

## **NORTH EASTERN ZONE- STATUS REPORT**

Tamil Nadu state is classified into seven agro-climatic zones, based on rainfall distribution, irrigation pattern, soil characteristics, cropping pattern and other physical, ecological and social characteristics as given below:-

1. North Eastern Zone
2. North Western zone
3. Western Zone
4. Cauvery Delta zone
5. Southern zone
6. High rainfall zone
7. High altitude and Hilly zone

### **North Eastern Zone**

This zone cover the districts of Thiruvalluvar, Kancheepuram, Cuddalore (excluding Chidambaram and Kattumanarkovil taluks), Villupuram, Thiruvannaamalai, Vellore district and parts of Perambalur and Ariyalur district. The following research station are functioning under the North Eastern Zone.

1. Rice Research Station, Tirur
2. Oilseed Research Station, Tindivanam
3. Regional Research Station, Vriddhachalam
4. Sugarcane Research Station, Cuddalore
5. Sugarcane Research Station, Melalalthur
6. Agricultural Research Station, Virinjipuram
7. Vegetable Research Station, Palur

## **GENERAL AGRICULTURAL CHARACTERISTICS**

### **Delineation and general description of the zone**

#### **Population**

The Notheastern zone comprising the revenue districts of Thiruvallur, Vellore, Kancheepuram, Thiruvannamalai, Villupuram, Cuddalore, Perambalur and Ariyalur are situated between  $18^{\circ}5'$  and  $13^{\circ}2'$  of North latitude and  $76^{\circ}15'$  and  $80^{\circ}22'$  East longitude. It is having an area of 31065 sq. km. which is equivalent to 23.9% of the state area. This zone has the population of 124.94 lakhs equivalent to 19.1 % of state population.

#### **Physiography**

The zone can be broadly divided into six geographical tracts.

- i) The coastal plain stretching from 1998 km from at lake to Kanyakumari about 80-96 km wide with an average elevation of 77 km above sea level. It comprises the Northern plain (Thiruvallur, Vellore, Kancheepuram, Thiruvannamalai, Villupuram, Part of Cuddalore, Perambalur and Ariyalur).
- ii) A considerable portion is hilly and mountainous undulating with hillocks.
- iii) The Eastern Ghats comprising a line of hills, the Javadis, Shevaroyis, Kalrayans, Pachamalais and Kollimalais between the Palar and Cauvery rivers and beyond, and linked with the tail of Cuddapah in the Nilgiri hills.
- iv) The central Plateau undulating between the eastern and western ghats, 150-160 m in elevation, with the Palghat gap between the Nilgiris and the Annamalai hills on the west. Between the Cauvery and the Palghat gap the plateau rises gradually from 120 to 1180 m along the river reaching up to 360 to 460 m in the west, broken occasionally by granitic and gneissic rocks.
- v) Western Ghats comprise the highest mountains of the peninsula. The Nilgiris located on the Northern side of the Palghat gap form a compact area of about 2950 km with a summit level of 1830 to 2440 m rising with extreme abruptness on all sides.
- vi) There are some back water lag on adjoining the coast around Cuddalore, Marakkanam and Pichavaram.

The principal rivers of the zone entirely depend on rainfall received in five to six months in a year and almost dry in the hot weather. To harnessed for irrigation uses, these rivers need the constructional storage works and barrages.

## **Soil**

Soils in this zone vary considerably due to geological climatic and vegetation changes besides human exploitation.

## **Geology**

The greater part of the zone consists mainly of metamorphic crystalline rocks of Archaean age belongs to the Charnokite and Khondalite groups. Laterite, Boulder bed tertiary, Gondwana, Archean, Sathyavedu conglomerates, Sriperumbudur beds and Alluvium is seen in this zone.

In North west of Vriddhachalam, land of red hills of Pondicherry are overlined by fossiliferous upper cretaceous formations.

The geological foundation of the north eastern part of the zone is gneiss. In spite of the great age of this series and the high degree of metamorphism undergone, the time of their sedimentary origin can still be seen clearly. Along with the gneissic formation and being a semi arid region the soil formation has been mainly influenced by the parent material and their physiographic position with poor addition of organic matter due to the available plant and animal life in the area. As such the physical processes of soil formation predominate over the chemical processes.

Apart from geological formation the wide variations in the climatic conditions and ecological factors influence the evolution of soils in this zone leading to wide differences in soil properties and soil profile development. The high range of soil variability is noticed in this zone.

This zone is also undoubtedly the major depository of the state mineral wealths viz., Iron ore, Pyrrholite, Magnesite, Graphite, Sulphides, Carbonalite, Barytes, Feldspar, Vermiculite, Stealite and talc constantly of attractive geologists and Industrialists Copper and lead bearing minerals and granite deposits are seen respectively in Kallakurichi taluk, Mailum and its adjacent areas. The geology of the zone may be considered as an epitome of the geology of the peninsula.

## **Soil types**

The major soil types found in the zone can be grouped as "Vertic haplustalf" having soil colour ranging from dark greying, "Udic haplustalf" having colour ranging from light yellowish brown to brownish, "Vertic Ustochrepts" with the colour ranging from light grey to dark, red soil laterite soil, river alluvium and alluvial soil. These soils predominate in Vellore, Thiruvannamalai, Cuddalore and Villupuram district. In Thiruvallur and Kancheepuram districts the red non calcareous soil predominantly present in all the taluks of the Kancheepuram district except in Kancheepuram taluk where its occurrence is negligible.

The next major soil viz. black soil is present mostly in the taluks of Maduranthagam, Ponneri, Uthiramerur and Chengleput taluks of Thiruvallur and Kancheepuram district. Cuddalore and Villupuram district. It occupies 45% of the total cultivable area. The soils are either shallow or deep upto 5m. In certain localities these soils have black surface followed by light brown deeper layer. These are highly Argillaceous (30-50% clay) and produce deep cracks in summer due to shrinkage on drying. They contain high amounts of Iron, Calcium and Magnesium.

The alluvial soil represents 11% of the total area of Thiruvallur and Kancheepuram districts which are pre-dominantly present in Kancheepuram taluk. In Villupuram and Cuddalore districts, saline coastal alluvium occurs along the coastal line and their origin may be sedimentary or formed by the rivers and are overlaid with sand blown from sea breaches.

Ferruginous red loam occurs in Thiruvallur, Kancheepuram, Vellore, Villupuram, Cuddalore, Perambalur and Ariyalur districts. The texture is usually loamy, the colour varying from red at the surface to yellow at the lower horizon. The soils are of medium depth with good drainage, free from accumulation of salt and calcium carbonate, pH ranging from 6.5 to 8.0 and contain low amounts of organic matter, nitrogen and phosphorus but with generally adequate amounts of potash and lime.

### **Coastal salt affected soils**

The Thiruvallur and Kancheepuram districts are a coastal district having the four taluks viz., Ponneri, Saidapet, Chengalpattu and Madurantakam along the coast which extends to 142 km. The saline and alkaline soils of nearly 11, 796 ha are distributed in patches in the above four taluks.

### **Climate**

The climate in the zone basically semi-arid tropical. Four distinct seasons occur South West Monsoon (June-Sep.) North East Monsoon (Oct-Dec.) Winter season (Jan-Feb.) and Summer season (Mar-May). The hottest months are April-June and the cold climate prevails during December and January.

### **Rainfall**

The annual rainfall of the zone excluding hills varies from 800-1400 mm. The South West Monsoon, North East monsoon, Winter showers and Summer rain in Vellore and Thiruvannamalai districts of the zone contribute respectively 47, 42, 2 and 9 percent to the annual rainfall the quantum and distribution may vary between seasons and places within the zone. In Thiruvallur and Kancheepuram districts maximum precipitation is contributed by North East monsoon (56%) followed by South West monsoon. It is noticed that a wet period of 7 months and dry period of 5 months in a year. Since the soil is moist and dry for more than 190 cumulative days in a year the soil moisture regime is grouped under 'Ustic'.

In Cuddalore and Villupuram, the South West monsoon, North East monsoon and hot weather period contribute 39.47, 53.87 and 6.64% of the total rainfall. The precipitation in the different agricultural divisions varied from 4.17% of the annual rainfall in Villupuram and Cuddalore to 8.96% at Vriddhachalam. This showed that the precipitation during hot weather period from Feb-May decreased from the interior parts of the district to the coastal belt.

### **Temperature**

The average maximum temperature ranged from 28.2 to 38.9<sup>0</sup> C and the minimum from 19.5 to 24. 8<sup>0</sup> C. The differences between the mean maximum temperature and the mean minimum temperature is maximum in the month of March. The plains of Tirupattur region of district records both lowest night temperature (14<sup>0</sup> C) and the highest day temperature (40<sup>0</sup> C).

### **Humidity**

In general the highest relative humidity percentage recorded during the months of Oct-Jan. in this zone.

### **Wind**

Wind velocity is lowest during the months of Oct, Nov. from Oct-Mar. wind blows generally from Northeasterly and easterly directions. South westerly and westerly winds predominate from May to September.

### **Cloudiness**

The skies are generally clear or lightly clouded from January to middle of April. The cloudiness increases thereafter and skies remain generally clouded from June to December.

