

# **TAMILNADU AGRICULTURAL UNIVERSITY**

## **43<sup>rd</sup> RESEARCH COUNCIL MEETING**

### **Agenda No.1**

#### **Confirmation of the proceedings of the 42<sup>nd</sup> Research Council meeting**

The proceedings of the **42<sup>nd</sup> Research Council** meeting held on **March 2, 2009** were communicated to all the members. There was no exception to the minutes from the members and therefore it is requested that the Research Council may be pleased to confirm the proceedings of the 42<sup>nd</sup> meeting.

## Agenda No.2

### ACTION TAKEN ON THE RECOMMENDATIONS OF 42<sup>nd</sup> RESEARCH COUNCIL MEETING (MARCH 2, 2009)

#### CROP IMPROVEMENT

**1. *Methods to extend the seed viability in groundnut may be suggested (Action: Special Officer, Seeds)***

- **Short term storage:** Pods dried to moisture content of 8-9 % can be stored for 8-9 months in gunny or cloth bags.
- **Medium term storage:** Pods dried to moisture content of 6-8 % can be stored for 12-15 months in poly lined gunny bags.
- **Long term storage:** Pods dried to moisture content of less than 5 % can be stored for more than 15 months in 700 gauge polythene bags. After drying to the required moisture level (as above), pods are to be treated with Carbendazim 50% WDP @ 2g + halogen mixture @ 3g/kg to maintain viability.
- **Mid storage correction treatment:** The following methods of mid storage treatment are also found to be effective in prolonging the shelf-life of groundnut pods. Hydration with double the volume of water for 6 h and dehydration to original moisture content (S-D method) or Moisture equilibration treatment of 48 h and drying to original moisture content (M-E-D method).

**2. *Development of high yielding early maturing hybrids in maize and composites suited for rainfed conditions may be intensified (Action: Director, CPBG)***

In maize, the early maturity hybrids and composites have low yielding ability and can not withstand mid and terminal drought in rainfed conditions compared to late maturity hybrids. In addition the farmers prefer to grow only late maturity hybrids (110-115 days) which have the yield potential of more than 4 tons/acre. Based on farmer's needs, the maize hybrid breeding have been reoriented for development of single cross maize hybrids with late maturity suited for rainfed conditions. Due to these efforts, high yielding late maturity (110-115days) hybrids viz.,CMH08-239,CMH08-259,CMH08-282 and CMH08-284 have been identified and they will be evaluated further for identification of high yielding stable hybrids suited for rain fed conditions.

**3. *Bt cotton hybrids suitable for problem soils may be suggested (Action: Director, CPBG)***

Private Bt cotton hybrids are not specifically evaluated for problem soils. Bt cotton hybrids may not come up well under problem soils. However, the Bt cotton hybrids suitable for different districts are furnished below.

<b>Company</b>	<b>Short listed Bt cotton hybrids</b>	<b>Year of Release</b>	<b>Districts where the hybrid performance monitored by MEC team</b>
Ankur Seeds Ltd.,	Akka BG I	2007	Salem, Perambalur, Villupuram, Trichy, Erode
Emergent Genetics India Pvt. Ltd.,	Brahma Bt	2006	Salem, Perambalur
J.K Seeds Ltd.,	J.K. Durga Bt	2006	Trichy
Mahyco Seeds Ltd.,	MRC 6322 Bt	2005	Villupuram, Trichy
	MRC 7347 BG II	2007	Salem, Perambalur
	MRC 7351 BG II	2006	Salem, Perambalur, Coimbatore
	MRC 6918 Bt	2006	Dharmapuri, Salem, Villupuram, Cuddalore, Perambalur, Trichy, Vellore
Nuziveedu Seeds Ltd.,	Bunny Bt & Mallika Bt	2005	Dharmapuri, Salem, Villupuram
	Bunny BG II	2006	Perambalur, Trichy
Nath Bio-gene	NCEH 3R (Nath Baba)	2006	Dharmapuri, Salem, Trichy
Rasi Seeds Ltd.,	RCH 2 Bt	2004	Salem, Vellore, Dharmapuri, Perambalur
	RCH 2 BG II	2006	Salem, Vellore, Dharmapuri, Perambalur
	RCH 20 Bt	2004	Trichy, Salem, Vellore
	RCHB 708 Bt	2006	Dharmapuri, Salem, Perambalur, Vellore, Trichy
Tulasi Seeds Ltd.,	Tulasi 4 Bt	2006	Trichy, Perambalur
	Tulasi 117 Bt	2006	Trichy, Perambalur

<b>Districts</b>	<b>Hybrids</b>
Salem	Akka BG I, Brahma Bt, MRC 7347 BG II, MRC 7351 BG II, Bunny Bt, Mallika Bt, NCEH 3R (Nath Baba), RCH 2 Bt, RCH 2 BG II, RCH 20 Bt, RCHB 708 Bt and MRC 6918 Bt
Perambalur	Akka BG I, Brahma Bt, MRC 7347 BG II, MRC 7351 BG II, MRC 6918 Bt, Bunny BG II, RCH 2 Bt, RCH 2 BG II, RCHB 708 Bt, Tulasi 4 Bt and Tulasi 117 Bt
Villupuram	Akka BG I, MRC 6322 Bt, MRC 6918 Bt, Bunny Bt and Mallika Bt
Trichy	Akka BG I, J.K. Durga Bt, MRC 6322 Bt, MRC 6918 Bt, Bunny BG II, NCEH 3R (Nath Baba), RCH 20 Bt and RCHB 708 Bt
Erode	Akka BG I
Coimbatore	MRC 7351 BG II
Cuddalore	MRC 6918 Bt
Vellore	MRC 6918 Bt, RCH 2 Bt, RCH 2 BG II, RCH 20 Bt and RCHB 708 Bt
Dharmapuri	MRC 6918 Bt, Bunny Bt, Mallika Bt, NCEH 3R (Nath Baba), RCH 2 Bt, RCH 2 BG II and RCHB 708 Bt

4. ***The ART may be carried out in large areas so as to give a real picture of the elite cultures developed. The DEE is desired to do the ARTs in one acre fields by the KVK scientists of various districts. Hence proper guidance may be issued to the concerned scientists to conduct ARTs accordingly (Action: Director, CPBG / DEE)***

#### **Rice**

The Adaptive Research Trials on Rice viz., ART-Early, Quality rice – Early, Medium, Hybrid rice (Early), Hybrid Rice (Medium) numbering three each are conducted in the following KVK's during 2009. KVK, Tindivanam, KVK, Sandhiyur, KVK, Madurai, KVK, Vridhachalam, KVK, Tirur, KVK, Sirugamani, KVK, Needamangalam, KVK, Sikkal and KVK, Vamban

#### **Sorghum**

Two sorghum hybrids TNSH 482 and TNSH 483 have been repeated for one more year in ART during 2009-10. The seeds for these hybrids and the checks have been already dispatched for 40 locations and 70 locations respectively for Kharif and rabi seasons. However, seed multiplications of test entries will be taken up in large scale in advance for conducting ART trials with KVK in future.

#### **Pearl millet**

Two pearl millet hybrids TNBH 07516 and TNBH 07 523 are being tested in ART during 2009-10. The seeds for these hybrids and the checks have been already dispatched for 40 locations in Rabi seasons. However, seed multiplications of test entries will be taken up in large scale in advance for conducting ART trials with KVK in future.

#### **Small millets**

Two Ragi advanced cultures viz., Tamil Nadu Agricultural University 1008 and Tamil Nadu Agricultural University 1018 will be sent for *rabi* ART during 2009-10 to 55 locations. The seeds for these cultures and the checks will be sent to the major Ragi growing districts and the respective KVKs during November-December, 2009. For popularization of latest small millet varieties like CO(Te) 7, CO(Samai) 4, CO(PV)5 and CO(KV)2 the seeds will be sent to the KVK centers where these crops are majorly grown.

#### **Pulses**

In blackgram and greengram 30 Adaptive Research Trials in each totaling to 60 ARTs are being conducted through the following KVKs during rabi 2009-10. Virudhachalam, Papparapatty, Madurai, Vamban, Ramanathapuram, Sirugamani, Virinjipuram, Tindivanam, Kundrakudi and Sandhiyur

#### **Oilseeds**

Twenty sets of sunflower ART (Rabi / summer 2009-10) will be sent to the following KVK's. Dharmapuri (Pappanapatty) Krishnagiri, Karur (Kulithalai) Perambalur, Trichy (Sirugamani), Dindigul, Tindivanam, Virudhachalam, Madurai and Theni.

**5. Fine grain rice variety suitable for exports may be developed (Action: Director, CPBG / Director, TRRI, Aduthurai)**

- A new short duration rice culture CB 05 501 (CO 47 x BPT 5204) is under ART Rice 14 / 2009 – 10. The culture has the maturity duration of 120 days yielded 9.0 tonnes under station trial. Extensive on-farm testing is being taken up under participatory breeding activities to evaluate the adaptability of the culture in comparison to ADT43.
- Another short duration culture CB 06732 (BPT 5204 / ARC 5954// Kavva) is also under ART Rice 3/2009-10. This culture has recorded an average grain yield of 5999 kg/ha in MLT with 25.4% increase over ADT 43. This culture has also performed very well under large scale demonstration plots.
- Promising early duration cultures CB 06591 (JGL 4970 / ADT 43), CB 06 112 (ASD 18 / AS 94140) CB 05 535 (ADT 43/ IET 17090) are under advanced stage of evaluation.
- Medium duration rice cultures CB 06 651 (JGL / Rasi) CB 05 219 (BPT 5204 / JGL 1798) are found promising and are in MLT QR- Medium 2009.
- Other Promising medium duration cultures, CB 08101 (CO 43 / IR 64), CB 06 124 ( BPT 5204 / Jeeraga Samba) CB 07 137 ( BPT 5204 / JGL 179) are under advanced stage of evaluation. (CPBG)
- The rice varieties exported from India are Basmati rice (organic, brown, parboiled, raw), non-aromatic rice (long, medium and short grain both raw and parboiled) and brokens (5-100%). Under the non aromatic group, some of the varieties exported are IR 36, IR 64, PR 106, Ratna, P4, White ponni, Deluxe ponni (ADT 43), idly rice etc., In Tamil Nadu, the preferences are for short / medium slender and short bold rice. Hence research efforts are oriented towards development of varieties with the above grain type. At Tamil Nadu Rice Research Institute, Aduthurai, fine grain varieties are being developed in short, medium and long duration group.
- In the medium duration group, AD 01260 (CR 1009/Jeeraga samba) is a fine grain medium slender culture with a 1000 grain weight of 14.2g. It has head rice recovery of 71.3% and polished rice yield of 73.5%. Its average grain yield is 6173 kg/ha. Apart from this, 85 fine grain cultures are being evaluated in different trials for its yield and grain quality.
- In the long duration group, a medium slender fine grain culture AD 02235 (BPT 5204/CR 1009) is being evaluated in Adaptive Research Trials.
- This culture recorded an average grain yield of 5132 kg/ha with 5.3 and 20.1 per cent increase over CR 1009 and BPT 5204 respectively. It is moderately resistant to WBPH. It has high HRR (63.0%) intermediate amylose, Gelatinization temperature and soft Gel consistency.
- In short duration group, 53 cultures with medium slender fine grain are being evaluated for yield and quality. (TRRI)

## CROP MANAGEMENT

- 1. Location specific contingent alternative crop plan to mitigate drought and flood may be developed for Cauvery Delta (Action: Director, SCMS / Director of Research / Director, TRRI, Aduthurai)**

Studies were conducted at the Soil Water Management Research Institute, Thanjavur to identify and evaluate economic cropping systems for the new Cauvery delta zone during 2008-09.

Crop Sequence			Grain Yield (kg/ha)			Rice Grain Equivalent Yield kg/ha /year	Gross Income Rs/ha/yr	Net Income Rs/ha/yr	BC Ratio
Kharif	Rabi	Summer	Kharif	Rabi	Summer				
<b>Conventional</b>									
Rice	Rice	Blackgram (Seed crop & residue incorporation)	5709	5508	799.66	13120	137760	89460	2.85
<b>Flood situation</b>									
Rice	Rice	Sesame	5513	5403	728.11	12996	136458	90458	2.96
Rice	Rice	Brinjal	5429	5419	5503	16088	168924	115624	3.16
Drum seeded rice	Rice	Maize + Blackgram (IC)	5387	5433	5073 223	14732	154686	107686	3.39
<b>Drought situation</b>									
Maize + Blackgram	Rice	Blackgram (Seed crop & residue incorporation)	5628 350	5523	808	12033	126346	87096	3.21
Onion	Rice	Blackgram (Seed crop & residue incorporation)	5513	5516	804	15305	160702	107903	3.04
Bhendi	Rice	Greenmanure (Seed & residue incorporation)	6523	5567	198	12156	127636	83098	2.86
Blackgram	Rice	Cowpea (Seed & residue incorporation)	758	5522	665	8276	86898	49618	2.33

### Contingent Crop Plan for Cauvery Delta Zone

Canal water released	Month	Jun	July	Aug	Sep	Oct	Nov	Dec	Jan	Feb	March	April	May
	<b>1. Old Delta (Cauvery and Vennar basin)</b>												
	<b>A. Filter point irrigated areas</b>												
June 12 <sup>th</sup>	<b>Normal</b>	Kuruvai paddy				Thaladi paddy				Rice fallow Pulses			
July	Situation 1	-	Kuruvai paddy			Thaladi Paddy				Rice fallow Pulses			
August	Situation 2	Cotton Contd....		Samba Paddy				Rice Fallow Cotton					
	<b>B .Canal irrigated areas</b>												
September	Clayey soils	Green Gram /Black Gram / Bajra / Finger millets			Samba Paddy				Rice fallow Pulses				
	Loamy soils	Gingelly			Samba Paddy				Rice fallow Pulses				
	Light soils	Groundnut			Samba Paddy				Rice fallow Pulses				
August	All	Green manure-Daincha		Samba Paddy				Rice fallow Pulses		-	-		
Beyond September	All	Fallow/Green manure		Semi dry Samba Paddy				Rice fallow Pulses			-		
	<b>2. New Delta (G.A canal areas)</b>												
	<b>A. Bore well irrigated areas</b>												
June 12 <sup>th</sup>	<b>Normal</b>	Kuruvai Paddy				Thaladi Paddy				Pulses		-	
July	Situation 1	-	Kuruvai paddy			Thaladi Paddy				Pulses / Sesame / Sun Flower			
August	Situation 2	Green manure		Samba Paddy				Irrigated groundnut / Vegetable/ pulses					
September	Situation 3	Irrigated Maize/Sunflower/ Vege./groundnut Contd....			Late Samba				Irrigated pulses/Sesame		Irrigated M/SF/V/G		
	<b>B. Canal irrigated areas</b>												
September	Situation 1	Green Gram /Black Gram / Bajra / Finger millets			Samba Paddy				Pulses/Gingelly				
	Situation 2	Gingelly			Samba Paddy				Pulses/Gingelly				
	Situation 3	Groundnut			Samba Paddy				Pulses/Gingelly				
August	Situation 4	GM- sun hemp		Samba Paddy				Pulses/Gingelly					

## **Contingent Action for Flood affected paddy, sugarcane and banana**

### **Paddy**

**Stage 1:** All stages of the crop submerged in water for 25 days and became decayed

Remedy: In well irrigated areas(Bore well/Filter point), water may be drained and the field may be leveled and sown directly with germinated seeds of short duration varieties like ADT 36 and ADT37,42 and 45.

**Stage 2:** Crop losses in patches at early tillering stage due to inundation.

Remedy: Existing hills may be thinned and planted to fill the gap. Further, topdressing may be done with N fertilizer (Ammonium Chloride @ 105 Kg / Ha. or Ammonium sulphates @125 Kg / Ha.).If the above fertilizers are not available, Urea (@ 55 kg / Ha.) can be mixed with Gypsum (@ 45 kg / Ha.) and Potash (@ 42.5 kg /Ha.) may be applied.

**Stage 3: In the ill-drained areas, the crop may become pale due to Nitrogen and Zinc deficiency.**

Remedy: To correct this deficiency, 5 Kg urea can be mixed with 2.5 Kg Zinc sulphate in 500 l of water and sprayed on the foliage with hand sprayer.

**Stage 4: Nutrient deficiency may occur in the well matured crop of the varieties like CR 1009, ADT 38, 39 and CO43 due to prolonged inundation.**

Remedy: Under this condition, water has to be drained and top dressing may be done with N fertilizer (Ammonium Chloride @105 Kg/ Ha. or Ammonium sulphate @125 Kg / Ha.).If the above fertilizers are not available, Urea (@ 55 kg / Ha.) can be mixed with Gypsum (@ 45 kg / Ha.) and Potash (@ 42.5 kg / Ha.) may be applied.

**Stage 5: In some places, silt might have deposited on the paddy crop when the fields got drained off with water.**

Remedy: For this, 5 Kg urea can be mixed with 2.5 Kg Zinc sulphate in 500 l of water and sprayed on the foliage with hand sprayer.

**Stage 6: Because of the inundation of more than 2 weeks, some medium duration varieties would have been affected with case worm damage (up to 40 %).**

Remedy: In the affected places, 2.5 l Kerosene /hectare may be mixed with 6-7 kgs sand and spread uniformly. Further, crop has to be disturbed at its middle with rope by two persons through walking so that worms drop down and get them destroyed. Alternatively, Monocrotophos (1000 ml /ha ) or chlorpyrifos (1250 ml ) can be sprayed with hand sprayer.



## Sugarcane

### Stage: Fields inundated with water and crop affected with white fly.

Remedy: Water may be drained immediately. Spraying may be carried out with Fenitrothion (1500 ml / Ha.) or Monocrotophos (2000ml / Ha.).

## Banana

- Growth may be affected due to prolonged submergence. Leaves may also become yellowish and thereby a chance of wilt diseases. So, water has to be drained by either forming trenches or pumping the water outside.
- Due to prolonged submergence, trees may loose strength and uproot. So, the bearing trees have to be straightened and tied up with poles immediately.
- Flood affected banana trees require additional nutrients. So, fertilizer has to be applied as given below with different varieties.

Poovan	Urea	65g	Potash 175 g
Rasthali	Urea	90g	Potash 175 g
Nendran	Urea	90g	Potash 215 g
Others	Urea	90g	Potash 160 g

- Leaves become yellow, stem may break and form crack at bottom due to wilt disease. To arrest, 2% Bavistin (2g/lit of water) may be applied @ 3 ml /tree at the hole formed at half the size of the trunk and covered with clay.
- Eye shaped yellow spots may appear and the leaves become dry due to Leaf spot diseases. Bavistin 0.1% (1g / l of water) may be sprayed 2-3 times at 20 days interval.

