48.2	57.8	58.9	608.3	76.3
Total	823.8	785.4	638.4	724.2	774.6	849.1	913.1

2. Ramanathapuram district

Month	Ramnad	Rameswaram	Tiruvadanai	Paramakudi	Mudukulathur	Kamuthi
January	35.2	49.0	31.4	34.9	33.2	30.9
February	11.2	9.8	4.5	5.2	11.0	4.3
March	12.8	3.3	8.1	12.2	12.2	22.9
April	26.5	29.9	32.6	33.7	25.8	33.2
May	26.2	23.6	14.4	45.4	55.4	39.0
June	8.5	6.0	18.7	25.0	22.0	19.0
July	12.4	3.8	11.4	28.4	19.2	21.3
August	10.0	5.5	14.9	53.1	14.6	34.0
September	23.8	16.5	43.2	53.9	73.6	66.3
October	200.6	195.1	168.2	180.8	174.3	221.2
November	238.7	221.7	194.9	161.4	162.7	144.0
December	130.8	172.9	91.2	62.0	85.3	51.6

3. Sivagangai district (Average of 50 years)

Sl. No.	Month	Rainfall (mm)
1.	January	24.89
2.	February	3.76
3.	March	17.20
4.	April	48.19
5.	May	64.43
6.	June	62.65
7.	July	57.96
8.	Aug.	78.91
9.	Sep.	115.19
10.	Oct.	197.58
11.	Nov.	154.97
12	Dec.	66.44
	Total	892.17

4. Thoothukudi district (Agri. Research Station, Kovilpatti)

Sl. No.	Month	Rainfall (mm)
1	January	30.4
2	February	13.9
3	March	15.5
4	April	59.0
5	May	52.3
6	June	16.3
7	July	23.7
8	August	28.7
9	September	98.9
10	October	190.7
11	November	124.8
12	December	63.0
	Total	717.2

5. Tirunelveli District

Month	Tenkasi	Sankarankovil	Nanguneri	Palayamkottai	Radhapuram	Sivagiri	Ambasamudram
January	27.9	20.0	28.4	33.2	24.9	19.5	51.5
February	27.8	23.1	23.0	23.2	17.5	43.4	40.7
March	53.2	35.0	28.3	32.3	35.0	55.3	94.5
April	79.8	67.3	46.7	51.1	34.0	73.4	68.9
May	59.2	45.5	34.2	38.5	26.9	57.0	42.9
June	44.2	9.6	29.4	11.7	36.0	13.6	25.5
July	58.1	15.6	25.5	10.3	35.6	28.2	22.9
August	30.9	17.0	18.5	16.1	15.9	28.1	15.6
September	37.8	30.9	32.9	39.5	22.3	47.3	33.6
October	120.0	121.9	130.6	119.7	122.0	169.4	153.1
November	153.0	152.8	150.5	142.6	173.8	177.1	232.6
December	69.8	60.8	105.3	81.7	58	87.4	164.4

6. Madurai district

No.	Months	Madurai North	Madurai South	Melur	Thirumangalam
1	January	15.8	20.9	22.5	24.0
2	February	14.3	9.3	14.1	15.6
3	March	20.9	20.05	14.7	19.8
4	April	63.5	58.2	59.7	62.3
5	May	57.3	57.05	63.0	65.7
6	June	34.9	49.5	40.7	35.9
7	July	41.9	49.4	50.9	43.7
8	August	110.3	111.7	108.4	49.8
9	September	111.5	98.9	104.9	103.4
10	October	200.6	196.4	178.6	199.3
11	November	144.5	146.8	133.5	151.4
12	December	54.9	61.8	59.3	60.8

7. Dindigul district

Month	Dindigul	Natham
January	35.1	35.1
February	14.5	11.7
March	16.3	14.7
April	58.9	68.1
May	71.1	79.0
June	42.4	33.6
July	33.0	50.0
August	69.1	109.2
September	96.3	134.4
October	178.8	191.0
November	162.3	162.8
December	67.8	68.6
Total	845.6	978.2

III. DIFFERENT SOIL TYPES AVAILABLE IN THE REGION

The following seven soil groups are broadly found in the southern zone. They are Black soil, Red soil, Deep red loam soil, Red sandy soil, Lateritic soil, River Alluvium and Saline coastal alluvium. In the eastern coastal side of the southern zone, the soils are saline coastal alluvium and river alluvium. The black soil occupies the middle portion of the southern zone while the red sandy soil exists on the north eastern side and southern-western side of the black soil area. The occurrence of deep red soil is found on the western side of this zone .

Black soil

Even though soils are black, mostly mont-morillonite clay, the depth, calcium content and the texture of the soil vary considerably. The soils with slope, gentle to moderate invariably have shallow depth and pebbles and canker nodules are exposed. The soils are having coarse texture. This is mainly due to continuous erosion taking place over years. Such soils need soil conservation measures and are to be diverted into pastures and tree cropping. The deep soils have calcium as gypsum (CaSO_4) in a few soil series as in Kovilpatty series and in many other parts the calcium is present as Carbonate (Cankar nodules showing violent effervescence from surface to sub-surface soil). Cracking due to uneven drain during summer exposes sub soil leading to loss of stored moisture. Cracks develop, if the dry spell exceeds three weeks. Such soils warrant summer ploughing and shallow interculture.

The black soils are predominant in Virudhunagar, Ramanathapuram, Tirunelveli and Thoothukudi districts. These soils are generally observed in semi arid conditions with annual precipitation of 500-1000 mm. The soils are shallow to deep even upto 5 metres. These soils

have black surface followed by light brown deeper layers. These are highly argillaceous (30 to 50% clay) and produce deep cracks in summer exhibiting the characteristic property of swelling on wetting and shrinkage on drying. The soils have high silica sesquioxide ratio of 2.7 to 3.5. The cation exchange capacity is also of high in order viz. 30-70 meq/100 g of soil. They contain high amounts of iron, calcium and magnesium. Free calcium carbonate is present in the soil in the form of Kankar. They are poor in organic matter, nitrogen and phosphorus retentive capacity due to the presence of expanding type of 2:1 lattice clay viz. montmorillonite. The black soils are distributed mostly in the central portion of the southern zone. The following soil series viz. Kovilpatti and Subramaniapuram predominate in Tirunelveli district; Peelamedu, Kalathur, Anaiyur and Alanthur in Madurai district, Kovilpatti, Palamedu in Ramnad district.

Deep red loam soil

The soils are deep. They are fairly medium to high in fertility status and varieties of crops could be grown in these soils.

The ferruginous deep red loam occupies part of the districts of Tirunelveli (Ambasamudram, Sivagiri, Sankarankoil) and Virudhunagar district (Rajapalayam, and Srivilliputhur). The soils are deep and of loamy texture. The colour is red when the iron oxide occurs as haematite or anhydrous ferric oxide and the colour is yellow when it occurs in the hydrated form as limonite. Ordinarily the surface soils are red while the horizons below have yellowish colour. The soils have generally free drainage, the pH range from 6.5 to 8.0. The soils exhibit striking absence of horizon differentiation and also absence of salt or calcium carbonate accumulation.

Red soil

Several hillocks are noticed in these deep red soil belts. The soils are mostly rolling soils, shallow in depth and subject to erosion and even as deep gullies. Several thousand hectares of area are as barren and uncultivated. Soil hardening is noticed in many parts, hampering with seed establishment. Such soils need physical improvements through application of organic amendments.

The ferruginous red gravelly soils occur in the districts of Madurai, Ramanathapuram and Tirunelveli. These soils are mainly associated with granites and are rich in iron bearing minerals such as limonite and magnetite. The texture of these red soils is sandy loam. Ordinarily the surface soils are red, while the horizons below show yellow colour. These soils are shallow in depth, have free drainage and the pH range lies between 6.5 to 8.0. These soils show absence of horizon differentiation and there is no accumulation of salt and calcium carbonate. The soils contain low amounts of organic matter, nitrogen and phosphorus but have generally adequate amounts of potash and lime.

Red sandy soil

This area relatively receives low rainfall and alkaline patches occur in many isolated patches. The irrigation water is also brackish making the reclamation further difficult.

The ferruginous shallow red soils occur in Madurai and Dindigul districts. These soils originate from ancient crystalline and metamorphic rocks and are poor in lime, potash, humus and nitrogen besides low in phosphorus content. These soils are rich in Kaolinite type of

mineral and the main features of these soils are rich in Kaolinite type of mineral and the main features of these soils are (i). Light texture, porous and friable structure (ii) Absence of lime, Kankar and free calcium carbonate and (iii) Small quantity of soluble salts (not exceeding 0.05%). At times such red soils occur side by side with black soils which is attributed to the difference in the morphological nature of the parent materials.

Lateritic soil

These soils have low base status since this area receives around 1000 mm of rainfall per annum.

The laterite soils are also found to some extent in the southern zone of Tamil Nadu. The colour of the soil varies from red to yellow depending on the degree of hydration of the ferric oxide. The base exchange capacity of the soils is about 10 meq./100 g. of soil. The soils have a pH around 5.0. They are characterised by very low amount of silica and high amount of sesquioxides.

The silica sesquioxide ratio ranges from 1.5 to 2.0. The low level lateritic soils are poor in organic matter, nitrogen, potash and lime. The phosphorus is largely unavailable due to fixation in the soils as iron and aluminium phosphate. The lateritic soil clays have Kaolinite as the most abundant mineral with interstratified vermiculite coming next in abundance.

River alluvium soil

The river alluvium soil are, as a rule, transported and are found in the coastal areas as in Tirunelveli. These are heavier soils and rich in plant nutrients. The soils are characterised by alternate layers of fine and coarse sand. The base exchange capacity is on an average 35 meq/100 g. Soils and the silica sesquioxide ratio is 2.5, showing thereby the dominant clay minerals are of 2:1 type (mixed mineralogy).

Saline coastal alluvium soil

Because of its location along the sea coast, soils have salinity due to tidal waves and wind. Sand dunes are noticed over a long stretch due to heavy wind blowing. Such lands do not have soils but only sand to a considerable extent. This needs special reclamation efforts to arrest the spread of the sand dune area.

The sandy coastal alluvium occur along the sea coast as a narrow belt in the districts of Ramanathapuram, Thoothukudi and Tirunelveli. Their origin may be sedantary or coastal alluvium formed by the rivers and are over lined with sand . The texture of these soils varies from sandy loam to pure sand depending on the variable amount of sand present in them.

1. Block Calcareous Soil

a) Kovilpatti series (KVP)

Consists of black, very deep, calcareous, moderately well drained, heavy textured soils derived from gneiss. The profile invariably consists of gypsum in various stages of development. These soils generally occur in low elevation and develop deep cracks during

summer. Gilgai formations and micro relief are common pH ranges from 6.1 to 9.1 (neutral to strongly alkaline).

b) Subramaniapuram series (Sbn)

Consists of black, very deep, calcareous, moderately well drained, heavy textured with developed, moderately strong structure and well defined horizon soils derived from gneiss. The profiles invariably do not contain gypsum. The soils occur in lower elevations. They develop deep cracks during summer and gilgai formation and micro-relief are common. pH ranges from 6.7 to 9.7 (Neutral to very strongly alkaline).

c) Avudiayar koil series (Avk))

Comprises of very deep, sandy clay loam, yellowish brown, in situ soils developed from laterite parent material. The surface sandy clay loam texture is underlined by sandy clay texture. Lime concretions are invariably present below the AP horizon.

d) Alathur series (Alt)

Comprises grayish brown very deep soils occurring at the bottom of the very gently slopes of the Cauvery Mettur Project Area. Derived mainly from the lateritic parent material. They are sandy clay at the surface changing to clay loam below and occur in association with Mudukkur soils. Lime concretions are present in the lower depths.

e) Peelamedu series (Plm)

Ash greyish brown to very dark gray, very deep, fine, calcareous, moderately well drained, neutral to moderately alkaline soil developed over gneiss mixed with calcium carbonate. The soil develops cracks 1 m wide and 40-60 cm deep which further widen and deepen as summer season proceeds. Distinct silicon sides are present in the solum. Soil occurs on very gently sloping lands of undulating topography and is subjected to moderate sheet erosion. Climate is semi-arid with an annual rainfall of 60-100 cm and mean annual temperature of 24-34°C.

f) Kalathur series (Klt)

Consists of very dark grey to greyish brown soil mainly formed due to the process of sedimentation by the river Cauvery. It is very deep silty clay soil with sub-soil underlined by sand below 175 cm. Lime concretions are met with in the sub-soil.