### **Land use pattern**

Of the total geographical area of 12.23 lakh hectares in Vellore and Thiruvannamalai districts only 5.01 lakh hectares are

Tuot	-	TYPIC USTORTHENT
Tuft	-	TYPIC USTIFLUVENT
Tupt	-	TYPIC USTIPSAMMENT
Uuop	-	TYPIC USTOCHREPT 9USTROPEPT0
Fuop	-	FLUVENTIC USTOCHREPT 9USTROPEPT0
Vuop	-	VERTIC USTOCHREPT (USTROPEPT)
Ffop	-	TYPIC FRAGIOCHREPT (TROPEPT)
Ursf	-	UDIC RHODUSTALE
Uhsf	-	UDIC HAPLUSTALE

Trsf	-	TYPIC RHODUSTALE
Thsf	-	TYPIC HAPLUSTALE
Vhsf	-	VERTIC HAPLUSTALF
Tesv	-	TYPIC CHROMUSTERT
Ecsv	-	ENTIC CHROMUSTERT
Dcsv	-	UDORTHENTICK CHROMUSTERT

**Legend for agro ecological situation map of North Eastern Zone**

SITUATION NUMBER		DESCRIPTION
1	Red non-calcareous - Low Rainfall – Low Elevation	(RNC-LR-LE)
2	Red non-calcareous – Low Rainfall – Medium Elevation	(RNC-LR-ME)
3	Red Non-calcareous – Medium Rainfall – Low Elevation	1(RNC-MR-LE)
4	Red non calcareous – Medium Rainfall – Medium Elevation	1(RNC-MR-ME)
5	Red non-calcareous – High Rainfall – Low Eleation	1(RNC-MR-ME)
6	Red calcareous – Low Rainfall – Low Elevation	1(RC-LR-LE)
7	Red calcareous – Low Rainfall – Medium Elevation	(RC-LR-ME)
8	Red calcareous – Medium Rainfall – Low Elevation	(RC-MR-LE)
9	Red calcareous – Medium Rainfall – Medium Elevation	(RC-MR-LE)
10	Red calcareous – High Rainfall – Low Elevation	(RC-HR-LE)
11	Black Non-calcareous – Medium Rainfall – Low Elevation	(BNC-MR-LE)
12	Black Non-calcareous – Medium Rainfall – Medium Elevation	(BNC-MR-ME)
13	Black calcareous – Low Rainfall – Medium Elevation	(BC-LR-ME)
14	Black calcareous – Medium Rainfall – Low Elevation	(BC-MR-LE)
15	Black calcareous – High Rainfall – Low Elevation	(BC-HR-LE)
16	Coastal Saline Alkaline and Swamp – High rainfall – Low Elevation	(CS-HR-LE)

## **DETAILS OF CROPS GROWN IN NORTH EASTERN ZONE**

- Area covered production and productivity of North Eastern zone is enclosed in Annexure II (Table 1 & 2)
- i) Details of area covered under principle crops of North Eastern zone (district wise) are discussed hereunder

The total area cultivated in paddy is 7.4 lakh ha. Of which 26.18 per cent of the area is covered by Kancheepuram district followed by Thiruvannamalai (19.36%), Villupuram 917.13%), Thiruvallur (11.03%) and Vellore (6.89%) (Table 2).

With respect to millets, 2.52 lakh is under North Eastern Zone. Thirty eight percent of the area is covered by Cuddalore district followed by Villupuram 22.38 and Thiruvannamalai 12.18 percent respectively.

Area covered under pulses is 2.743 lakh ha. Of which 46.12 per cent of the area is covered by Cuddalore district and followed by Villupuram.

Sugarcane is cultivated in 2.646 lakh ha while cashew is grown in an area of 7038 lakh ha. The major cashew grown district are Perambalur and Ariyalur district and Cuddalore which occupies 77.56 and 22.44 per cent of the total cashew cultivable area.

- Popular varieties of different crops grown in North Eastern zone.

**Popular varieties of different crops grown in North Eastern Zone**

<b>Crops</b>	<b>District</b>	<b>Season</b>	<b>Improved varieties</b>
<b>Paddy</b>	Kancheepuram	Sornavari (April-May)	TKM 9, ADT 36, IR 50, ADT 37, ASD 16, ASD 17, ASD 18, ASD 20, ADT 42, ADT 43, ADT 41, CORH 1, MDU 5
		Samba (August)	White Ponni, CO 43, ADT 40,
		Late samba (Sep-Oct)	IR 20, White Ponni, ADT 39, CO 45, CO 43, TRY 1, MDU 5, ASD 20, CORH 2
<b>Paddy</b>	Kancheepuram	Navarai (Dec-Jan)	ADT 36, ADT 39, ADT 37, ASD 16, ASD 20, IR 64, CO 37, ASD 18, ADT 42, IET 1722, IR 20, CO 43, CORH 1, MDU 5.
		Dry (July- August)	TKM 9, IR 50, PMK 1, PKM 2, MDU 5, TKM 11.
		Semi Dry (July- August)	TKM 9, PMK 1, TKM 10, PMK 2, IR 20, MDU 5, TKM 11.

<b>Crops</b>	<b>District</b>	<b>Season</b>	<b>Improved varieties</b>
<b>Paddy</b>	Vellore Tiruvannamalai	Sornavari	CO 37, ASD 16, ASD 17, ASD 18, ADTRH 1, ADT 41, ADT 42, ADT 43, MDU 5, CORH 1, ASD 20
		Samba	CR 1009, ADT 40, White Ponni, CO 43, IR 20, TRY 1, CORH 2, ASD 19, MDU 5, Bhavani, Paiyur 1, PY 4, CO 45.
		Navari	Rasi, ADT 36, ADT 39, CO 43, IR 64, ASD 16, ASD 18, ADT 42, IR 20, CO 37, CORH 1, MDU 5, ASD 20

<b>Paddy</b>	Cuddalore Villupuram	Sornavari	ADT 36, TKM 9, IR 50, ASD 16, IR 64, ASD 18, ADTRH 1, ADT 41, ADT 42, ADT 43, MDU 5, CORH 1, ASD 20
		Samba	CR 1009, ADT 38, White Ponni, CO 43, IR 20, TRY 1, CORH 2, ASD 19, MDU 5, CO 45, PY 4,
		Navari	ADT 36, ADT 39, CO 43, IR 64, ASD 16, ASD 18, ADT 42, IR 20, CORH 1, MDU 5, ASD 20
	Perambalur Ariyalur	Kuruvai (June-July)	TKM 9, IR 50, CO 37, ASD 18, ADT 42
		Samba (August)	White Ponni, CO 43, CR 1009, TRY 1, ASD 19, IR 20
		Late samba	IR 20, White Ponni, ADT 39, CO 43, CO 45, ASD 19.
		Navarai (Dec-Jan)	ASD 18, ADT 42.

<b>Crops</b>	<b>District</b>	<b>Season</b>	<b>Improved varieties</b>
<b>Cholam</b>	Kancheepuram Thiruvallur	Thaipattam (Jan-Feb)	CO 21, K 5
		Chithirai pattam (April-May)	K 4, CSH 5, COH 3, CO 26, BSR 1, COH 4
		Adipattam (Jun-Jul)	Tall
		Purattasipattam (Sep-Oct)	Tall, CO 25
	Vellore Tiruvannamalai	Thaipattam (Jan-Feb)	K 5
		Chithirai pattam (April-May)	CO 21, K 5
		Adipattam (Jun-Jul)	Co 19, K 5, K. Tall, COH 3, CO 25, CO 26, BSR 1, COH 4
		Purattasipattam (Sep-Oct)	K5, K. Tall, Co 26

	Cuddalore Villupuram	Thaipattam (Jan-Feb)	CO 21, CSH 5, COH 3, CO 26, BSR 1
		Chithirai pattam (April-May)	CO 26
		Adipattam (Jun-Jul)	K 5, K. Tall, COH 3
		Purattasipattam (Sep-Oct)	CO 21, K 5, K. Tall, CO 25, CO 26, BSR 1
	Perambalur Ariyalur	Thaipattam (Jan-Feb)	CO 25, CSH 5, COH 3, COH 4, BSR 1
		Chithirai pattam (April-May)	CO 25, CO 21, CSH 5, COH 3, COH 4, BSR 1
		Adipattam (Jun-Jul)	K 5, K. Tall, COH 3, CO 25, CO 26, BSR 1
		Purattasipattam (Sep-Oct)	K. Tall, CO 25, CO 26, BSR 1

<b>Crops</b>	<b>District</b>	<b>Season</b>	<b>Improved varieties</b>
<b>Cumbu</b>	North Eastern Zone (Except Kancheepuram, Thiruvallur district)	<b>Irrigated</b> Chithirai pattam (March-April)	WCC 75, K 3
		Masipattam (Jan-Feb)	WCC 75, K 3, CO 7, X 6, X7
		<b>Rainfed</b> Adipattam (Jun-Jul)	WCC 75, K 3

<b>Crops</b>	<b>District</b>	<b>Season</b>	<b>Improved varieties</b>
<b>Ragi</b>	Kancheepuram Thiruvallur, Vellore, Thiruvannamali Prambalur Ariyalur	Marghazipattam (Dec-Jan)	CO 11, Co 7, CO 18
		Chithirai pattam (April-May)	CO 11, K 7
		Adipattam (Jun-Jul)	INDAF 5, CO 11, CO 7
		Purattasipattam (Sep-Oct)	CO 11

	Cuddalore Villupuram	Marghazipattam (Dec-Jan)	CO 7, CO 11, CO 12, Co 13, Local
		Chithirai pattam (April-May)	CO 11, CO 12, K 7, CO 13
		Purattasipattam (Sep-Oct)	CO 11, CO 12

<b>Crops</b>	<b>District</b>	<b>Season</b>	<b>Improved varieties</b>
<b>Cotton</b>	Cuddalore Perambalur	Irrigated (Aug-Sept) Rice fallows	MCU 5, MCU 5, Sunvin, MCU 9, Hybrid DCH 32, Varalaxmi. MCU 7, ADT 1

<b>Sugarcane</b>	Kancheepuram, Thiruvallur, Villupuram	Early season (Dec-Jan)	COC 71, COC 772
	Cuddalore		COC 773
	Vellore		COC 85061
	Perambalur		CO 8021
	Kancheepuram, Thiruvallur	Mid season (Feb-Mar)	CO 6304, COC 774
	Villupuram		COC 775
	Cuddalore		COC 774
	Vellore		CO 449,
	Perambalur		CO 8001
	Kancheepuram, Thiruvallur	Late Season (Apr-May)	CO 6304, COC 8201
	Villupuram		COC 8201
	Cuddalore		COC8201
Vellore		COC 771	
Perambalur		COC 777	