### 2. Recommended dosage of micronutrients for different crops may be suggested (Action: Director, SCMS)

#### Micronutrients Recommendations for Agricultural crops (Irrigated)

Crops	Element	Mode of application	Recommendations
Wetland rice	Zn	Soil	25 kg ZnSO <sub>4</sub> ha <sup>-1</sup>
		Nursery application	Dipping of rice seedling in 2.0% ZnO suspension for calcareous soils
		Foliar	0.5% ZnSO <sub>4</sub> thrice (30,40 & 50 <sup>th</sup> day)
Rice -Cauvery delta zone	Cu	Soil and Foliar	5 kg CuSO <sub>4</sub> ha <sup>-1</sup> combined with 0.2% foliar spray of CuSO <sub>4</sub> thrice
Semidry and rainfed Rice	Fe and Zn	Soil	Combined application of 50 kg FeSO <sub>4</sub> ha <sup>-1</sup> along with 25 kg ZnSO <sub>4</sub> ha <sup>-1</sup>
		Foliar	1% FeSO <sub>4</sub> along with 0.5% ZnSO <sub>4</sub> at 15, 25 and 35 DAS.
Sorghum Maize	Fe	Soil	50 kg FeSO <sub>4</sub> + 12.5 t FYM ha <sup>-1</sup>
		Foliar	1% FeSO <sub>4</sub> + 0.1% citric acid thrice
Maize Sorghum, Ragi	Zn	Soil	25 kg ZnSO <sub>4</sub> ha <sup>-1</sup>
		Foliar	0.5% ZnSO <sub>4</sub> spray (Thrice at 30 <sup>th</sup> , 40 <sup>th</sup> and 50 <sup>th</sup> DAS)
Cumbu	Mn	Foliar	0.2% MnSO <sub>4</sub> thrice

Groundnut	Zn	Soil	25 kg ZnSO <sub>4</sub> ha <sup>-1</sup> as enriched FYM
	B	Soil	10.0 kg Borax ha <sup>-1</sup>
	Fe	Foliar	1.0% FeSO <sub>4</sub> + 0.1% citric acid
Sunflower	Zn	Soil	25 kg ZnSO <sub>4</sub> ha <sup>-1</sup>
		Foliar	0.5% ZnSO <sub>4</sub> thrice
Sesamum	Mn	Soil	5 kg of MnSO <sub>4</sub> ha <sup>-1</sup>
Pulses	Zn	Soil	25 kg ZnSO <sub>4</sub> ha <sup>-1</sup>
		Foliar	0.5% ZnSO <sub>4</sub> foliar spray thrice
Sugarcane	Fe	Soil	100 kg FeSO <sub>4</sub> ha <sup>-1</sup> + 12.5 t FYM ha <sup>-1</sup>
		Foliar	1% FeSO <sub>4</sub> + 0.1% citric acid thrice on 90, 110 and 130 <sup>th</sup> DAS
	Zn	Soil	37.5 kg ZnSO <sub>4</sub> ha <sup>-1</sup>
		Foliar	0.5% ZnSO <sub>4</sub> foliar spray thrice on 90, 110 and 130 <sup>th</sup> DAS
Cotton	Zn	Soil	50 kg ZnSO <sub>4</sub> ha <sup>-1</sup>
		Foliar	0.5% ZnSO <sub>4</sub> thrice
Fodder grasses	Fe	Foliar	Repeated spray of 1% FeSO <sub>4</sub> + 0.1% citric acid
Fodder cowpea	Mo	Soil	0.5 kg/ha Sodium molybdate +12.5 t FYM ha <sup>-1</sup>

**Note:** Foliar spray should be given during the early stage of crop growth at 7 – 10 days interval for short duration crops and 15 days interval for long duration crops

### Secondary nutrient recommendation for specific crops (Irrigated)

Crops	Element	Mode of application	Recommendations
Cotton	Mg (reddening)	Foliar	2% MgSO <sub>4</sub> + 1.0% urea
Potato	Mg	Soil	50 kg MgSO <sub>4</sub> ha <sup>-1</sup>
Rice	Ca and S	Soil	500 kg gypsum ha <sup>-1</sup>
Maize / sorghum	S	Soil	30 kg S ha <sup>-1</sup>
Groundnut	Ca and S	Soil	400 kg gypsum ha <sup>-1</sup>
Sunflower	S	Soil	40 kg S ha <sup>-1</sup>
Sesame	S	Soil	40 kg S ha <sup>-1</sup>
Pulses	S	Soil	40 kg S ha <sup>-1</sup>
Cotton	S	Soil	55 kg S ha <sup>-1</sup>
Onion	S	Soil	30 kg S ha <sup>-1</sup>
Sugarcane	S	Soil	45 kg S ha <sup>-1</sup>
Tapioca	S	Soil	20 kg S ha <sup>-1</sup>
Potato	S	Soil	75 kg S ha <sup>-1</sup>

### Micronutrients Recommendations for Horticultural crops (Irrigated)

S.No.	Crops	Element	Mode of application	Recommendations
1.	Jasmine	Fe and Zn	Soil	25 g FeSO <sub>4</sub> and 4.0 g ZnSO <sub>4</sub> / plant
		Fe	Foliar	0.5 % FeSO <sub>4</sub> + 0.1% citric acid spray at monthly intervals
2.	Crossandra	Fe	Soil	100 kg FeSO <sub>4</sub> ha <sup>-1</sup> + 12.5 t FYM ha <sup>-1</sup>
3.	Grapes	Multi nutrient	Foliar	ZnSO <sub>4</sub> 0.2% + boric acid 0.1% + 1% urea twice during blooming and ten days after first spray
4.	Banana	Multi nutrient	Foliar	1% DAP+1% MOP + 0.5% ZnSO <sub>4</sub> and 0.2% Borax + 0.2% Cu SO <sub>4</sub>
5.	Turmeric	Zn	Soil	50 kg ZnSO <sub>4</sub> ha <sup>-1</sup>
			Foliar	0.5% ZnSO <sub>4</sub> thrice
		Fe	Soil	100 kg FeSO <sub>4</sub> ha <sup>-1</sup> + 12.5 t FYM ha <sup>-1</sup>
			Foliar	1.0% FeSO <sub>4</sub> + 0.1% citric acid
6.	Onion	Mn	Soil	25 kg MnSO <sub>4</sub> ha <sup>-1</sup>
7.	Tapioca	Fe and Zn	Foliar	1.0% FeSO <sub>4</sub> + 0.5% ZnSO <sub>4</sub> twice at 60 and 90 DAP
8.	Tobacco	Fe and Zn	Soil	100 kg Fe SO <sub>4</sub> + 50.0 kg ZnSO <sub>4</sub> ha <sup>-1</sup>
			Foliar	0.5 % ZnSO <sub>4</sub> + 1% Fe S O <sub>4</sub>
9.	Cabbage Cauliflower	Mo	Soil	1.0 kg of Sodium molybdate ha <sup>-1</sup> + 25 t FYM ha <sup>-1</sup>
10.	Brinjal	Zn	Soil	25 kg ZnSO <sub>4</sub> ha <sup>-1</sup>

**Note:** Foliar spray should be given during the early stage of crop growth at 7 – 10 days interval for short duration crops and 15 days interval for long duration crops.

### 3. *Optimum dosage of water soluble fertilizers and its cost for different crops may be worked out (Action: Director, SCMS / Director, WTC)*

#### SUGARCANE

Recommended fertilizer dose – 275:60:112.5 NPK kg/ha

Fertilizer through fertigation: 275:15:112.5 NPK kg/ha

S.No.	Name of fertilizer	Quantity (kg/ha)	Cost (Rs. /ha)
1.	Super phosphate	281	1124
2.	13 -00-45	125	13,125
3.	12-61-00	25	1875
4.	00-00-50	113	5650
5.	Urea	574	2870

Fertigation schedule

Stage	Duration days	Fertilizer grade	No. of applications	Qty Kg/application	Qty (kg / ha)	Cost (Rs. / ha)
I	1 - 70	12-61-00	14	0.9	126.0	9450
		13-00-45	14	1.8	252.0	26,460
		Urea	14	12.1	169.4	847
II	71-120	12-61-00	10	1.2	12.0	900
		13-00-45	10	5.0	50.0	5250
		Urea	10	20.9	209.0	1045
III	121-160	12-61-00	8	3.1	24.8	1860
		13-00-45	8	5.6	44.8	4704
		Urea	8	14.1	112.8	564
IV	161 - 210	12-61-00	10	2.5	25.0	1875
		13-00-45	10	6.8	68.0	7140
		Urea	10	8.3	83.0	415

**MAIZE**

Recommended fertilizer dose: 135: 62.5: 50 NPK kg/ha

Fertilizer through fertigation: 135: 15.6: 50 NPK kg/ha

S.No.	Name of fertilizer	Quantity (kg/ha)	Cost (Rs. /ha)
1.	Super phosphate	293	1172
2.	13 -00-45	111	11,655
3.	12-61-00	25	1875
4.	Urea	260	1300

Fertigation schedule

Stage	Duration days	Fertilizer grade	No. of applications	Qty Kg/application	Qty (kg / ha)	Cost (Rs./ha)
I	1 - 15	12-61-00	5	1.0	5.0	375
		13-00-45	5	2.2	11.0	1155
		Urea	5	5.9	29.5	1475
II	16 -45	12-61-00	10	1.0	10.0	750
		13-00-45	10	3.3	33.0	3465
		Urea	10	7.6	76.0	380
III	46-65	12-61-00	6	1.7	10.2	765
		13-00-45	6	5.6	33.6	3528
		Urea	6	12.7	76.2	381
IV	66 - 90	12-61-00	8	4.2	33.6	2520
		Urea	8	9.8	78.4	392

## GROUNDNUT

Recommended fertilizer dose: 17:34:54 NPK kg/ha

Fertilizer through fertigation: 17:8.5:54 NPK kg/ha

S.No.	Name of fertilizer	Quantity (kg/ha)	Cost (Rs. /ha)
1.	Super phosphate	160	640
2.	13 -00-45	120	12,600
3.	12-61-00	14	1050

Fertigation schedule

Stage	Duration days	Fertilizer grade	No. of applications	Qty Kg/application	Qty (kg / ha)	Cost (Rs./ha)
I	1 - 15	12-61-00	5	0.3	1.5	1125
		13-00-45	5	2.4	12.0	1260
II	16 -45	12-61-00	10	0.4	4.0	300
		13-00-45	10	3.6	36.0	3780
III	46-75	12-61-00	10	0.4	4.0	300
		13-00-45	10	3.6	36.0	3780
IV	76 - 100	12-61-00	8	0.5	4.0	300
		13-00-45	8	4.5	36.0	3780

(SCMS)

Optimum dose of water soluble fertilizers now recommended for different crops is given below for adoption by the farmers:

Crop Category	Crop	Spacing (m)	Fertilizer dose (kg ha <sup>-1</sup> )	Fertigation period and interval
Fruit crops	Amla	6 x 6	55:140:55	March to May; 30 splits; once in 3 days
	Ber	7 x 7	105:42.5:105	March to May; 30 splits; once in 3 days
Vegetables	Tomato	0.6 x 0.45	150: 100: 50	10 to 105 DAT; 32 splits; once in 3 days
	Brinjal	0.6 x 0.6	100:50:30	10 to 105 DAT; 32 splits; once in 3 days
	Bhendi (hybrids)	0.6 x 0.3	200:100:100	1 to 100 DAT; 32 splits; once in 3 days
	Chillies (hybrids)	0.75 x 0.6	120:80:80	10 to 105 DAT; 32 splits; once in 3 days
	Capsicum	0.6 x 0.3	160:60:30	10 to 105 DAT; 32 splits; once in 3 days
Flower crops	Rose	2 x 1	30:62.5:62.5	October to December & July to September; 26 splits: weekly once
	Malligai	1.25 x 1.25	387.5:775:775	December to February & June to August; 26 splits: weekly once
	Jathimalli	2 x 1.5	202.5:405:405	December to February & June to August; 26 splits: weekly once
	Crossandra	0.6 x 0.6	75:50:125	Throughout the year; 52 splits; weekly once
	Tuberose	0.45 x 0.2	200:200:200	Throughout the year; 52 splits; weekly once

Commercial crops	Coconut	7.5 x 7.5	100:75:57.5:216	January to Septemeber; 38 splits; weekly once
	Sugarcane	0.9 x 1.0	275:60:112.5	1 to 270 DAP; 38 splits; weekly once
	Cotton	0.75 x 0.3	80:40:40	1 to 120 DAS; 40 splits;
Field crops (grown as pure as well as intercrops)	Groundnut	0.3 x 0.1	17.5:35:52.5	1 to 90 DAS; 30 splits; once in 3 days
	Sunflower (hybrids)	0.6 x 0.3	90:90:40	1 to 75 DAS; 25 splits; once in 3 days
	Hybrid Maize	0.6 x 0.2	135:62.5:50	1 to 90 DAS; 30 splits; once in 3 days
Mulberry		0.6 x 0.6	300:120:120	Throughout the year; 52 splits; weekly once

The above schedule is for medium fertility soil, an 25 % extra dose for low fertile and 25 % less dose may be adopted for high fertile soils. However, the fertigation dose and the timing will vary according to the native soil fertility, water quality, crop duration, variety / hybrid and targeted yields. Micro irrigation system should be operated 5-10 minutes before and after fertigation. Increasing the frequency of application will improve the fertilizer use efficiency. (WTC)

**4. Research undertaken on Response Farming may be extended to encompass the pest and disease forecast especially in banana and cassava (Action: Director, SCMS)**

Pest and disease forecast in banana and cassava is in progress.

**5. Solid waste studies has to be intensified. An integrated approach for production of organic manures using farm waste, green leaf manures along with effective bio agents for conversion, besides utilizing the urban waste may be developed. Animal waste along with night soil can also be considered for enriching the organic manure in addition to their utilization for the energy production (biogas production). Massive plants for conversion of bio-wastes into useful products needs to be explored as done in the developed nations (Action: Dean, AEC&RI, Coimbatore / Director, SCMS / Director, CPMB)**

With the technical support of Department of Bioenergy a biogas plant of 24M<sup>3</sup> capacity was installed at Tamilzhagam hostel (about 400-500 students) to treat night soil. Arrangements were made to utilize the produced biogas for cooking at Tamilzhagam mess. With the financial support of ICAR, Renewable Energy Sources scheme of Department of Bioenergy one 10M<sup>3</sup> capacity biogas plant was installed to treat 50-70 kg / day kitchen cum dinning waste of ladies hostels. The gas produced is utilized for regular cooking in ladies hostel mess. (Engg)

- Model vermicompost units are functioning in all the farms of TNAU. All the farm waste generated are converted into vermicompost and again put back into the farm as source of nutrient and also for soil health. In Central farm premises two vermicompost units with total area of 3000 square feet is functioning. Vermicompost unit is also functioning in Wetland, Paddy Breeding Station, Coconut nursery and also in Millet Breeding station. So all the farm wastes are now properly recycled in the farm itself.

- For managing the solid waste generated in the campus, as suggested in the Research Council, a massive plant is now planned to erect in the campus itself. For erection and installation of machineries a private firm is entrusted with this work. Tentatively it has been planned to operate the unit from May 2010. Once this unit is functional TNAU will be garbage free campus.
- Composting of human waste (i.e.) night soil was done in Musiri, Trichy District. The quality and the maturity of the night soil compost was assessed. The night soil compost was applied to sapota and lime seedlings and their performance under field conditions being studied. The experiment is in progress. (SCMS)
- **Solid waste management program** : This program has been intensified in the Department of Environmental Science, TNAU, Coimbatore. Scientific protocol has been developed for all the biodegradable waste management. For Agro waste management, all the farms functioning in TNAU main campus, have established a composting unit with the technical advice from department of Environmental Science. The organic manure produced in the farm is utilized by the farm itself for their field. In the Central Farm premises the Biogas unit already established was not used for quite some time has been revived and energy production has been done from the cowdung generated from the Dairy unit. The digested slurry is used for vermicompost production in the central farm premises itself.
- For solid wastes generated from the departments and residential quarters and student hostel in the TNAU campus, a model composting plant has been proposed to establish in the campus. For infrastructure development, experts advice has been sought. Two persons, one from New Delhi and another from Mumbai have visited the campus. Their reports are awaited. The first work that has been identified for execution of solid waste management program in TNAU campus is waste segregation into degradable and non degradable. An awakening program has been planned for the ladies staying in the TNAU quarters with the help of TNAU ladies club in the first week of March 2010. Once the waste has been segregated then managing the biodegradable will be done through composting and non degradable will be sold to vendors. This work will be completed before April 2010.
- **Biodegradation of agricultural waste by white rot fungi:** This project is conducted with different types of agricultural waste at five centres of TNAU, the department of Environmental Sciences is one of the sub centres for the biodegradation of cotton and millets waste. In this project, the preliminary characterization of cotton and maize stalks were completed and the processes of composting with different bioinoculants are under progress.
- **Utilization of night soil compost for crop production:** Human waste compost / Night soil compost was obtained from the Ecosan compost chambers constructed by SCOPE (NGO) at Musiri, Trichy (Dt). The compost obtained from Ecosan compost chambers are odorless after six months and free from pathogens. The colour of the compost is brown to black. The pH of the compost was 8.15 and the EC was 2.25 dSm<sup>-1</sup>. To utilize the night soil compost for crop production, the experiments are being conducted with field crops (Paddy) and horticultural crops (Marigold, Lime and Sapota). The results showed that NS compost and vermicompost at various doses and in combination were found to increase the soil fertility status. (SCMS)

**6. *Influence of climatic changes on the crop growth and pests & disease has to be studied (Action: Director, SCMS)***

Under 50 crore project "Climate change and ecosystem dynamics: Integrated assessment of soil, plant, water and atmosphere interactions and impact of climate change on agro-ecosystems" the bioecology of pest and diseases studies are in progress.

**7. *There should not be any duplication in various crop boosters / tonics / mixtures developed by TNAU Vs such products already developed by various institutes / organizations (Action: Director, SCMS)***

The crop boosters / tonics / mixtures developed at Department of Crop Physiology, TNAU are exclusive and do not duplicate the product developed by other institutes / organizations.

## **WATER MANAGEMENT**

**1. *The research on fertigation schedule to the main and intercrop needs to be intensified under intercropping situations for higher efficiency. The drip irrigation system is found to be economically viable than sprinkler system. New methods may be proposed to study the cost effective drip irrigation system (Action: Director, WTC)***

Research programmes are now proposed to conduct field trials on fertigation schedule to the main and intercrops under intercropping situations using drip irrigation system.

**2. *All water management research should be comprehended for making holistic, integrated recommendations for large scale adoption (Action: Director, WTC / Director, SCMS)***

Action is initiated to compile the information on research findings pertaining to water management for different crops in order to bring out a booklet.

**3. *Sub-surface irrigation systems to be studied thoroughly (Action: Director, SCMS / Director, WTC)***

- Intensive studies on sub-surface irrigation are being conducted in sugarcane in places like Coimbatore, Madurai, Bhavanisagar and Sivagangai. The results are highly encouraging. Details of the protocol to be adopted is being worked out for giving solid recommendations to the farmers for successful adoption by them. Based on the experience, the field trials conducted in sugarcane under the auspices of TN-IAMWARM project is being tried only with the sub-surface drip system on a large scale.
- Intensive research on optimizing row spacing for mechanized cane cultivation, optimizing irrigation water requirement and evaluating water soluble fertilizers along with liquid biofertilizers is now proposed for evaluating sub-surface drip fertigation and mechanized sugarcane cultivation at Madurai and Cuddalore centres.



- Preliminary studies conducted at Wetlands of TNAU indicated that the sub-surface drip system can also be made for aerobic rice crop giving a mean higher grain yield of 15-20 per cent than the surface drip irrigation system.

**4. Studies are to be strengthened for micro sprinkler systems (Action: Director, WTC / Director, SCMS)**

- Results of the field trials conducted with mobile micro-sprinklers indicated the possibility of providing supplemental irrigation to pulses especially in Cauvery Delta Zone in terms of higher grain yield. However, caution should be taken to use pure quality water while using micro sprinklers for irrigation purpose.
- Accordingly, it is recommended to provide supplemental irrigation to rainfed pulses at critical stages (flowering and pod formation) during prolonged drought period with mobile sprinklers which improves the grain yield by 24 per cent.
- Research studies using micro sprinkler system is now intensified for crops like vegetables, curry leaf and forages in the Irrigation Cafeteria of WTC.