2. Red non-calcareous soil

a) Surangudi series (Srg)

Consists of reddish brown to dark red, very deep, coarse to fine loamy, strong to slightly acid soil developed from loose material with fairly large quantities of quartz grains. This series occurs along the coast subjected to wind erosion and deposit. Sand dunes are commonly associated with this series. Climate is semi-arid with an average rainfall of 62 cm and mean annual temperature of 26-34 °C .

b) Nagampatti series (Ngp)

Consists of deep to very deep, non-calcareous, well drained, fine loamy, red soils developed from weathered gneiss. These soils occur on comparatively elevated lands and are subjected to sheet and gully erosion in slopy lands. The soil reaction ranges from strong acidic to mild alkaline with pH 5.5 to 7.6.

c) Vylogam series

Consists of red to dark red, deep to very deep 76-100 cm coarse loamy to fine loamy, well drained, slightly to strongly acid soil developed from weather pegmattite and gneiss and occurring on gentle slopes of undulating topography. It has conspicuous quartz mixed from gravel layer in the lower part of the solum. The soil is subject to moderate sheet erosion.

d) Pattukottai series (Pkt)

Comprises very deep, sandy loam, brown soils with sand and clay loam sub soil. They occupy the top portions of the gently sloping Cauvery-Mettur project area and developed from lateritic parent materials. The soils are well drained and noncalcareous. Iron concretions and Kaolin are met with at lower depths.

e) Vallam series (Vlm)

Comprises deep sandy loam, yellowish red soils with sandy clay loam to gravelly clay sub soil. They occupy the top most portion of the lateritic cap and are derived from lateritic parent material. The soils are well drained and non-calcareous.

f) Budalur series (Bdl)

Comprises moderately deep to deep sandy clay loam with clay loam in the sub soil. The soils are well drained and are derived from gneissic rock, dark red and non-calcareous.

g) Mudukulam series (Mud)

Comprises very deep, sandy clay loam, dark red soils. Soils are derived from lateritic parent materials. They are well drained and non-calcareous.

h) Irugur series (Igr)

Consists of red, moderately deep, coarse to fine loamy, well drained, slightly acid to neutral, insitu soils developed over weathered gneiss. Presence of quartz gravels on the surface and within the profile is commonly observed. The soil occurs on very gently sloping lands and subject to moderate to severe sheet erosion. Climate is semi-arid with an average annual precipitation of 60-90 cm and a mean annual temperature of about 23 to 34 C with pH ranges from 6.7 to 7.0.

i) Palaviduthi series (Pvd)

Red to dark reddish brown, very deep, fine loamy to fine, moderately well drained soil occurring on very gentle to gentle slopes. Iron gravel and lim nodules are found below 1-2 m depth. The soil is strong to slight acidic in reaction. Climate is semi-arid with an annual rainfall of 60-89 cm and mean temperature of 23-34 C.

3. Brown non-calcareous soil

a) Madukkur series (Mdk)

Comprises very deep, brown soils, derived from lateritic parent materials. The soils occupy the gently-sloping middle portion of the Cauvery-Mettur project area. They are sandy loam on the top grading to sandy clay loam below, non-calcareous and have plenty of yellow and brown mottlings in the sub-soil. They occur in association with the reddish brown soils of Pattukottai series and the yellowish brown sandy clay soils of Alanthur series.

b) Palathurai series (Plh)

Consists of reddish brown, deep, fine loamy, calcareous, well drained, neutral to mildly alkaline soil developed over gneiss mixed with calcium carbonate. The soil occurs on level to very gently sloping lands and subject to moderate sheet erosion. Climate is semi-arid with an average rainfall of 69-100 cm and mean annual temperature of 24 to 35°C with pH ranges from 7.5 – 7.9.

c) Malampatti series

Comprises very deep, brown, soil of alluvial origin sandy clay loam on the surface grading to clay below occupying the lower portion of the area. The soil is calcareous. The soil pH is 10.0.

d) Thumbapatti series

Comprises very deep, yellowish brown, coarse loamy soils developed from aeolian deposits (pH 8.0) with regard to the soil conditions of the southern zone nearly one fourth of the total area comprises of the problem soils (acidic soils 4.88%, alkaline soils 11.30% and saline soils 9.95%) and the remaining three fourth of the area with normal or neutral soils. The fertility status of the southern zone is generally poor with low N and P status.

4. Brown calcareous soils

Brown calcareous soils are observed in the northern part of the southern zone. The predominant soil series found are Madukkur, Palathurai, Malapatti, Thumbapatti, Palaviduthi, Mullur, Vadavalam and Poram.

a) Vilathikulam series (Vlk)

Yellowish brown to dark brown, very deep, fine loamy, well drained, calcareous, neutral to moderately alkaline soil developed from the old flood plains of river alluvium. Climate is semi-arid with an annual rainfall of 62 cm and mean annual temperature of 28-34° C with pH ranges from 7.40 to 9.0.

b) Vadamalapuram series (Vmp)

Brown to dark greyish brown, very deep, fine loamy to fine, moderately well drained, calcareous soil of alluvial origin. It occurs on flat to very gently sloping lands with pH 7.6 and 8.2

IV. DIFFERENT CROPS CULTIVATED, AREA COVERED (ha) AND POPULAR VARIETIES

1. Virudhunagar district

a) Area coverage (ha)

Cereals and Millets

Name of taluk	Paddy	Cholam	Cumbu	Maize	Ragi	Tenai	Varagu	Samai	Kudiraivali	Total
Virudhunagar	870	957	1377	385	72	2	9	-	5	3677
Aruppukottai	3322	4012	3580	96	126	4	102	1	178	11421
Tiruchuli	6571	588	155	10	100	-	14	-	86	7524
Kariapatty	3713	1456	94	30	-	-	50	7	57	5407
Sattur	957	458	2391	1916	69	14	-	-	58	5863
Sivakasi	1214	132	1715	1248	73	-	-	-	10	4392
Srivilliputhur	8992	59	409	1017	83	-	-	-	229	10789
Rajapalayam	6916	26	723	929	185	1	-	-	22	8802

Pulses

Name of taluk	G.gram	Bengalgram	Redgram	Blackgram	Mochai	Karamani	Kollu	Total
Virudhunagar	2203	17	48	792	4	30	2	3096
Aruppukottai	1031	81	168	2617	47	57	3+1	4005
Tiruchuli	42	-	183	66	4	17	2	314
Kariapatty	252	8	247	169	27	4	2	709
Sattur	1610	11	25	450	5	398		2504
Sivakasi	244	-	8	187	1	32	9	481
Srivilliputhur	461	-	7	216	462	1013	1	2160
Rajapalayam	68	-	14	756	1	113	45	997

Sugar crops

Name of taluk	Sugarcane	Panai	Total
Virudhunagar	123	5	128
Aruppukottai	290	1	291
Tiruchuli	144	6	150
Kariapatty	246	1	247
Sattur	23	8	31
Sivakasi	315	1	316
Srivilliputhur	1679	334	2013
Rajapalayam	1232	25	12

S.No.	Name of taluk	Spices	Fruit crops	Vegetables	Flowers
1	Virudhunagar	629	199	228	23
2	Aruppukottai	5316	202	304	273
3	Tiruchuli	748	108	175	101
4	Kariapatty	944	107	439	216
5	Sattur	834	138	213	17
6	Sivakasi	18	425	368	29
7	Srivilliputhur	182	1786	976	19
8	Rajapalayam	187	512	216	8
	Total	8858		2918	

No	Name of taluk	Chillies	Coriander	Tamarind	Cardomum	Curry leaf	Total
1	Virudhunagar	278	348	-		3	629
2	Aruppukottai	1860	3444	8		4	5316
3	Tiruchuli	702	43	3		-	748
4	Kariapatty	342	596	5			944
5	Sattur	502	347			5	834
6	Sivakasi	791	16			8	18
7	Srivilliputhur	426	-			1	182
8	Rajapalayam	579	-	-	332	-	187
	Total	5480	4794	16	332	21	8858

Crops grown	Virudhu nagar	Aruppu kottai	Tiruchuli	Kariapatti	Sattur	Sivakasi	Srivilli puthur	Raja palayam
Fruit crops								
Banana	90	121	51	42	55	225	223	65
Mango	07	20	40	10	7	40	927	318
Guava	90	42	8	51	51	134	568	36
Papaya	8					4		
Ber	1	6						
Lemon	3	5	6	1	18	18	-	69
Sapota		6	3	2	7		65	22
Pomegranate		2					3	
Amla			10			2		
Grapes				1				
Orange						2		2
Total	199	202	108	107	138	425	1786	512

Vegetables

Senai	3	1	1	-	3	17	13	4
Onion	141	147	29	302	47	151	844	91
Brinjal	25	40	18	39	46	42	35	64
Bhendi	5	26	7	8	37	13	11	12
Aavarai	1	-	-	6	5	-	1	-
Tomato	42	42	18	33	59	94	46	38
Poosani	1	1	-	1		1		-
Bitter gourd	2	5	2	10	2	-	5	1
Greens	8	4	90		4			
Snake gourd						1		
Bottle gourd						12		
Beans						1		
Sweet potato		26	10	38		3		1
Seeni Avarai					5	1		
Vellari				1	2	6		
Agathi				1		2		
Peergankai					3		4	
Sapang kilangu						24	16	
Karunai kilangu		12						
Others								5
Total	3923	8674	956	1447	1846	2499	1431	1115

Flowers

Rose	3	21	1	2	-	2	-	1
Jasmine	2	243	88	213	9	18	15	7
Jathimalli	1	-	-	-	-	-	-	-
Samanthi	8		1			2	2	
Sevanthi	7	3			5	2	2	
Arali	2					3		
Crosandra	-	6	11	1	3	2		

Forest Trees

Crop	Virudhu nagar	Aruppu kottai	Tiruchuli	Kariapatti	Sattur	Sivakasi	Srivilli puthur	Raja palayam
Savukku	10	7		14		6		
Musugottai	2					5	1	
Teak	8	11	21	9	1			
Neem	5	39	24	38	38	-		
Eucalyptus		48	5		1	1		
Karuvel		20			4	4		1
Total								

Name of taluk	Groundnut	Coconut	Gingelly	Sunflower	Castor	Palmrosa	Cotton
Virudhunagar	196	63	115	514			3923
Aruppukottai	1072	158	155	496	2		8674
Tiruchuli	5625	114	1442				956
Kariapatty	1880	92	1151	161	1		1447
Sattur	25	72	27	113	31		1846
Sivakasi	133	132	37	54	1		2499
Srivilliputhur	263	3642	317	2			1431
Rajapalayam	14	3567	62			18	1115

b. Popular crop varieties

Crop	Virudhu nagar	Aruppukottai	Tiruchuli	Kariapatti	Sattur	Sivakasi	Srivilli puthur	Raja palayam
Paddy	ADT 39,42 ASD 19,20	ADT 39,42 ASD 19,20 MDU 5	ADT 39,42 ASD 18, 19, 20 MDU 5 CO 46	ASD 19,20 ADT 42	ADT 39, 42,43 ASD 19,20 CO 46	ASD 19,20 ADT 42	CO 43 ASD 16, 18,19, 20, ADT 42	CO 43 ASD 16, 18,19, 20, ADT 42
Cholam	APK 1 K 8	APK 1 K 8	K 8	-	K 8	-	-	-
Cumbu	ICMV 221 CO 7	ICMV 221 CO 7	CO 7	-	ICMV 221 CO 7	-	-	-
Maize	-	CO 1	CO 1	-	CO 1, Vijay composite	-	CO 1	CO 1
Redgram	SA 1 APK1	SA 1 APK1	SA 1 APK 1, Vamban 2	SA 1 APK1	SA 1 APK1	SA 1 APK1	SA 1 APK1	SA 1 APK1
Blackgram	TMV 1, CO 5	TMV 1 CO 5 APK 1	TMV 1 CO 5	TMV 1 CO 5	TMV 1 Vamban 3	TMV 1 CO 5	TMV 1 CO 5	TMV 1 CO 5