**OILSEEDS**

<b>Groundnut</b>	Kancheepuram Thiruvallur, Villupuram, Cuddalore, Vellore, Perambalur	Early season Adipattam (Jun-Jul)	TMV 7, VRI 2, VRI 3, VRI 4, Co 3
	Kancheepuram Thiruvallur, Villupuram, Cuddalore, Vellore, Perambalur	Late Adipattam (Jul-Aug)	TMV 7, JL 24, VRI 2, VRI 3

<b>Groundnut</b>	Kancheepuram Thiruvallur, Villupuram, Cuddalore, Vellore, Perambalur	Aypasipattam (Oct)	TMV 2, TMV 7, Co 2, JL 24, VRI 2, VRI 3,
	Kancheepuram Thiruvallur, Villupuram, Cuddalore, Vellore, Perambalur	<b>Irrigated</b> Summer (Apr-July)	TMV 2, TMV 7, CO 3, JI 24, VRI 2, VRI 3
	Kancheepuram Thiruvallur, Villupuram, Cuddalore, Vellore, Perambalur	Margazhipattam (Dec-Jan)	TMV 7, CO 3, VRI 2, VRI 3, VRI 4
	Kancheepuram Thiruvallur, Villupuram, Cuddalore, Vellore, Perambalur	Masipattam (Feb-Mar)	TMV 7, CO 2, CO 3, JL 24, VRI 2, VRI 3

<b>Sesame</b>	Kancheepuram Thiruvallur, Villupuram, Cuddalore, Vellore, Perambalur	<b>Rainfed</b> Adipattam (Jun-Jul)	TMV 3, TMV 5, VRI 1
		Kathigaipattam (Oct-Nov)	TMV 3, TMV 5, TMV 6, VRI 1
		Masipattam (Feb-Mar)	TMV 4, TMV 6
		<b>Irrigated</b> Masipattam (Feb-Mar)	TMV 3, TMV 4, TMV 6, VRI 1

<b>Castor</b>	Perambalur	<b>Rainfed</b> Adipattam (June-Jul)	TMV 4, TMV 5
	Kancheepuram Thiruvallur, Villupuram, Cuddalore, Vellore, Perambalur	Hybrids)	TMVCH 1

**Pulses**

<b>Redgram</b>	Kancheepuram Thiruvallur Villupuram Cuddalore Vellore Perambalur Thiruvannamalai	Adipattam (June-Aug)	} CO 5 VBN 2 VBN 2, SA 1, CO 4, VBN 1, K 1, CO 6 SA 1, CO 4, CO 5, VBN 2 VBN 2, SA 1, CO 4, CO 5 VBN 2, APK 1 SA 1, CO 4, CO 5, VBN 2
		Purattasi pattam (Sep-Nov) Summer (Feb-Mar)	

<b>Blackgram</b>	Kancheepuram Thiruvallur Villupuram Cuddalore Vellore Perambalur Thiruvannamalai	Adipattam (June-Aug)	} T 9, VBN 3 T9, TMV 1, VBN 2, VBN 3 T9, TMV 1, VBN 2, VBN 3 T9, TMV 1, VBN 2, VBN 3 VBN 2 T9, TMV 1, VBN 2, VBN 3, CO 5
		Purattasi pattam (Sep-Nov) Summer (Feb-Mar)	

<b>Greengram</b>	Kancheepuram Thiruvallur Villupuram Cuddalore Vellore Perambalur Thiruvannamalai	Adipattam (June-Aug) Purattasi pattam (Sep-Nov) Summer (Feb-Mar)	CO 4, KM 2, VBN 1, CO 67 K1, CO 5, K 851, CO 6 CO 4, KM 2, CO 5 K 851, CO 4, KM 2, VBN 1, K1, CO 6 CO 5, CO 4, KM 2, VBN 1, K 1, CO 6 CO 4, KM 2, VBN 1, K 1, K 851, CO 6 VBN 1
<b>Cowpea</b>	Kancheepuram Thiruvallur Villupuram Cuddalore Vellore Perambalur Thiruvannamalai	Adipattam (June-Aug) Purattasi pattam (Sep-Nov) Summer (Feb-Mar)	CO 4, CO 6 - CO 4, KM 1, CO 4, KM 1 CO 4, Pai 1 - CO 4, Pai.1
<b>Cashew</b>	Kancheepuram Thiruvallur Villupuram Cuddalore Vellore Perambalur Thiruvannamalai		VRI 1, VRI 2, VRI 3, VRI 4

## TECHNOLOGY DEVELOPED UNDER VARIOUS RESEARCH STATIONS

### Rice Research Station, Tirur

#### Crop Improvement

The following rice varieties were released from this station

Variety	Year of release
TKM 1	1950
TKM 2	1950
TKM 3	1950
TKM 4	1950
TKM 5	1952
TKM 6	1952
TKM 7	1973
TKM 8	1976
TKM 9	1978
TKM 10	1992
TKM 11	1992

- The rice variety TKM 6 locally called as a Sanna Sornavari a hybrid derivative of the cross GEB 24/CO 18 attained global importance and widely used as a good donor in most of the hybridization programmes.
- The rice variety TKM 9, a hybrid derivative of the cross TKM 7/IR is yet another high yielding rice variety from this Station which has performed wonderfully well both under semidry and wet conditions through out Tamil Nadu.
- TKM 10 is a cross derivative of CO 31/C 22 with duration of 135 days. It is a medium tall plant with medium slender white rice and best suited for semidry tracts of Kancheepuram and Tiruvallur districts.
- The variety TKM 11 (C 22/BJ 1) evolved as a fine grain variety for upland and semidry conditions. This variety is becoming popular in recent years due to the unprecedented drought conditions prevailed in the part of Northern Districts of Tamil Nadu especially in the Kancheepuram and Thiruvallur districts.

## Crop Management

- Growing rice and blackgram in 4:1 ratio was economical under rainfed farming in Samba season
- Application of Phosphorus at 75% STCR recommended level either as DAP or super phosphate alongwith Phosphobacterium and Azospirillum significantly increased the grain yield in irrigated rice to the level of 15% in Tiruvallur and Kanchipuram districts.
- Combined spray of zinc sulphate (0.5%), Ferrous sulphate (0.25%), Manganese sulphate (0.1%), copper sulphate (0.1%) on 20,40 and 50 DAT alongwith basal application of Azospirillum and Phosphobacterium @ 2 kg ha<sup>-1</sup> gave 20% increased the yield in irrigated rice during all the seasons.

## Crop Protection

- Extensive survey of rice crops conducted in Kanchipuram and Tiruvallur districts revealed that yellow stem borer, leaf folder, green leaf hopper and earhead bug are the major pests affecting the crop and resulted in 20 to 25% loss in yield. Of late rice black bug, gall midge and hispa are emerging as major pest problems in these districts. Green leaf hopper, vector of Rice Tungro disease is prevalent all through the year and three species viz., *Nephotettix virescens* sp, *N. nigropictus* and *N. malayanus* have been identified and the predominant is *N. virescens*. Survey revealed that the prevalence of two species of leaffolders viz., *Cnaphalocrocis medinalis* and *Marasima patnalis*
- Rice planted in the month of June resulted in severe incidence of green leaf hopper which inturn increased the RTV.
- Studies conducted on the evaluation of botanicals against the rice earhead bug indicated that the spray of Neem Seed Kernel Extract (NSKE) 5% and *Ipomoea* spp leaf extract 10% at 10 days interval from panicle initiation is proved to be highly effective.
- Rice accessions viz., IET 12029, IET 13989, IET 12901, IET 12872, IR 58099 – 41 – 2 – 3, IR 53970-2-1 and IR 52341 – 60-1-2-1 were moderately resistant to rice black bug.
- A complete management practices were evolved for rice black bug. Spraying of acephate @ 625 g/ha or monocrotophos @ 1000 ml/ha or Neem seed kernel Extract 5% at 10% ETL was highly effective against rice black bug.
- Blast: TM 1307, TM 8089, TM 9423, IET 8059 and IR 64  
RTV: TKM 11, ADT 37, IR 72, TM 5516, TM 5616, TM 1307, BG 1165/2 and IR 68305-18-1.
- Extensive survey for the occurrence of rice diseases was taken up. The major devastating diseases are blast, brown spot, sheath rot and Rice Tungro diseases. Of late, bacterial leaf streak, bacterial leaf blight and stem rot are emerging as major problems in these districts.
- Seed treatment with Carbendazim (0.05%) proved to be very effective against brown spot and *Fusarium* root rot in nursery.
- Spraying of edifenphos @ 750 ml/ha at 30, 45 and 60 DAT was effective for the management of blast, sheath rot and brown spot.

- Spraying of streptomycin @ 50 g/ha + copper oxy chloride @ 1250 g/ha at maximum tillering stage effectively controlled the bacterial leaf blight and bacterial leaf streak disease in rice.
- Foliar application of leaf extracts of *Vitex negundo* 10% or *Prosopis spareiflora* 10% was highly effective for brown spot and grain discoloration diseases.
- Leaf extracts of *Aegle marmelos* (Vilvam) 10 per cent as spray effectively checked the leaf blast and neck blast in rice.