**CROP PROTECTION**

**1. Use of new promising-pesticides and combination pesticides may be suggested (Action: Director, CPPS)**

S.No.	CHEMICAL NAME	Dose a.i. ha <sup>-1</sup>	CROP	PEST
1.	Flubendiamide 480SC	24g	cabbage	Diamond back moth
2.	Flubendiamide 480SC	16g	Tomato	<i>Helicoverpa armigera</i>
3.	Flubendiamide 480SC	60g	Chillies	Fruitborer
4.	Flubendiamide 480SC	48g	Redgram	<i>Maruca testulalis</i> , <i>Excelastis atomosa</i> <i>Helicoverpa armigera</i>
5.	Flubendiamide 480SC	48g	cotton	bollworms
6.	Flubendiamide 480SC	24g	rice	Leaf folder
7.	Fipronil 80WG	50g	Rice	Stem borer and leaf folder
8.	Fipronil 5SC (Regent)	50g	Rice	Stem borer and leaf folder
9.	Fipronil 80WG	50g	Grapes	Thrips
10.	Fipronil 80WG	50g	Chillies	Thrips
11.	Imidacloprid 200SL	50g	Grapes	Grapevine flea beetle
12.	Imidacloprid 200SL	25g	Cucumber	Sucking insects
13.	Imidacloprid 200SL	50g	Tobacco	Sucking pests
14.	Imidacloprid 17.8SL	15g	okra	Sucking pests
15.	Imidacloprid 17.8SL (Tatamida)	25	okra	Sucking pests
16.	Imidacloprid 17.8SL	50g	Cotton	Sucking pests
17.	Imidacloprid 70WDG	24.5g	Cucumber	Aphids, leaf hoppers
18.	Triazophos 20EC (Hostothion)	600g	cotton	Bollworms
19.	Triazophos 40EC	200g	Chillies	Sucking pests
20.	Spirotetramat 150 OD	60g	Chillies	Sucking pests
21.	Spirotetramat 150 OD	75g	Cotton	Sucking pests
22.	Lamdacyhalothrin 5 CS (Karate Zeon)	30g	Brinjal	Shoot and fruit borer

23.	Lamdacyhalothrin 5 CS (Karate Zeon)	30g	Tomato	Fruit borer
24.	Lamdacyhalothrin 5 CS (Karate Zeon)	30g	Bhendi	Fruit borer
25.	Lamdacyhalothrin 5 CS (Karate Zeon)	15g	Mango	Mango hoppers
26.	Lamdacyhalothrin 4.9 CS (Matadar 5CS)	50g	rice	Leaf folder, stemborer
27.	Emamectin benzoate 5SG (Proclaim)	11g	Cotton & Bhendi	<i>Helicoverpa armigera</i>
28.	Emamectin benzoate 5EC	15g	Bhendi	Fruit borer
29.	Emamectin benzoate 5EC	15g	cotton	Bollworms
30.	Emamectin benzoate 1.9EC	20g	Bhendi	Fruit borer
31.	Emamectin benzoate 1.9EC	20g	cotton	Bollworms
32.	Thiamethoxam 25WDG	25	cotton	Sucking pests
33.	Thiamethoxam 25WDG	25	rice	GLH & BPH
34.	Indoxacarb 14.5 SC	75g	Cotton	Bollworms
35.	Indoxacarb 14.5 SC	25g	Cabbage	Diamond back moth
36.	Indoxacarb (KN 128)15EC	40g	cabbage	Diamond back moth
37.	Indoxacarb (KN 128)15EC	75g	Cotton	Bollworms
38.	Spinosad 2.5SC (Success)	18.75g	Cabbage	Diamond back moth
39.	Spinosad 45SC (Tracer)	75g	Chillies	Fruitborers
40.	Bifenthrin 10EC (Talstar)	50g	Rice	Leaf folder
41.	Spiromesifen 240SC (Oberon)	120g	Okra	Red spidermite
42.	Spiromesifen 240SC (Oberon)	96g	Tea	Tetranychid mite
43.	Buprofezin 25SC	200g	cotton	Sucking pests
44.	Buprofezin 25SC	200g	rice	GLH & BPH
45.	Buprofezin 25SC (Applaud 25 SC)	325g	Grapes	Mealybugs
46.	E2Y 45 20SC	40g	Chillies	Fruitborer
47.	E2Y 45 20SC	40g	Tomato	Fruitborers
48.	E2Y 45 20SC	40g	Redgram	Pod borer complex
49.	E2Y 45 20SC	10g	Cabbage	Diamond back moth
50.	Ethiprole 10SC	50g	Rice	BPH, WBPH
51.	Thiacloprid 24SC	50g	Rice	BPH, WBPH
52.	Propargite 570EC (Omite)	570g	Okra	Red spidermite
53.	Fenazaquin 10EC (Magister)	570g	Okra	Red spidermite
54.	Chlorpenapyr 10SC (Interpid)	100g	Cabbage	Diamond back moth
55.	Diafenthiuron 50WP	0.6g	Cardamom	Shoot and capsule borer, thrips
56.	Diafenthiuron 50WP(Pegasus)	0.1g	Cardamom	thrips
57.	Acetamiprid 20SP	80g	Cotton	Sucking pests
58.	Abamectin 1.9EC	22.5g	Cotton	Boll worms
59.	Fenazaquin 10EC (Magister)	125g	chillies	Yellow mite
60.	Fenpyroximate 5SC	30g	chillies	mite
61.	Kinadan gold (Phosphamidin)	600g	Cotton	Leaf hopper, thrips, aphids, whitefly and boll worms

62	Lancer gold (Acephate)	1000g	Cotton	Sucking pest complex and boll worms
63	Ustaad gold (cypermethrin)	400g	Cotton	Sucking pest complex and boll worms
64	Emamectin benzoate	11 g & 8.50 g	Cotton Bhendi	Boll worms Shoot and fruit borer
65	Triazophos	1000 g	Cotton	Boll worms and whitefly
66	Novaluron	100 g	Cotton	<i>Helicoverpa armigera</i>
67	Fluzanium	100 g 100 g	Cotton Cabbage	Boll worm complex and Spodoptera DBM and Spodoptera
68	Cyazofamid	75 g 75 g	Cotton Rice	Boll worm complex and Spodoptera BPH, WBPH, GLH
69	Benfuracarb 40% EC	500g 500g a.i/ ha	Rice Brinjal	BPH, GLH, stem borer and leaf folder Aphids, leaf hopper, shoot and fruit borer and whitefly
70	Hexythiazox 5.45% EC	300 ml	Chilli	Mites
71	Buprofezin 25 % SC	150 g 200 g	Chilli Rice	Yellow mite, Thrips and Jassids BPH, WBPH and GLH
72	Abamectin 1.8% EW	800 ml ha <sup>-1</sup>	Okra & Brinjal Chilli Cabbage	Mites Mites and thrips DBM
73	Monocrotophos 25 %SG	200 g	Cotton	Aphid, Jassid, Thrips and Whitefly
74	Monocrotophos 15% SG	400 g	Rice	BPH, WBPH and GLH
75.	Neem azal T/S Neem azal F	600 ml 3 kg	Grapevine Rice	Flea beetle and spodoptera Stem borer, leaf folder
76	AVANA (Neem based granules)	2.5- 3 Kg acre <sup>-1</sup>	Sugarcane	Early shoot borer

### New generation fungicides against plant diseases

S.No.	Name of the fungicide	Dose	Uses
1	Ridomil Gold 68 WG (Mefonoxam 4% + Mancozeb 64%)	2.5 g/lit	Application of Ridomil Gold 68 WG (Mefonoxam 4% + Mancozeb 64%) @ 2.5 g / lit at the time of initial appearance of disease was found to be highly effective against grapevine downy mildew disease, where as it was moderately effective against potato late blight disease
2	Folio Gold 44 SC [Metalaxyl-M + Chlorothalonil 36.4% SC (w/w)]	2.0 ml/lit	Application of Folio Gold 44 SC [Metalaxyl-M + Chlorothalonil 36.4% SC (w/w)], 2.0 ml / lit at the time of initial appearance of disease effectively controlled the early and late leaf blight diseases of tomato and late blight of potato
3	Revus 25 SC (Mandipropamid)	1.0 ml/ lit	Application of Revus 25 SC (Mandipropamid) @ 1.0 ml/ lit at the time of initial appearance of disease effectively reduced the incidence of late blight disease in potato and downy mildew disease in grapevine

4	Amistar 25 SC (Azoxystrobin)	0.5 ml/lit	Application of Amistar 25 SC (Azoxystrobin) @ 0.5 ml/lit at the initial appearance of disease effectively reduced the late blight incidence in potato
5	Score 25 EC (Difenoconazole)	0.25-0.50 ml/lit	Application of Score 25 EC (Difenoconazole) @ 0.25-0.50 ml/lit was found to be effective against fruit spot/rot caused by <i>C. gloeosporioides</i> , <i>A. alternata</i> and <i>C. punicae</i> in pomegranate
6	Filia 52.5 SE (Propiconazole + Tricyclozole)	2 ml/lit	Application of Filia 52.5 SE (Propiconazole + Tricyclozole) @ 2 ml/lit was found to be effective in reducing the severity of sheath blight and blast diseases in rice
7	Kocide (Copper hydroxide)	2.5g/lit	Foliar application of Copper hydroxide (Kocide) at 2.5g/lit concentration significantly reduced the incidence of rice false smut and bacterial blight.

**General comments:** No phytotoxicity symptoms were observed in all the tested concentrations of Ridomil Gold 68 WG, Folio Gold 44 SC and Mandipropamid 25 SC on potato, Ridomil Gold 68 WG, Mandipropamid 25 SC and Mandipropamid + mancozeb 65 WG on grapes, Folio Gold 44 SC on tomato, Amistar 25 SC on potato, Score 25 EC on pomegranate and Filia 52.5 SE on rice.

**2. Liquid formulation comprising consortia of microorganisms that promotes nitrogen and phosphorus availability and induce resistance may be developed and made available to farmers by obtaining registration from Central Insecticide Board (Action: Director, CPPS)**

- Liquid formulation of *Pseudomonas* was developed by adding chemical amendments viz., trehalose (10 mM), PVP (2 %) and glycerol (10 mM) to the NA broth separately and the survival was studied up to 180 days under room temperature. A steady and slow decrease in population of *Pseudomonas* was observed during the storage period. The liquid formulation enriched with glycerol supported maximum population throughout the period of study and recorded  $9.5 \times 10^5$  cfu / ml on 180 days followed by trehalose ( $1.0 \times 10^5$ cfu / ml) and PVP ( $2.15 \times 10^4$ cfu /ml) on 120 days. Control treatment recorded the population level of  $10^8$  at 15 days and thereafter a rapid decline in the population was noticed.
- Standardization of dosage of liquid formulations of *Pseudomonas* for seed treatment and their survival on seeds was studied. The inoculum level of 10 ml / kg seeds with equal volume of rice gruel was found to be optimum dose for seed treatment. Liquid formulation of *Pseudomonas* has shown better adherence and survival on tomato seeds than carrier based one.
- Increased activities of defense enzymes for induced resistance were observed viz., peroxidase, polyphenol oxidase, phenylalanine ammonia lyase,  $\beta$ -1, 3-glucanase, chitinase, catalase and lycopene content were found to be significant in combined application of seedling dip + soil drench + foliar spray with liquid formulation and same application with talc formulation treated tomato plants when compared to control.
- For seedling root dipping method, 150 ml /ha of liquid formulations of *Pseudomonas* with 25 l sterile water was observed to be the optimum dose. Liquid formulation showed more adherence and survival of *Pseudomonas* cells on the roots of tomato seedlings than carrier based inoculant.
- In the glasshouse and field conditions, the early blight and *Fusarium* wilt incidence were significantly reduced in the treatment combination of

combined application of seedling dip + soil drench + foliar spray with liquid formulation of Pf1 than the talc formulated product of Pf1. Further multi location demonstration trials under NADP were carried out for the management of diseases on banana and sugarcane using the liquid formulation of *Pseudomonas fluorescens*. Toxicological data for liquid formulation will be done in future work.

**3. Pestigation studies have to be strengthened & appropriate crop & material(s) specific pestigation prescription is to be made (Action: Director, CPPS / Director, WTC / Director, SCMS)**

- Under NADP scheme, pestigation of *Pseudomonas fluorescens* (Pf1) was done on banana crop for the management of *Fusarium* wilt and nematode complex at Pudukkottai district a trial was conducted. When the liquid formulation of Pf1 was applied through drip at the rate of 1 litre per 25 litres of water tank was found to be effective in the reduction of *Fusarium* wilt and nematode population and simultaneously increases the banana yield. It was also noticed that the Pf1 bacteria established well in the banana rhizosphere region of crop.

## **HORTICULTURE**

**1. Efforts may be taken to develop sweet tamarind variety for commercial venture. An alternate variety for the existing PKM 1 tamarind may be developed at HC&RI, Periyakulam as it is not true to type now. Further, the reason for low yield of tamarind PKM 1 may be assessed and the issues to be addressed (Action: Dean, HC&RI, Periyakulam)**

- **Efforts may be taken to develop sweet tamarind variety:** Under ICAR adhoc scheme on "Improvement of sweet tamarind" (Apr 04 to March 09), 22 genotypes were collected and evaluated. Among the genotypes, considerable variations (28 to 44%) on growth parameters were recorded. Few types have started flowering. All the progenies are under further evaluation.
- Mutation breeding was also initiated. All the progenies are in pre bearing age.
- **An alternate variety for the existing PKM 1 tamarind may be developed at HC&RI, Periyakulam:** In order to develop a tamarind variety with high yield potential, few high yielding seedling progenies collected from Gudalur are under evaluation at HC&RI, Periyakulam since the ecological conditions at Gudalur differs from that of Periyakulam.
- During 2008 five high yielding progenies yielding >350 kg/tree identified in the farmers' field of Cumbum region were air grafted for further evaluation at HC&RI, Periyakulam.
- **Reason for low yield of tamarind PKM 1 may be assessed and the issues to be addressed:** A survey was made to assess the reasons for low yield of PKM 1 tamarind in the farmer field of Madurai district. From the survey it was found that PKM 1 tamarind requires rainfall during flowering period (May-June) for better fruit set. It cannot be grown purely as a rainfed crop as it requires supplement irrigation during flowering.

- In all the fields surveyed, heavy flowering was noticed during May-June. However, due to failure of summer showers almost all the flowers dropped and the fruit set observed was very poor. While at HC&RI, Periyakulam under irrigation good fruit set was recorded in the PKM 1 tamarind trees.
- A field visit to tamarind field of Th. Thangaraj (3 km from Arur) of Dharmapuri District was made by a team of scientists on 04.02.2010 to assess the problems related to flowering in Tamarind variety PKM 1.
- The farmer planted 400 grafts of tamarind during 1998 purchased from another farmer which are not PKM 1 variety.

2. ***The HC&RI, Coimbatore produces quality bananas and cassava in a limited quantity for supplying to entrepreneurs who will be multiplying them at a larger scale for farmers. The entrepreneurs willing to commercialize tissue culture plants may be supplied with adequate, quality mother plants from HC&RI, Coimbatore (Action: Dean, HC&RI, Coimbatore)***

Action has been taken to mass multiply the quality tissue culture plants of Banana especially the promising banana hybrids developed at HC&RI, Coimbatore and the Tissue culture units have come forward to take up this work. In the case of cassava, action has been taken to initially multiply the disease free materials from the commercial lab of HC&RI, Coimbatore and the hardened materials will be raised in disease free (Non – traditional) area for multiplying the setts which can be supplied to the farmers directly.

## **AGRL. MARKETING**

1. ***Price forecast for various agriculture produce is being successfully carried out by CARDS, TNAU. Forecast on banana may be disseminated to the NRCB (Action: Director, CARDS)***

As per the NAIP DEMIC forecast schedule, banana forecast is due on March 2010. Hence after approval banana forecast from Vice-Chancellor during March 2010, the market advisories will be shared to the NRCB, Trichy.

## **HOME SCIENCE**

1. ***Value addition in tapioca are to be made other than the products already developed by CTCRI to avoid duplication (Action: Dean, HSC&RI, Madurai / Dean, AEC&RI, Coimbatore)***

The nutrient constituents of enriched sago were analyzed. The nutrient contents in enriched sago were higher when compared with control. The result showed that the carbohydrate and moisture content present was high in control when compared with enriched sago. But the quantity of other nutrients namely protein, fat, crude fibre, calcium and  $\beta$ -carotene present in enriched sago is high when compared with control. The fibre content of the enriched sago has increased as the level of incorporation of papaya and carrot powder increases. But the incorporation of these ingredients did not alter the physical properties of the enriched sago.

## **EXTENSION**

### **1. *Prospects of using interactive multimedia (E-agriculture) in technology dissemination to farmers may be suggested (Action: DEE)***

Tamil Nadu Agricultural University has taken the initiative to develop AGRITECH PORTAL exclusively for promoting the Transfer of Technology process so that the extension functionaries' located at 385 blocks and district head quarters shall get the technical information at touch of the keyboard. For the first time, not only crop based technologies but also the information / knowledge of all aspects under agriculture have been integrated in the portal. It has nearly two lakh pages under the category of Agriculture, Horticulture, Agricultural Engineering, Forestry, Fisheries, Animal Husbandry, Agricultural Marketing, Sericulture and Seed Certification. There is provision in the portal to instantaneously interact with the Subject Matter Specialist at University and Indian Council of Agricultural Research Institutions (ICAR).

#### ***Key Features of Portal***

- Information related to agriculture published in major dailies are scouted and up loaded daily.
- Nearly 300 success stories have been documented for sharing the information among the farmers.
- Video clippings on major technologies and working of farm machineries and special types of cultivations like Precision Farming and System of Rice Intensification are also available.
- Audio documentation of important agricultural issues has been developed for nearly 400 hours of streamed audios for the use of the clients.
- Nutritional status of crop, value addition, processing and recipe for various food article preparations are added with relevant procedural process.
- Input availability (seeds, fertilizers, chemicals) at Government, Private and Tamil Nadu Agricultural University centres are available.
- All the Government Programmes and Schemes, Banking and Credit facility are access able under one umbrella.
- e-copy of Uzhavarin valarum velanmmai both current and past issues are made available in the portal.

The portal will be useful not only to the Agricultural Extension Functionaries, but also the innovative farmers and public who have computer knowledge can access the information. The multimedia portal has been dedicated to service on 27<sup>th</sup> Oct'2009. Further, e-Extension Centre has linked with 60 Centres of TNAU (10 Academic Campus + 36 Research Stations and 14 Krishi Vigyan Kendra) through Multiple Video Conferencing facility.

## POLICY

- 1. *The activities to harvest water namely desilting tanks, water harvest at the dwellings are to be continued effectively to save the rain water and prevent soil erosion. The nutrient available in the desilted soil can be effectively utilized (Action: Dean, AEC&RI / Director, WTC / Director, SCMS)***

Sedimentation pattern in irrigation tanks and encroachment problems and remedial measures were discussed in a workshop organized by Water and Power Consultancy Ltd (WAPCOS), Chennai in collaboration with District Administration at the Agricultural Engineering College and Research Institute, Tamil Nadu Agricultural University, on 18<sup>th</sup> November 2009. The scientist of Soil and Water Conservation Engineering department participated and discussed the issues including Farmers Participatory Research on water management with Joint Secretary, MoWR, New Delhi and Regional Director (Central Ground Water Board). The District Collector and Corporation Commissioner also attended the meeting. (Engg)

Policy note has been submitted to the Government to the effect of rain water harvesting in dwellings and also by desilting the tanks for adoption in the coming year for the presentation of "Policy Note" by the Hon'ble Minister of Agriculture, Government of Tamil Nadu, during the budget session for the ensuing year. (WTC)

- 2. *Suitable suggestions are to be made to Govt. to have the programme of desilting of tanks in the state as a continuous basis (Action: Director, WTC)***

- Tank rehabilitation options that restore the original standards should be given priority. Desilting is a important option.
- In a 10 cycle, only in three years , the tank gets full storage, five years deficit storage and in the remaining two years the tanks fail. Therefore, desilting the tank fully will not be economical, as the benefits due to desilting will be in three years only, where tanks get full supply.
- Also, disposal of the entire desilted material is difficult, as the fertile silt is found only in the top (0.4 metre) layers. Therefore, full scale desilting may not be warranted.
- Considering the high cost (around Rs.200 / m<sup>3</sup>) of silt, partial desilting that helps to restore original (10 %) dead storage could be attempted as part of tank rehabilitation options as this will help increase non-irrigation benefits of tank water particularly in the non-tank-irrigation season. Besides, recharging of wells will be improved.
- Partial desilting could be done nearer to the lower sluice as well as around the periphery of the tank water spread areas.
- Consultation or Policy Advocacy groups may be formed to link the village panchayat unions and *Zilla Parishad* for allocation of funds, overall tank improvements, including desilting, and management and investment.



**3. Suggestion to be given to Govt. for strict adherence of roof water harvesting (Action: Director, SCMS / Director, CARDS / Dean, Engg)**

Roof water harvesting is an important component for sustenance of water resource particularly in urban areas. It has been a mandatory requirement in approval of construction plan. Hence, proper design, operation and maintenance part should be looked into, by periodical inspection by the competent authorities by whom water supply connections are implemented.

**4. Policy decision is to be made to have multi-disciplinary, mission mode, crop mode approach in the research system (Action: All University Officers)**

During the monthly review meetings with the HODs the need for multi-disciplinary research projects/schemes are emphasized and they are asked to prepare projects by involving scientists from different departments with mission mode, crop mode approach.

- Under 'crop mode' concept one NMPB scheme on medicinal plants has been recently closed which involved scientists of both Entomology and Horticulture.
- The IWDP scheme operated here is run totally on 'mission mode' approach by involving scientists of Economics, Agronomy, Soil science, microbiology and Horticulture.
- The recently obtained GOI- Central sector scheme on seed production is functioning under 'mission mode' and breeders, seed technologists and agronomists are involved in this scheme.
- Another scheme sponsored by TNSCS&T is jointly run by Physiologists and Breeders.

FC&RI, Mettupalayam has reoriented all the research projects to have multidisciplinary research approaches through a mission mode in association with various stake holders. Currently the concept is successfully introduced and implemented in industrial agroforestry through multidisciplinary approach involving pulp and match wood species. Action is also initiated to implement the concept of multidisciplinary mission mode approaches for augmenting research system in energy and other industrial wood species.