Greengram	KM 2	KM 2	KM 2	KM 2	KM 2 K 1 CO 6	KM 2	KM 2 K 1 CO 6	KM 2 K 1 CO 6
Cowpea	P 152	P 152	P 152	P 152	P 152	P 152	P 152	P 152
Cotton	LRA 5166	LRA 5166 MCU 10	LRA 5166	LRA 5166	LRA 5166 KC 2	LRA 5166	LRA 5166	LRA 5166 MCU 5 SVPR 2
Groundnut	TMV 7 VRI 2	TMV 7 VRI 2	TMV 7 VRI 2	TMV 7	TMV 7	TMV 7	TMV 7	TMV 7
Gingelly	TMV 3 CO 1	TMV 3 CO 1	TMV 3	TMV 3	TMV 3	TMV 3	TMV 3 SVPR 1	TMV 3 CO 1 SVPR 1
Sunflower	CO 2 CO 4	CO 2 Morden	CO 2		CO 2 CO 4		CO 2 Morden	
Sugarcane			COC 671, 771, 8304, 86061				CO 661, 771, 8304, 86061	CO 661, 771, 8304, 86061
Fodder chulam	CO 27 K 7	CO 27 K 7	CO 27 K 7	CO 27 K 7	CO 27 K 7	CO 27 K 7	CO 27 K 7	CO 27 K 7
Chillies	K1	K1	K1	K1	K1	K1	K1	K1

2. Ramanathapuram district

a) Area coverage(ha)

Crop	Ramnad	Rames waram	Tiruvadanai	Paramakudi	Mudu kulathur	Kamuthi
Paddy	13462	2635	39889	24336	37813	14209
Cholam	6	0	0	54	275	2851
Cumbu	29	0	0	0	190	398
Ragi	12	0	12	271	299	403
Kudiraivali	139	81	22	125	130	112
Blackgram	1	1	0	29	411	2339
Greengram	11	0	0	1	91	9
Cowpea	26	91	0	10	9	12
Gingelly	425	126	90	593	69	97
Groundnut	487	42	102	1960	1711	2588
Coconut	3643	2664	457	75	598	45
Sunflower	0	0	0	0	12	99
Cotton	453	0	112	1325	742	1596

Chillies	955	115	746	3088	9313	3104
Coriander	240	60	3	36	834	686
Sugarcane	0	0	0	128	0	122
Banana	6	1	28	79	0	45

b. Popular crop varieties

Crops	Popular varieties
Paddy	CO 43, MDU 5, ASD 18, ADT 36, ADT 42, PMK 2, Local varieties
Chillies	Local Gundu, K 1
Cotton	MCU 5, LRA 1566, MCU 7
Blackgram	TMV 1, T 9
Cowpea	P 152

3. Sivagangai district

a) Area coverage

Crop	Sivagangai	Manamadurai	Ilayangudi	Devakottai	Karaikudi	Tirupathur	Total
Paddy	22771	10390	16915	15494	10183	14785	90538
Millets							
Cholam	163	104	66	13	6	72	424
Cumbu	37	91	8	5	4	31	176
Ragi	141	324	480	27	34	83	1089
Other millets	-	29	180	6	-	58	273
Total millets	341	548	734	51	44	244	1962
Pulses							
Redgram	112	58	10	20	13	400	613
Blackgram	233	52	32	155	50	166	688
Greengram	44	42	1	9	10	68	174
Cowpea	111	41	40	23	20	571	766
Other pulses	-	15	40	5	2	137	199
Total pulses	500	208	83	211	95	1342	2439
Ground nut	2420	441	131	106	271	7872	11241
Sesame	82	382	172	80	27	69	813
Sunflower	5	2	1	2	-	-	10
Soybeans	1	-	-	-	-	-	1
Castor	3	1	-	-	-	-	4

Cotton	129	346	69	40	-	82	666
Sugarcane	1830	2914	68	15	170	191	5052

b. Popular Crop Varieties

Crop	Productivity (t/ha)	Varieties popular
Paddy	2.33	MDU 5, ADT 36, ADT 39, IR 36
Millets	2.13	CO 26 Cholan, CO 13 Ragi, WCC 75 Cumbu
Pulses	0.55	SA 1 Redgram, TMV 1 Blackgram, KM 2 Greengram, P 152 Cowpea
Groundnut	1.71	TMV 7
Gingelly	0.63	TMV 3
Cotton	3.00	MCU 7, LRA 5166
Sugarcane	13.3	COC 671, 771

Thoothukudi District

a) Area Coverage(ha)

Crop	Thoothu kudi	Ottapi daram	Srivai kundam	Thiru chendur	Sathan kulam	Kovil patti	Vilathi kulam	Total
Paddy	1200	1050	9950	8450	1600	1750	1000	25000
Cholan	200	1800	500	-	-	5500	7000	15000
Cumbu	2500	9500	2000	-	-	11500	15000	41000
Ragi	50	850	50	-	-	1700	1350	4000
Other Millets	100	300	50	-	-	400	1150	2000
Redgram	-	-	-	-	-	50	50	100
Blackgram	900	3000	2550	400	100	5500	4850	17300
Greengram	500	1000	300	200	400	950	1650	5000
Cowpea	-	50	-	-	-	-	150	200
Total Pulses	1400	4500	2900	600	600	7000	7000	24000
Horsegram	-	200	-	-	-	200	100	500
Cotton	3000	14200	3000	-	400	12600	8800	42000
Groundnut	150	300	200	350	1400	300	300	3000
Gingelly	300	1700	100	400	-	1000	500	4000
Sunflower	100	1500	-	-	-	1400	2000	5000
Castor	25	25	25	25	25	50	25	200

Total Oil seeds	275	3525	325	775	1425	2750	2825	12200
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b) Popular Crop Varieties

Crop	Variety	Average Yield kg/ha
I. RICE (Early Kar) (April - May)	TKM 9	5019
	IR 50	6000
	ADT 36	4000
	IR 64	6146
	ADT 42	5537
Kar (May-June)	ASD 16	5600
	ASD 17	5422
	ASD 18	5900
	JJ 92	4758
	ADT 42	5537
II. SORGHUM	K8	3680
	CO 25	2440
	CO 21	2750
	K 4	-
	COH 3	3000
	CO 26	4500
	COH 4	-
	BSR 1	2500-3500
	CSH 5	4000
	COH 3	3000
	K 9	2000
	K Tall	3750
	APK 1	2619
	K 10	1600
III. CUMBU	X6	2394
	WCC75	2000
	K 3	800
	CO 7	2500-2800
	X 7	2513
IV. RAGI	CO 11	3250
	K 7	3130
	K 5	1100
	CO 7	2750
	CO 12	3250
	Paiyur 1	3125
V. PULSES – REDGRAM	CO 6	893
	CO 4	980
	CO 5	760

VI. BLACKGRAM	CO 5	740
	VBN 1	700
	ADT 2	-
	ADT 3	-
	ADT 4	-
	ADT 5	-
	TMV 1	-
VII. GREENGRAM	CO 4	910
	KM 2	767
	VBN 1	770
	CO 5	900
	ADT 2	850
	ADT 3	500
	Paiyur 1	742
VII. COWPEA	CO 4	-
	CO 2	-
IX. GROUNDNUT	TMV 2	1250
	TMV 7	1400
	TMV 10	1650
	CO 1	1675
	CO 2	1650
	VRI 2	2060
	VRI 3	1882
	VRI 4	2171
	BSR 1	2845
X. GINGELLY	CO 1	450-650
	TMV 3	400-650
	TMV 5	450-650
	VRI 1	450-650
	SVPR 1	607
XI. SUNFLOWER	CO 1	800
	BSH 1	1250
	CO 3	1250
	CO 4	1600
XII. COTTON	MCU 5	1850(Irrigated)
	MCU 9	2100(Irrigated)
	SVPR 1	1500-1600(Irrigated)
	SVPR 2	1658 (Irrigated)
	K 9	570(Rainfed)
	K 10	726(Rainfed)
	KC 2	772(Rainfed)
	K 11	1100(Rainfed)

Tirunelveli district**a) Area coverage (ha)**

Crop	Palayam kottai	Sankaran kovil	Tenkasi	Sivagiri	Nangu neri	Shen cottai	Amba samudram	Radhapuram
Rice								
Kar	3366	98	3239	172	318	2762	11095	92
Pishnam	4400	10817	9299	7476	6117	3030	12540	2036
Summer			104	72	1245			
Sorghum	---	794	723	25	---	296	2	142
Blackgram	317	3905	2269	1055	341	2327	427	170
Chillies	5	2520	1800	93	10	59	36	245
Onion	2	503	912	56	2	228	33	--
Sugarcane								
Main crop	12	647	80	2639	3	7	94	4
Ratoon		119	53	751				
Crop								
Groundnut	35	1374	971	85	414	2210	391	639
Sesamum	1	75	270	68	15	37	25	40
Castor	4	1216	23	-	-		18	5
Ragi	40	526	8	94		-	-	-
Cotton	143	3180	651	2204	427	-	598	237
Sunflower	---	6611	23	-	---	---		-
Pepper	---	15	4	-	---	4		-
Greengram	-	9934	500	163	43	2	3	83
Redgram	-	44	33		---	---	3	2
Ginger	-	-	7			7		
Horsegram	-	-	3					135
Cumbu	-	-	1	15				
Senna	-	-			43			
Lime fruit							2	
Maize	-	-	-	-	-	-	-	4

b) Popular Crop varieties

Sl.No	Crop /Varieties	Performance	Remarks
1.	ASD 16	Good	High yielder, fertilizer responsive, suitable for acidic, saline and sodic soils, moderately resistant to pest and disease – suitable for Kar, Late Pishanam and Summer seasons.
2.	ASD 18	Good	High yielder – fine grain variety susceptible to blast suitable for Kar and Summer seasons.
3.	ASD 19	Fair to Good	Moderate yielder – in low fertile soils high use of soil ‘N’ – moderate resistant to pest , disease – suitable for Pishanam season
4.	ASD 20	High	High yielder, long slender susceptible for blast – suitable for Kar and Summer season.
5.	ADT 36	Good	Good performance high yielder – fine grain, fertilizer responsive suitable for Kar, Pishanam, Summer.
6.	ADT 38	Good	Fine grain – High yielder suitable for Pishanam – moderate resistant to pest and diseases
7.	ADT 39	Good	Fine grain – High yielder suitable for Pishanam – moderate resistant to pest and diseases
8.	ADT 43	Good	High yielder – fine grain - suitable for Kar and Summer.
9.	IR 20	Good	High yielder – suitable for Pishanam season – fine grain.
10.	IR 50	Good	Very high yielder – fine grain susceptible to blast - BPH – season Kar, Summer.
11.	IR 64	Good	Suitable for Pishanam/late Pishanam Higher yielder – long slender grain
12.	MDU 5	Good	Short duration – suitable for Kar/Summer season
13.	Ponni	Good	Good quality grain, fine grain suitable for Pishanam season Higher market value.
14.	Banana NENDRAN (local)	Good	Early maturing (10 months) – High yield resistant to most of the pest and diseases , very good price.
15.	RASAKATHALI	Good	Good price – susceptible to Panama wilt. (12-13 months)

16.	ROBUSTH	Good	10 – 11 months short in stature high yielder good demand.
17.	KATHALI	Good	Suitable for water – logged and moist soils; grown as Ratoon crop, good for leaf purpose susceptible for panama wilt
18.	THOLUVAN	Good	Good yielder Tasty fruits no propping needed – susceptible for panama wilt; good price
19.	PULSES Blackgram Rice – Fallow Midhiulunthu	Fair	Short duration YMV susceptible average yielder in the existing conditions
20.	GROUNDNUT TMV 2, TMV 7	Fair to Good	Average yield – shortage of seed materials non - adoption of improved technologies.
21.	GINGELLY Local	Fair to Good	Average yield – shortage of seed materials non - adoption of improved technologies

Madurai district

a) Area coverage

Sl. No.	Crop	Madurai North	Madurai South	Melur	Thirumangalam
1	Cereals				
	Paddy	24649	3946	21681	2948
	Sorghum	9	522	31	1749
	Bajra	3	52	28	200
	Maize	1	-	7	278
	Ragi	1	6	-	13
	Tenai	-	1	-	-
	Varagu	-	-	-	27
	Samai	-	1	-	-
	Kudiraivali	-	4	-	94
Total cereals		24663	4532	21747	5313
2	Pulses				
	Bengalgram	-	-	-	12
	Redgram	1	43	44	235
	Greengram	-	87	11	971
	Blackgram	2	34	63	135