## **Oilseed Research Station, Tindivanam**

### **Crop Improvement**

- Twelve high yielding groundnut varieties TMV 1 to TMV 12 were released. This include six bunch, three semi-spreading and three spreading varieties. TMV 2 is a bunch variety with wider adaptability and is under cultivation in Karnataka, Andhra Pradesh and Gujarat also. TMV 10 is a semispreading variety with highest oil content (54%).
- Six high yielding sesame varieties TMV 1 to TMV 6 were released. TMV 3 is a cosmopolitan variety suited for all season. TMV 5 is suited to cold weather season while TMV 4 and TMV 6 are suited for summer season.
- Six high yielding castor varieties TMV 1 to TMV 6 and one castor hybrid TMVCH 1 were released.
- One high yielding blackgram variety TMV 1 was released. It is a short duration variety suited for districts in the North Eastern Zone.
- The following intercropping systems which were highly profitable were developed 1: 6 Blackgram : Groundnut; 1:6, Castor- Groundnut; 1:4, Cumbu-Groundnut.
- In the case of late receipt of monsoon, blackgram + castor at 6:1 ratio is recommended.
- Dual spraying of Glyphosate 1% (post –emergence) 15 days prior to sowing followed by pre-emergence application of metalachlor @ 1 kg ai/ha on third day after sowing controlled weeds efficiently.
- Groundnut seed hardening with calcium chloride 0.5 per cent induced drought tolerance and increased the yield.
- Summer ploughing followed by glyphosate spray effectively controlled *Gyperus rotundus*.
- Raising castor by forming ridges 60 cm apart and furrows of 30 cm width, 15 cm depth is better than flat bed method.
- A manurial schedule of 10:10:45 NPK kg ha<sup>-1</sup> with 6.25 M.T of farm yard manure has been developed for rainfed groundnut. For irrigated groundnut, the schedule was fixed as 17:34:54 NPK kg ha<sup>-1</sup>.
- Enriched farm yard manure @ 750 kg ha<sup>-1</sup> is recommended in the case of non-availability of bulky farm yard manure.
- Ten per cent infested leaflets was estimated to be the economic threshold level for groundnut leafminer (GLM).
- Intercropping cumbu with groundnut at 1:4 ratio reduced GLM incidence.
- The parasite *Gonozius* sp. was found to be potential in reducing GLM incidence.

- Grade 3 was estimated to be the critical level for the application of fungicides to groundnut diseases.
- Spraying of carbendazim 50 WP 250 g/ha plus mancozeb 1000 g/ha was effective in reducing rust and tikka leaf spot of groundnut.

### **Regional Research Station, Vridhachalam**

#### **Groundnut**

- Application of fluchloralin or metachlor as pre-emergence herbicide with one hand weeding gave equal yield to that of two hand weedings.
- Adoption of full package VRI 2 groundnut cultivation registered significantly higher pod yield of 2852 kg ha<sup>-1</sup> and C:B ratio of 1:3.37 through farmers practice.
- Intercropping of groundnut : cowpea : soybean in 10:1:1 ratio has reduced the incidence of leafminer to significant level.
- Spraying of cyproconazole 0.1% or diphonoconozole 0.1% or carbendazim 0.1% + Tridermorph 0.1% on 45 and 60 DAS was found to be very effective in controlling late leaf spot and rust diseases.

#### **Sesame**

- Pre-emergence application of alachlor 2.5 kg ai/ha + one hand weeding on 30 DAS controlled weed infestation.
- Spraying of NSKE 5% on 35<sup>th</sup> and 55<sup>th</sup> DAS is as effective as insecticidal spray against shoot webber
- Soil application of neemcake (150 kg ha<sup>-1</sup>.) + *Trichoderma* seed treatment (4 g/kg of seed) reduced the root rot disease and thereby increased the yield to 40% over control.

#### **Cashew**

- The foliar feeding of nitrogen (with 3% and 4% urea) along with insecticide (endosulfan 0.07%) at flushing, flowering and fruiting along with soil application of NPK (500:250:250 g/tree) was found to be highly beneficial and remunerative.
- Softwood grafting of cashew with 90 days old scion on 30 days old root stocks during January, February, July and December was recommended.
- Spray of neem oil (2%) and neem seed kernel extract (5%) was found to be cost effective against foliage pests.

#### **Mushroom**

- VM 1, an edible funnel mushroom comes to first harvest in 30-35 days yielded 6-8 kg/spawn bottle with a keep quality of 7-10 days under natural conditions.

## Technologies included in CPG/passed on to ART/OFT

### Groundnut

**VG 9711:** Bunch type groundnut matures in 105-110 days, a derivative of the cross CG 26 x ICGS 44, a mean pod yield of 2683 kg ha<sup>-1</sup> as compared to checks by VRI 2 (1964 kg ha<sup>-1</sup>) and VRI 4 (1979 kg ha<sup>-1</sup>), tolerant to rust disease, the kernels are red and medium size, the shelling outturn of the culture is 76.0% and the oil content is 51.8%.

**VG 9526:** Extra early bunch groundnut maturity in 9-95, derivative of the cross (ICGS 44 x JL 24) x ALR 2, mean pod yield is 2166 kg ha<sup>-1</sup> as compared to 1444 kg ha<sup>-1</sup> by VRI 3, 1708 kg ha<sup>-1</sup> by local red and 1416 kg ha<sup>-1</sup> by TMV 2 checks, the kernels are small with more testa colour, shelling percentage is 76.5% 15 days seed dormancy

### Sesame

- Neem seed kernel extract 5% is equally effective as that of Endosulfan 35 EC (1.6 lit/ha) for the control of sesame shoot webber.

### Varieties released and their popularity

Groundnut	Year of release	Yd/ha (kgs)	Shelling (%)
VRI 1	1981	1800	74.4
VRI 2	1985	2000	74.0
VRI 3	1991	2600	75.0
VRI 4	2000	3320	721.1
VRIGn 5	2001	2133	75.0
Sesame	Year of release	Yd/ha (kgs)	Oil content
VRI 1	1995	2500	50.5%
Cashew	Year of release	Yd/ha (kgs)	Shelling (%)
VRI 1	1981	560	28
VRI 2	1985	680	28.5
VRI 3	1991	1075	29.1
VRI 4	2000	1250	28.5

## Sugarcane Research Station, Cuddalore

### Crop Improvement

Twelve early and nine mid late sugarcane varieties have been released from this research station

Early : CoC 671, CoC 771, CoC 772, CoC 8001, CoC 85061, CoC 86062, CoC 90063, Co 8021, CoC 91061, CoC 92061, Co 86249 and CoC 98061.

Mid : Co 6304, CoC 774, CoC 775, Co 8362 and CoC 99061

Late : CoC 777, CoC 778, CoC 779, CoC 8201

CoC 671 released during 1975, uplifted the rural economy of the sugarcane growing farmers and revolutionized the sugar industry in the state. It was the most popular variety upto mid nineties when it succumbed to red rot disease.

Co 86249 is resistant and CoC 98061 and CoC 99061 are moderately resistant to red rot disease.

### **Crop Management**

- Cosi 86071 performed better for drought tolerance with the highest cane yield of 129.5 t/ha.
- Press mud application @ 25 t/ha increases cane and sugar yields
- Short crop of cane (6-8 months age) records better germination than aged ones
- Among the spacing, 80 cm between cane rows brings out more cane yield
- The optimum seed rate for high yield is 75, 000 double budded setts per hectare
- Among the planting methods, the conventional method of arranging cane setts in the furrows end to end and covered by soil 1-2 cm thick is found to be easily adopted by farmers
- Pre-emergence application of herbicide 'Atrazine' @ 0.5 kg ha<sup>-1</sup> is effective in controlling weeds in the intercropping system without affecting intercrops like blackgram soybean and groundnut.
- Mulching ridges with raw press mud @ 25 t/ha records 85.5 per cent weed control efficiency.
- Irrigation once in 9 days at germination phase, 10 days at tillering and growth phases and at 13 days during maturity phase is found to be ideal for sugarcane
- Among the intercrops, blackgram proves better with a net return of Rs. 2.63 for one rupee invested.
- Growing green manures like sunnhemp, daincha as intercrops in sugarcane adds 15 t/ha of green manure when incorporated in soil and increase cane yield by 10-15 t/ha
- Application of 25 per cent excess, N a fortnight ahead and withholding irrigation during September second fortnight arrests flowering/arrowing in cane without affecting sugar quality.
- Harvesting of cane at maturity both in plant and ratoon crops fetches a maximum return of Rs. 2.38 and Rs. 3.39 respectively.
- Growing of crops in 3 years rotation in the sequence of sugarcane plant + sugarcane ratoon + groundnut, green manure and paddy results in higher profits
- Stubble shaving and shoulder breaking, application of 25 per cent sprouting of sugarcane stubbles.
- Detrashing of cane and high level earthing up during 7<sup>th</sup> month ensures higher cane yield.

- Application of 275 kg, N, 63 kg P<sub>2</sub>O<sub>5</sub> and 113 kg K<sub>2</sub>O Per hectare was found to be the optimum dose for maintaining the cane yield.
- Sugarcane quality could be sustained by decreasing reducing sugars (0.3%) and narrowing the N/P<sub>2</sub>O<sub>5</sub> ratio (0.2) with the application of compost (25 t/ha), phosphorus (63 kg P<sub>2</sub>O<sub>5</sub>/ha) and potassium (113 kg k<sub>2</sub>O/ha).
- Phosphorus needs to be applied as basal dose at planting and N and K need to be applied in three equal splits on 30<sup>th</sup>, 60<sup>th</sup> and 90<sup>th</sup> day of planting in heavy soils (clayey soils) and in four equal splits on 30<sup>th</sup>, 60<sup>th</sup>, 90<sup>th</sup> and 120<sup>th</sup> day of planting in light textured (sandy) soils.
- The deficiencies of micronutrients in sugarcane could be managed with basal (soil) application of 20 kg ferrous sulphate, 10 kg manganese sulphate, 10 kg zin sulphate, 5 kg Borax mixed with 500 kg of compost per hectare
- Occurrence of iron deficiency (Iron chlorosis) in Iron deficient soils/ratoon sugarcane having stresses could be corrected by spraying of 5 kg Ferrous sulphate + 5 kg Urea dissolved in 500 litres of water per hectare at 15 days interval till deficiency symptoms disappear.
- In Zinc and Boron deficient soils, application of Zinc sulphate 28 kg ha<sup>-1</sup> and Borax 5 kg ha<sup>-1</sup> enhanced the cane yield
- Staking of harvested cane under shade with trash cover could minimise the loss in weight and accumulation of reducing sugars significantly.
- The cane yield recorded with the application of 8 kg ha<sup>-1</sup> of phosphobacteria and 50 per cent P<sub>2</sub>O<sub>5</sub> as Super phosphate is on par with the yield recorded the application of 8 kg ha<sup>-1</sup> of phosphobacteria and 100 per cent P<sub>2</sub>O<sub>5</sub> as mussorie rock phsophate. Similarly, incorporation of 6 kg ha<sup>-1</sup> Azotobacter with 225 N/ha recorded equal cane yield as that of 275 kg N/ha as Urea alone.
- For drought management, mulching the ridges with cane trash on 7<sup>th</sup> month followed with Kaolin spray at 120 days (12.5 kg ha<sup>-1</sup>) at 2 per cent ensures higher cane yield
- The chemical ripener soidum metasilicate @ 25 kg ha<sup>-1</sup> as foliar spray on 10<sup>th</sup> month increased the CCS per cent by 1.5 unit.
- The intensity of cane juice quality deteriororation is very rapid from 40-96 hours after harvest.