In all the monthly meetings conducted at TRRI, Aduthurai and technical inspections at region II research stations, the scientists were sensitized to formulate multi-disciplinary mission mode, crop mode approach in the research system and the same is being followed. (TRRI)

## Agenda No.3

New Schemes sanctioned from March 2009 to January 2010

### I. ICAR FULLY & PARTLY FINANCED SCHEMES

(Rs. in lakhs)

Sl. No.	Title of the Project	Location	Date of Start	Date of Closure	Budget
1.	Techno-economic assessment of the unexploited value added agro processing technologies of the hill tribes for commercialization, rural empowerment & livelihood security of tribal communities	Dept. of PHTC, Coimbatore	April, 2009	Sept. 2011	7.20
2.	Pre and post harvest technologies for moringa to enhance the shelf life and value addition	Dept. of PHTC, Coimbatore	Jan. 2010	Jan. 2012	38.51
3.	Environmental and socioeconomic externalities of land degradation in the Nilgiris mountain of Tamil Nadu	Dept. of PHTC, Coimbatore	Oct. 2009	Dec. 2011	8.16
4.	Estimating Marketing Efficiency of Horticultural Commodities under Different Supply Chains in India	Dept. of Agrl. Economics, Coimbatore	01.04.09	31.03.10	4.12
5.	Organic Farming in Tamil Nadu: Food Security and Land Quality Implications	Dept. of Agrl. Economics, Coimbatore	01.06.09	30.11.10	4.00
6.	Network project for establishment of nucleus seed gardens for production of quality materials of recently released coconut cultivars	CRS, Veppankulam	Dec. 09	March 2012	6.96
7.	Evaluation of T x T and D x D coconut hybrids for copra yield and good quality tender nut water	CRS, Veppankulam	April 09	March 2012	2.25
8.	Front line demonstration of mung bean and urdbean	ADAC&RI, Trichy	2009	2010	0.60
9.	Development of hybrids in brinjal	VRS, Palur	1.4.2008	31.3.2011	10.00
10.	Survey on Tsunami Affected Households	Nagapattinam district	Feb 2006	Nov 2010	8.20
11.	Bacterial melanins ad UV protectant for biocontrol agents	Dept. of Nematology, Coimbatore	Nov. 2009	Oct. 2012	16.56
12.	Utilization of fly ash as a source of silicon and potassium for mitigating the biotic and abiotic stress in rice	AEC&RI, Kumulur	1.10.2009	30.9.2012	27.50

13.	Technology Assessment and Designing Extension Modules for Precision Farming through Farmers Participatory Research and Extension	KVK, Sandhiyur	27.10.2008	2.09.2009	5.00
14.	L-RAMP : Rural Innovation Identification and Supporting Innovators Network Programmes	Dept. of AE&RS, Coimbatore	Dec 2005	July 2009	3.97
15.	Developing a New Extension Model: Synergetic Extension Model for sustainable and Profitable Farming	Dept. of AE&RS, Coimbatore	07.10.2009	31.03.2011	10.00
16.	Strengthening of Quality seed production and distribution	Seed Centre, Coimbatore	13.06.2008	31.03.2010	319.20
17.	Quality seed production and distribution	Seed Centre, Coimbatore	17.11.2008	31.03.2010	31.33
18.	Development of instructional materials for ITI students in Agricultural Sector	Dept. of SS&T, Coimbatore	Jan. 2010	Jan. 2011	13.41
19.	Drip irrigation capacity building and management initiative for maximizing productivity and income	WTC, TNAU, Coimbatore	09.09.2009	08.09.2011	57.00
20.	Development of microbial consortium for Arbuscular Mycorrhizal Fungi and rhizobacteria for nutrition and growth promotion of nursery and direct seeded crop plants	Dept. of Agrl. Microbiology, Coimbatore	June 2009	May 2012	19.29
	<b>Total</b>				<b>593.26</b>

## II. GOVERNMENT OF INDIA (GOI) SCHEMES

(Rs. in lakhs)

Sl. No.	Title of the Project	Location	Date of Start	Date of Closure	Budget
1.	Development and strengthening of infrastructure facilities for production and distribution of quality seeds – Madurai centre	AC&RI, Madurai	3 years		35.00
2.	National Invasive Weed Surveillance (NIWS)	AC&RI, Madurai	2 years		17.28
3.	Utilization of organic wastes for the production And formulation of entomopathogenic fungi for Eco friendly pest management of white grub	AC&RI, Madurai	3 years		17.8
4.	Development of new functional microbial consortium formulation suitable for biofertilization and phyllosphere spray in precision farming	AC&RI, Madurai	3 years		21.58

5.	Balanced fertilization for yield maximization and impact of root exudates on soil health in Glory lily ( <i>Gloriosa superba</i> ).	Dept. of SS&AC, Coimbatore	Dec 2008	Nov 2011	9.50
6.	Upliftment of rural women through dissemination of improved technologies in coconut cultivation and employment generation activities	TCRS, Yethapur	Januray 2007	March 2010	14.40
7.	Biointensive management of papaya mealy bug ( <i>Paracoccus marginatus</i> ) in mulberry ecosystem.	Dept. of Sericulture	August 2009	July 2011	6.20
8.	Techno economical empowerment of farm women through Integrated Farming Systems approach	Dept. of Sericulture	November 2009	October 2012	8.67
9.	Technological empowerment of farm women sericulturists	Dept. of Sericulture	November 2009	October 2012	8.07
10.	Breeding bio fortified rice varieties with high Fe and Zn content	ADAC&RI, Trichy	2009	2011	6.12
11.	Development of salinity stress resistance in rice varieties	ADAC&RI, Trichy	2009	2013	56.32
12.	Exploiting the dormant stages of bacteria to increase the shelf life of bio inoculants	ADAC&RI, Trichy	2009	2011	1.87
13.	Establishment of model nursery	VRS, Palur	2008	2010	17.50
14.	Mission Biofuels - Development of <i>Jatropha</i> Hybrids for Higher Seed and Oil Yield	FC&RI, Mettupalayam	01.07.2009	30.6.2014	26.10
15.	Afforestation and Evaluation of Fast Growing Trees for high Carbon Sequestration values	FC&RI, Mettupalayam	October 2009	September 2010	36.75
16.	Developing DUS descriptors and test guidelines for Tree Species of <i>Neem</i> , <i>Karanja</i> and <i>Jatropha</i>	FC&RI, Mettupalayam	September 2009	August 2012	27.6
17.	Investigation on safe disposal of sludge from terry towel (Textile) industry for agro forestry production.	FC&RI, Mettupalayam	2009	2012	11.54
	<b>Total</b>				<b>322.30</b>

### III. STATE GOVERNMENT SCHEMES

(Rs. in lakhs)

Sl. No.	Title of the Project	Location	Date of Start	Date of Closure	Budget
1.	Improved scientific methods of storage and pest management for women	AC&RI, Madurai	1 year	-	0.15
2.	Management of Nutritional and Physiological disorders in Agricultural and Horticultural crops	AC&RI, Madurai	1 year	-	0.15
3.	Consultancy project on Landscaping at Madurai Kamaraj University	AC&RI, Madurai	2 years	-	19.56
4.	Developing comprehensive district agricultural plan	ADAC&RI, Trichy	2009	-	5.00
<b>Total</b>					<b>24.86</b>

### IV. FOREIGN AGENCY SCHEMES

(Rs. in lakhs)

Sl. No.	Title of the Project	Location	Date of Start	Date of Closure	Budget
1.	Cereal Systems Initiative for South Asia	Dept. of ARM, Coimbatore	1.10.09	30.11.2011	4.00
2.	Economic Impact of Climate Change on Yield Variability of Major Crops in Tamil Nadu	Dept. of ARM, Coimbatore	1.2.2010	31.10.2011	7.00
3.	<i>Jatropha curcas</i> : Applied and Technological Research on Plant Traits	Centre of Excellence in Biofuels, Coimbatore	1.1.2010	31.12.2013	54.60
<b>Total</b>					<b>65.60</b>

### V. PRIVATE AGENCY SCHEME

(Rs. in lakhs)

Sl. No.	Title of the Project	Location	Date of Start	Date of Closure	Budget
1.	Testing the bio-efficacy of HGW 86 (Cyantraniliprole) 10 % OD (Oil dispersible formulation) against insect pests of Gherkins and Tomato	AC&RI, Madurai	1 year	-	1.75
2.	Evaluation and optimization of the specialty water soluble fertilizers 28:28:0 and Gromore Sulphur for higher productivity in Sugarcane, Banana and Maize crops under drip fertigation system	AC&RI, Madurai	2 years	-	4.98

3.	Evaluation of Allwin Wonder and Allwin Top in Tomato	AC&RI, Madurai	1 year	-	1.87
4.	Noni-based agrochemicals and biopesticides: A new dimension for enhancing productivity in farming	AC&RI, Madurai	3 years	-	9.90
5.	Evaluation of bio-efficacy of Emamectin Benzoate 5 % SG (New source) and Emamectin 5 % WG (UV protectant) against insect pests of Okra, cotton and cabbage.	AC&RI, Madurai	2 years	-	6.40
6.	Studies on the bio efficacy and phytotoxicity of Ethoxysulfuron 15 WG (Sunrice 15 WG) in Sugarcane	SRS, Cuddalore	April 2009	March 2011	1.99
7.	Testing of rice hybrids developed by Bayer Bioscience (P) Ltd.	Dept. of Rice Coimbatore	2008	2010	2.40
8.	Testing of rice hybrids developed by Rice Tec.	Dept. of Rice Coimbatore	2008	2010	2.74
9.	Testing of rice hybrids developed by Devgen and Crop Technology (P) Ltd.	Dept. of Rice Coimbatore	2008	2010	0.60
10.	Women empowerment through bio-complex approach in Tamil Nadu	Dept. of Rice Coimbatore	2009	2012	7.77
11.	BASF trial on evaluation of exotic rice material	Dept. of Rice Coimbatore	2009	2010	3.85
12.	Evaluation of newly designed Zinc and Iron chelates for rice	Dept. SS&AC, Coimbatore	7/2009	6/2010	2.57
13.	Evaluation of bioefficacy of sunflower and Spinetoram 12 SC w/c (11.7% w/w) against major cotton pests and their natural enemies	HC&RI, Periyakulam	August 2009	March 2011	5.00
14.	Evaluation of bioefficacy and phytotoxicity of Fipronil 80 WG (Regent 80 WG) against onion thrips	ADAC&RI, Trichy	2009	2010	1.90
15.	Evaluation of bioefficacy and phytotoxicity of combination fungicide, fluopyram 200 + tebuconazole 200-400 SC w/v against powdery mildew and anthracnose in chilli	ADAC&RI, Trichy	2009	2010	2.23
16.	Efficacy of HGW860D against insect pests of pomegranate	ADAC&RI, Trichy	2009	2011	0.50
17.	Evaluation of bioefficacy and phytotoxicity of Nativo 75 WG (Trifloxystrobin 25% + Tebuconazole 50%) ready mix against onion purple blotch and tomato early blight	ADAC&RI, Trichy	2009	2011	3.58

18.	Evaluation of bioefficacy and phytotoxicity of Nativo 75 WG (Trifloxystrobin 25% + Tebuconazole 50%) ready mix against Sigatoka disease in banana	ADAC&RI, Trichy	2009	2011	2.51
19.	Survey of Biogas Plants and study on replacement of fossil fuel in reducing Green House Gases under CDM	Dept. of Bio Energy, Coimbatore	June 2009	November 2009	1.60
20.	Biodiesel production from algae M/S.Bharat Petroleum Corporation Limited (BPCL)	Dept. of Bio Energy, Coimbatore	2009	2011	32.23
21.	Bioefficacy of high azadirachtin neem oil (3000 ppm) against sucking pests and fruit borer of tomato	Dept. of Entomology Coimbatore	8.9.2009	7.9.2010	0.62
22.	Bioefficacy, Safety and Phytotoxicity of Thiamethoxam 75 SG in cotton, sugarcane, rice and groundnut	Dept. of Entomology Coimbatore	18.8.09	17.8.2011	4.85
23.	Evaluation of insect resistant transgenic corn hybrids	Dept. of Entomology Coimbatore	19.8.09	18.8.2010	5.19
24.	Bioefficacy, safety and phytotoxicity of new insecticides in chilli, tomato, redgram and bengalgram	Dept. of Entomology Coimbatore	8.9.2009	7.9.2011	6.62
25.	Testing of private maize entries against the major pest and diseases	Dept. of Entomology Coimbatore	Sept. 2009	Aug. 2010	1.73
26.	Testing of Monsanto private maize entry against the major pest and diseases	Dept. of Entomology Coimbatore	22.10.09	21.10.2010	0.57
27.	Testing of pioneer maize entry against the major pest and diseases	Dept. of Entomology Coimbatore	7.10.2009	6.10.2010	0.57
28.	Bioefficacy of new plant based products against diamond back moth on cabbage	Dept. of Entomology Coimbatore	10.9.2009	9.9.2010	0.40
29.	Bioefficacy, phytotoxicity and effect on natural enemies for Cartap hydrochloride 4% G on rice	Dept. of Entomology Coimbatore	10.8.2009	9.8.2010	1.15
30.	Bioefficacy, phytotoxicity, effect on natural enemies and residues for Fipronil 5% SC on chilli and rice	Dept. of Entomology Coimbatore	10.7.2009	9.7.2010	3.42
31.	Bioefficacy of Magister 10 EC against okra, brinjal and tomato mites	Dept. of Entomology Coimbatore	16.4.2009	15.4.2011	3.20
32.	A Value Chain on Wild Honey Bee	Dept. of Entomology Coimbatore	22.9.2009	21.9.2012	48.32

33.	Priming and pelleting for value added seeds	Dept. of SST, Coimbatore	29.4.2005	31.7.2008	4.55
34.	Seed and Seed crop fortification with KCPL secondary proteins	Dept. of SST, Coimbatore	30.7.2007	29.6.2009	2.29
35.	Development of fortified seed pelleting technology for cotton	Seed Unit, Coimbatore	4.12.2008	3.12.2009	1.01
36.	Development of mechanized integrated seed coating technology for maize and pearl millet	Dept. of SST, Coimbatore	June 2008	May 2010	2.87
37.	Evaluation of DISCO brand seed coating polymer of INCOTEC on Agronomic crops for storability	Dept. of SST, Coimbatore	June 2008	May 2009	1.59
38.	Enhancing the livelihood of dry land farmers of Tamil Nadu by imparting knowledge on hybrid seed production technology and importance of quality seed in Maize, Bajra, Sorghum	Dept. of Millets, Coimbatore	August, 2009	July, 2009	6.40
	<b>Total</b>				<b>191.72</b>

## VI. VENTURE CAPITAL SCHEMES

(Rs. in lakhs)

Sl. No.	Title of the Project	Location	Date of Start	Date of Closure	Budget
1.	Mass production of Arbuscular mycorrhizal fungi and azolla	Tamil Nadu Agricultural University	2009 onwards		1.50
2.	Virus elimination through tissue culture techniques in cassava	T CRS, Yethapur	June 2008	March 2011	2.00
3.	Production of Vermicompost and Vermiwash	T CRS, Yethapur	September 2006	March 2010	0.50
4.	VCS on production of TNAU coconut tonic for North Western Zone of Tamil Nadu.	T CRS, Yethapur	September 2003	March 2010	0.30
5.	Production of hybrid castor seeds under contract farming system	T CRS, Yethapur	September 2006	March 2010	0.45
6.	Production of CO <sub>2</sub> and CO <sub>3</sub> Cassava seed materials	T CRS, Yethapur	December 2003	March 2010	0.35
7.	Mass multiplication of ornamental plants for rapid urbanization	ADAC&RI, Trichy	1.3.2010	28.2.2012	1.00
	<b>Total</b>				<b>6.10</b>



## **Agenda No.4**

### **RESEARCH HIGHLIGHTS**

#### **Abstract of Research Findings**

#### **LIST OF NEW CROP VARIETIES AND FARM IMPLEMENTS RELEASED DURING 2009**

##### **Varieties**

1. Rice – Anna (R) 4
2. Kudiraivali - CO(KV) 2
3. Greengram – VBN (Gg) 3
4. Sesame - TMV (Sv) 7
5. Castor - YRCH 1
6. Cotton – SVPR 4
7. Sugarcane - COC (SC) 24
8. Guinea Grass – CO(GG) 3
9. Brinjal - COBH 2
10. Snake Gourd – PLR (SG) 2
11. Cashew - VRI (CW) H 1

##### **Implements**

1. Improved TNAU dhal mill
2. Twin row precision organic manure cum fertilizer
3. Worker friendly arecanut stripper
4. Multi row power weeder for SRI

# AGRICULTURE

## I. CROP IMPROVEMENT

### A. FOR ADOPTION

#### RICE – PMK (R) 4

Parentage	:	Pantdhan 10 / IET 9911
Duration	:	100-105 days
Season	:	Samba (September – October)
Grain yield	:	3.7 tonnes / ha (14.7% increase over PMK (R) 3)
Highest yield obtained	:	4.5 tonnes / ha
Area of adoption	:	Ramanathapuram & Sivagangai districts

#### Special features

- Semi dwarf, erect, non – lodging
- Drought tolerant
- Long slender white rice with high head rice recovery (62.1%)
- Short duration (100 – 105 days) - a week earlier than PMK (R) 3

#### KUDIRAIVALI – CO (KV) 2

Parentage	:	Pure line selection from genetic accession EF 79
Duration	:	95 days
Season	:	Kharif and Rabi
Yield	:	2114 kg/ha (23.2, 10.6 and 15.6% increase grain yield over checks CO 1, K 1 and VL 29 respectively)
Highest yield obtained	:	3095 kg/ha
Area of adoption	:	Madurai, Ramnad, Tuticorin and Virudunagar districts

#### Special features

- Higher yield
- Short duration
- Drought tolerant
- Non-lodging
- Highly suitable for value addition

### **GREENGRAM – VBN (Gg) 3**

Parentage	:	K1 / Vellore local
Duration	:	65-70 days
Season	:	All seasons
Yield	:	826 kg/ha Rainfed (Kharif) – 775 kg/ha Irrigated (Rabi) – 878 kg/ha (16.0% increase over VBN (Gg) 2, 19.0% increase over CO 6 and 8.0% increase over CO (Gg) 7)
Highest yield obtained	:	1600 kg/ha
Area of adoption	:	All the parts of Tamil Nadu except Nilgiris and kanyakumari districts

#### Special features

- High yield
- High protein content (24.16%)
- Resistance to yellow mosaic virus
- Resistant to powdery mildew
- Multiblooming type

### **SESAME – TMV (Sv) 7**

Parentage	:	Si 250 / ES 22
Duration	:	85 – 90 days
Season	:	Kharif and Rabi (rainfed) and Summer (irrigated)
Yield	:	Rainfed: 750 kg/ha [14.4% increase over TMV 3 and 14.8% increase over VRI(Sv)2] Irrigated: 820 kg/ha [17.4% increase over TMV 6 and 18.4% increase over VRI(Sv)2]
Highest yield obtained	:	1780 t/ha
Area of adoption	:	Suitable for all sesame growing areas of Tamil Nadu

#### Special features

- High yield
- Tolerant to root rot disease
- Lustrous brown testa
- Suitable for value addition

### **CASTOR – YRCH 1**

Parentage	:	DPC 9 / TMV 5
Duration	:	150 – 160 days
Season	:	June – July (Rainfed and Irrigated) November – December (Irrigated)

Yield : 1861 kg/ha  
(27% increase over GCH 4)  
Highest yield obtained : 2500 kg/ha  
Area of adoption : Throughout Tamil Nadu

#### Special features

- More female flowers on the spike (95%)
- Non lodging
- Non shattering
- Low leaf hopper and whitefly incidence
- Moderately tolerant to capsule borer

#### **COTTON – SVPR 4**

Parentage : A hybrid derivative of the cross MCU 5 with S 4727  
Duration : 150 days  
Season : Feb – March (Summer irrigated)  
Yield : 1583 kg/ha  
(13.0% increase over SVPR 2)  
Highest yield obtained : 3772 kg/ha  
Area of adoption : Summer irrigated tracts of Tamil Nadu which include Madurai, Dindugul, Theni, Virudhunagar, Ramanathapuram, Tirunelveli, Villupuram and Cuddalore districts

#### Special features

- Higher lint yield (573 kg/ha)
- Moderately resistant to leafhopper
- Highly tolerant to high night temperature (>27°C) during summer
- Match the recent CIRCOT norms and can spin 40's
- Suitable for summer irrigated cotton belt

#### **SUGARCANE – COC (SC) 24**

Parentage : Co 8371 x MS 6847  
Duration : 300 – 330 days  
Season : Early (December – January)  
Special (June – July)  
Yield : 133 t/ha  
(12.8 and 2.6% increase over CO 86032 COC (SC) 23 respectively)  
Highest yield obtained : 226 t/ha  
Area of adoption : Entire sugarcane growing districts in Tamil Nadu & Puducherry states

### Special features

- Erect, non-lodging and suitable for machine harvesting
- Good ratooner
- Easy de-trashable
- Tolerant to drought and saline condition
- Moderately resistant to red rot and Smut diseases
- Tolerant to stalk borers
- Highly suitable for cogeneration (>14% fibre)

### **GUINEA GRASS – CO (GG) 3**

Parentage	:	Clonal selection from Mumbasa
Duration	:	Perennial
Season	:	Throughout the year
Yield (Green fodder)	:	424 t/ha/year (77.0% increase over CO 2)
Highest yield obtained	:	517 t/ha/year
Area of adoption	:	Throughout the state of Tamil Nadu

### Special features

- Profuse tillering (40-60 per clump) and non-lodging
- High leaf stem ratio (0.73)
- Shade tolerant
- Quick regeneration capacity
- High palatable, preferred by milch cattle, goat, sheep, pigs and Emu
- High crude protein content (6.35%)
- Free from pest and disease

## **B. FOR ON FARM TESTING**

### **RICE**

The following rice varieties and hybrids have been identified superior and are to be tested under Adoptive Research Trial/ On-farm Trial during 2009-10.