	Field beans	1	10	11	83
	Cowpea	1	65	491	156
	Horsegram	-	2	16	7
	Others	-	-	-	36
Total pulses		5	241	636	1635
Cereals + Pulses		24668	4773	22383	6948
3	Spices & Condiments				
	Chillies	-	44	8	119
	Curry leaf	-	11	-	-
	Mint	-	1	-	-
	Coriander	-	7	-	64
	Turmeric	-	-	9	-
	Tamarind	59	11	872	-
	Total	59	74	889	183
4	Sugar				
	Sugarcane	525	138	1569	281
	Palymarah	44	8	13	24
	Total	569	146	1582	305
5	Tuber crops, fruits & vegetables				
	Fruits				
	Banana	157	538	338	49
	Mango	430	79	2235	16
	Jack	2	-	7	-
	Guava	41	22	74	31
	Sapota	2	4	24	15
	Jamun	1	-	-	-
	Pomegranate	-	9	2	-
	Watermelon	-	2	-	-
	Lemon	3	8	23	3
	Orange	-	-	1	-
	Aonla	-	-	1	-
	Total	636	662	2707	114
	Dried fruits	3	-	216	-
	Cashew nuts				

	Vegetables				
	Lab lab	-	36	-	-
	Onion	-	53	13	344
	Bhendi	2	19	2	60
	Tomato	1	34	10	135
	Bittergourd	1	-	18	2
	Sweet potato	-	10	5	3
	Brinjal	-	41	10	71
	Ribbed gourd	-	1	-	-
	Moringa	-	2	1	1
	Cauliflower	-	2	-	64
	Corm	-	1	24	4
	Chillies	-	8	-	-
	Pumpkin	-	-	3	2
	Snakegourd	-	-	-	4
	Clusterbeans	-	-	-	4
	Cucumber	-	-	-	5
	Tapioca	-	-	-	1
	Greens	-	25	-	-
	Others	-	-	-	35
	Total Food crops	25939	5887	27867	8282
	Fibre				
	Cotton	-	18	128	1281
	Silk cotton	2	8	8	-
	Oil seeds				
	Groundnut	31	267	3735	644
	Coconut	774	1012	3814	401
	Gingelly	9	133	192	143
	Soybean	-	-	1	-
	Sunflower	-	-	-	60
	Castor	-	1	-	-
	Total	814	1413	7742	1148

	Dye				
	Senna	-	2	-	83
	Medicinal plants				
	Bettlevine	30	48	-	-
	Palmarosa	4	-	-	-
	Others	-	2	-	-
	Fodder				
	Cholam	-	1	6	467
	Subabul	8	4	4	-
	Elephant grass	-	133	2	-
	Others	-	-	6	20
	Flowers				
	Rose	1	-	-	-
	Jasmine	25	293	8	42
	Others	-	4	-	42
	Trees				
	Euclayptus	8	9	52	15
	Casuarina	14	2	8	19
	Tea	7	34	35	-
	Mulberry	-	1	1	7
	Others	-	8	6	44
	Other crops	913	1980	8000	3494
	Food + Other crops	26852	7867	35867	11776
	Area sown more than once	6530	250	870	322
	Net area sown	20322	7617	34997	11454

b) Popular Crop varieties

Rice

Kuruvai : ADT 36, ADT 43, ASD 18, MDU 5

Samba : ADT 39, CO 43, ASD 19, Ponni

Cholam : CO 26, K 6, K 8

Cumbu	:	CO 7, WCC 75
Blackgram	:	T 9
Greengram	:	KM 2, CO 4
Cowpea	:	P 152
Chillies	:	K 1
Sugarcane	:	COC 671, 771

Dindigul district

a) Area coverage

No.	Crops	Dindigul	Natham
1	Cereals		
	Paddy	7752	2645
	Cholam	16494	1489
	Cumbu	1339	459
	Maize	4014	-
	Ragi	85	413
	Thinai	107	7
	Varagu	196	78
	Samai	370	85
	Kudiraivali	288	268
	Total cereals	30645	5444
2	Pulses		
	Bengalgram	516	-
	Redgram	1072	123
	Greengram	1265	30
	Blackgram	1194	410
	Mochai	1370	48
	Cowpea	5042	492
	Horsegram	1111	671
	Other pulses	11570	1751
	Total Food grains	42215	7195

3	Spices		
	Arecanut	16	-
	Cardomam	166	-
	Chillies	518	12
	Pepper	334	-
	Cinnamon and Clove	2	-
	Curryleaf	9	-
	Coriander	356	-
	Turmeric	41	1
	Tamarind	1685	2043
	Total spices	3127	2056
4	Sugar crops		
	Sugarcane	1913	99
	Palmyrah	58	4
	Total sugar crops	1971	103
5	Fruits, vegetables and tubers		
	Banana	1102	105
	Mango	4509	5028
	Jackfruit	183	3
	Pineapple	10	-
	Guava	213	159
	Grapes	74	3
	Parikai	2	-
	Sapota	111	3
	Pomegranate	431	-
	Other fruits	-	5
	Orange	155	-
	Lemon	1895	18
	Kodai orange	2	-
	Other citras fruits	60	5320
	Total	8747	-
	Dry fruits		
	Cashew	132	3

	Vegetables		
	Tapiocca	178	1
	Sweet potato	98	-
	Beat root	2	-
	Onion	1323	75
	Brinjal	168	12
	Bhendi	112	13
	Avarai	244	-
	Tomato	532	60
	Snake gourd	35	-
	Bitter gourd	20	1
	Velari	5	45
	Beans	5	-
	Moringa	26	6
	Califlower	55	-
	Karunai kilangu	-	3
	Other vegetables	39	216
	Total Food grains	59033	14897
II	Non-food grains		
1	Cotton	2054	772
2	Oil seeds		
	Groundnut	6194	310
	Coconut	7202	1731
	Gingelly	1461	-
	Sunflower	459	-
	Soyabean	2	-
	Castor	29	-
	Total	15367	2023
3	Medicinal plants		
	Tobacco	195	-
	Betelvine	53	-
	Coffee	4460	-
	Cincone	2	-
	Total	4710	-

4	Fodder crops		
	Cholam	1	-
	Subabul	12	1
5	Flower crops	720	109
	Eucalyptus	24	13
	Casurina	26	-
	Bamboo	1	1
	Mulberi	7	3
	Acacia	9	-
	Others	323	112
	Total Non Food grains	1110	15
	Total	-	141
	Total Food grains + Non Food grains	23254	8778
	Net sown area (more than ones)	82287	23675
	Gross cropped area	76903	22752

b) Popular Varieties

Crop	Dindigul	Natham
Paddy	CO 43	ASD 19, ASD 20
	ASD 20	ADT 36
	ASD 19	IR 20
	ADT 39	CO 43
	IR 20	
Sorghum	K 3	K 4
	K 4	K 3
	CO 26	CO 26
Cumbu	ICMV 221	ICMV 221
	ICMS 7703	Raj.171
		KM.2
		ICMS 7703
Ragi	CO 13	CO 13

Maize	Pioneer, CO 1	Mahyco
	Kanchan	CO 1
	Paras	
	Mahyco	
Thinai	CO 6	-
Varagu	CO1, CO 2	CO 1
Samai	CO 1, CO 2	CO 1
Kudiraivali	CO 1	CO 1
Redgram	SA 1	SA 1
Blackgram	VBN 1	VBN 1
	VBN 3	VBN 3
	T 9	T 9
Greengram	KM 2	KM 2
	K 1	K 1
Cowpea	P 152	P 152
Horsegram	CO 1	CO 1
Bengalgram	CO 2	-
Sugarcane	COC 671, 771	COC 671, 771
Cotton	LRA 5166, MCU 5	LRA 5166, MCU 5
Groundnut	TMV 7, VRI 2	TMV 7, VRI 2
Sunflower	CO 1, Morden	CO 1, Morden
Gingelly	TMV 3, CO 1	TMV 3, CO 1

V. Constraints and Problems of the area in each district

1. Virudhunagar district

- ❖ **Soil :** Soil is one of the major inputs for dryland agriculture. Lack of knowledge in keeping the soil health is the major constraint. Continuous erosion leaves the soil barren due to removal of top soil. Periodical non-application of organic manures is an another constraint. This is due to the reduced population of livestock in villages because of their maintenance cost. Leaving the land barren will make the land susceptible for soil erosion and ultimately the soil will be unsuitable for cultivation. This is mainly due to urbanization, industrialization, increased cost of cultivation and increased demand for agricultural labour.

- ❖ In the irrigated area of Srivilliputhur and Rajapalayam, there is alkalinity problem in soils which affects the yield of Rice, Cotton, Chillies and Sugarcane.
- ❖ **Climate** : Climate change is a serious public concern. Industrial pollution and rapid deforestation are the prime factors leading to climate change. This leads to changes in rainfall pattern and distribution and ultimately on the crop productivity.
- ❖ Frequent alterations in rainfall pattern especially during the North East monsoon period and it results in water stress especially for winter rainfed summer irrigated crops
- ❖ **Socio-economic conditions** : During the recent past, due to increase in the cost of cultivation of field crops, the farmers of dryland areas are switching over to perennial crops. Because of the increased demand of agricultural labour, the farmers themselves are leaving the lands fallow and seeking jobs in the nearby industries like matches and fire-works.
- ❖ Non-availability of adequate farm labourers for timely farm operations in Srivilliputhur region due to mushrooming of small scale industries like Matches and Fires.
- ❖ **Extension activities** : While comparing the extension activities of the past decades with the present one, vast changes in transfer of technologies have taken place and the constraints have been comparatively reduced. Thanks to the development in mass media communication systems - the technologies developed are immediately passed on to the farmers. However the poor economic condition of the dryland farmers leads to the non-adoption / low adoption of the technologies.
- ❖ Lack of plant protection knowledge in the usage of pesticides in crops viz., cotton, chillies and paddy.
- ❖ Lack of motivation and technical know how in the adoption of latest technologies in crop production as well as protection.
- ❖ Non-availability of quality seeds especially in cotton
- ❖ Lack of net work for getting remunerative prices for farm produce like onion, maize and rice
- ❖ Lack of storage facilities for the perishable commodities like guava, onion, tomato, mango and lime which are produced abundance in this region.
- ❖ Lack of technical know how in production and processing of export oriented horticulture produce and value added products. High price fluctuations for the agricultural commodities

2. Ramanathapuram District

1. Low rainfall
2. Early drought and late water logging
3. Sandy soils with high infiltration rate makes it unsuitable for many ID crops
4. Sodic and alkaline soil and water
5. Low investment power of the farmers
6. Social problems to go for cropping during summer months
7. Intrusion of sea water even at 25-30 feet from the ground
8. Low market price to the farm produce
9. Lack of Knowledge on Production technologies
10. High labour cost
11. Non-availability of suitable crop varieties to meet the local situations
12. Lack of knowledge on mechanization

3. Sivagangai district

- Rainfall is very limited and a short duration high yielding drought tolerant paddy variety is needed
- Stem weevil in cotton is a problem

4. Thoothukudi district

- ❖ Even though the IPM technologies are available to manage cotton pests the adoption of IPM using bio-control agents is not more due to insufficient production and availability of bio-control agents.

5. Tirunelveli district

Crop Improvement

- (i) Lack of suitable crop varieties to withstand the changing adverse weather conditions – Rain – humidity - temperature etc.
- (ii) No vast difference in yield between varieties and hybrids of rice.
- (iii) Poor seed set in hybrid rice due to improper synchronization in flowering.
- (iv) Maintenance of purity in hybrid rice.
- (v) High cost of seeds
- (vi) Lack of Technical know how.
- (vii) Lack of still more shorter duration rice varieties to manage with the available irrigation sources to potentials to accommodate with monsoon rains.

Crop Management

- (i) Emerging problems on weed management due to lack of suitable herbicides in wet seeded rice.
- (ii) Establishment techniques in direct wet seeded rice.
- (iii) Establishment of broad casted seedlings (seedling throwing) under unfavourable conditions like sandy soils, rains etc.
- (iv) Lack of knowledge in raising special seedlings/nurseries for use in manual and mechanical transplanter.
- (v) Lack of awareness about the importance of organic manures which can alleviate most of the soil problems.
- (vi) Continuous use of inorganic, complex fertilizers in the absence of organic fertilizers – green/ Green leaf Manure's/FYM and biofertilizers.
- (vii) Disposal of bulk organic wastes, either plant/animal.
- (viii) Lack of Nutrient management with reference to soil fertility status.
- (ix) Non adoption of crop rotation.
- (x) Non application of Gypsum ,Borax to oilseed and earthing up in groundnut.