### **Crop Protection**

- Among the borer pests, early shoot borer (*Chilo infuscatellus*) causes damage even upto 60 per cent in young shoots during March to June.
- No variety is found to be completely resistant to early shoot borer
- Trash mulching on ridges during 10 DAP and intercropping green gram reduces the early shoot borer incidence.
- Neem seed kernel extract 5 per cent or neem oil 2 per cent in second round preceded by Sevidol granule application (1 kg ai/ha) reduce early shoot borer to the extent of more than 60 per cent.
- Sevidol 4.4 granules @ 12.5 kg ha<sup>-1</sup> applied in whorls or at root zone followed by irrigation or endosulphan 0.07% spray reduces the incidence of early shoot borer and increases the cane yield.

- The tachinid fly parasitoid *Sturmiopsis inferens* is active on early shoot borer during summer months.
- The major egg parasitoids on internode borer are *Trichogramma chilonis* and *Telenomus beneficiens* in Cuddalore region and their parasitization varies from 30-55 per cent under natural condition.
- Release of *Trichogramma chilonis* egg parasitoid @ 2.5 cc/ha at fortnightly intervals six times commencing from fourth month onwards effectively checks the incidence of internode borer.
- Closed cup release through ice cream or plastic disposable cups increases the percentage emergence of parasitoid *T. chilonis* (70-74%) as against conventional method of card tying in field (61%).
- Detrashing of cane during 5<sup>th</sup> and 7<sup>th</sup> months decrease the infestation of internode borer, mealy bugs, white fly, scales and pyrilla.
- Pyrilla is found to occur during September to November. Good showers followed by a dry spell is found to be more favourable for the multiplication of the pest.
- Monocrotophos 0.05 per cent spray after detrashing reduce pyrilla significantly. The parasitoid *Epipyropis melanoluca* parasitizes both nymphs and adults of pyrilla even to the extent of 84-88 per cent.
- White fly, *Aleurolobus barodensis* a pest in problem soils can be managed by an insecticides of systemic nature such as acephate, carbosulfan etc. after detrashing.
- White grub, *Holotrichia serrata* incidence is more prevalent in Dharmapuri, Erode and Coimbatore districts.
- Co 86249 is completely resistant to red rot (*Collectotrichum falcatum*) disease.
- COC 98061, CoC 99061, Cosi 95071, CoG 93076, Co 85019, Co 86010 are moderately resistant varieties to red rot
- Six isolates of red rot disease are identified with varying degrees of virulence
- Delayed irrigation or alternate row irrigation reduces the red rot disease incidence level to 48 per cent while normal irrigation elevates the incidence to 74 per cent.
- Smut disease (*Ustilago scitaminea*) has two epidemic periods viz. May to June and October to November and can be managed by aerated steam therapy
- Set rot (*Ceratocystis paradoxa*) can be tackled by sett treatment in Carbendazim 0.5 g/l or triadimaton 0.5 g/lit before planting. Carbendazim 25 DS is also effective
- Top rot can be minimized by spraying copper oxy chloride or chlorothalnil or Mancozeb @ 0.5 g/l
- Sugarcane sett treatment is followed by mixing 125 g of Carbendazim 50 WP 250 g of Carbendazim 25 DS in 250 l of water along with 2.5 kg of Urea and dipping the setts for 5 minutes
- Among different genera of nematodes on sugarcane the commonly noticed ones are Hoptolalimus, Helicotylenchus, Pratylenchus, Criconema, Meloidogyne, Trichodorus, Rotylelnchus and Tylenchus.
- A nematode population of 800 – 1000/250 g of soil reduces the cane yield even though the cane appeared to be healthy
- Crop rotation with rice, fallowing the field for about three months reduce nematode population in soil

- Application of FYM @ 60 t/ha or press mud @ 45 t/ha, poultry manure (guano) @ 3 t/ha or neem cake @ 100 kg/ha are effective against nematodes
- Granular nematicides like Carbofuran 3 G @ 1.5 kg ha<sup>-1</sup> is against nematodes

### **Forestry**

- Among the tree species for saline coastal soil (8.4 pH and 3.8 EC) *Casuarina equisetifolia*, *Acacia auriculiformis* and *A.hotosericea* were adoptable with soil amendments with red earth, FYM and Coir pith
- *Cassia fistula* is too sensitive to saline soils
- *Casurina equisetifolia* adopts to coastal saline soil provided some soil amendments like FYM are added
- The height and girth of *Casuarina equisetifolia* could be increased by the application of 150 kg P205/ha as Rock phosphate incubated with phosphobacteria and Farm yard manure

### **Agricultural Extension**

- Regular training programmes on all sugar production technologies are being conducted to the cane staff of different sugar mills of Tamil Nadu and Pondicherry. Sugarcane growing farmers and Extension staff of Department of Agriculture, Tamil Nadu under SUBACS programme.
- Both on and off-campus farm advisory works on various problems related to sugarcane production are rendered
- AIR broadcast from Pondicherry is done regularly
- Several publications like books, booklets, pamphlets, research articles both in English and Tamil are brought out regularly on sugarcane production.

### **Sugarcane Research Station, Melalathur**

#### **Crop Improvement**

- GOG. 773 – Early season cane with high yield and good ratooning ability.
- CoG. 93076 – Mid-late season cane with high yield, good ratooning ability, non-flowering, non-lodging and especially withstands drought with the ability to come up well in red rot prone areas.
- CoG.94077 – Early maturing, high yielding with good quality, non-flowering and suitable for jaggery production.
- CoG. 95076 – Early season cane – high yield, good ratooning ability, moderately tolerant to moisture stress and comes up well in tannery effluent polluted soils.

## Crop Management

- Sugarcane intercropped with greengram was remunerative with increased profit as compared to sugarcane alone.
- Raising greengram as intercrop in sugarcane and incorporating as green manure on 45<sup>th</sup> day recorded significantly higher yield than sugarcane alone.
- Trash mulching on ridges before first irrigation can be practiced to control weeds as well as to combat drought.
- Irrigation at 50% field capacity during tillering phase and growth phase and 25% field capacity during maturity phase was effective in obtaining maximum cane sugar yield.
- Propping by trash twist method effectively prevented lodging of cane and gave better juice quality and maximum cane and sugar yield.
- Sodium metasilicate spray at 12 kg ha<sup>-1</sup> at 6.8 and 10<sup>th</sup> months resulted in ripening of sugarcane and best quality at 11<sup>th</sup> months.
- The addition of wild bhendi extract (deola – *Hibiscus ficuleus*) followed by lime was found to be eco-friendly and the best clarificant in jaggery preparation resulting in permanent golden yellow colour compared to the addition of hydrose.
- Spraying either with 2.5% Potassium sulphate or 2.5% super phosphate solution during April was found to be effective in tiding over the drought condition during summer month of April to June.
- Mulching coir pith along ridges and furrows in tannery effluent polluted soils was found to be the best soil amendment resulting in maximum cane yield and sugar yield.
- Gap filling with sprouted settings in ratoon crop was found to increase the cane yield and sugar yield.
- Burning trash immediately after the harvest of plant crop affected the sprouting and tillering capacity resulting in low cane yield.
- Intercropping with soyabean recorded the highest income when compared with conventional method.
- Among the different months of planting, January and February was found to be the best in terms of cane yield and quality.

## Crop Protection

- Maximum buildup of early shoot borer *Chilo infuscatellus* population and infestation was found in last week of March after germination of mother shoot in April and reached its peak in May. The carry over of this pest in the area once in July to the young special season crop (Adsali) and second in January to next early eksali crop.
- Two rounds of spray with NSKE 5% on 30<sup>th</sup> and 50<sup>th</sup> days after planting was effective against early shoot borer with the highest sugar yield of 8.74% t/ha.
- Two spraying of phosphomidon 0.05% or dimethoate 0.05% on detashed crop during 7<sup>th</sup> and 8<sup>th</sup> month of crops was found effective against mealy bugs with the highest cane and sugar yields.
- A sum of 91 clones were screened for their field resistance against major pests of sugarcane.

- Soaking sugarcane setts for 15 minutes in carbendazim 0.05% + wetting agent teepol 0.1% recorded maximum yield.
- Grassy shoot disease was effectively controlled by treating the setts with aerated steam therapy at 52<sup>o</sup> C for one hour. Among the antibiotics chloramphenicol 250 ppm was effective in suppression of grassy shoot disease up to 7 months after planting.
- Screening sugarcane clones by pressure inoculation with smut teliospores resulted in earliest and maximum smut incidence among different methods of artificial inoculation.
- The intensity of diseases like sett rot, grassy shoot disease, leaf blight, smut, twisted top and leaf spot was more in tannery effluent affected soils than in non tannery soils.
- Sett rot (*Ceratocystis paradoxa*) was effectively controlled by biocontrol agent *Trichoderma harzianum* + *Azospirillum* sett treatment resulting in the higher cane and sugar yield.
- CoG. 93706 is moderately resistant to red rot.