#### **Short duration culture**

**CB 06732:** This culture has recorded an average grain yield of 5999 kg/ha in MLT with 18.2, 22.5, 25.4 and 22.2 per cent higher yield over ASD 16, ADT 36, ADT 43 and ADT (R ) 45 respectively. The culture has recorded high milling (67.2%), and volume expansion (7.0 ml) after cooking. It has intermediate amylose, GT and soft GC. It is moderately resistant to WBPH.

#### **Mid early culture**

**CB 04044:** This culture recorded an average grain yield of 5439 kg/ha in 124 days with 13.5, 5.8 and 23.4 per cent higher yield than CO 47, ADT 39 and ASD 16. In quality tests it has intermediate amylose, GT and soft GC. It is moderately resistant to WBPH and RTD.

#### **Medium duration culture**

**CB 05022:** The culture recorded a mean grain yield of 6076 kg/ha in 133 days with 9.5, 24.1 and 42.7 percent increased yield over ADT (R) 46, I.W. Ponni and BPT 5204 respectively. The culture has high head rice recovery (60.6%), intermediate amylose, GT and soft GC. It is moderately resistant to BPH and moderately susceptible to WBPH, GLH and brown spot.

#### **Short duration aerobic culture**

**CB 05701:** This culture recorded an average grain yield of 2202 kg/ha in 107 days duration with 7.1, 28.3 and 9.9 per cent increase over PMK (R) 3, PMK 1 and TKM (R) 12 respectively. The culture has high milling (70.0%), intermediate GT. It is moderately susceptible to GLH.

#### **Quality culture – early**

**CB 05501:** This culture recorded a mean grain yield of 5296 kg/ha with 16.9 percent increased yield over the check variety ADT 43. The culture has intermediate GT, amylose and soft GC. It is moderately susceptible to WBPH and GLH.

#### **Short duration hybrids**

**TNRH 135:** The hybrid TNRH 135 recorded an average grain yield of 5479 kg/ha which is 5.8 percent increased yield over CORH 3, 15.8 percent over ADT 43 and 19.3 percent over ADT (R) 45. It is having medium slender grain type with high LER, low BER

and intermediate GT. It is having moderate resistance to stemborer and moderate susceptibility to gall midge, leaf folder, blast, BLB and brown spot.

**TNRH 180:** This hybrid recorded an average grain yield of 5803 kg/ha in 117 days with 7.5, 16.9, 14.8 and 7.5 percent increased yield over CORH 3, ADT 43, ADT (R) 45 and DRRH 2 respectively. It has high milling (77.4%), HRR (57.8%) and volume expansion ratio (4.8 times). It has intermediate amylose and soft GC. It is moderately susceptible to brown spot and RTD.

### **Medium duration hybrid**

**TNRH 174:** This hybrid recorded an average grain yield of 5733 kg/ha in 131 days with 11.8 and 9.2 percent increased yield over ADT 39 and CORH 2 respectively. It has intermediate amylose, GT and soft GC. It is moderately susceptible to WBPH.

## **MILLETS**

### **SORGHUM**

#### **Cultures in ART Hybrids**

**TNSH 482** (ICSA 51/TNS 30): This is high yielding hybrid with duration of 100 days with average grain yield of 6048 kg/ha which is 30.7 percent increase over COH 4. The grain colour of the hybrid is pearly white and it is moderately resistant to shootfly and resistant to downy mildew. The stover yield is 12.3 t/ha.

**TNSH 483** (MS 70 A/TNS 30): This hybrid is having high grain and stover yield (5688 kg/ha and 10.5 t/ha respectively) which is 23.0 per cent increase over COH 4. It is an early maturing hybrid (100 days) with pearly white grains. The grain colour is pearly white and it is moderately resistant to shootfly and resistant to downy mildew

### **PEARLMILLET**

#### **Hybrids in ART**

**TNBH0642** (ICMA 93111/ PT 6029-30): This high yielding cumbu hybrid registered the mean grain yield of 3276 kg/ha which is 19 per cent increase over the check X7(2744kg/ha). It is a bold grain hybrid with high Fe content and also resistant to downy mildew.

**TNBH07523** (ICMA 92888/ PT 6040): It is a high yielding hybrid with a mean yield of 2600 kg/ha which is 12 per cent increase over the check X7. This hybrid has high level of resistance to downy mildew.

**TNBH 07516** (ICMA 92888/ PT 6033) another cumbu hybrid with a mean grain yield of 2575 kg /ha registered 15 per cent increased yield over the check X7(2316 kg/ha). It is a bold grain hybrid, resistant to downy mildew

## **RAGI**

**TNAU 1008:** This culture was developed by hybridization of CO 11 X PR 202 and selection from subsequent generations. It is of shorter duration (108 days) and recorded an average yield of 2833.0 Kg/ha which was 41.9% higher than check GPU 28 and 29.0% higher than CO (Ra) under rainfed conditions. This culture is drought tolerant and not affected by major pest and diseases.

**TNAU 1018:** It was developed by hybridization and selection of CO 9 x DPI 2011. The duration of the culture is 105 days and is blast resistant. It registered an average yield of 2828 Kg/ha, which was 41.1% higher than GPU 28 and 29.0% higher than CO(Ra)14 under rainfed conditions.

**DPI -03-007-01:** This drought tolerant culture was developed by crossing CO 12 x GPU 28 and selection from the segregating generations. It matures in 110 days and it recorded an average yield of 2865 Kg/ha which was 43.5% higher than check GPU 28 and 30.5% higher than CO(Ra)14.

## **VARAGU**

**TNAU 51:** This culture is a pure line selection from Perambalur local. It matures in 120 days and is drought tolerant. It recorded an average yield of 3320 Kg/ha while the check CO 3 registered an average yield of 1200 Kg/ha. It is resistant to head smut.

## **PULSES**

### **REDGRAM**

The medium duration culture CRG 990014 is in second year of ART.

**CRG 990014** (CO 6 X ICPL 87119): This is a long duration culture (180 days) with average grain yield of 1875 kg/ha, which is 16.3% increase over Co 6 (1612 kg) and 18.4% increase over Vamban 2 (1583 kg). This culture is resistant to sterility mosaic disease. This culture is recommended for release based on the results obtained ART / OFT.

Two early duration cultures CRG 06-12 and CRG 07-10 are in first year of ART  
**CRG 06-12** (Co 5x Co(Rg) 7). This is a short duration culture maturing in 120 days with mean grain yield of 1371 kg/ha. This culture is resistant to sterility mosaic disease.

**CRG 07-10** (Mutant from VBN 1 (200Gy): This is a short duration culture maturing in 120 days with mean grain yield of 1390 kg/ha. This culture is resistant to sterility mosaic disease and indeterminate growth habit.

### **BLACKGRAM**

The culture CBG 645 is being evaluated in ART 2009. The culture CBG 653, is a cross derivative of DU 2 x UB 20 is also being evaluated in ART. This culture is recommended for release based on the results obtained ART / OFT. Both the cultures are resistant to MYMV.



## GREENGRAM

An advanced high yielding culture CGG 936 is being tested in ART. This is a cross derivative of Pusabold x Co 6. It is a bold seeded variety and resistant to MYMV. Another high yielding culture CGG 934 is also being evaluated in ART 2009. It is a cross derivative of CO 6 x ML 267. This culture recorded an average yield of 649 kg/ha which is 25.28% yield increase over Co (Gg) 7. It is resistant to MYMV disease.

## OILSEEDS

### GROUNDNUT

**ICGV 87846:** A Virginia bunch groundnut culture ICGV 87846 recorded 1603 kg/ha while the locally grown variety recorded 869 kg/ha only in Farmers Participatory Varietal Selection Trials under rainfed condition at Namakkal district during Kharif 2008. This culture has 70 per cent shelling per cent with 49.5 per cent oil content. This culture is being tested in adaptive research trails during 2009.

### SUNFLOWER

**Hybrid CSFH 5060:** The hybrid is developed by utilizing our own converted CMS line with mono head restorer line. It matures in 85-90 days. It has recorded a seed yield of 2710 kg / ha as compared to 2185 kg / ha by Sunbred 275. The yield increase is 24.0 per cent. The volume weight of this hybrid is 43.3g / 100 ml and oil content is 40.7 %. The seeds are bolder with the 100 seed weight of 6.8g. It is being tested in adaptive research trial during 2009-10.

**Hybrid CSFH 6256:** It is a high oil content hybrid with mono head restorer line. It matures in 85-90 days. It recorded a seed yield of 2660 kg/ha as compared to Sunbred 275 (2110 kg/ha) which is 26.0 per cent increased yield. The volume weight of this hybrid is 43.5g /100 ml and oil content is 42.0 %. The 100-seed weight is 5.5 g. It is being tested in adaptive research trial during 2009-10.

**Hybrid CSFH 5080:** It is a high yielding hybrid with mono head restorer line. It matures in 85-90 days. It recorded a seed yield of 2465 kg/ha as compared to Sunbred 275 (2110 kg/ha). The yield increase is 16.8 per cent. The volume weight of this hybrid is 42.0 g /100 ml and oil content is 39.0 %. The 100-seed weight is 5.4 g. It is being tested in adaptive research trial during 2009-10.

## COTTON

### For MLT/ART

- The two intra *hirsutum* hybrids viz., TCH 2251 and TCHH 2322 are proposed for evaluation under ART during 2009-10 in five locations each of Dharmapuri, Salem, Erode, Theni and Perambalur districts, 20 OFTs through KVKs of TNAU and 5 OFTs by the Research Station. The hybrids TCHH 2322 and TCHH 2251 recorded a mean seed cotton yield of 2166 kg/ha and 2195 kg/ha which is 16.7% and 18.3 % increased yield over the check Bunny (1855 kg/ ha). With

regard to fibre quality parameters, TCHH 2322 had recorded 33.2mm of span length and 23.2g/tex of bundle strength and TCHH 2251 had 32.9 mm fibre strength and 23.1 g/tex of fibre strength. These hybrids mature in 165 days and are suitable for winter irrigated tracts on Tamil Nadu.

- The elite culture, TCH 1705 is proposed for ART during 2009-10 in five locations each of Theni, Coimbatore, Erode, Dharmapuri and Perambalur districts, 20 OFTs through KVKs of TNAU and 5 OFTs conducted by the Research Station. It has recorded a mean seed cotton yield of 1833 kg/ha which was 27.0 % increased yield over the check MCU 13 (1444 kg/ha). It has 30.4mm of span length and 23 g/tex of bundle strength.
- The elite cultures viz., TCH 1715, TCH1716 and TCH 1710 recorded an average kapas yield of 1975 kg/ha, 1839 kg/ha and 1711 kg/ha which were 32.5 %, 23.3 % and 14.7 % increased yield over the check MCU 13 (1491 kg/ha). All these three cultures recorded more than 32 mm of span length and 23 g/tex of bundle strength. These three entries are proposed for evaluation under MLT during 2009-10 in three Research Stations of Coimbatore, Perambalur and Srivilliputtur.

## FORAGE CROPS

### Guinea Grass

**CO(GG)3:** The results reveal that on an average a green fodder yield of 243.42 kg/cent has been harvested as against the existing variety Co 2 (137.19 kg/cent). When the green fodder is calculated over seven cuts/ha/year it worked out to be 425.99 t as against the variety Co 2 (210.1 t/ha/yr). The per cent increase over the check Co 2 is 77.42, which is considered to be a miracle in forage research.

## BREEDER SEED PRODUCTION

The details on breeder seed production and distribution in different crops during 2008-09 (production during 2007-08 and supply during 2008-09) for preparing consolidated report for combined 2009.

(Unit in kg)

S. No.	Crop/ Variety	STATE		GOI		PRIVATE		TOTAL	
		Indent	Distn.	Indent	Distn.	Indent	Distn.	Indent	Distn.
1	Paddy	17,121	19,933	5,600	2,565	70,215	98,911	1,00,761	121409
2	Millets	222	335	-	-	149	954	371	1289
3	Pulses	13,479	12,851	1,435	1,035	-	781	14,914	14,667
4	Oilseeds	23,351	25,348	11,155	9,323	17	504	34,523	35175
5	Cotton	336	399	-	-	44	526	380	925
6	Forage Crops	-	-	50	50	-	-	50	50
7	Vegetables	-	47	43	41	82	81	125	169
	<b>Total</b>	<b>54509</b>	<b>58913</b>	<b>18283</b>	<b>13014</b>	<b>70507</b>	<b>101757</b>	<b>151124</b>	<b>173684</b>

## II. CROP MANAGEMENT

### A. FOR ADOPTION

#### RICE

1. Power operated two row weeder is recommended for SRI cultivation.
2. Use of PPFM (*Methylobacterium* sp) for mitigation of terminal drought is recommended.
3. Pre-emergence pretilachlor (S) 0.45 kg/ha on 3 DAS fb azimsulfuron 50 DF 35 g/ha on 20 DAS + hand weeding on 45 DAS ( $T_2$ ) for broad spectrum weed control and higher grain yield and economic returns in both irrigated and rainfed direct seeded rice

#### MILLETS & FORAGES

##### 1. PGR consortia for maize

Response of maize to PGR consortia was positive in terms of productivity

##### 2. Fertilizer recommendation for drip fertigation in maize

- Drip irrigation - Soil application of 100% RDF (150 : 75 : 75 kg NPK ha<sup>-1</sup>)
- Drip fertigation - 125% of RDF (188 : 94 : 94 kg NPK ha<sup>-1</sup>) P as basal application, N & K through fertigation
- Drip fertigation - Water soluble fertilizers - 100% RDF ; 50% P & K as basal and 50% as water soluble fertilizers.

##### 3. TN - IAMWARM project

Improved production technologies in hybrid maize enhanced the grain yield (47%).

##### 4. Soil Test Based Fertilizer prescription for Hill Wheat

Ooty soil series (*Typic Haplohumult* - Ultisol)

Complex experiments. HRS, Ooty (2006-08)  
Test verification trials at Kalrayan Hills of Namakkal Dt. with wheat variety HW 2044 (2008-09).

The following fertilizer prescription equations have been developed, validated and recommended for adoption in Hilly tracts of Tamil Nadu.

$$\begin{aligned} \text{FN} &= 7.60 \text{ T} - 0.55 \text{ SN} - 0.92 \text{ ON} \\ \text{FP2O5} &= 3.59 \text{ T} - 0.26 \text{ SP} - 0.54 \text{ OP} \\ \text{FK2O} &= 3.88 \text{ T} - 0.45 \text{ SK} - 0.51 \text{ OK} \end{aligned}$$

## PULSES

1. Improved production technologies adopted in TN - IAMWARM can be recommended for achieving higher yield under irrigated situation.
2. Supplemental irrigation at critical stages (flowering and pod formation) during prolonged drought improves the yield by 24 per cent in rainfed pulses.
3. Diesel engine operated power weeder with 45 cm width (Garuda) is suitable for altered crop geometry of 60 cm row spacing for pulses.
4. Lime application is recommended for pulses with soil pH less than 6.0.

## OILSEEDS

### 1. Enriched micronutrient mixtures for oilseed crops

TNAU micronutrient mixtures enriched with Farm Yard Manure @ 7.5 kg ha<sup>-1</sup> in rainfed and 12.5 kg ha<sup>-1</sup> in irrigated conditions gave higher yield of oilseed crops viz., sesame sunflower and groundnut.

2. Enhanced seed rate to optimize plant population in medium bold groundnut varieties Use of seed rate at 175 kg/ ha (based on seed germination and seed weight) helps to maintain the optimum plant population of 33 plants / m<sup>2</sup> in medium bold varieties like VRI 2, Co 3 and VRI 7.

### 3. Technology capsule for rainfed oilseed crops

Technology capsule consists of seed treatment / hardening, seed drill sowing, organic mulch, biofertilizer + macro and micro nutrient mixtures, mechanical threshing gave increased yield of oil seed crops (groundnut, sesame, sunflower and castor) in rainfed conditions.

### 4. Foliar nutrient for groundnut in irrigated conditions

PGR consortia developed for irrigated groundnut is effective in providing foliar nutrition like combined nutrients spray.

5. Lime application is recommended to soils with pH less than 6.0.

### 6. Improved production technologies for oilseed crops

Improved production technologies gave higher yield in oilseed crops under irrigated condition in river basins of TN - IAMWARM project.

## COTTON

### 1. TNAU PGR consortia for cotton

Foliar application of TNAU PGR consortia at 1.25 per cent during stray flowering and boll development stages was found to increase the seed cotton yield by 23% over control.

### 2. TNAU MN Mixture for Cotton

#### *a. Rainfed Cotton*

Application of TNAU MN mixture @ 7.5 kg ha<sup>-1</sup> as EFYM registered 44% increase in kapas yield over check and 22.3% over the Dept. of Agriculture MN mixture in rainfed cotton

#### *b. Irrigated Cotton*

Application of TNAU MN mixture @ 12.5 kg ha<sup>-1</sup> as EFYM registered 28% increase in kapas yield over check and found comparable with the Dept. of Agriculture MN mixture in irrigated cotton.

#### *c. Hybrid Cotton*

Application of TNAU MN mixture @ 15 kg ha<sup>-1</sup> as EFYM registered 14% increase in kapas yield over check and 10% over the Dept. of Agriculture MN mixture in irrigated hybrid cotton.

## SUGARCANE

1. Foliar application of 'sugarcane booster' @ 5, 7.5 and 10 kg /ha respectively at 45, 60 and 75 DAP recorded significantly higher cane yield and quality.
2. Adoption of enhanced new NPK schedule of 300: 100: 200 kg NPK/ha recorded 7.95% increased cane yield over the existing blanket recommendation, besides increasing the CCS% and sugar yield.
3. Application of TNAU MN mixture @ 50 kg/ha as EFYM recorded 14.6 % higher cane yield.
4. Application of 150% N, P & K depending upon the crop growth in fortnightly or weekly interval enhances the cane yield in paired row system as well as in pit method of planting.
5. New clone for release: 00 Si 133 – High yield, high quality, non flowering, erect and self de-trashing.
6. Sugarcane syrup products standardized and used for developing confectioning products.

## PALM

### 1. Coconut based multi species cropping system

A suitable cropping system model for coconut garden for Cauvery Delta Zone. Coconut + black pepper + banana + elephant foot yam / greens registered highest (25.7%) increase of cumulative mean nut yield and B: C ratio of 1 : 2.26.

## **2. Medicinal and aromatic plants for adult coconut garden**

Medicinal plant viz., *Aloe vera* (B:C ratio of 1:3.8) and Aromatic plant viz., Lemon grass (B:C ratio of 1 : 2.1) are the best suitable herbal plants to grow as intercrop in adult coconut garden in Cauvery Delta Zone.

## **NON CROPS**

### **1. Management of poor quality irrigation water in sugarcane**

Application of pressmud @ 15 t ha<sup>-1</sup> + 50 % GR for higher cane yield and net returns under paper mill effluent irrigation in sugarcane variety COSi (SC)6.

### **2. Decolourization of coffee pulp waste water**

Treatment of coffee pulp waste water with blue green algae for highest decolourization efficiency (89.58 %) followed by *Pseudomonas putida* (76.80 %). Coffee pulp wastewater can also be decolourized with the fungal cultures isolated from coffee pulp wastewater.

### **3. Spacing and fertilization for tropical Sugarbeet**

A spacing of 45 x 15 cm and drip fertigation with 100% recommended dose of fertilizer (150:75:75 kg NPK ha<sup>-1</sup>) are optimum for higher root yield of tropical sugarbeet.