Plant protection :

- (i) The Problem of rice yellow stem borer in Pishanam rice crop.
- (ii) Leaf folder and earhead bug incidence in the vegetative and milky stages of rice crop.
- (iii) The activities of egg parasitoids of rice yellow stem borer and leaf folder is not upto the level of expectation and encouraging the rice-eco-system.
- (iv) The continuous and indiscriminate use of plant protection chemicals, chemical fertilizers leading to the development of resistance to pest and disease pathogens and destruction of predators leading to human health hazards and environmental pollution

Seed technology :

- (i) Limited availability of indigenous implements suitable for seed programme.
- (ii) Unawareness of the farmers about the seed and seed production technologies.
- (iii) The general unfamiliarity of the labour and farmers with seed handling, seed drying and seed treating in the seed production programme.
- (iv) Lack of quality and quantity seeds in time .

Environmental:

- (i) Vagaries of Monsoon.
- (ii) Industrial effluents, agricultural and animal wastage, causing pollution to soil, water and atmosphere.
- (iii) Lack of maintenance of Irrigation tanks, canals etc, occupied by the aquatic problem weeds.
- (iv) Indiscriminate use of chemicals, pesticides etc eradication by other mean – causing imbalance in the natural - pest – predator system and eco-system.
- (v) Non-adoption of eco-safety measures

Physical :

- (i) Climatic factors with reference to rainfall distribution, temperature, relative humidity evaporation early or late on set and early withdrawal of monsoon .
- (ii) Soil, soil types, soil fertility, acidity, alkalinity factors. Non adoption of soil amelioration measures for soil problems, toxicity and deficiency.

Economical :

- (i) Poor status, economic conditions of farmers.
- (ii) Larger number of smaller, fragmented holdings which do not permit for large scale mechanisation.
- (iii) In sufficient storage and marketing facilities .
- (iv) Illiteracy to know , adopt and to avail the existing financial assistance from Government/Private sector.

Dindigul district

The general constraints observed in this district is listed below:

- ❖ The adoption rate of recommended technologies are poor (for eg.) only 20% of adoption is observed in bio-fertilizer application, 10% is weedicide usage, 60% in population maintenance and 15% zinc sulphate application in case of rice and nil% adoption for seed hardening and 5% for moisture conservation measures such as broad bed furrow system and compartmental bunding in millets and pulses and use of bio-fertilizers (Nil %) in cottonm sett treatment (15%), ratoon crop management (Nil %) is sugarcane is generally observed.
- ❖ Labour problem is also noticed.
- ❖ Marketing problem due to fluctuations in marketing price
- ❖ Erratic rainfall leads to shift in cropping pattern (eg.) cotton area is replaced by maize.

VI. Technologies so far developed i.e. Varieties, Management, plant protection and other items developed in each Research Station**1. Regional Research Station, Aruppukottai****Crop improvement – Varieties Released****APK 1 Varagu**

- ◆ Released during 1991
- ◆ Duration : 110-120 days
- ◆ Yield : 1800-4200 kg/ha

APK 1 Blackgram

- Released during 1993
- Duration 60 days
- Suitable for intercropping with cotton

APK 1 Cholan

Released during 1996

Duration : 105 days

Non-lodging type

Yield : 3500 kg/ha

APK 1 Redgram

Released during 1999

Short duration : 95-105 days

High yielding type suitable for all seasons

Resistant to YMV, suitable for intercropping

Uniformity in bearing

Yield : 867 kg/ha

APK 1 Oyster Mushroom

Released during 1995

Mushroom appear in about 7-12 days

Keeping quality : 72 hours

Fibre content : 56%

Suitable for growing throughout Tamil Nadu

Yield : 910 gm/bed

APK 2 Milky Mushroom

Released during 1997

Duration : 40-45 days

Shelf life : 3 to 5 days

Protein Content	:	32.3%
Yield	:	356 gm/bed

Crop Management

- ◆ Premonsoon dry seeding on 35th standard week (September 1st week) with cotton, sorghum and pulses. Premonsoon sowing during the first week of September is the optimum sowing time for the newly released APK-1 red gram in this tract.
- ◆ Contingent cropping in case of delayed onset of monsoon- During years of normal rainfall, pre- monsoon sowing of cotton, sorghum or pulses is desirable. Pearl millet is the suitable crop for sowing during the onset of North-East Monsoon i.e. October 15. When the rainfall delayed for 15-30 days, sunflower is the best choice for sowing up to November 15. Delayed monsoon till the first week of November or failure of sown crops, either sunflower, coriander, horsegram, chickpea, and senna which are ideally suited for late sowings. Under late monsoon situation, with low rainfall distribution, senna is the suitable crop.
- ◆ Seed hardening with 2.0 % KCl or KH_2PO_4 solution to induce drought tolerance in millets and cotton and seed hardening with ash + gum paste for pulses (greengram and blackgram)
- ◆ Using tractor drawn and bullock drawn seed drills for sowing
- ◆ Under rotational cropping system sowing cotton followed by millets, coriander and sunflower is found ideal for black soils and Groundnut followed by millets and pulses is found ideal for red soils
- ◆ Cotton +blackgram or greengram or clusterbean , sorghum + cowpea, coriander + bengalgram were found suitable intercropping systems for rainfed vertisols.
- ◆ Pre-emergence application of Butachlor @ 2.0lit/ha or Fluchloralin @ 2.0 lit/ha for cotton, Atrazine @ 500gm/ha for sorghum, maize and pearl millet coupled with one hand weeding on 30-35 DAS were found suitable weed management practices under rainfed conditions.
- ◆ Morinda is an obnoxious weed in rainfed vertisols. Application of 2,4-D sodium salt on the stem at the ground level, after removing the bark for one inch arrests the re-growth of morinda.
- ◆ Application of 40:20:0 kg NPK /ha + composted farm wastes @ 5 t/ha (Using Pleurotus fungus and urea)+ bio-fertilizer seed treatment is an ideal INM practice for sorghum based intercropping systems

- ◆ Application of FYM @ 12.5t/ha every year or 25 t/ha once in two years + soil application of 2kg Azospirillum with recommended inorganic fertilizers (40:20:0 kg NPK/ha) found ideal for cotton and sorghum rotational system of cropping.
- ◆ Application of 2.0 kg azospirillum + 40:20:0 kg NPK /ha recorded higher grain yield in pearl millet..

Integrated farming system

Integrated Farming System with crop component (Cotton, Sorghum, Pulses), horticultural component (Ber, Amla, Custard apple) and animal component of Tellicherry goat (5+1) is found suitable for rainfed vertisol for higher income.

Soil Moisture Conservation

- ◆ Summer ploughing , Broadbed and furrow system and compartmental bunding are found ideal for higher soil moisture conservation and yield
Contour cultivation across the slope is found ideal with vetiver and cenchrus vegetative barriers when the slope is mild
- ◆ Vetiver, chenchrus are found suitable for vegetative hedges under rainfed situation.
- ◆ Vetiver slips are to be planted within 24 hours of uprooting and root dipping either in Azospirillum or in 5% Glucose solution for better establishment.
- ◆ Vetiver slips are to be planted at 15-20 cm spacing in zig-zag manner for effective soil moisture conservation and higher yield.

Agricultural Engineering

- ◆ Tractor drawn cultivator and seed planter found to be highly suitable for the vertisol.
- ◆ Low Cost drip irrigation method was developed
- ◆ soil moisture prediction model developed for sorghum.
- ◆ Chiesel plough followed by one disc plough and one harrow plough contributed higher yield in sorghum.
- ◆ Incorporation of coirpith after chselling the soil recorded higher seed cotton yield.

Forestry

- ◆ Neem selection from Therboki, Ramnad was found suitable for rainfed vertisol.
- ◆ Planting of *Acacia leucophloea* (velval) at 5 x 5 m espacement was optimum for getting higher biomass under Agroforestry system in rainfed situation.
- ◆ Subabul or *Desmanthus* can be used for formation of alleys under food-fodder production systems in rainfed vertisol.
- ◆ Greengram and clusterbean are more remunerative crops under ber tree based agri-horticulture system in rainfed situation.
- ◆ Growing fodder sorghum in the interspace of sesbania or neem or acacia tree component is a suitable silvi-pastoral system for fodder production in rainfed situations.
- ◆ Fodder sorghum and fodder maize are more suitable under sapota based horti-postoral system in rainfed situation.

Crop Protection

- ❖ Intercropping in cotton with clusterbeans (2:1) reduced the leafhopper incidence by 50%.
IPM Practices developed for rainfed cotton and controlling ber fruitfly.
- ❖ In cotton, the var MCU 10, SVPR 1 and the culture TSH 286 were found resistant to black arm (*X. conopsea* pv. *malvacearum*)
- ❖ In sunflower, seed treatment with *T. harzianum* @ 4g/kg and presowing application of FYM @ 1 ton/ha reduced the charcoal rot.
- ❖ Spraying Dinocap 0.1% or Tridemorph 0.05% or Carbendazim 0.1% or Penconazole 0.1% reduced the powdery mildew disease of blackgram.
- ❖ Carbendazim 0.1% spray twice at 15-20 days interval immediately after the appearance of the symptoms effectively reduced the black leaf spot in ber.
- ❖ Dipping the ber fruits for 10 minutes in Sodium Chloride 2% or Potassium metabisulphite 3% or Carbendazim 0.1% before storage reduced the post harvest rotting of ber fruits.

Social sciences

- ◆ Chillies has prominent channel to market the produce in southern agro climatic situation. It is a best alternate crop for cotton in vertisol areas of southern zone.

- ◆ Uncertainty and risks in agriculture changes occupational pattern in rainfed tract. 15.47 percentage of workers group ;involved in manufacturing and processing. Only 3.8% of total population involved in agriculture.
- ◆ Economic viability of Ber, Guava and Sapota crops are high under vertisols of southern zone.
- ◆ In Aruppukottai Agricultural division of Virudhunagar district, more than 90% of the farmers were adopted the technologies like deep and increased no, of ploughings, summer ploughing. Farm Yard Manure application, broadcastiung method of sowing and mixed cropping system in cotton, cholam and cumbui crops. About 50% of the farmers were adopted the technologies such as optimum seed rate and pest control method in cotton crop. About 30% farmers reported that 2, 4-D sodium salt is costly and also not easily available though it effectively control the weed Morinda Tinctoria.

Dryland Horticulture

- ❖ The fruit crops viz. Ber, Custard Apple, Amla, Jamun, Bael, Pomegranate, Mango, Sapota, West Indian Cherry; Tree crops viz. Tamarind, Neem, Vagai; Vegetable crops viz. Clusterbean, Bhendi, Cowpea, Solanaceous and Cucurbitaceous vegetables; aromatic plants like vetiver are highly suitable under rid condition.
- ❖ The varieties like Kaithali in Ber, AS 1 in Custard apple are highly remunerative.
- ❖ 'In situ' budding of ber.
- ❖ Pruning during last week of February for enhancing ber yield.
- ❖ 'Five per cent slope' towards tree trunk for moisture conservation in fruit crops.
- ❖ The optimum spacing to higher yield in var. Banarasi is 8 x 3 m and it is 8 x 4 m for Var.Kaithali
- ❖ Carbendazim 0.1% spray twice at 15-20 days interval immediately after the appearance of the symptom effectively reduced the black leaf spot in ber
- ❖ Dipping the ber fruit for 10 min. in sodium chloride 2% or potassium metabisulphide 3% or Carbendazim 0.1% before storage reduced the post-harvest rotting of ber fruits.

2. Cotton Research Station, Srivilliputhur

Varieites :

Cotton :	MCU 2	..	Released during 1954
	MCU 4	..	Released during 1957
	MCU 8	..	Released during 1974
	SVPR 1	..	Released during 1991
	SVPR 2	..	Released during 1996
	SVPR 3	..	Released during 2000
Sesamum	SVPR 1	..	Released during 1992
Palmyrah	SVPR 1	..	Released during 1991

Crop Management

- ❖ A new cropping pattern consisting of a three crop sequence of cotton-pulse-paddy was found to be feasible with high economic returns in the place of existing crop sequence of cotton-rice.
- ❖ For summer irrigated cotton, the fertilizer dose of 60:30:30 kg NPK/ha was found to give maximum yield in medium duration cotton varieties. Half the quantity of 'N' and the entire P and K must be applied as basal and the remaining half of N must be applied on 45th day and earthed up.
- ❖ Clipping off apical buds from 15th node ie., at 75-80 days arrests excessive vegetative growth and increase seed cotton yield.
- ❖ The results of the study on the effect of sowing practices and nutrient management on rice fallow cotton revealed that sowing in seed row tillage after the harvest of paddy recorded significantly higher yield of kapas over other sowing practices.