### **Promising Clones**

- G. 95716, G. 95754, G. 95769, G. 96720 and G. 96736 are moderately red rot resistant clones, advanced to C. A. E. trails.

### **Agricultural Research Station, Virinjipuram**

#### **Crop Improvement**

- A greengram culture VMGG 97001 was selected from K. 851 through pure line selection. The culture VMGG 97001 proved its superiority by recording highest yield of 1020.4 kg ha<sup>-1</sup> which was 27.6 and 27.8 percent increased yield over the checks KM. 2 (799.2 kg ha<sup>-1</sup>) and VMB-1 (793.3 kg ha<sup>-1</sup>) respectively. A greengram variety VRMGg 1 is released during the year 2001.
- Of the 105 sorghum cultures evaluated, VMS 98001 (Thalaivirichan Type) was found to be most promising and suitable for Vellore and Thiruvannamalai districts.
- A total quantity of 3887 kg of greengram (K.851) breeder seed was produced and supplied to farmers through department of Agriculture.

#### **Crop Management**

- Maize varieties Co.1 and Africantall, C0.13 ragi and BN.2 grass were identified as suitable crops for tannery polluted areas. Desmanthus and Korai comes up well even when irrigated with raw effluent.
- Application of composted coconut coirpith @ 10 tonnes/ha in the tannery polluted area was found to be best soil amendment.
- Soil application of animal skin waste and tannery sludge increased the available nitrogen and phosphorus content. While the available potassium content was not altered. However electrical conductivity of soil increased from 0.1 to 0.8.
- The application of tannery effluent to soil resulted in reduction of hydraulic conductivity from 1.4 to 1.5 g/CC.

- The ground water samples collected from Pernampet and Ambur belts were found to be contaminated with tannery effluents.
- Electrical conductivity of contaminated groundnut water samples indicated the toxic EC range of 9 to 10  $\text{dsm}^{-1}$
- Phytotoxic elements like sodium and chloride exceeded the critical limits and recorded 2935 mg/L and 223 mg/L respectively
- Water hyacinth was found to absorb the toxic elements chromium and retained it in roots (4.8 ppm) and in leaves (2 to 5 ppm)
- Eight native micro organisms were isolated to explore the possibilities of detoxifying the effluent
- An unidentified bacteria was found to reduce the pH of effluent from 9.7 due to production of organic acids during its growth in effluent.
- An alga was found to thrive well in the effluent and improved the dissolved oxygen content of the effluent
- The bacteria, *Pseudomonas* sp. was found useful in effluent separation of sludge, thereby reducing the toxicity of the effluent.

### **Crop Protection**

- Spraying of neem seed kernel extract (NSKE) 5% at 10 days interval from flower initiation was found to be effective for the management of fruit borer on brinjal.
- Spraying of NSKE 5% thrice at 10 days interval from flower initiation was found to be the most effective against the gram pod borer, *Helicoverpa armigera* on redgram
- Sorghum cultures viz., EC 0024, MS 1142 and TNSH 9407 were found to be resistant to sorghum shootfly
- Spraying of NSKE 5% on 10<sup>th</sup> and 20<sup>th</sup> day after sowing was found to be effective in controlling sorghum shootfly.
- Spraying of Carbendazim 0.2% at triweekly interval was found to be effective in reducing the black spot disease of rose.
- Capsule application of carbendazim @ 100 mg/corm effectively control the panama disease of banana.
- Incorporating the antagonists viz., *Trichoderma viride* and *I. harazianum* on application of neem cake ( 8 kg/sq. meter) in nursery reduce the damping off disease of tomato.
- Spraying of Mancozeb 0.2% thrice at tri-weekly interval effectively controlled leaf spot diseases of tomato.

### **Horticulture**

- The low cost technique of producing better grade bunches by spraying 2-4-D at 15 ppm concentration on the bunch within 15 days after the opening of the last hand had been popularised among the growers.
- Application of urea blended with neem cake has increased the productivity of banana. This method also had suppressed the nematode level in “Rasthali” banana.

- Drought resistant studies in banana varieties revealed that the yield of poovan (AAS) was not much affected by decreased water supply whereas Robusta (AAA) recorded the lowest yield under water stress conditions.
- It was found that the first and second ratoon crops of poovan banana require the same fertilizer dose of 110:35:330 g NPK/plant.
- The Dwarf cavendish banana can be grown at a spacing of 1.5 m x 1.5 m (4444 plants/ha) which accommodates 1358 more plants per hectare as compared to the earlier practice of 1.8m (3086 plants/ha) spacing.
- Applying pendimethalin as pre-emergence herbicide at one kg ha<sup>-1</sup> followed by early post emergence (10 DA) application of Imazethapyr at one kg ha<sup>-1</sup> controlled weeds in tomato crop resulting in higher tomato yield and higher returns.
- In banana, application of glyphosate weedicide at one kg ha<sup>-1</sup> at 30 DAP and another one kg ha<sup>-1</sup> at 30 days after first earthing up on 3<sup>rd</sup> month recorded higher bunch weight.
- Azospirillum can be applied for banana at 18 g/plant in three splits. The first split as basal, the second at 3 months after planting and third at 5 months after planting. This gave 4.1% increased yield. The cost benefit ratio is 1:3 .17.
- VMB. 7 has been identified as a promising “Mullukathiri” local brinjal.
- CP. 11 long size papaya has been isolated as a promising selection.
- Banana clones viz., Kunnan, Nney Poovan, Ayirankai Rashthali, Karpooravalli and Pacha Bothan were found to be resistant to nematodes.
- Spraying 2, 4 – D @ 15 ppm on banana bunch recorded the highest bunch weight of 17.5 kg over the control (12.8 kg).

### Vegetable Research Station, Palur

#### Varieties released

CROP	VARIETY	YEAR OF RELEASE	SPECIAL FEATURES
Brinjal	PLR 1	1990	High yield potential (25.1) t/ha. Possess extended shelf life.
Jack	PLR 1	1992	Off-season bearing. High yielding (79 fts./tree). Suitable for high density planting.
Chilli	PLR 1	1994	Tolerant to salinity, green chilli variety. High yielding (18.4 t/ha).

#### Crop Management

- Soaking in double the quantity of Water for half – an-hour and incubating for six days is found optimum for pregermination of Ash gourd and Ribbed gourd seeds for early plant stand. Pregerminated seeds of Ash gourd started emerging within three days after sowing where as dry seeds emerge in seven days.
- Seed dormancy in Annamalai Brinjal was broken by seed treatment with KNO<sub>3</sub> 2% solution .

- A technique was evolved in bitter gourd to avoid field loss of seeds due to fruit cracking and bird damage. Fruits of seed crop can be harvested three days before full ripening, when mild orange tinge appears on the warts of the fruits and allowed to ripen in a room under ambient conditions for four days and then seeds extracted to avoid the field loss.
- Controlled imbibition of bitter gourd seeds by mixing with moist sand was found to increase the field emergence and seedling vigour.
- In Chilli seeds, high vigour of seeds could be achieved by extracting the seeds immediately after harvest and then drying under the sun in the morning hours of the day.
- Seed set in aggregatum onion types 'mutloor' is controlled both by the environment and genetic factors. Study of seed set at different locations revealed that 79.9 per cent seed set was recorded near sea shore and it decreased progressively to 76.9, 76.0 and 47.9 and 4 km. from sea shore and at Vegetable Research Station, Palur respectively.
- Tomato PKM 1 could be raised for four generations, without varietal deterioration.
- Manurial (300:50:90 kg NPK/ha) and spacing (75 x 60 cm) requirements were standardised for PLR 1 Brinjal.
- Agrotechniques were standardised (40:30:60 kg NPK/ha and maintaining three plants per pit) for producing quality seeds in MDU-1 bitter gourd.
- Optimum stage of harvesting the seed crop in Amaranthus was fixed. Harvesting 25 days after 50% flowering recorded maximum yield in Co. 1 and Co. 2 Amaranthus. Seed germination was also maximum when harvested 25 days after 50% flowering.
- Application of recommended dose of biofertilizers viz., Azospirillum and phosphobacteria @ 2 kg ha<sup>-1</sup>. along with fertilizer dose of 50:50:50 kg ha<sup>-1</sup> found to improve the seed yield and quality in bhendi.
- Maximum augmentation in seed recovery and seed yield was obtained in PLR 1 Chillies at 60 x 45 cm. Spacing with a fertilizer dose of 140:70:70 kg NPK and Azospirillum 2 kg per ha.
- Annamalai brinjal responded well for ratooning with yield potential of 63% of the main crop within 100-110 days and with a fertilizer dose of 75:25:30 kg NPK/ha plus Azospirillum and phosphobacterium each 2 kg ha<sup>-1</sup>.
- Pre plant and 20 DAP post treatment directed application of glyphosate at 1.5 kg ha<sup>-1</sup> effectively suppressed nut grass and increased the yield of brinjal.
- The pre emergent herbicides viz., Fluchloralin, Pendimethalin and Metalachlor at 1 kg ha<sup>-1</sup> and Oxyfluorfon at 0.20 kg ha<sup>-1</sup> effectively controlled the annual weeds, as effectively as hand weeding in bhendi.
- A fertilizer dose of 140:70:70 kg NPK/ha with 30 minutes soaking of seedling roots in Azospirillum and 60 x 45 cm. Spacing was optimum to get maximum yield and seedling vigour for a seed crop of Chilli PLR 1.
- July to February was found to be ideal period to plant tapioca in the North Eastern Zone for getting continuous supply of tubers throughout the year. PLR ME 46 Tapioca culture and Co 2 were found to be better genotypes for North Eastern Zone for getting continuous supply of tubers throughout the year.