1.

## B. FOR ON FARM TESTING

### RICE

#### 1. Evaluating Direct Planting system (DPS) across rice growing tracts of Tamil Nadu

##### Treatments

- T<sub>1</sub> : Direct planting system  
T<sub>2</sub> : Direct wet seeding  
T<sub>3</sub> : Farmers practice of rice cultivation

Area : 5 cents each  
Replication : If possible  
Season : Kuruvai / Samba (As per the location)  
Variety : Choice of the region

Location : Tirur, Aduthurai, Thanjavur, Trichy, Madurai, Killikulam, Ambasamudram, and Bhavanisagar

Coordinator : Professor and Head, Dept. of Agronomy

#### 2. Integration of power weeder in SRI, drum seeded and broadcast seeded rice

##### Treatments

##### a. SRI

- T<sub>1</sub> : Existing weed management (rotary / cono weeder twice at 10 & 25 DAT with manual removal of left out weeds in between )  
T<sub>2</sub> : Motorized weeder at 10 & 25 DAT with manual removal of left out weeds in between  
T<sub>3</sub> : PE butachlor 1.0 kg / ha 3 DAT followed by Motorized weeder at 30 DAT

##### b. Drum seeded and c. broadcasted rice (DPS)

- T<sub>1</sub> : PE pretilachlor (S) 0.45 kg/ha on 3 DAS followed by manually operated cono / rotary weeder at 45 DAS  
T<sub>2</sub> : Motorized weeder weeding at 20 and 45 DAS  
T<sub>3</sub> : PE pretilachlor (S) 0.45 kg/ha 3 DAS followed by Motorized weeder\* at 45 DAS

\* Motorized weeder to be supplied by Professor and Head, Farm Machinery, TNAU, Coimbatore

Location : Coimbatore, Aduthurai and Madurai  
Coordinator : Professor and Head, Dept. of Agronomy and Farm Machinery, TNAU, Coimbatore

### 3. Evaluation of TNAU micro nutrient (MN) mixture for rice

#### Treatments

##### a. Wetland rice

- T<sub>1</sub> : Control (Recommended N, P, K only)  
T<sub>2</sub> : NPK + 25 kg MN mixture of State Dept. of Agriculture  
T<sub>3</sub> : NPK + 12.5 kg MN mixture of State Dept. of Agriculture as enriched FYM  
T<sub>4</sub> : NPK + 25 kg MN  
T<sub>5</sub> : NPK + 12.5 kg MN mixture of TNAU as enriched FYM

##### b. Rainfed rice

- T<sub>1</sub> : Control (Recommended N, P, K only)  
T<sub>2</sub> : NPK + 12.5 Kg MN mixture of Dept. of Agriculture  
T<sub>3</sub> : NPK + 12.5 kg MN mixture of State Dept. of Agriculture as enriched FYM  
T<sub>4</sub> : NPK + 6.25 kg MN mixture of State Dept. of Agriculture as enriched FYM  
T<sub>5</sub> : NPK + 12.5 kg MN mixture of TNAU  
T<sub>6</sub> : NPK + 12.5 kg MN mixture of TNAU as FYM  
T<sub>7</sub> : NPK + 6.25 kg MN mixture of TNAU as FYM

- Location : a) Wetland rice : Coimbatore, Aduthurai, Trichy, Bhavanisagar, Thanjavour, Madurai and Killikulam  
b) Rainfed rice : Ramnad & Paramakudi  
Co-ordinator : Professor and Head, Dept. of SS&AC, TNAU, Coimbatore

### 4. Management of negative K balance in wetland rice soils of Anaimalai block

#### Treatments

- T<sub>1</sub> : Farmers' practice  
T<sub>2</sub> : Rec. dose of fertilizer (150 : 50 : 50 kg NPK /ha)  
T<sub>3</sub> : Enhanced K dose as per SSNM (150 : 50 : 50 kg NPK/ha)  
T<sub>4</sub> : STCR recommendation

- Location : Anaimalai block ( 5 locations)  
Co-ordinator : Professor and Head, Dept. of Soil Science and Agrl. Chemistry, TNAU, Coimbatore



## OILSEEDS

### 1. System approach for sustaining crop productivity under irrigated conditions

#### Treatments

- T<sub>1</sub> : Existing system (sesame-groundnut-sesame)  
T<sub>2</sub> : Groundnut – cereals – sesame  
T<sub>3</sub> : Sesame – cereals – groundnut

Season : *Kharif* – Rabi – Summer  
Varieties : Groundnut : TMV (Gn) 13  
Sesame : VRI 1  
Cereals : Ragi (Co 13)  
Location : RRS, Vridhachalam  
Co-ordinator : Professor and Head, Dept. of Agronomy, TNAU, CBE

### 2. Castor based intercropping systems with high value crops under irrigated condition

#### Treatments

- T<sub>1</sub> : Castor spacing 1.5 x 1 m + onion 2 rows (60 x30x60 cm) leaving 60 cm on either side  
T<sub>2</sub> : Castor pure crop 1.5 x 1 m

Varieties : Hybrid castor, onion  
Season : *Rabi*  
Location : Yethapur and Bhavanisagar  
Co-ordinator : Professor and Head, TCRS, Yethapur

### 3. Improving shelling percentage of VRI 6 spanish bunch groundnut

#### Treatments

- T<sub>1</sub> : Raised bed (45 x 10 cm width) 12.5 t FYM+ 150 % RDF (split application) enriched TNAU MN mixture combined nutrient sprary  
T<sub>2</sub> : Flat bed (30 x 10 cm) 12.5 t FYM + 100% RDF + enriched TNAU MN mixture

Season : *Kharif* (Rainfed, 2009) *Rabi* and Summer 2009 – 10 (Irrigated)  
Seed rate, seed treatment with bio inoculants, biofertilizers and gypsum application are common for both treatments  
Varieties : VRI 6 will be supplied by RRS, Virudhachalam  
Location : Virudhachalam, Aliyarnagar & Bhavanisagar  
Co-ordinator : Professor and Head, Dept. of Agronomy, TNAU, CBE

**2. Effect of *Rhizobium* + *Phosphobacterium* (PSB) + *Methylobacterium* as seed treatment**

**Treatments**

T<sub>1</sub> : 100% RDF  
T<sub>2</sub> : 50% RDF  
T<sub>3</sub> : 50 % RDF + *Rhizobium* + PSB + *Methylobacterium*

Varieties : Blackgram and Greengram  
Location : Vamban, Aduthurai and Tindivanam  
Co-ordinator : Professor and Head, Department of Microbiology, Coimbatore

**3. Effect of foliar application of *Methylobacterium* for drought tolerance in pulses (Vamban, Aduthurai and Tindivanam)**

**Treatments**

T<sub>1</sub> : 2% KCl foliar spray + 100 ppm boric acid on 30 DAS  
T<sub>2</sub> : Seed treatment and foliar application of *Methylobacterium* on 30 DAS  
T<sub>3</sub> : Control

Varieties : Blackgram and Greengram  
Location : Vamban, Aduthurai and Tindivanam  
Co-ordinator : Prof. and Head, Department of Microbiology, CBE

**4. Evaluation of new herbicide molecules in irrigated green gram and black gram**

**Treatments**

T<sub>1</sub> : Pendimethalin 1.0 kg/ha on 3 DAS + Hand weeding on 30 DAS  
T<sub>2</sub> : Pendimethalin 1.0 kg/ha on 3 DAS + Imazethapyr 60 g /ha on 30 DAS  
T<sub>3</sub> : Pendimethalin 1.0 kg/ha on 3 DAS + quizalofop ethyl 50 g /ha on 30 DAS

Location : Coimbatore, Vamban and Tindivanam.  
Co-ordinator : Professor and Head, Department of Agronomy, CBE

**5. Mechanization in rainfed Pulses**

**Treatments**

Sowing with seed drill + Weeding with power weeder+ Harvesting with mini combine

Location : Farmers holdings  
NPRC, Vamban.  
Co-ordinator : Professor (Agronomy), NPRC, Vamban.

## SUGARCANE

### 1. Evaluation of suitable elite microbial consortia for *insitu* composting of sugarcane trash

#### Treatments

- T<sub>1</sub> : Control (Trash alone)  
T<sub>2</sub> : Trash (incorporated by power weeder 5') + 20% additional basal N (50 kg N) + Rec. PK  
T<sub>3</sub> – T<sub>2</sub> : Elite microbial consortia through irrigation water

- Period : Two years  
Location : SRS, Cuddalore  
EID Parry, Nellikuppam  
SRS – Sirugamani  
EID Parry, Pettavaithalai  
Scientist Incharge : Coimbatore – Dr. M. Prasanthrajan (ENS)  
SRS, Cuddalore – Dr. P. Christy Nirmala Mary  
SRS, Sirugamani – Dr. S. Panneerselvam  
Co-ordinator : Professor and Head, Dept. of Environmental Sciences,  
TNAU, Coimbatore

## COTTON

### 1. Auger hole seeding / transplanting in cotton

#### Treatments

- T<sub>1</sub> : Transplanting in pits filled with coir pith  
T<sub>2</sub> : Farmers method of sowing (Flat bed)  
Location : Kovilpatti & Aruppukottai

### 2. Performance of tropicultor

#### Treatments

- T<sub>1</sub> : Broad bed and furrow with seed cum fertilizer sowing, Mechanical weeding and earthing up  
T<sub>2</sub> : Farmers method of sowing (Flat bed)  
Location : Kovilpatti & Aruppukottai

### III. CROP PROTECTION

#### A. FOR ADOPTION

#### RICE

##### 1. Castor oil soap against rice leaffolder and yellow stemborer

Spraying of castor oil soap 2 & 4 @ 1% recorded the lowest leaffolder (2.69-3.14%), stemborer (dead hearts 5.83- 6.43 %; white ear 4.65 -5.16 %) incidence, with the maximum yield of 3679-3887 Kg/ha and BC ratio of 1: 8.7- 9.3 respectively without affecting the activity of natural enemies.

##### Effect of castor oil soaps against rice pests

Treatments	LF (%)	DH (%)	WE (%)	Yield (Kg/ha)	B : C ratio
Castor Oil Soap-1 @ 1.0 %	3.21	6.05	5.12	3708	6.0 : 1
Castor Oil Soap-2 @ 1.0 %	2.69	6.43	4.65	3887	9.3 : 1
Castor Oil Soap-4 @ 1.0 %	3.14	5.83	5.16	3679	8.7 : 1
Neem oil 3 %	3.14	5.26	5.78	3609	3.9 : 1
Profenophos 50 EC 0.04 %	2.32	5.76	5.52	3704	7.8 : 1
Untreated check	7.11	11.01	8.26	3117	

(Pooled mean of KKM, MDU, TRY, ADT, ASD & CBE centres)

##### Effect of castor oil soaps on natural enemies of rice pests

Treatments	Location				
	Killikulam	Madurai		Aduthurai	
	Spiders (No./ hill)	Mirid (No./hill)	Spider (No./hill)	Spider (No./hill)	Coccinellids
Castor Oil Soap-1@1.0 %	0.04	6.95	2.95	0.15	0.15
Castor Oil Soap-2@1.0 %	0.13	6.95	2.80	0.23	0.10
Castor Oil Soap-4@1.0 %	0.25	6.70	2.65	0.20	0.15
Neem oil 3 %	0.04	6.35	2.60	0.15	0.20
Profenophos 50EC 0.04 %	0.00	7.35	2.50	0.23	0.10
Untreated check	0.09	7.95	3.15	0.13	0.13

**Recommendation:** Spraying of Castor Oil Soaps - 2&4 @ 1% is recommended for the management of rice leaffolder and stemborer.

##### 2. Chlorantraniliprole against rice leaffolder and stemborer

Spraying of Chlorantraniliprole 20 SC at 30 g ai/ha was highly effective against rice stemborer recording the lowest white earhead damage (2.03 %) with the highest yield (5564 kg/ha) and BC ratio (3.12 : 1).

### Effect of Chlorantraniliprole on rice stemborer

Treatments	White earhead (%)		Pooled Mean	LF (%)	Grain Yield (kg/ha)	BC ratio
	I season	II season				
Chlorantraniliprole 20 SC 30 g ai/ha	1.39	2.67	2.03	2.9	5565	3.12 : 1
Chlorpyrifos 20 EC 0.1 %	3.48	6.23	4.86	4.8	5200	2.80 : 1
Control	5.18	8.59	6.89	11.8	4822	

(Pooled mean of two locations Coimbatore & Killikulam)

### Toxicity of Chlorantraniliprole to natural enemies

Insecticides	Spider\ LD <sub>50</sub> (µg g <sup>-1</sup> )	LD <sub>95</sub> (µg g <sup>-1</sup> )	LD 50 48h	LD <sub>95</sub> (µg g <sup>-1</sup> )	Mirid		Trichogramma	
	24h				24 h	48 h	LC <sub>50</sub>	LC <sub>95</sub>
Endosulfan	0.057	1.217	0.022	0.176	212.59	66.651	1.8501	89.7509
Thiamethoxam	0.005	0.024	0.002	0.011	0.213	0.019	0.0014	0.1039
Chlorantraniliprole	0.046	0.263	0.037	0.387	5.948	1.299	1.9530	22.6864

**Recommendation:** Spraying of Chlorantraniliprole 20 SC 30 g ai/ha is recommended for the management of rice leaf folder and stemborer. It is also found to be comparatively safer to natural enemies.

### 3. Rice - Sweet flag inter cropping for managing insect pests on rice

Stemborer (0.7 %) and leaf folder (2.88 %) damage was significantly low with more numbers of long jawed spiders (1.67 / 10 hills) in rice-sweet flag cropping when compared to pure crop of rice. The gross return was more (Rs. 1,21,990/-) in rice - sweet flag combinations when compared to either rice or sweet flag alone.

Treatments	Pests and natural enemies				Gross return (Rs./ ha)	
	DH (%)	LF (%)	Spiders /10hills	Spider egg masses /20sq.m	AC&RI Killikulam	Farmer's field
Sweet flag-one row 30x30cm+Rice-one row - 30x10cm(Replacement)	0.70	2.88	1.67	1.33	1,21,990	1,17,400
Sweet flag alone - 30x30 cm	-	-	5.67	6.33	98,000	72,000
Rice alone - 15x10 cm	6.22	7.51	0.67	0.00	90,531	-

(Mean of three field trials)

**Recommendation:** Rice - Sweet flag inter cropping is recommended for the management of stemborer and leaf folder and for the conservation of natural enemies in rice eco-system.

#### 4. Management of rice blast with new fungicide, Filia

Two sprayings of Filia (Tricyclazole + Propiconazole) 52.5 SE @ 1.5 ml/l at 15 days interval after the appearance of disease were found effective in reducing the severity of blast (17.7%) and increased the grain yield (5412 kg/ha) as against 34.7 % severity in untreated check coupled with 4341 kg/ha of grain yield.

Treatment	Blast (PDI)	Grain yield (kg/ha)	C:B
Filia 52.5 SE 1.5 ml/lit	17.7	5412	1:5.11
Tricyclazole 75% WP 0.5g/lit	24.5	4898	1:3.24
Untreated control	34.7	4341	-

(Mean of three locations)

**Recommendation:** Two sprays of Filia 52.5 SE at 1.5 ml /lit (at the time of disease appearance and 15 days later) is recommended as an alternate chemical for the management of blast in rice.

### MILLETS

#### 1. Validation of pest management technologies against major pests of sorghum

Treatment	Shoot fly Dead hearts (%)-28 DAE	Stem borer Dead hearts (%) - 45 DAS	Midge - spike let damage (%)	Grain yield kg/Ha	C:B Ratio
T <sub>1</sub> - Seed hardening with KH <sub>2</sub> PO <sub>4</sub> + ST with chlorpyrifos + <i>Pseudomonas</i> + Azophos	1.8	13.2	7.0	2737	1:2.05
T <sub>2</sub> - Seed hardening with KH <sub>2</sub> PO <sub>4</sub> + ST with imidacloprid + <i>Pseudomonas</i> + Azophos	0.9	10.9	6.7	2953	1:2.21
T <sub>3</sub> - Farmers practice (Spraying of methyl-0-demeton on 15 DAE + endosulfan on 45 DAE + dusting of carbaryl on 50% flowering and 15 days later)	4.5	16.1	7.0	2558	1:1.39
T <sub>4</sub> – Untreated control	8.9	26.1	11.1	2150	-

(Centers: Pooled mean of two years trials conducted at ARS, Kovilpatti and RRS, Aruppukottai)

The treatment Seed hardening with KH<sub>2</sub>PO<sub>4</sub> + Seed treatment with imidacloprid + *Pseudomonas* + Azophos recorded 10.9 % damage by stem borer dead hearts on 45<sup>th</sup> days after germination. The spikelet damage caused by the midge damage was

recorded and the data revealed that the damage was 6.7 per cent. However, the treatment viz. Seed hardening with  $\text{KH}_2\text{PO}_4$  + seed treatment with imidacloprid + *Pseudomonas* + Azophos recorded the lowest damage of all pests with increased yield and high Cost benefit ratio which was followed by the treatments Viz. Seed hardening with  $\text{KH}_2\text{PO}_4$  + seed treatment with chlorpyrifos + *Pseudomonas* + Azophos as compared to the untreated control, which recorded the maximum pest damage with lowest yield.

## 2. Evolving IPM strategies for major pests and diseases of pearl millet

T <sub>1</sub>	Seed treatment with Metalaxyl @ 6g/kg of seeds + Seed treatment with Imidacloprid @ 5g/kg of seeds + Removal of downy mildew infected plants upto 45 days of sowing + Spraying of Mancozeb @ 1000g/ha + Spraying of NSKE 5% @ 50% flowering
T <sub>2</sub>	Seed treatment with Metalaxyl @ 6g/kg of seeds + Removal of downy mildew infected plants upto 45 days of sowing + Spraying of Mancozeb @ 1000g/ha + Spraying of NSKE 5% @ 50% flowering
T <sub>3</sub>	Control

### Effect of treatments on the severity of major pests and diseases and yield of pearl millet

Treatments	% Downy mildew		% Shoot fly	Rust (% Leaf area)	Grain Yield (Kg/ha)	C:B
	30 DAS	60 DAS				
T1	3.1	4.6	1.8	1.4	1831	1: 1.65
T2	3.5	5.7	4.2	1.4	1637	1:1.35
T3	8.6	17.6	6.0	3.1	1275	-

\*Mean of three locations

The results revealed that the seed treatment with Metalaxyl @ 6g/kg of seeds + seed treatment with Imidacloprid @ 5g/kg of seeds + Removal of downy mildew infected plants upto 45 days of sowing + spraying of Mancozeb @ 1000g/ha + Spraying of NSKE 5% @ 50% flowering recorded the lowest incidence of downy mildew and rust with 4.6 and 1.4 per cent respectively, which also recorded a significantly lower shoot fly infestation of 1.8 per cent dead heart. The above treatment recorded a significantly higher grain yield of 1831 kg/ha with a C:B of 1:1.65.

## PULSES

### 1. Management of stem fly- root rot complex in black gram by using bio-inoculants

Seed treatment with *Beauveria bassiana* + *Pseudomonas fluorescens* (Pf 1) @ 5 g each / kg and foliar spray @ 5 g each / lit on 30 DAS recorded minimum stem fly - root rot incidence (7.47%) with the grain yield of 731.0 kg/ha and CB ratio of 1: 1.84 in blackgram as against 32.06 % disease incidence and 400 kg seed yield /ha in untreated

control. Though chemical treatment is effective, in lieu of eco-friendly approach, seed treatment and foliar application of *Beauveria bassiana* + *Pseudomonas fluorescens* (Pf 1) on 30 DAS @ 5 g each is recommended.

S.No	Treatment details	% of stem fly and root rot complex *	% decrease over control	Yield (kg/ha)	CB ratio
1.	<i>Beauveria bassiana</i> + <i>Pseudomonas fluorescens</i> (Pf 1) ( ST+ FS) (5+ 5 g / kg or lit)	7.47 b	76.70 b	731.0 a	1: 1.84
2.	Carbendazim ( ST+ FS)2g/lit and 0.1%	7.04 b	78.04 b	710.50 b	1: 1.78
3.	Imidacloprid ( ST) 5g/kg	6.03 a	81.19 a	729.30 a	1: 1.82
4.	Untreated Control	32.06 d	-	400.0 e	-

Pooled analysis of four season data (Kharif 2007 to Rabi,2008)

**Recommendations:** Seed treatment and foliar application of *Beauveria bassiana* + *Pseudomonas fluorescens* (Pf 1) on 30 DAS @ 5 g each is recommended for the management of stem fly - root rot complex in blackgram.