Crop Protection

- ❖ Seed treatment with chlorpyriphos @ 50 ml/kg of cotton seed is effective for the control of surface weevil.
- ❖ Cotton sown on ridges and earthed up on 40th day reduced the incidence of stem weevil (18.5%) as against 42.5% incidence sown on beds.
- ❖ The plant products viz., Neem oil 3% and NSKE 5% spraying were found to be effective in minimizing the incidence of jassids on cotton.

- ❖ Application of Neem cake @ 150 kg/ha to the soil and seed treatment with talk based *Trichoderma viride* @ 4g/kg reduced the root rot incidence.

3. Agricultural Research Station, Ramanathapuram

Crop Improvement - Rice

- Pipeline cultures of drought resistant, medium slender, white rice are RM 96019 (TGR 75), 105-110 Days, 3300 kg/ha, RM 97015 (IET 15323), 105-110 Days, 3200 kg/ha, RM 97011-95-110 Days, 3000 kg/ha & RM 97010 (IET 14976), 110 Days, 3400 kg/ha.

Crop Management

- In the coastal sandy soils grain yield was improved by addition of tank silt @ 2.5 t/ha (35%), pre-sowing seed hardening in 1% KCl (12-16%)
- Phosphorous requirement can be reduced by 25% through the application of enriched farm yard manure
- Optimum time for pre-monsoon sowing of rice, to obtain early vigour and ultimately higher grain yield is September 15.

In tree/horticultural crops

- Establishment and early vigour of tree crops is influenced by addition of bio-fertilizers viz., *Azospirillum* 10 g, *Phosphobacteria* 10 g & VAM 150 g per tree besides gypsum to the pit for coastal sandy soils.
- Intercropping of sorghum, cumbu, greengram, cowpea, blackgram, gingelly & cotton can be taken up during the first 3 years of planting of neem, tamarind, vagai, salvadora, guava and sapota
- *Casuarina* leaf litter mulch to pomegranate improved the soil moisture retention by 17-23%.

Role of bio-fertilizers

In coastal sandy soils application of bio-fertilizers of *Azospirillum*, *phosphobacteria* & VAM irrespective of the crop applied showed spectacular response for establishment and yield.

- A study revealed that the optimum spacing and INM for higher biomass production of *prosopis juliflora* could be 2.0 m x 3.0 m and the combined application of native soil + gypsum 5 kg + *phosphobacteria* 50 g + VAM 150 g/tree respectively.
- The suitable and fast growing tree species for coastal soil were *Eucalyptus tereticornis* and *Casuarina equisetifolia*

- Under the INM principle, combined application of Native Soil + DAP 50 g + phosphobacteria 50g + VAM 150 g/t at planting and followed by application of DAP @ 50 g/tree every year.
- Phosphobacteria 50 g/t VAM found to boost the growth of Neem, Vagaim, Salvadora and Guava in the coastal and inland areas of Ramnad
- In general, combined application of Biofertilizers (Azospirillum / Rhizobium + Phosphobacteria + VAM) was found to boost the growth of trees.
- The grass palmarosa (C.martina var. motia) was found suitable for wastelands of Ramnad.
- The medicinal plants like Withania somnifera, Catheranthus resins and Vinca rose were tried, among them Vinca rose was found to be drought tolerant.
- An ad-hoc experiment on ragi cultivation in typical rice season under excess moisture (standing water for some part of the season) revealed that ragi can with stand flooded situation.
- Annuals like Cowpea, (Co.5) and cholam performed well under Salvadora (3 year) plantation.
- The annual moringa is performing well under coastal sandy saline soils with saline pot water irrigation.

4. Agricultural Research Station, Paramakudi

Varieties

PMK 1 Rice (CO 25 x ADT 31)

- ❖ Released during 1985
- ❖ Drought tolerance and non-lodging
- ❖ Matures in 120-125 days
- ❖ Best suited for semi-dry condition in Ramanathapuram and Sivagangai district. Yield : 2650 kg/ha under moisture stress condition

PMK 2 Rice (IR 13564 – 149.3 x ASD 4)

- ❖ Released during 1994
- ❖ Matures in 110-115 days
- ❖ Drought tolerance and non-lodging
- ❖ Tolerant to water inundation
- ❖ Grain yield : 3200 kg/ha under rainfed condition

- ❖ Suitable for both dry and semi-dry systems of cultivation in Ramnad and Sivagangai district.

PMK 1 Chilli (CO 2 x Ramanathapuram Gundu)

- ❖ Released during 1994
- ❖ Suitable for rainfed condition
- ❖ Yield : 2400 kg dry pods per lactale
- ❖ Duration : 200 days
- ❖ Conical fruits with attractive red colour
- ❖ Fruits contain 0.36% capsaicin

Crop Management

- Pre-emergence application of Oxy-flourfen @ 0.15 kg a.i/ha is highly effective in controlling weeds in rainfed chilli.
- Application of NPK as per soil analysis along with enriched FYM @ 750 kg/ha and 4 kg each of Azospirillum and Phosphobacteria gave higher yield under semi-dry paddy.

Crop Protection

- Neem oil 1% or neem cake extract 5% was effective in controlling chilli aphids
- Dimethoate 0.03% or neem oil, 1% or neem cake extract 5% was effective in controlling chilli thrips
- Dicofol 0.03% or Phosalone 0.07% was effective in containing yellow mites in chilli
- Ethanotic and Hexane extract of Neem Seed Kernel were effective at 1% in controlling aphids and thrips in chilli
- Basal application of neem cake @ 100 kg/ha, release of Trichogramma chilonis @ 5 CC/ha on 40,47,54 and 61 DAS and T.japonicum on 67, 74, 81 and 88 DAS and spraying NSKE 5% at 50% ETL controlled the major pests of semi-dry paddy.

5. Agricultural Research Station, Kovilpatti

Varieties :

S.No.	Variety	Parentage	Year of release	Duration (Days)	Yield	
	SORGHUM				Grain kg/ha	Straw kg/ha
i..	K 1	Selection from Local Irungu	1942	115	100	4000
ii.	K 2	Selection from Local	1946	100	4000	-
iii.	K 3	Cross Derivative	1956	120	250	6000

		from K.1 x Periyamenjal Cholan				
iv.	K 4	Cross Derivative from CO.18 x K.2	1970	90	4000	-
v.	K Tall Hybrid	MS.2219 A x IS.3541	1975	95	3000	-
vi.	K 5	Pure line Selection from IS.3541	1977	95	2700	-
vii.	K 6	Selection from Usilampatti Local	1978	90	2500	
viii.	K 7	Cross derivative from K.3 x M.35-1	1980	105	800	
ix.	K 8	Cross derivative from IS.12611 x SC.108	1989	95	2500	
X	K 9	Cross derivative from (MS.36200 x TWC.120) x TWC.180	1990	120	2700	-
xi.	K 10	Cross derivative from K.7 x SPV.102	1991	95	-	-
xii.	K 11	Cross derivative from K.7 x A.6652	2000	115	1560	10360
II.	CUMBU					
i.	K 1	-	1939	90	750	-
ii.	K 2	-	1967	80	2000	-
iii.	K 3	-	1977	85	1800	-
iv.	K 4 HB(Hybrid)	-	1980	90	3000	-
III.	MAIZE					
i.	K 1	Composite	1973	85	3000	
ii.	K 2 HM(Hybrid)	Double cross hybrid	1980	90	4000	
IV	RAGI					
i.	K 1	PLS from local	1948	135	2400	-
ii.	K 2	PLS from Kovilpatti cultivar	1955	135	3200	-
iii.	Saradha	PLS from Anakapalli	1970	105	3600	-
iv.	PR 202	PLS from Andhra Pradesh	1074	107	4000	-
v.	K 5	Saradha x EC.158	1978	105	4600	-
vi.	K 6	Natural mutant from local cultivar	1978	80	3200	-
		CO.8 x K.2				
vii.	K 7		1979	100	4500	-
V.	TENAI					
i..	K 1	-	1974	90	1200	-
ii.	K 2	-	1978	80	1800	-
VI.	VARAGU					
1.	K 1	-	1979	100	1800	-

VII.	PANI VARAGU					
i.	K 1	-	1978	65	1900	-
ii.	K 2	-	1980	65	2200	-
VIII.	SAMAI					
i.	K 1	-	1979	70	1500	-
IX.	KUDIRAI VALI					
i.	K 1	-	1970	90	1000	-
ii.	K 2	-	1978	90	2500	-

Karunganni Cotton

S.No.	Varie ties	Parentage	Year of release	Duration (Days)	Yield kg/ha	Mean Halo length (mm)	Ginning outturn %	Spinnability (counts)
1.	C 7	Pure line selection from local varity	1925	210	112	21	30	24
2.	K 1	Pure line selection from C7	1935	210	350	22	30	24
3.	K 2	-	1948	200	370	22	31	28
4.	K 5	-	1951	195	370	22	31	28
5.	K 6	6186-8	1953	195	420	23	34	32
6.	K 7	(1143 Ex52-2) x 1523 R	1967	195	470	24	36	34
7.	K 8	6874 x 7112 B	1971	180	540	26	35	40
8.	K 9	H4 x 0896	1978	150	620	26	37	40
9.	K 10	K.9 x 11876	1985	150	726	24	38	30
10.	K 11	(K.9x1187 6) x (K.9 x H450)	1995	140	1000	24	35	30

Cambodia cotton

S.No.	Variety	Parentage	Year of release	Duratin (Days)	Yield kg/ha	Halo length (mm)	Ginning outturn (%)	Spinnability
1.	MCU 6	(MCU.6 x Kambala) x (MCU.1 x 9971) x MCU.1	1970	165	693	27.0	36	40
2.	KC 1	Reselection from the variety SRT.1	1980	140-145	400	21.9	36	40
3.	KCH 1 (Hybrid)	MCU.7 x SB 289-E	1980	140-145	1681	29.8	31	50
4.	KC 2	MCU.10 x KC.1	1987	145-150	772	24.4	37	40

Crop Management

- Pre monsoon dry sowing on 39th Standard week in cotton, sorghum and pulses.
- Crop weather model has been developed for pre-monsoon, monsoon and late monsoon condition.
- Seed hardening with 2.0% KCl solution to induce drought tolerance.
- Seed dressing with Thiram or Bavistin at 2 gram per kg of seed to protect the crop from seed borne disease.
- Using tractor drawn seed drills for sowing.
- Weather forecasting alongwith Technical advises regularly during every week through All India Radio, Thirunelveli by 6.35 AM on every Thursday and Monday for the benefit of the farmers.
- Integrated Farming System approach for dryland crops.
- Land Management practices of Summer ploughing, deep furrow and broad bed system, compartmental bunding and raising live hedges with Vetiver along the contour line to arrest soil erosion and to conserve soil moisture for getting higher yields in rainfed crops in black soil tract.
- Application of 40:20:0 kg NPK/ha to cotton and millets for higher yield in rainfed black soil tract.
- Application of 40:20:0 kg NPK/ha as FYM + 20 kg N as urea for higher yield on cotton and millets.
- Application of 40kg N + 20kg P + 25kg ZnSO₄ per ha. For higher grain yield in cotton-sorghum and cumbu crops.
- 1.0% MgSO₄ spray at 45 and 60 DAS alongwith recommended fertilizer dose for higher seed cotton yield.
- Maintenance of two milch cows in rainfed vertisol as one of the components in integrated farming system approach is economically feasible, viable and sustainable.
- Disseminating IPM technologies for cotton
- Cotton + Blackgram/Greengram/Clusterbean intercropping system for higher monetary return and less jassid incidence.
- Sorghum shootfly can be controlled by polleting the seeds with 4 ml of Chlorpyrifos 20 EC or Monocrotophos 35 EC WS or Phosalone 35 EC with 2.5% gram Solution in 230 ml of water/kg of seed.