## Crop Protection

- Neem oil 4% and NSKE 5% control bhendi and brinjal fruit borer.
- Onion thrips and leaf spot disease can be controlled by spraying either dimethoate 500 ml./ha + mancozeb 1 kg ha-1 (or) methyl demeton 500 ml/ha + mancozeb 1.0 kg ha-1 (or) dimethoate 500 ml. + carbendazim 500 gm/ha (or) dimethoate 500 ml/ha + tridemorph 500 gm/ha.
- For the control of bhendi leaf hopper dimethoate 1000 ml/ha (or) methyl demeton 1000 ml/ha (or) NSKE 5% (or) accphate 1400 ml/ha (or) triazophos 1400 ml/ha may be used.

## **CONSTRAINS AND PROBLEMS OF THE AREA IN EACH DIVISION**

### **Paddy**

- Non-availability's of blast resistant paddy variety for the late samba seasons.
- Lack of labour savings implements during peak seasons of transplanting.
- Non-availability of suitable saline – alkaline resistant variety for Kancheepuram in the place of existing Try 1.

### **Millets**

- Lack of drought resistant and high yield ragi variety to replace Co 1.
- Lack of saline tolerant variety the North Eastern Zone.

### **Oilseeds**

- Lack of suitable technology to increase the dormancy in groundnut varieties.
- Non-availability of pest and disease resistant sesame varieties.

### **Pulses**

- Non-availability of saline tolerant pulse varieties for North Eastern Zone

### **Sugarcane**

- Among the abiotic constrains, salinity of water along the coastal belt poses a challenge to sugarcane production. Hence there is a need for screening of saline tolerant varieties especially for coastal belts with high yield potentials.
- In northern and southern districts drought during the vegetative phase of the crop hampers production. Hence evolving of drought tolerant varieties of sugarcane is the need of the hour in view of the dwindling water table in these areas.
- Among the biotic constrains, red rot disease is common in all the high yielding and sugar rice varieties of sugarcane. Even the newly released varieties which registered themselves as moderately resistant to red rot, shown to be susceptible at the later periods of introduction.
- Of late, the borer insect pests especially early shoot borer, internode and top borers have been considered as a major constrain in cane production. Early shoot borer in the early stage of crop creates yield loss considerably in summer months. Internode and top borers attack the crop during the vegetative to maturity phase in complex and damage the quality of much concern to farmers and sugar mills.

### **Cotton**

- Lack of suitable Hybrid/Variety for saline patches of North Eastern Zone

### **Vegetables & Fruits**

- Lack of cold storage facilities for storage for vegetables and fruits.

### **Cashew**

- Lack of pest and disease varieties with special reference to Tea mosquito bug.

### **Coconut**

- Lack of Suitable technology for Eriophyid mite

### **General**

- Lack of technologies for value added products.
- Shelf life period of bio- fertilizer is short.
- Intrusion of sea water spoils the quality of groundnut water table.

## **SUGGESTIONS TO ALLEVIATE PROBLEMS AND CONSTRAINS**

### **Paddy**

- Blast resistant paddy varieties are to be evolved to tackle the incidence of blast during late samba season
- Developing low cost farm implements to over come the labour problem during peak season or paddy transplanting.
- Suitable saline-alkaline resistant varieties are need to be evolved to replace of existing TRY 2.

### **Millets**

- Drought resistant and high yielding varieties of ragi to replace CO 1 are need to be developed.

### **Oilseed**

- Developing suitable technologies to increase the dormancy of groundnut varieties
- Developing large seeded groundnut for exports
- Evolving disease resistant varieties in sesame.
- Evolving-non shattering and early maturing variety in sesame

### **Pulses**

- Saline-tolerant varieties are to be evolved.

## **Sugarcane**

- As sugarcane production is confronted by soil and water salinity conditions, there is a need to identify saline tolerant sugarcane varieties especially for coastal tracts of Tamil Nadu.
- Red rot disease varieties are also to be evolved to tackle the menace of this disease in coastal districts of Tamil Nadu. Combining yield attributes with red rot resistance is the need of the hour as aimed by growers and sugar mills.
- Of late the borer insect pest complex also has pervaded the sugarcane crop loss scenario, which has to be tackled through integrated pest management techniques.
- Clones of drought tolerance are to be evolved either through conventional breeding or through bio technological approach, as the problems of water availability in Tamil Nadu is a foreseeable malady of sustainability.
- The recycling of organic wastes of sugarcane through agro-based industries can be made effective by the policy promoters of government.

## **Cotton**

- Developing pest and disease resistant drought tolerant varieties.

## **Cashew**

- Pest resistant variety of cashew are need to be evolved to overcome the problem of Tea Mosquito bug
- Evolving new varieties/hybrids with bold nut in Cashew for export purpose.
- Developing integrated pest management technologies in cashew.

## **General**

- Seed village concept may be popularized to overcome the problem of non-availability of improved seeds various crop.
- Technologies related to value added products are need to be developed.
- Farming system oriented and interdisciplinary approach of research are to be followed.
- Integrated agriculture are need to be popularized
- Popularize Eco-friendly approach of technologies

## **FUTURE THRUST**

### **Rice Research Station, Tirur**

- Breeding programmes to evolve drought resistant short and medium duration rice varieties suitable for upland and semi-dry condition.
- Breeding programmes to evolve blast, RTV, leaf folder and rice black bug resistant varieties.
- Collection and maintenance of rice germplasm to study the biotic and abiotic stresses.

- Studies on agronomical methods to combat drought and to reduce (about drudgery in rice transplanting and harvest)
- To find out effective and economic management practices for major rice pests through integration of botanicals, bio-control agents, cultural methods and behavioural approaches.
- Studies into Silicon nutrition or rice crop and management of Nitrogen fertilization through biofertilizers, SPAD meter monitoring in irrigated, upland and semidry rice.
- To study the occurrence of RTV causative factors responsible for epiphytotics and to evolve suitable management practices in rice with special emphasis of varietal resistance.
- Development and testing of gadgets processing physical and behavioural approaches and its evolution in pest dynamics.
- To conduct Adaptive Research Trials in the farmers field for efficient and economic irrigation water through Irrigated Agricultural Intensification Programme (IAIP)
- Popularization of rice based agricultural implements/machinery among the farmers of Tiruvallur and Kancheepuram districts.
- Process development of the utilization of rice straw and rice wastes and by products of farm and industrial applications viz., vermi-compost, making of paper boards enriched feed blocks etc.,
- Establishment of medicinal park in the research station premises as well as in TNAU-IVDP adopted villages and exploring the possibilities of using medicinal herbs in Integrated Pest and Disease Management (IPM) programmes.
- Propagation of ornamental plants and production of coconut seedlings for Urban Horticultural Development Center, Madras.

### **Oilseed Research Station, Tindivanam**

- Breeding for quality attributes in groundnut and sesame with particular emphasis on rainfed conditions with resistance/tolerance to biotic and abiotic stresses.
- Production of nucleus and breeder seeds of promising varieties released from the station.
- Undertaking water technology studies for rainfed oilseed crops.
- Developing Agri-Horti. And Agri-Sylvipastoral systems suitable for the region.
- Developing integrated pests and diseases management practices for rainfed conditions.
- Co-ordinating the extension activities in collaboration with sister and allied State Departments viz., Department of Agricultural, Department of Horticulture and Plantation Crops, Department of Seed Certification.

### **Regional Research Station, Vridhachalam**

- Evolving drought tolerant /resistant varieties in groundnut
- Transgression of wild genes to cultivated species for pest/disease tolerance.
- Developing large seeded groundnut for export
- Use of polyethylene film mulch in groundnut cultivation
- Developing low cost production
- Organic farming in large seeded groundnut for export purpose

- Developing technologies with biologicals to control pests and diseases of groundnut, sesame and cashew
- Evolving non-shattering and early maturing variety in sesame
- Evolution of CMS line for hybrid seed production in sesame
- Evolving new varieties/hybrids with bold-nut in cashew for export purpose

### **Sugarcane Research Station, Cuddalore**

- For sustainability in sugarcane production efficient and pragmatic efforts are to be taken up for the identification of resistant/tolerant varieties of sugarcane against biotic stresses like red rot disease and borer pest complex with high yield potentials.
- Similar efforts are also to be strengthened to isolate types of sugarcane against saline and drought tolerance.
- An efficient state level mechanism has to be formulated and devised by both sugar industries and state administration for the best and efficient utilization of sugarcane byproducts through agro based enterprises, so that the rural economy could be uplifted and self employment opportunities be created.

### **Sugarcane Research Station, Melalathur**

- Fulfilling the dire need of the sugarcane industry viz., identifying high sugared, moderately tolerant red rot sugarcane variety with high yield and good ratooning ability.
- Evolving high yield clones suitable for quality jaggery production.
- Mass producing biocontrol agent *Trichoderma harzianum* against sugarcane sett rot *Caretocystis paradoxa*.
- Evolving drought tolerant clones with high quality and disease resistance.
- To familiarize the latest technologies to sugar cane development worker's in the sugar factory, farmers and State Department Agricultural Officers.
- To increase the farm revenue by other income generating crops.
- To raise the standard of living of IVDP – village by demonstrating the latest technology related to agricultural and allied fields.