## 2. Management of cyst nematode, *Heterodera cajani* in redgram by seed treatment

Seed treatment with Neem Seed Kernel powder (NSKP) @ 10% (w/w) + *Pseudomonas fluorescens* @ 10g/kg seed recorded minimum nematode population of 18.99 eggs and juveniles per gram of soil with the seed yield of 865 kg / ha and CB ratio of 1: 2.93 in redgram.

Treatments	Final nematode population in soil (Eggs and juveniles / gram of soil)	Grain yield (Kg / ha)	C : B ratio
Neem Seed Kernel powder (10%) + <i>P. fluorescens</i> (10g/kg)	18.99	865	1: 2.93
Untreated control	27.17	670	-

Pooled analysis of three years data (Kharif 2006 to 2008)

**Recommendations:** Seed treatment with Neem Seed Kernel powder (NSKP) @ 10% (w/w) + *Pseudomonas fluorescens* @ 10g/kg seed is recommended for the management of cyst nematode, *Heterodera cajani* in redgram.

## OILSEEDS

### 1. Effect of PGPR and *Beauveria* mixtures on leafminer incidence on groundnut

The results from three centres indicated that need based application of quinalphos 25 EC @ 2 ml/l recorded the lowest leafminer damage (7.2 %) followed by seed treatment (10g/Kg) and foliar application of *Beauveria* + TDK + Pf1 (0.5 %) (15.05 %) compared to



22.95 per cent damage in untreated check. However the yield was maximum in the combination treatment (1639 Kg/ha) with the B:C ratio of 1: 1.33 followed by the insecticide treatment with 1559 kg/ha yield and 1:1.29 BC ratio.

Treatments	Per cent leaf miner damage at 70 DAS	Natural enemies /10 plants		Yield (kg/ha)	CBR
		Coccine-llids	Spiders		
T <sub>1</sub> - <i>Beauveria</i> + TDK 1 (ST +FS)	20.0	3.70	1.9	1411	1.13
T <sub>2</sub> - TDK 1 + <i>Pf 1</i> (ST + FS)	15.5	5.20	1.3	1432	1.14
T <sub>3</sub> - <i>Beauveria</i> + TDK+ <i>Pf 1</i> (ST+ FS)	15.1	2.70	0.6	1639	1.33
T <sub>4</sub> - Quinalphos 25 EC 2 ml/l	7.2	1.80	0.0	1559	1.29
T <sub>5</sub> - Untreated Control	22.9	5.40	0.8	1112	-

(Pooled mean of TMV, VRI, ALR)

**Recommendation:** In lieu of safety to natural enemies, seed treatment @ 10g/Kg of kernel and foliar application of *Beauveria* + TDK + *Pf1* @ 0.5 per cent is recommended for the management of groundnut leafminer.

## 2. Biological control of *A. flavus* infection and aflatoxin contamination in groundnut

The results revealed that seed treatment and soil application of *B. gladioli* @ 10g/Kg of kernel recorded the lowest infection of aflatoxin infection and contamination (14.64 per cent) with the maximum yield of 1398kg/ha compared to 32.12 per cent and 1025 Kg/ha respectively in untreated check.

No	Treatments	AFB1 in Kernals (µg/Kg)	Yield (kg/ha)
1	ST with <i>B.gladioli</i> (10g/kg)	20.87	1316
2	SA with <i>B.gladioli</i> (30.45 and 60DAS)	23.62	1322
3	ST+ SA with <i>B.gladioli</i> (10g/kg)	14.62	1398
4	ST with Carbendazim	24. 50	1374
5	Untreated control	32.12	1025

(Pooled mean of results from ALR, TVM, VRI & Bhavanisagar centres)

**Recommendation:** Seed treatment and soil application of *B.gladioli*@ 10g/Kg of kernel and 2.5 Kg/ha is recommended for the reduction in aflatoxin infection and contamination.

## COTTON

### 1. Management of stem weevil in cotton

Seed treatment with Chlorpyriphos @ 10 ml / kg + *Beauveria* @ 10 g / kg + drenching collar region with Chlorpyriphos @ 2.5 ml/l at 15 & 30 DAS + soil application of *Beauveria* @ 2.5 kg / ha on 20 DAS and earthing up (T<sub>2</sub>) recorded minimum stem weevil infestation of 29.07% as against 53.12% in untreated control. This treatment recorded maximum seed cotton yield of 1102.5 kg/ha with the cost benefit ratio 1: 2.0.

Treatments	Per cent infestation	Mean No. of galls/ plant	Yield (Kg/ha)	C:B ratio
Seed treatment with Chlorpyrifos @ 10 ml / kg + drenching collar region with Chlorpyrifos @ 2.5 ml/l at 15 & 30 DAS & earthing up	30.71	1.4	1090.0	1:1.9
Seed treatment with Chlorpyrifos @ 10 ml / kg + <i>Beauveria</i> @ 10 g / kg + drenching collar region with Chlorpyrifos @ 2.5 ml/l at 15 & 30 DAS + soil application of <i>Beauveria</i> @ 2.5kg/ha on 20 DAS&earthing up	29.07	1.2	1102.5	1:2.0
Seed treatment with Imidacloprid @ 10 g / kg + drenching collar region with Chlorpyrifos @ 2.5 ml/l at 15 & 30 DAS & earthing up	35.62	1.5	1136.3	1:1.9
Seed treatment with Imidacloprid @ 10 g / kg + <i>Beauveria</i> @ 10 g / kg + drenching collar region with Chlorpyrifos @ 2.5 ml/l at 15 & 30 DAS + soil application of <i>Beauveria</i> @ 2.5 kg / ha on 20 DAS & earthing up	29.87	1.0	1146.8	1:2.1
Seed treatment with <i>Beauveria</i> + <i>Pseudomonas fluorescens</i> each 10 g / kg + soil application each at 2.5 kg /ha on 15 DAS & earthing up	35.08	1.8	1036.0	1:1.8
Untreated control	53.12	1.9	819.3	-

(Pooled mean of results of four centres)

**Recommendation:** Seed treatment with Chlorpyrifos @ 10 ml / kg + *Beauveria* @ 10 g / kg + drenching collar region with Chlorpyrifos @ 2.5 ml/l at 15 & 30 DAS + soil application of *Beauveria* @ 2.5 kg / ha on 20 DAS and earthing up is recommended for the management of stem weevil in cotton.

## 2. Management of mealybugs in cotton

Spraying of chlorpyrifos @ 5 ml/litre recorded the lowest damage grade of 1 as against 4 in untreated control, with the maximum seed cotton yield of 1356 kg/ha with a C:B ratio of 1:1.34. Though profenophos (2 ml/lit) recorded the lowest damage grade of 1, as the cost of chemical was high, the C: B ratio was found to be low (1: 0.88).

Treatments	Assessment of Damage (Grading)			Yield (Kg/ha)	C: B ratio
	Initial stage	15 days after I spray	15 days after II spray		
T <sub>1</sub> - Acephate @ 2 g /lit	3	2	2	1302	1:0.52
T <sub>2</sub> - Chlorpyrifos @ 2.5 ml /lit	3	3	2	1323	1:1.51
T <sub>3</sub> - Chlorpyrifos @ 5 ml /lit	3	2	1	1356	1:1.34
T <sub>4</sub> - Methyl parathion @ 2ml /lit	3	2	2	1340	1:1.50
T <sub>5</sub> - Profenophos @ 2 ml /lit	3	2	1	1318	1:0.88
T <sub>6</sub> - Fish oil Rosin Soap @ 40 g / lit	3	3	2	1274	1:0.06
T <sub>7</sub> - Untreated check	3	3	4	1252	-

(Pooled mean of results of four centres)

**Recommendation:** Spraying of chlorpyrifos @ 5 ml/litre is recommended for the management of mealybugs in cotton.

## SUGARCANE

### 1. Effect of Chlorantraniliprole 20 SC against borer complex

Sett soaking of Chlorantraniliprole 20 SC @ 75 g ai/ha recorded the lowest early shootborer damage (8.53%), internode borer damage ( 2.43 %) with a maximum yield of 117 t/ha and a C:B ratio of 1:10.3 compared to 32.12, 7.50 % and 90 tonnes/ha in standard check i.e application of carbofuran respectively.

Treatment	ESB (%)	INB (%)	Yield (t/ha)	C:B
Sett soaking of Chlorantraniliprole 20 SC @ 75 g ai/ha	8.53	2.43	117	1:10.3
Sett soaking of malathion 50 EC @ 250 g ai/ha	32.12	7.50	90	1:7.1
Untreated check	40.33	10.69	82	-

### 2. Effect of Chlorantraniliprole 20 SC against termites

Sett soaking of Chlorantraniliprole 20 SC @ 125 g ai/ha recorded lowest bud and sett damage (15.16 & 5.23 %) with maximum yield of 123 t/ha and a C: B ratio of 1:6.85 compared to broadcasting with Lindane 1.3 D @ 1625 g ai/ha which recorded 34.55% & 16.84 % with an yield of 97 t/ha and a C:B ratio of 1: 5.65.

Treatment	Germination (%)	Bud damage (%)	Sett damage (%)	Yield (t/ha)	C:B
Sett soaking of Chlorantraniliprole 20 SC @ 125 g ai/ha	52.74	15.16	5.23	123	1:6.85
Broadcasting with Lindane 1.3 D @1625 g ai/ha	34.6	34.55	16.84	97	1:5.65
Untreated check	32.66	41.62	26.03	86	

### 3. Effect of Chlorantraniliprole 0.4 % GR against borer complex

In furrow application of Chlorantraniliprole 0.4 % GR at the time of planting @ 75 g ai/ha recorded the lowest early shootborer damage (6.45 %) , internode borer damage ( 5.06 %)and obtained maximum yield of 125 t/ha compared to 33.4 % , 14.05 % and 89 t/ha respectively in untreated check.

Treatment	ESB (%)	INB (%)	Yield (t/ha)
Infurrow application of Chlorantraniliprole 0.4 % GR 75 g ai/ha	6.45	5.06	125
Infurrow application of carbofuran 3 G @ 990 g ai/ha	18.36	9.69	102
Untreated check	33.44	14.05	89

**Recommendation:** Sett soaking of Chlorantraniliprole 20 SC @ 75 g ai/ha or infurrow application of Chlorantraniliprole 0.4 % GR @ 75 g ai /ha is recommended for the management of borer complex . Sett soaking of Chlorantraniliprole 20 SC @ 125 g ai/ha is recommended for the management of termites

## NON CROPS

### SERICULTURE

#### 1. IPM packages for silkworm pest and disease management

**IPDM Package implemented for management of both pest and diseases of silkworm**

**A. Grasserie Management:** It involves following treatments:

- a. TNAU Seridust as bed disinfectant @ 4 kg/ 100 dfl
- b. Plant product spray @ 800 ppm during third instar.

**B. Flacherie Management:**

- a. Application of chloramphenical @ 500 ppm during third, fourth and fifth instar.

**C. IPM package for uzifly management**

- a. Nylon net fixed on doors and windows
- b. Application of uzicide @ 5 litres / 100 dfls during third, fourth and fifth instars.
- c. Release of hyperparasitoid, *Nesolynx thymus* @ one lakh adults / 100 dfls during fourth, fifth and after harvest.
- d. Installation of uzitrap using azipore @ 25ml / litre and changed once in every three days from third instar stage onwards.

Economic characters of silkworm viz. larval weight, cocoon weight, shell weight and shell ratio were improved in IPDM package adopted trials when compared to farmers practice. Uzifly incidence, flacherie and grasserie infestations were to be reduced in IPDM package trials with the cocoon yield increase of 22.66 kg / 100 dfls and an additional income of Rs. 2833. IPDM package recorded the highest CB ratio of 4.87.

Treatments	Larval weight (g)	Cocoon weight (g)	Shell weight (g)	Shell ratio (%)	Loss due to Uzi (kg)	Loss due to Diseases (kg)	Yeild / 100 dfls	CB Ratio
IPDM package	3.59	2.03	0.37	18.02	1.02	0.51	84.17	4.87
Control	2.99	1.84	0.29	15.92	12.33	5.22	62.50	--

**Recommendation:** IPDM package is recommended for the management of uzifly, flacherie and grasserie of silkworm and for improved cocoon yield.

## 2. Effect of bio-control agents on root rot of mulberry

Module II comprising of application of *Pseudomonas flourescens* + *Trichoderma viride* + *T. harzianum* + FYM [1:1:1:20] @ 100g/plant + *Bacillus subtilis* + Zinc sulphate @ 10 kg/acre/year, thrice at 45 days interval recorded the minimum root rot incidence of 18.42 as against 40.81% in untreated control, with the maximum mulberry leaf yield of 25,430 kg/ ha with the B:C ratio of 1.7.

Treatments	Average root rot incidence (%)	Average leaf yield (kg/ha)	BC ratio
Module I	23.14	19,670	1: 1.3
Module II	18.42	25,430	1: 1.7
Farmers' practice	40.81	14,100	-

**Recommendation:** Application of *Pseudomonas flourescens* + *Trichoderma viride* + *T. harzianum* + FYM [1:1:1:20] @ 100g/plant + *Bacillus subtilis* + Zinc sulphate @ 10 kg/acre/year, thrice at 45 days interval is recommended for the management of root rot in mulberry.

## ENTOMOLOGY

### 3. Effect of Flubendiamide on the fruit borer damage and yield in chillies

Flubendiamide 20 WG was found to be effective for the management of fruit borers viz. *Helicoverpa armigera* and *Spodoptera litura* with the damage of 0.91 % and the maximum yield of 14.7 t/ha with the B:C ratio of 1:4.1 as against 28.12 % damage in untreated control.

Treatments	Dose (g a.i./ ha)	Fruit borer damage %		Yield (t/ha)	C:B ratio
		10 DAT	% decrease over control		
Flubendiamide 20 WG	60	0.91	96.7	14.7	1:4.1
Spinosad 45 SC	75	3.77	86.3	13.0	1:2.2
Untreated control	-	28.12	-	8.8	-

**Recommendation:** Flubendiamide 20 WG is recommended for the management of fruit borers viz. *Helicoverpa armigera* and *Spodoptera litura* in chillies.

### 4. Effect of Chlorantraniliprole 20 SC on podborer complex of pigeonpea and fruitborers of chilli and tomato

Chlorantraniliprole 20 SC @ 40 g a.i. ha<sup>-1</sup> recorded the lowest pod damage (6.25%) in pigeon pea, fruit borer damage in chillies (6.26%) and tomato (2.22%) with higher yield and higher benefit cost ratio without causing any phytotoxicity even at the higher dose of 80 and 160 g a.i. ha<sup>-1</sup>.

### Effect of Chlorantraniliprole 20 SC on pod borer complex of pigeonpea

Treatments	Pod damage (%)	Yield (kg ha <sup>-1</sup> )	Additional Income (Rs.)	ICBR
Chlorantraniliprole 20 SC @ 40 g a.i. ha <sup>-1</sup>	6.25	1150	16086	1:2.07
Spinosad 45 SC @ 75 g a.i. ha <sup>-1</sup>	9.38	1075	12936	1:1.91
Indoxacarb 14.5 SC @ 60 g a.i. ha <sup>-1</sup>	9.84	1067	12698	1:1.92
Untreated check	22.33	759	-	-

### Effect of Chlorantraniliprole 20 SC on fruit borers of chilli

Treatments	Fruit damage after third spray (%)	Yield (t/ha)	Additional Income (Rs.)	ICBR
Chlorantraniliprole 20 SC @ 40 g a.i. ha <sup>-1</sup>	6.26	22.22	50150	1:4.20
Spinosad 45 SC @ 75 g a.i. ha <sup>-1</sup>	9.69	20.65	38982	1:3.73
Indoxacarb 14.5 SC @ 60 g a.i. ha <sup>-1</sup>	9.87	20.79	40140	1:3.95
Untreated check	22.17	15.17	-	-

### Effect of Chlorantraniliprole 20 SC on fruit borers of tomato

Treatments	Fruit damage after third spray (%)	Yield (t/ha)	Additional Income (Rs.)	ICBR
Chlorantraniliprole 20 SC @ 40 g a.i. ha <sup>-1</sup>	2.22	44.47	48495	1:6.06
Endosulfan 35 EC @ 350 g a.i. ha <sup>-1</sup>	6.70	38.82	24315	1:14.20
Chlorpyrifos 20 EC @ 200 g a.i. ha <sup>-1</sup>	6.48	39.76	27905	1:15.16

**Recommendation:** Chlorantraniliprole 20 SC @ 40 g a.i. ha<sup>-1</sup> is recommended for the management of podborer complex of pigeon pea and fruit borers in chillies and tomato.

## B. FOR ON FARM TESTING

### RICE

#### 1. Effect of microbial bio-formulations against pests and diseases

Treatments	<i>R.Solani</i> (PDI)	<i>S.oryzae</i> (PDI)	Leaf folder (%incidence)	BPH (No./hill)	Spiders/hill	Yield (kg / ha)	CB ratio
Pf-1+ <i>Beauveria</i>	11.1 <sup>b</sup>	19.0 <sup>c</sup>	6.27 <sup>b</sup>	1.56 <sup>b</sup>	2.09 <sup>a</sup>	8500.9 <sup>a</sup>	2.53
Pf-1+AH-1+ <i>Beauveria</i>	6.71 <sup>a</sup>	13.3 <sup>a</sup>	4.76 <sup>a</sup>	0.61 <sup>a</sup>	1.97 <sup>a</sup>	8675.8 <sup>a</sup>	2.65
Carbendazim - Chlorpyrifos	12.8 <sup>b</sup>	15.05 <sup>b</sup>	4.25 <sup>a</sup>	0.19 <sup>b</sup>	1.09 <sup>b</sup>	6859.3 <sup>b</sup>	1.31
Control	45.05 <sup>c</sup>	47.8 <sup>d</sup>	35.24 <sup>c</sup>	6.05 <sup>b</sup>	1.01 <sup>b</sup>	6453.8 <sup>c</sup>	-

(Pooled mean of trials conducted at Thanjavur and Karur)

Among the treatments, Pf-1+AH-1+*Beauveria* consortia recorded significant reduction in pests and disease incidence. The same treatment also showed higher population of natural enemies and simultaneously increased the yield compared to other treatments.

#### Treatments

1. Pf1 + *Beauveria* @ 2.5 kg/ha
2. Pf1 + AH1 + *Beauveria* @ 2.5 kg/ha
3. Carbendazim @ 1g/lit - Chlorpyrifos @ 2ml/L
4. Untreated ontrial

Replications: Five

Design: Randomized block design (RBD)

Observations to be made: Pests, diseases and natural enemies on 45, 60 and 75 DAP

Time of application: Nursery (seed treatment: 10g/kg of seed), soil application on 30 and foliar spray on 45 and 60 DAP

Centres: Trichy, Madurai, Aduthurai and Killikulam

### PULSES

#### 1. Microbial consortia for the management of Podborer complex in Pigeon pea

Endosulfan at 50 % flowering registered 10.0 % pod damage in CO 6, 31.0% in LRG41 and 37.75% in VBN(Rg) 3, followed by 12.6% (CO 6), 38.00% (LRG41) and 40.75 (VBN(Rg) 3) in microbial consortia ST+SA+FA. Hence, a confirmative OFT is recommended to be conducted with the same variety in all centres with the following treatments.

- T1 - Consortia (*B.b +P.f*) ST + SA on 30 DAS + FA @ 10 g /lit at 50 % flowering
- T2 - Consortia (*B.b +P.f*) ST + SA on 30 DAS + FA @ 10 g /lit at 50 % flowering  
II spray at 15 days interval
- T3 - Consortia (*B.b +P.f*) ST + SA on 30 DAS + FA @ 10 g /lit at 50 % flowering  
II & III spray each at 15 days interval
- T4 - Endosulfan @ 0.07% at 50% flowering
- T5 - Untreated check

Replication: Four

Observation to be recorded

- Larval count on 3<sup>rd</sup>, 7<sup>th</sup>, 10<sup>th</sup> day after spraying
- Per cent Pod (Cumulative) damage at harvest
- Yield and C:B ratio

Centres: Coimbatore, Vamban, Paiyur, Aruppukottai and Virinjipuram

## 2. Bio-inoculants for the management of Podborer and Foliar diseases of Blackgram

Plant mortality due to stem fly and root rot complex was minimum in seed treatment with imidacloprid (6.03%), carbendazim (7.04%) followed by seed treatment (5 g each /kg) + foliar application of (5 g each /lit) bio-inoculants (*Beauveria bassiana* + *Pseudomonas fluorescens* - Pf 1) (7.47%). The confirmative experiments are to be carried out against podborer and foliar diseases with following treatments.