- Sowing cholam during 39th Standard week (Last week of September) registered least shootfly incidence and higher yield.

6. Rice Research Station, Ambasamudram

Crop improvement :

Varieties released : Total Number : 20

Kar : ASD 1, ASD 2, ASD 7, ASD 8, ASD 9, ASD 14, ASD 16, ASD 17, ASD 18, ASD 20.

Pishanam : ASD 3, ASD 4, ASD 5, ASD 6, ASD 10, ASD 11, ASD 12, ASD 13, ASD 15, ASD 19.

Red Rice : 9 varieties.

White Rice : 11 varieties.

Breeding national or international parents recognition received by Rice Research Station, Ambasamudram.

ASD 1 - Tolerant of seed aging high storage capacity with lesser seed deterioration.

ASD 7 - Noted for resistance to BPH & GLH and used as a donor globally in resistance programme.

ASD 8 - Possesses the resistant gene ,GLH.5 for green leaf hopper.

Ruling varieties :

Kar : ASD 16, ASD 17, ASD 18, ASD 20.

Pishanam : ASD 19.

Late Pishanam: ASD 16, ASD 17, ASD 18.

Crop management :

- Farming system: Rice – Rice – Pulses or Rice – Rice – Sesamum along with subsidiary units of milch animals, rearing of goats, fish cultures and mushroom cultivation are found to be economical for Thamirabarani region.
- Cropping system for Thamirabarani tract : Rice – Rice – Blackgram; Rice – Rice Sesamum.
- Optimum time of sowing for short and medium duration hybrids are the first fortnight of June and second week of October respectively.

- Basal application of DAP to the nursery at 2 kg/cent is found to be the best for obtaining higher yields.
- For semidry paddy, application of enriched FYM at 5.0 t/ha on the last ploughing is necessary; 5.0 t/ha of well decomposed FYM, 50 % of recommended P and K, 10 kg of Ferrous sulphate are mixed thoroughly and kept in a pit for one month under anaerobic condition (During the period of storage, springle water twice and mix it well)
- Application of Rock Phosphate in acid soils instead of superphosphate.
- Application of phosphobacterium to main field (2 kg/ha) increases the efficiency of “P” availability in acid soils.
- Recommendation of fertilizer and spacing for southern districts Kar : 125 : 50 : 50 kg NPK/ha; 15 x 10 cm (66 hills/m²) Pishanam 150 : 60 : 60 kg NPK/ha; 20 X 10 cm (50 hills/m²)
- ASD 16 and ASD 18 better suited for direct wet seeding in Kar season.
- Cage wheel puddling is better for direct seeded rice.
- Through integrated nutrient management with organic and biofertilizers, 25 % N and 50 % P₂ O₅ could be saved.
- Foliar spraying of Gibberelic Acid (GA₃) at the rate of 120 g/ha recorded maximum seed yield.
- Towards environmental safety and to avoid pollution of soil and water by the raw coirpith, the application of composted coirpith @ 12.5 MT/ha to low land rice was found to be good and natural composting of raw coirpith in manurial pit was found to be as good as composted by pleurotus.

Crop protection :

- Application of carbofuran to nursery @ 175 g/cent on 10th day of sowing controlled the sucking pests of nursery.
- Neem seed kernal extract 5% was found better in the management of rice pest.
- In the hybrid rice pest management Palmarosa oil at 0.5% or quinolphos was better in the control of leaf folder and stemborer.
- Dissolving phorate 10% granules @ 2.5 g/10 lrs. Of water and pouring it in rat holes and plugging with mud will completely destroy the adult and young one.

Seed technology :

- Optimum time of sowing for short and medium duration hybrids are the first fortnight of June and second week of October .

7. Agricultural College and Research Institute, Madurai

MDU 1 Rice

- Released during 1980
- For rainfed areas of old Ramanathapuram districts
- 20% yield increase over the local Chithiraikar

MDU 2 Rice

- Released during 1984
- Cold tolerant variety suitable for Cumum valley of Madurai district with low spikelet sterility
- 17% yield increase over IR.20

MDU 3 Rice

- Released during 1989
- Suitable for tail end area of PVRRP. Resistant to Gall midge
- 19% yield increase over IR.20

MDU 4 Rice

- Released during 1991
- Highly tolerant to cold, resistant to grain discoloration which is the problem in IR 20 and MDU 2
- 18% increase over IR.20

MDU5 Rice

- Released during 1996
- Very early maturing, suitable for direct seeding and transplanting in all seasons. Drought tolerant
- 17% yield increase over PMK 1, 12% over and 14% over ADT 36

MDU 1 Mushroom

- Released during 1997
- A new oyster mushroom with bright white colour; fleshy; thicker and tastier
- High yielding (522.9 g/500 g bed)
- Fast growing producing sporophores in 15.28 days as against 17.59 days in Co.1
- Shorter in duration (35 days) than Co 12 (45 days)
- More protein content (33.58%) than Co 1 (30.54%) on dry weight basis
- Less fat (2.26%) than in Co 1 (3.18%)
- Higher P, Mg, Ca, Cu, Fe and Mn content

- Less crude fibre (10.90%)
- Superior to Co 1 in overall acceptability

Horticultural crops

MDU 1 Chillies

MDU 1 Bhendi

MDU 1 Onion

MDU 1 Brinjal

MDU 1 Bitter gourd

MDU 1 Marigold

Crop Management

- Preparation of enriched manures from rural, urban and agricultural wastes through the process of vermi composting
- Weed management for low land rice
- In Periyar – Vaigai command areas of Tamil Nadu under low and condition wet seeded rice followed by summer ploughing with application of pre-emergence herbicide pretilachlor 0.75 kg/ha 4 days after sowing followed by one hand weeding 30 DAS is the best combination for obtaining higher yield.
- The unweeded check recorded the lowest – grain yield of 1705 kg/ha whereas pretilachlor followed by one handweeding 5426 kg/ha. Two manual weedings recorded 583 kg/ha pre-emergence application of pretilachlor supported with one hand weeding gave the highest net return, one hand weeding gave the highest net return, onehand weeding gave Rs.18253/ha whereas the existing practice of hand weeding gave only Rs.16613/ha.
- Nutrient management for summer irrigated cotton
- 60 kg N AZOS + NAA recorded higher yield with 0.75 lw/CPE ratio of irrigation water & 74074 pp net return Rs.14888/ha (2528 kg/ha) kapas yield.
- Application of pretilachlor plus safeness 0.5 kg/ha 4 DAS to wet rice nursery
- Preplant application of glyphosate 1.6 kg/ha during summer in rice system
- Rotational use of pretilachlor (0.75 kg) with and thiobencarb (1.25 kg) in low land rice.

- Intercropping of daincha on one side of the furrow four days after sowing and incorporation of the same 50 to 60 days after can planing was found to increase the cane yield by 8-10 t/ha besides increasing the sugar yield and soil fertility level.
- Under constraints of irrigation water crop sequence groundnut blackgram. Saves water besides increasing income
- Application of kaoline 1% for rice fallow cotton
- Dry seeding during first week of August month
- Sowing on BBF system
- Application of rock phosphate and phosphobacteria and enriched farm yard manure
- Developed irrigation calendar for all field crops in Periyar – Vaigai Command area

VII. PROSPECTS OF AGRO-BASED INDUSTRIES

The scope for agro-based industries depend on availability of raw materials, electricity, transport facilities, credit, demand for the products at production centre and also in other districts. Among the above factors, the availability of raw materials and enterpreneurship are most important. At present the existing agro industries in Southern districts are rice processing mills, pulses processing mills, edible oil extraction units, rice bran oil extraction unites. The processing of fruits are done by unorganized unites and under unhygienic conditions. There is a scope to start pickle manufacturing unites with lime (Dindigul, Tirunelveli), tomato (Dindigul, Theni) and chillies (Ramnad and Tuticorin). Poultry feed units can be started in Dindgul, Madurai and Virudhunagar. As the bullock population is declining paddy straw can be utilized to prepare mushroom at District capitals of southern districts.

Virudhunagar district

1. Processing and preservation of fruit crops especially for Guava and Sapota
2. Rice is the predominant crop grown in this division during winter. There is a great potential to rice bran oil. Emphasis may be given for production of rice bran oil. Establishment of rice bran oil mills will greatly enhance the economic status in this region besides filling the oil gap of the nation.
3. Cattle feed industries
4. *Dhal* and *masala* powder making industries
5. Cotton seed oil extraction industries

Ramanathapuram district

1. Coir waste based industries
2. Medicinal plants can be introduced and industries may be started based on the production.

Sivagangai district

1. Coir based Agro industries
2. Industries using prosopis

Thoothukudi district

1. In Thoothukudi district, millets and cotton crops are grown in larger areas, the residue of millets and cotton can be utilized for starting Paper Industries and Card board Industries.
2. The millet grains and sea foods are available in larger quantity. These grains can be utilised for preparation of poultry and Dairy feeds and hence there is a good scope for starting Poultry and Dairy Industries.
3. In rainfed areas, pulses are cultivated in considerable area. There is a scope for starting of Dhal Industries. Since cotton is an important commercial crop in this district, there is a scope for textile industries.
4. Match industries play a major role in providing employment opportunities in towns and rural areas. For preparation of match splints, wood materials are imported from Kerala. Hence the soft wood tree species can be grown extensively in wastelands, thereby production cost of match industries can be reduced considerably besides getting good revenue from the trees.
5. The rainfall is highly erratic and distribution is not uniform. Hardy and drought tolerant medicinal plants could be grown in the wastelands and hence there is a scope for starting of Ayurvedic medicinal industries.
6. Further Thoothukudi being a harbour city, the medicinal plants can also be exported to foreign countries.
7. In Thoothukudi, Thiruchendur, Sathankulam and Srivaikundam taluks, coconut is cultivated in considerable areas. Hence there is a scope for starting of coconut powder industries and coir industries.
8. In dry belts of Thoothukudi district, Palmyrah is also cultivated in considerable area. There is a good scope for starting of Toddy and Palm sugar industries. The Palmyrah tree leaves

and branches can be used for preparation domestic materials which provides employment opportunities to the rural mass.

Tirunelveli district

1. Cattle feed/Poultry feed industries can be started with the available raw materials/by products expected from sugar factories and millet crops.
2. Paper, Cardboard industries can be expected with the raw materials of Prosopis juliflora abundantly available in the Radhapuram, Nanguneri, Sankarankoil division waste materials (pseudo stem) of banana crop for packing Tobacco.
3. Charcoal making industries can be started with the available Prosopis crop and Cracker industries, medical industries gunpowder making industries can be thought of.
4. The coastal area, theri lands can be utilised for tree plantation with cashew, casuarina palmyrah and related food consumables and wood industries can be started . Conservation of soil and water and rural employment can be generated.
5. Mushroom farming enterprises can be taken in large scale using the available plenty paddy straw.
6. Coir industries can be expanded further, with the available coir pith and coir pith manuring can be undertaken towards disposal of coir waste.
7. The rainfed area of the districts in the division Tenkasi, Senkottai ,Radhapuram, Nanguneri and Sankarankovil may be fully exploited for tree plantation viz. neem tamarind Acasia babul Amla and other horticultural fruit crops depending upon the rainfall and supplementary irrigation.
8. Fish culture, prawn culture can be thought of in the East coastal areas of Tirunelveli district.

Madurai district

1. Fruit and vegetables processing industries in the southern region of Tamil Nadu
2. Cereals and pulses based instant/convenient foods may be prepared
3. Instant Masala Mix suitable for vegetarian and Non-vegetarian dishes
4. Flavour and colour extraction units may be started as per the requirement of commercial purpose and export
5. Entrepreneurial training for the Horticultural and Agricultural growers

Dindigul district

1. There are 22 Biscuit factories, 2 Dhal Mills, 7 Fire Works, 6 Flour Mills and 3 Oil Mills.
2. One Rice Bran Oil Factory at Dindigul and One Coconut Produce (Coconut mill and Coconut powder) manufacturing factory at Batlagundu are also available.