### **Agricultural Research Station, Virinjipuram**

- Evaluation of better Thalaivirichan cholam types
- Breeding in Maize Sugar, Millet, Greengram and Cotton
- Breeders seed production in pulses and Oilseeds.
- Evolving suitable cropping systems for this region
- Weed management in major crops including horticultural crops
- Ways to improve soil fertility and productivity under dryland, semi-dry and wet conditions
- Developing methods to improve the physical condition of the soils and to conserve more soil moisture

- Evolving methods to improve fertilizer use efficient by different major crops of this district
- Assessing the extent of soil degradation due to industrial pollution, with special reference to tanneries.
- Studies on the effect of industries on ground water quality
- Evolving suitable management practices for increasing the productivity of crops in polluted soil
- Organic farming approach in different crops
- Studies on the micro-nutrient requirement in different horticultural crops
- Developing nutritional management for field and horticultural crops in the tannery affected soils.
- To identify suitable banana cultivars from the evaluation of banana germplasm
- To select promising “Mullukathiri” local brinjal
- Introduction and evaluating suitable long size papaya types for this tract.
- Identifying suitable fruit crops for dry land horticulture
- Study on coconut based cropping system
- Seed production in Vegetables and papaya
- Evolving suitable management practices of pests and diseases of groundnut, millets, pulses, coconut, fruit crops, vegetables and flower crops.
- Use of different botanicals for the management of different pests and diseases of important crops of this tract.
- Evolving better methods for production of parasites and predators.
- Studies on the integrated pests and diseases management on different crops.
- Mass multiplication of bio-control agents like *Trichoderma viride* and *Pseudomonas* sp. for the management of different diseases.
- To find remedial measures for Sigattoka problem in banana
- To screen varieties tolerant to tannery effluent
- To reduce the vegetative dominance in pulses

### **Vegetable Research Station, Palur**

#### **Fruits**

- Mango and Guava** : Introduction and evaluation of varieties and hybrids.
- Jack** : Identification and evaluation of superior clones with large size (50-100 kg) quality fruits for commercial cultivation. Integrated nutrient and pest and disease management.
- Banana** : Evaluation of tissue cultured bananas.

#### **Vegetables**

- Brinjal** : Improvements of local brinjals like Vellore Mullukathiri, Kandar Kottai, Gnanamedu etc. Thro’ hybridization and selection to comine yield, quality and adaptability.
- Greens** : Improvement of leaf (Green) type amaranthus

<b>Chilli</b>	: Improvement of Green chilli types Evaluation of nonpungent types.
<b>Tomato</b>	: Improvement of irrigated and rainfed tomatoes.
<b>Onion</b>	: Improvement of seeded onion 'Mutlur' and identification of "Bellary" type onions.
<b>Goords</b>	: Improvement of gourds especially Pumpkin and bittergourd.
<b>Tapioca</b>	: Systems cropping

### Spices

<b>Coriander</b>	: Evaluation of leaf (Green) types
<b>Tamarind</b>	: Introduction and evaluation of tamarind 'Plus trees'
<b>Curry Leaf</b>	: Collection and Evaluation of different types.

### Flowers

<b>Tagetes</b>	: Improved of tagetes.
<b>Tuberose</b>	: Introduction and evaluation of types.

### **Fruits – Vegetables and Flowers**

- Integrated nutrient, pest and disease management
- Weed management
- Protected cultivation of vegetable crops in low cost green houses.

### **Seed production and nursery programmes**

- Seed Technology of vegetables
- Improvement of green houses for the propagation of fruits and ornamentals.

## **PROSPECTS OF AGRO BASED INDUSTRIES OF NORTH EASTERN ZONE (District wise)**

### **Thiruvallur and Kancheepuram**

#### **Farm mechanization**

Agricultural development depends largely in technological innovation and its successful transfer. It focuses the utilization of hand tools, implements for draft animals and mechanically powered machinery for Agricultural land development, production, harvesting and on-farm processing.

The major crops grown in the districts are rice, groundnut, pulses and sugarcane. The traditional/conventional types of implements are used at present. These units are to be

replaced by new implements of higher efficiency. The following table gives details about the various implements which are in use at present.

There is a great scope for introducing the power operated rice transporters, rice combines in these areas. Since labour scarcity is a major constraint nowadays, farmers are switching over to improved equipment, implements for cultivation and processing of crops. The various equipment, implements viz., Tractor drawn seed drill (9 rows /11 rows), groundnut thresher, diggers, dhal mills, drum seeders (manual and power drawn), transplanters and combines are gaining importance due to labour scarcity, time mechanization is the right tool for the successful cropping in strategy.

The various fruits like mango, guava are grown in major areas in both the districts. Hence, the following types of fruits based agro industries will be focused.

- i) Fruit juice manufacture
- ii) Jams and Jellies
- iii) Tuti-fruiti (fruit cubes/slices)
- iv) Mini cold storage units

There are above 35 food processing industries in operation in Madras District. For these units, the raw materials sources will be from these two districts (Tiruvallur and Kancheepuram). There are about 3 cold storage units amounting to 9,000 tonnes of storage capacity in Madras district which will catch the needs of produces from the adjoining Tiruvallur and Kancheepuram districts.

### **Agro based industries suggested**

The promising agro-based industries for these two districts are given below:

- Modern rice mills
- Rice bran oil (Solvent extraction) mills
- Agricultural tools and implements manufacturing industries with special reference to rice and groundnut cultivation and processing.
- Dhal mill units
- Oil extraction units
- Food based industries : Ragi malt, Papped, flour, etc.
- Co-operative jaggery units
- Fuel briquettes from agricultural wastes
- Paper boards from rice straw/groundnut husk
- Seed processing plants
- Chemicals from agricultural wastes (Activated carbon, furfural etc.,)

## **Villupuram**

- Developing tapioca based agro industries for making starch, sago and vermicelli.
- Establishing fruit preservation and processing units for drought tolerant fruit crops like pomegranate, guava and mango.
- Setting up paddy bran oil extraction units.
- Encouraging vegetable, flower cultivation since Chennai is very near to this district for meeting out the urban demand and setting up cold storage units for preserving the vegetables and flowers.

## **Cuddalore**

Sugarcane as an industry based crop, offers enormous scope for agro-based industries. The numerous sugar mills situated in India themselves will tackle the scope of sugarcane based industries. Next to cotton mills, sugar mills occupy a pivotal role in the uplift of rural economy through sugarcane cultivation. Invariably all the byproducts of sugarcane viz., molasses, bagasse, pressmud, cane trash, spent wash, factory effluent, sugarcane juice, flyash etc., are utilized either directly or indirectly by different type of consumers. Sugarcane is an important cash crop in India and occupies about 3.3 million hectares representing around 2% of cropped area. Annually around 14.5 million tones of sugar are produced and generates income of about 22,000 cores of rupees to cane growers. Apart from the main product sugar, nearly 10-20 tones of cane trash could be obtained from one hectare and the same can be recycled by composting or mulching. Similarly 7 tones of press mud, 45 tones of bagasse, 7.5 tones of molasses and 6 tones of other wastes are also obtained. In addition, nutrients like potassium is entirely washed out in effluent and this could be either recovered by proper technology or used in Agriculture for replenishing the soil.

Press mud is converted into organic manure by bio composting in many sugar mills. Bagasse is used as fuel for co-generation of power in sugar industries. Around 30 million tones of bagasse is generated every year from sugar Industries of India. Vermi compost is now being developed by Sugar Industries and also by private enterprises from sugar mill wastes. The molasses produced from sugar mills is efficiently used in distillery factories for the production of alcohol. The spent wash generated by each unit to the tune of 500-1000 m<sup>3</sup> is also treated and can be applied to fields in dilution with irrigated water. Sugarcane juice preparation and bottling is also now being ventured by some enterprises. Ethanol as transport fuel can be manufactured from varieties of bio-mass feed stocks viz., lignocellulose bio-mass. Thus sugarcane by products offer vast opportunities for setting up an array of agro-based industries in India.

Small scale units for processing fruits like banana, jack, guava and vegetables like chillies and onion besides the already existing cashew and coir industry.

### **Vellore and Thiruvannamalai**

- Coconut industries – Many industries are running profitably in this area by removing outer shell/husk of coconut.
- Coir industries :- By using the coir waste from the coconut industries. They are making coir ropes in large scale manner as well as small scale unit and as house hold unit. More than 20 industries are doing this work.
- Mushroom cultivation:- Few people are engaging in cultivation of mushroom after getting adequate training from Tamil Nadu Agricultural University.
- Co-generation : Co-generation of power can be erected in sugarcane mills by utilizing the sugarcane bagasse as raw material.
- Sericulture
- Mass multiplication of bio-control agents like *Pseudomonas fluorescens* and *Trichoderma viride*.
- Production Biofertilizers and Vermicomposting.
- Seed production Industries for field and Horticultural crops.
- Essential oil extraction units for flower crops (Jasmine, Tuberose, Rose)
- Coconut based industries – Coir Making Cobra, Oil extraction and Cosmetics.
- Fruit processing units especially for Mango, Banana and Papaya
- Vegetable processing units especially for Tomato, Cucurbits and Moringa.
- Tamarind based industries.
- Paper pulp making industries – Eucalyptus and Sugarcane
- Tissue culture industries for Horticulture crops and Commercial forest trees.
- Sugarcane based Agro industries
- Sago industries
- Palmyrah industries
- Animal cum poultry seed industry based on paddy, millets and minor millets.
- Medicinal plants based industries.

**TAMIL NADU AGRICULTURAL UNIVERSITY**

From

Dr.S.E.Naina Mohammed, Ph.D.,  
Professor and Head  
Regional Research Station  
Vridhachalam - 606 001.

To

The Director of Research,  
Tamil Nadu Agricultural University  
Coimbatore – 641 003

**No. RRS/VRI/Status Report/NEZ/2001 dated 23.02.2001**

Sir,

Sub: Status Report - North Eastern Zone – sending of – regarding.  
Ref: Phone message received from the Director of Research,  
Tamil Nadu Agricultural University, Coimbatore

====

I submit to enclose herewith a copy of Status Report pertaining to North Eastern Zone of Tamil Nadu for your kind perusal along with computer floppy 3 ½` diskette.

Encl: As above

**Professor and Head**

## CONTENT

Sl. No	Particulars	Page No
1	<b>Introduction</b>	01
2	General Agricultural characteristics of the North Eastern Zone	02
3	Rainfall Analysis	07
4	Details of Crops grown in North Eastern Zone	07
5	Technologies developed under various Research Stations	15
6	Constrains and problem of the area in each division	30
7	Suggestions to alleviate problems and constrains	32
8	Future thrust	34
9	Prospect of agro-based industries of North Eastern Zone	39