VIII. Suggestion to alluviate the problems and constraints and improvement of agricultural productivity and production

Virudhunagar district

- ❖ Soil erosion should be arrested and rain water must be conserved by adopting suitable management technologies.
- ❖ Soil health care by application of organic manures, bio-fertilizers and soil amendments
- ❖ Encouraging the farmers to raise the green manure crops like Daincha and sunnhemp in the cropping system will improve the soil condition
- ❖ Ameliorative measures through Gypsum application after soil testing in alkaline areas wherever possible
- ❖ Development and introduction of alkaline tolerant crop varieties to improve production and productivity.
- ❖ Adoption of low and no cost technologies and inter cropping of pulses for getting higher net income in rainfed areas
- ❖ Mechanised farming may be encouraged in a cooperative manner in labour scarce areas.
- ❖ Tree cropping and growing medicinal plants in marginal lands and growing fruit trees in medium fertile soils
- ❖ Mushroom cultivation and goat rearing for marginal farmers and land less people
- ❖ Exploration of short duration drought evading crops to tide over rainfall aberrations
- ❖ Adopting suitable contingent cropping system for aberrant weather situations.
- ❖ Contingency plans like farm pond, formation of broad bed, contour bed and other allied water harvesting techniques for effective utilization of available water.
- ❖ Imparting plant protection knowledge for effective and timely use of pesticides.
- ❖ Motivating the farmers to adopt latest technologies on production and protection
- ❖ Introduction of seed village and motivating the farmers to grow their own seed.
- ❖ Formation of registered cooperative societies in marketing net work (as in Dairy) to fetch higher remunerative prices.

- ❖ Establishment of cold storage units for perishable commodities.

Ramanathapuram district

- ❖ Lab to land programme has to be strengthened
- ❖ Agro industries based cropping system has to be developed
- ❖ Introduction of mechanization
- ❖ Concentration on need based research

Sivagangai district

- ❖ Development of high yielding crop varieties with very high drought tolerance
- ❖ Popularization of the released drought tolerant short duration varieties
- ❖ Developing cashew plantations and orchards

Thoothukudi district

- ❖ More bio-control labs have to be established to supply the bio control agents to the farmers.
- ❖ In blackgram, salt tolerant varieties are to be evolved without sacrificing the yield for deep vertisol tracts.

Tirunelveli district

- ❖ Selection of suitable crop varieties with reference to climate, soil etc, to withstand local, adverse and changing conditions.
- ❖ Adoption of soil amelioration measures to correct soil problems and toxicity deficiency.
- ❖ Evaluation and Evolution of new crop varieties to withstand the location specific constraints and changed / changing weather conditions. (eg. Hardy Millet crops, Shorter duration varieties, varieties/ crop suited for sodic and acid soils etc.)
- ❖ Evolution of high yielding crop varieties with resistance to pest and diseases with local and location specific adaptability.
- ❖ Using modern breeding tools for developing varieties resistant to pest and diseases,
- ❖ Weeds, soil toxicity besides packed up with higher protein, vitamins etc.
- ❖ Use if soil amendments, soil conservation and mulching, soil analysis and balancing the micronutrients status.
- ❖ Soil water management, summer ploughing, residue in corporation recycling of organic carbon use of bio control agencies.
- ❖ Crop rotation, mixed and inter cropping, border, bound cropping, catch cropping, trap cropping etc for maintenance of soil fertility.

- ❖ Refinement of seed management, seed treatment technologies, seed storage and seed and hybrid seed production technologies.
- ❖ Use of Integrated water management, weed management, nutrient management and pest and disease management.
- ❖ Use of botanicals in pest, disease management.
- ❖ Avoiding indiscriminate use of inorganic fertilizers, chemicals, pesticides, fungicides, and herbicides etc.
- ❖ Strictly following the improved agricultural production technologies, management practices ear marked for each crop and varieties with reference to season.
- ❖ Application of organic, green and green leaf manure.
- ❖ In depth study of egg parasitoids.
- ❖ Developing genetically resistant varieties for rice yellow stem borer, leaf folder and ear head bug
- ❖ Improving the population of natural predators by use of organic fertilizer/bio pesticide, botanicals.
- ❖ Refinement of the indigenous implements used in seed programme.
- ❖ Training to seed growers, in various production, protection, storage aspects of technologies.
- ❖ Adoption of all improved scientific technologies.
- ❖ Use of specified crop and varieties for location, region, district concerned.
- ❖ Adoption of identified cropping system of the particular area.
- ❖ Introduction of any crop variety in a particular region with the approval of the state agricultural university, Department of Agriculture, State and Central Government concerned.
- ❖ Education, Information training etc to farmers with reference to varieties, adaptability. Improved technologies.
- ❖ Improving the economic background of farmers.
- ❖ Avoiding pollen contamination mixture of seeds.
- ❖ Use of different crop varieties of same crop in a particular division to be thought off.
- ❖ Supply of good quality, quantity seeds in time.
- ❖ Community nursery, transplanting by using mechanised transplanter – harvest by haverster.
- ❖ Application of herbicides in large scale by mass contact programme.

- ❖ Strict enforcement of seed treatment technologies biofertilizer, pesticide, fungicide before seed packing itself by the concerned authority, production department private/ Government agencies.
- ❖ Frequent training, demonstration to farmers in various aspects besides conduct of on farm trials and FLDs .
- ❖ Intensification of integrated village adoption programme and extending to more no. of villages.
- ❖ Enforcement on soil analysis.
- ❖ Improving the storage, marketing facilities.
- ❖ Developing Agrobased and allied industries for getting higher income to the farming community besides fixing normal sale price for the agricultural commodities.
- ❖ Maintenance of irrigation tanks, channels weed free.
- ❖ Adoption of eco-safety measures.
- ❖ Profitable cropping and farming systems to be adopted.
- ❖ Formulation and adoption of contingency plan to accommodate the vagaries of monsoon division wise.
- ❖ Improving the status of farmers by improving storage facilities and by getting reasonable price for agri commodities.
- ❖ Grouping the holdings for mechanization.
- ❖ Refining the Agricultural Education to farmers, AIR, Farm School on AIR etc.

Dindigul district

- ❖ Increasing the productivity by creating awareness among the farmers about the latest technologies through demonstrations and wide publicity and thereby increasing the adoption rate.
- ❖ Use of high yielding varieties/hybrids for cultivation
- ❖ Providing incentives and motivating the farmers to increase the production by issuing prizes to the farmers recording highest yield.
- ❖ Providing irrigation facilities
- ❖ Converting the uncultivable lands to cultivable lands
- ❖ Growing commercial crops

IX. FUTURE THRUST

Regional Research Station, Aruppukottai

- Evolving high yielding, drought tolerant, pest & disease resistant varieties/hybrids
- Evolving suitable low cost farm implements esp. for sowing and weeding
- Intensification of research on Integrated Nutrient Management, Integrated Pest, Disease & weed management and Integrated Farming System Approach
- Crop weather modeling for rainfed crops
- Research on Dryland Tree Farming
- Dryland horticulture involving Ber, Sapota, Custard Apple, Tamarind, Amla and Mango
 - Collection and evaluation of germplasm
 - Physiological studies for drought alleviation and yield improvement
 - Post harvesting technologies
 - Pest and Disease Management

Cotton Research Station, Srivilliputhur

- Development of intra hirsutum and inter-specific cotton hybrid for the summer irrigated/rice fallow tracts
- Identification of suitable restorer lines for the existing male sterile lines
- Wide hybridization for imparting resistance to stem weevil and wilt diseases in the improvement of hirsutum cotton
- Crop weather modeling and studies on continuous use of herbicides in summer irrigated cotton based cropping system
- Evolving a viable IPM module for summer irrigated cotton
- Identification of new chemicals and formulations against jassids and boll worms in cotton
- Development of management strategy for bacterial blight and root rot of cotton
- To educate the farmers on the improved varieties and technologies of major crops through trainings and demonstrations.

Agricultural Research Station, Ramanathapuram

Research Programme for improvement of annual crops:

- Drought resistant and salinity tolerant rice varieties to overcome early drought and later water stagnation condition are to be intensified.

- Intensification of research on commercial crops like cotton, chilli, groundnut, etc. to suit this district. There is a lot of scope for improvements in the rice fallow cotton and 'gundu' type chilli cultivation.
- Intensification of research on introduction of newer commercial/Oil yielding crops.
- Bio techniques to develop species to withstand stress conditions.
- Feasibility studies to introduce sericulture to overcome rural unemployment problem. Suitable methods of mushroom cultivation utilizing available agricultural wastes.

Improvement of perennial crops/trees

Selection and breeding of tree species for wastelands:

- Correct choice of species through survey
- Choice and selection of best performing races and genotypes within a species based on high survival, adaptability, growth root system etc.
- Selected materials can be multiplied vegetatively or by seed and used for plantations. Seeds have to be collected from natural sites and later, seed orchards have to be established to produce seeds.
- Intensification of research over introduction of annuals, commercial crops, green manure and forage crops
- INM for tree crops of commercial values

Improvement of horticultural crops

- Evolving suitable species of cashew to coastal wastelands
- Introduction of fruit crops for coastal sandy areas
- INM for fruit crops and other water related problems of coastal sandy soils

Agri-horti-silvi studies

- Laying out Silvi-pasture models with trees like. *Acacia leucophlaea* Neem etc. with forage grass and legumes.
- Intensification of research on Silvi-pasture, agri-horti, agri-silvi, agri-silvi-horti wherever possible in the coastal sandy soils.
- Identification of salt tolerant root stocks for tree species.

Integrated farming systems for coastal areas

- Pasture development and integrated farming system studies may be taken up to develop specific modules

- Integration of coastal aqua culture with effective crop components according to local condition
- Exploring the possibilities for the introduction of various farming systems according to the resources available in different ecological situation of the district.

Sivagangai district

- Future thrust may be given on popularization of existing drought tolerant varieties.
- Introduction of dryland horticulture and cashew plantation

Agricultural Research Station, Kovilpatti

- Breeding for high yielding, drought tolerant and pest and disease tolerant/resistant varieties/hybrids in cotton, millets, oil seeds and pulses suitable for rainfed black soil tract of southern districts of Tamil Nadu.
- Breeding for high yielding varieties of chillies superior to K.1 and K.2 varieties suitable for irrigated condition in southern districts of Tamil Nadu.
- Developing weekly weather based forecasting with technical bulletin for Thoothukudi and Thirunelveli districts and broadcasting through All India Radio, Tirunelveli for the benefit of the farmers.
- Developing crop weather modeling for cotton, sorghum and pulses under rainfed situation.
- Developing internet communications through V SAT for weather forecasting for dryland crops with particulars emphasis to pest and disease.
- Developing sustainable integrated farming system approach for the dryland tracts of southern districts of Tamil Nadu.
- Developing soil health improvement and integrated nutrient management for dryland crops.
- Developing botanicals and bio-control methods and integrated pest management for dryland crops.
- Developing suitable land management system for soil and moisture conservation for rainfed crops in vertisols in southern districts of Tamil Nadu.
- Transfer of Technology through Extension staff in Agricultural Department/All India Radio, Thirunelveli, Adoptive Research Trial/On farm Trial/Demonstration/Field day/Farmer's Day and Publications.
- Conducting training to the farmers and staff of State Department of Agriculture on various aspects of Agriculture with particular emphasis on dryland Agriculture.

Rice Research Station, Ambasamudram

- Develop technology in hybrid rice seed production.
- Evolution of high yielding salt and acid tolerant genotypes.
- Development of new rice hybrids using two line breeding system,.
- Production of Nucleus & breeder seeds of varieties released from this station.
- Nursery techniques for manual/mechanical transplanter.
- Detailed studies in seedling broadcasting.
- Evolve rice genotypes to withstand hardy weeds and herbicides application.
- Find out alternate strategies for the existing drudgeries of women agricultural labourers in transplanting, direct seeding. Weeding, harvesting etc.
- Evaluation of rice varieties resistant to major insect pests and diseases.
- Balancing the pest – predator system of rice.
- Management of acid soil.
- Enriched farm yard manure in semi-dry paddy.
- Establishment in seedling broadcasting under unfavourable conditions.

Dindigul district

- Evolving a new blast resistant variety suitable for high mist & Chill weather prevailing under the foot hills of Western Ghats of Palani suitable for late Samba season (October-February) as 8000 ha is grown with late Samba crop.
- A new variety similar to Co.43 with high yield potential may be evolved to replace Co.43 in Palani Taluk.
- A suitable hybrid cholam for rainfed cultivation may be evolved as the normal area under rainfed sorghum cultivation is around 60000 ha.
- The maize hybrids CO 1 and COo 2 are inferior in their performance compared to private company hybrids (Pioneer, Mahyco, Pro agro) and hence suitable hybrid in maize may be evolved.

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