- T1 - *Beauveria bassiana* ST @10g/Kg of seed + FA at 30 DAS @10g /lit
- T2 - *Beauveria bassiana* + *Pseudomonas fluorescens* (Pf 1) ST @ each 5 g/Kg of seed + FA 30 DAS each 5g/lit
- T3 - Foliar application of Carbendazim (0.1%) + Endosulfan (0.07%) at 30 DAS
- T4 - Untreated Check

Replication - Five

Observations to be recorded

- Larval count on 3<sup>rd</sup>, 7<sup>th</sup>, 10<sup>th</sup> day after spraying
- Per cent Pod (Cumulative) damage at harvest
- Foliar diseases- Powdery mildew, Leaf spot in PDI
- Yield and C: B ratio

Centres : Combatore, Vamban, Aduthurai, Aruppukottai and Kovilpatti

## COTTON

### 1. Management of mealybugs in cotton

Chemical insecticides viz., chlorpyrifos, profenophos and dimethoate have already been proven to be effective for the management of cotton mealybugs. To increase the efficacy of treatments, the OFT has been proposed by combining the chemical insecticides with the botanical pesticides.



## Treatments

- T<sub>1</sub> - Profenophos 50 EC @ 2 ml /lit
- T<sub>2</sub> - Profenophos 50 EC (2 ml /lit) + Azadirachtin 1 % (2 ml /lit)
- T<sub>3</sub> - Chlorpyriphos 20 EC @ 5 ml /lit
- T<sub>4</sub> - Chlorpyriphos 20 EC (2.5 ml /lit) + Azadirachtin 1 % (2 ml /lit)
- T<sub>5</sub> - Dimethoate 30 EC @ 2 ml /lit
- T<sub>6</sub> - Dimethoate 30 EC (2 ml /lit) + Azadirachtin 1 % (2 ml /lit)
- T<sub>7</sub> - Buprofezin 70 WP @ 2g/lit
- T<sub>8</sub> - Untreated check

**Replications:** Three

**Time of application:** First spray - immediately after appearance & second spray - after a fortnight

### Observations to be recorded

- Per cent plants infestation
- Damage by grading (1, 5 & 10 DAS)
- Natural enemies
- Yield and C:B ratio

**Centres :** Coimbatore, Madurai, Trichy, Killikulam, Srivilliputhur & Aruppukottai.

## 2. Management of cotton stem weevil

Seed treatment with Chlorpyriphos @ 10 ml / kg + *Beauveria* @ 10 g / kg + drenching collar region with Chlorpyriphos @ 2.5 ml/l at 15 & 30 DAS + soil application of *Beauveria* @ 2.5 kg / ha on 20 DAS and earthing up recorded minimum stem weevil infestation of 29.07% as against 53.12% in untreated control. To have better efficacy on cotton stem weevil the dose of bio-inoculants viz., *Beauveria* and *Pf 1* have been doubled and hence the OFT has been proposed with the following treatments.

## Treatments

- T<sub>1</sub> - ST with chlorpyriphos @10 ml/ kg + Drenching collar region with chlorpyriphos @ 2.5 ml /l at 15 and 30 DAS and earthing up
- T<sub>2</sub> - ST with chlorpyriphos @10 ml/ kg + *Beauveria* @ 10 g / kg + Drenching collar region with chlorpyriphos @ 2.5 ml /l at 15 and 30 DAS + soil application of *Beauveria* @ 2.5 kg / ha on 20 DAS and earthing up
- T<sub>3</sub> - ST with chlorpyriphos @10 ml/ kg + *Beauveria* @ 20 g / kg + Drenching collar region with chlorpyriphos @ 2.5 ml /l at 15 and 30 DAS + soil application of *Beauveria* @ 5.0 kg / ha on 20 DAS and earthing up
- T<sub>4</sub> - ST with *Beauveria* + *Pf 1* each 20 g + soil application each at 5.0 kg / ha on 15 DAS and earthing up
- T<sub>5</sub> - Untreated check

**Replications:** Four

**Observations to be recorded:**

- Per cent plant infestation & mortality
- No. of galls /plant
- Yield and C: B ratio

**Centres:** Srivilliputhur, Kovilpatti & Aruppukottai.

**OILSEEDS****1. Biological Control of *Spodoptera litura* using *Nomurea rileyi***

Treatments		Larvae / 10 plants after I spray *		Larvae / 10 plants after II spray *		Natural enemies/ plant		Yield (Kg/ha)	CBR
		7 DAT	14 DAT	7DAT	14 DAT	Cocci-nellid	Syrphid		
T <sub>1</sub>	<i>N. rileyi</i> @ 1 g / lit	19	15	15	14	6.0	4.2	1750 <sup>c</sup>	1.52
T <sub>2</sub>	<i>N. rileyi</i> @ 2 g / lit	17	14	14	12	7.2	3.8	1750 <sup>c</sup>	1.52
T <sub>3</sub>	T <sub>1</sub> + NSKE 5%	13	13	11	10	6.4	3.2	1875 <sup>a</sup>	1.63
T <sub>4</sub>	T <sub>2</sub> + NSKE 5%	13	10	10	10	6.2	4.2	1775 <sup>b</sup>	1.54
T <sub>5</sub>	Quinalphos @ 2 ml / lit	4	8	3	6	0.8	0.6	1850 <sup>a</sup>	1.60
T <sub>6</sub>	Control	23	26	25	25	8.2	7.8	1150 <sup>d</sup>	

(Pooled mean of two season data)

Application of *Nomurea rileyi* @ 2 gm/lit with NSKE 5% and application of quinalphos could afford better control of groundnut defoliators. Consequently the yields were 1875 kg/ha and 1850 kg/ha with the CBR of 1.63 and 1.60, respectively. Hence the following OFT is proposed.

**Treatments**

- T<sub>1</sub> - *N. rileyi* @ 2 g / lit
- T<sub>2</sub> - *N. rileyi* @ 2 g / lit + NSKE 5%
- T<sub>3</sub> - Quinalphos 25 EC @ 2ml/l
- T<sub>4</sub> - Untreated Control

**Replications:** Six

**Time of application**

- Two sprays at fortnightly interval based on ETL

**Observations to be recorded**

- Per cent damage in ten randomly selected plants/plot
- No. of larvae/plant in ten randomly selected plants/plot
- Natural enemies/10 plants
- Yield in Kg/ha
- C:B ratio

**Centres:** Vridhachalam, Tindivanam, & Aliyar

2. Effect of *Beauveria* and PGPR consortia on leafminer and collar rot incidence in groundnut

S. No.	Treatments	Leafminer incidence (%)	Collar rot incidence (%)	Yield (Kg/ha)	Per cent increase over control	CBR
1.	<i>Beauveria</i> (B2)	4.68	11.05	1729.0	66.01	1:3.4
2.	TDK 1	5.48	5.87	1995.5	91.59	1:4.8
3.	Pf1	6.11	6.20	1955.5	87.75	1:4.6
4.	B2+ TDK 1	2.71	3.45	2241.5	115.21	1:6.0
5.	B2 + Pf1	3.61	4.37	2162.5	107.63	1:5.6
6.	TDK 1 + Pf1	4.95	2.30	2310.0	121.79	1:6.3
7.	B2+ TDK 1 + Pf1	0.91	0.77	2525.0	142.43	1:7.4
8.	Carbendazim+Endosulfan	3.79	5.72	2125.0	104.03	1:4.3
9.	Untreated Control	18.20	29.5	1041.5		-

(Pooled mean of two season data)

Application of B2+ TDK 1 + Pf1 @ 10 g/kg as seed treatment, 2.5kg/ha as basal (soil application) and three foliar sprays @10g/lit could afford better control of leafminer and collar rot incidence in groundnut and increase the yield about 2525 kg/ha compare to control and CBR of 1:7.4. Hence the following OFT is proposed.

**Treatments**

T1 - B2+ TDK 1

T2 - TDK 1 + Pf1

T3 - B2+ TDK 1 + Pf1

T4 - ST with Carbendazim (2g/kg) + FS of Endosulfan (2 ml/lit)

T5 - Untreated Control

**Replications** : Four

**Time of applications**

- Three foliar sprays at 30, 45 and 60 DAS

**Observations to be recorded**

- Per cent disease incidence in ten randomly selected plants/plot
- No. of larvae/plant in ten randomly selected plants/plot
- Yield in Kg/ha
- C:B ratio

**(Centres:** ORS, Tindivanam; RRS, Vriddhachalam)

3. Management of mealybugs in sunflower

Earlier studies indicated that spraying of Profenophos 50 EC @ 2 ml/l was found to be effective for a week. Hence an OFT is recommended.

**Treatments**

1. FS spray of Profenophos 50 EC 2 ml/l

2. FS spray of Profenophos 50 EC 2 ml/l + neem oil 20ml/l

3. FS dimethoate 30 EC 2 ml + neem oil 2ml/l

4. FS Consortia of *Pf 1* + *B.bassiana* 10 g each

5. Untreated check

**Replications:** Four

**Time of spray**

- First at the time of appearance
- Second spray at fortnightly interval

**Observations to be made**

- Population (No.) in ten randomly selected plants
- In top 10 cm of stem
- Head /Capitulum
- Yield
- C:B ratio

**Centres:** TNAU, KKM, & Trichy

## PALMS

**1. Demonstration & popularization of parasitoids for management of black headed caterpillar (BHC)**

- Braconid, Bethyid parasitoids and Anthocorid predator (Salem, Dindigul, Villupuram)

## NON CROPS

(Sericulture, Apiculture, Nematology and Toxicology)

**1. Castor oil soaps against sucking pests of crops**

The efficacy of newly developed Soft Soaps based on castor oil was evaluated both in screenhouse and in field against sucking pests such as whiteflies, aphids, mealybugs and mites on bhendi, brinjal and chillies.

Treatments	Whitefly per leaf	Aphids per leaf	Mealy bugs/ 2 - node shoot	Mites per sq.cm	Yield (kg/ha/picking in bhendi)	B : C ratio
Castor Oil Soap-2 @ 1.0 %	0.5	4.3	1.8	5.7	1290	1.2 : 1
Castor Oil Soap-4 @ 1.0 %	0.2	2.2	1.3	9.8	1355	1.8 : 1
Castor Oil Soap-1 + Neem oil (2:1) @ 1.0 %	0.9	4.5	0.9	6.7	1397	2.3 : 1
Imidacloprid 17.8 SL 50 g ai/ha	1.3	0.9	0.4	12.3	1284	1.1 : 1
Untreated check	1.3	7.0	3.5	11.3	1174	

(AC & RI, KKM)

The results indicated that Castor Oil Soaps were moderately effective against the above pests with the benefit-cost ratio 1.2 to 2.3 as against 1.1 in the standard Imidacloprid.

**Treatments**

1. Castor Oil Soap-2 @ 1.0 %
2. Castor Oil Soap-4 @ 1.0 %
3. Castor Oil Soap-1 + Neem oil (2:1) @ 1.0 %
4. Imidacloprid 17.8 SL 50 g ai/ha
5. Untreated check

**Locations:**

Killikulam (bhendi, brinjal and chillies), Kovilpatti (chillies, cotton), Srivilliputhur (cotton), Periyakulam (bhendi) and Paiyur (brinjal and chillies)

**Observations to be recorded:**

- Aphids, thrips and whiteflies per leaf, mealybugs / 2-node shoot and mites per sq. cm.
- Natural enemies
- Phytotoxicity
- Yield
- BC ratio

# HORTICULTURE

## I. CROP IMPROVEMENT

### A. FOR ADOPTION

#### BRINJAL – COBH 2

Parentage	:	EP 65 / Pusa Uttam
Duration	:	120-130 days
Season	:	July – December and January – June
Yield	:	58 t/ha (15.4 and 16.2% increase over Ravaiyya and COBH 1 respectively)
Highest yield obtained	:	65 t/ha
Area of adoption	:	Coimbatore, Erode, Salem, Namakkal, Dharmapuri, Karur, Cuddalore, Vellore, Trichy and Tiruvannamalai districts

#### Special features

- Medium sized, slightly oblong and glossy violet colour fruits
- High ascorbic acid (16.5 mg/100g)
- Moderately tolerant to shoot and fruit borers

#### SNAKE GOURD – PLR (SG) 2

Parentage	:	Pure line selection from Ariyankuppam local
Duration	:	145 days
Season	:	Suitable for all seasons
Yield	:	35 t/ha (12.3% increase over CO 2)
Highest yield obtained	:	38 t/ha
Area of adoption	:	Cuddalore, Villupuram, Vellore, Thiruvannamalai, Kanchipuram and Perambalur districts

#### Special features

- Fruits are plumpy, fleshy with attractive white colour
- Less fibre content
- Excellent cooking quality
- Average single fruit weighs 600 gm
- Preferred in the local and super markets
- Short fruit enables easy handling and long distance transport

## CASHEW – VRI (CW) H1

Parentage	:	M 26/2 / M 26/1
Duration	:	Perennial,rainfed
Season	:	Rainfed planting
Yield (Nuts)	:	14.5 kg/tree, 2900 kg/ha
	:	(13.5% increase over VRI 3)
Highest yield obtained (Nuts)	:	16.5 kg/tree
Area of adoption	:	All cashew growing districts of Tamil Nadu

### Special features

- Cluster bearing (6-10 fruits/panicle)
- Bold nuts (7.2 g) and kernel (2.2 g)
- High shelling (30.5%)
- Suitable for export (W 210 grade)
- Easy peeling testa

## BER

Ber variety Kaithali is recommended for adoption in Tamil Nadu condition with following salient parameters.

Yield	-	24.96 kg/tree
Fruit weight	-	18.84 g/fruit
Pulp weight	-	17.64 g/fruit
TSS	-	16.5 <sup>0</sup> Brix
% Fruit fly incidence	-	50 (August) 85 (September)

## B. FOR ON FARM TESTING

### Banana

**H -212 (AB):** It is a cross between Karpooravalli and Pisang Lilin, with a duration of 362 days which is akin to Ney Poovan and tolerant to nematodes with a bunch weight around 13 kg. Individual fruit weight is 76 g. Number of hands and number of fingers in a bunch is 11 and 160 respectively. TSS content is 26%. Multiplication through tissue culture is under progress for on farm testing.

**NPH – 02-01 (AAB):** It is a cross between H -201 and Anaikomban which resembles Pachanadan. The bunch weight is 19 kg. Individual finger weight is 77.60 g and number of fingers in a bunch is 213. The TSS content is 16.8%. It is resistant to

*Fusarium* wilt (race 2), nematode (*Pratylenchus* spp.) and leaf spot. Multiplication through tissue culture is in progress for on farm testing.

**H-531 (AAB):** It is a cross between Poovan and Pisang Lilin which is akin to Poovan. It recorded a bunch weight of 13.5 kg with 9 hands and 126 fingers in a bunch. Individual fruit weight is 98g. TSS content is 22.50 ° Brix. It is resistant to nematode and *Fusarium* wilt. Multiplication through tissue culture is in progress for on farm testing.

## **Papaya**

**CP-50:** Of late, Papaya ring spot virus is very serious disease causing 70-90% yield loss in papaya. A new genotype CP-50 (Wild papaya x C0.6), field tolerant to PRSV, with castor leaf type was identified. The yield/tree/year is 52.8 kg. The number of fruits/tree is 26 and individual fruit weight is 2.03 kg. The TSS content is 13° Brix. Papain yield/fruit is 20 g wet latex. This genotype is recommended for on farm testing.

## **Tomato**

**COLCNRH 1:** In tomato, leaf curl virus and nematode resistant hybrid COLCNRH 1 has been developed and it is in pre-release stage. The identified or evolved hybrid has a yield potential of 73t/ha with a fruit weight of 65.6 g besides resistance to viral and nematode. The fruits are borne in clusters of 3-4. The seeds of the pre-release tomato hybrid COLCNRH 1 have been sent for conducting 220 ART trials and 20 MLT trials during the year 2008-09 and the results are being compiled.

## **Chilli**

**CCH 1:** In chilli, anthracnose resistant hybrid CCH 1 has been developed and it is in pre-release stage. The identified or evolved hybrid has a yield potential of 31.5 t/ha of green chilli and 6.9 t/ha of dry chilli yield. The fruits are dark green and samba type. The average green fruit weight is 3.40 g besides resistance to anthracnose. The seeds of the pre-release chilli hybrid CCH 1 have been sent for conducting 148 ART trials and 12 MLT trials during the year 2008-09 and the results are being compiled.

## **Turmeric**

**CL 101:** Turmeric culture CL 101 was identified as high yielding accession with a yield potential of 43.8t/ha. The curcumin content was 4.14%. The culture was approved for release in the XX AICRP on Spices Group meeting held from 6<sup>th</sup> to 8<sup>th</sup> June 2009 at TNAU, Coimbatore. This will be proposed for variety release in the ensuing year.

The pre release culture CL 101 was raised in the farmer's field at Devayarayapuram, Boluvampatty and Mallur in addition to College orchard, Coimbatore during 2008-09. The yield recorded in places tested are as follows.



Culture	Yield t/ha				Mean yield (t/ha)
	CBE	Devaraya puram	Boluvam patty	Mallur	
CL 101	46.6	43.3	40.0	45.3	43.8
Check (BSR2)	35.0	32.0	35.0	38.0	35.0

CL 101 is to be forwarded for OFT/ART and for varietal release.

### **Gerbera**

**GJ 23:** It is a promising bedding type which produces 40.25 flowers/plant/ year with attractive yellow flowers of diameter (10.31cm) and stalk length (41.74 cm).

### ***Coleus forskohlii***

**Cf 36:** The culture (*Cf 36*) was identified for better yield and quality parameters, which exhibited higher number of tubers (13.46), fresh weight (1.27kg/plant), dry weight (0.25kg/plant) with increased tuber length (13.70cm) and girth (0.84 cm) on comparison with the Attur local type. The culture *Cf 36* was screened for nematodes and wilt which showed field tolerance to nematodes and wilt.

### ***Ocimum sanctum***

**OS.3:** Among the sixteen accessions evaluated for herbage yield and oil content, the accession OS.3 was identified as superior genotype. The genotype OS.3 recorded the highest green herbage yield (17.43 t/ha), which is 27.26 per cent increased yield over local check. The essential oil content was also highest in O.S. 3 (72.37 kg/ha) when compared to local check, which recorded the lowest oil content of 58.32 kg/ha.

### ***Artemisia pallens***

**AP. 7:** Among fourteen accessions evaluated for yield and oil recovery, the accession AP. 7 was identified as superior genotype. The genotype AP. 7 was tested with check (local type) in different locations. The highest mean plant height (64.25 cm) and number of laterals per plant (18.41) were registered in AP. 7. The pooled fresh herbage yield (17.61 t/ ha) and dry herbage yield (12.08 t/ ha) was highest in AP. 7 when compared to local check which registered 12.95 and 9.05 t/ha respectively. Similarly AP. 7 also registered highest oil content of 10.40 kg/ha, which was 20 per cent increase over local check.

## II. CROP MANAGEMENT

### A. FOR ADOPTION

#### 1. HIGH DENSITY PLANTING IN MANGO

##### Details of Technology

- Mango trees are normally planted by farmers at a spacing of 10 x 10m accommodating 100 trees per hectare. Under this system, due to less number of trees the productivity per unit area is low. In the normal spacing the tree canopy takes 8 years to cover the area. Hence high density planting system is suggested for higher productivity efficient utilization of land and other natural resources. The results of 14 years of research in mango is presented below.
- Double hedge row system (10x5x5 m) can accommodate 222 plants/ha compared to 100 trees/ha in conventional system of planting (10m x 10m) the increased population is around 122%.

Double hedge row planting

```
*--- 5 m --- *-----10 m ---- *--- 5 m --
*                               --*          -*
5 m                               5 m
*--- 5 m --- *-----10 m ---- *--- 5 m --
*                               -- *          -*
5 m                               5 m
*--- 5 m --- *-----10 m ---- *--- 5 m --
*                               -- *          -*
```

Spacing: 10x5x5 m  
Number of plants: 122/ha

##### Benefits

- More plants can be accommodated (122% increase in population over the square system of planting) per unit area
- More yield can be obtained (9.45 t/ha) compared to square system (5.05 t/ha)

##### Economics

- The increased yield in double hedge row system is (88%) over conventional system.

The yield in double hedge row system is 9.45 t/ha with a cost benefit ratio of 5.82 compared to conventional system (5.05 t/ha with a cost benefit of 5.05).

### III. CROP PROTECTION

#### A. FOR ADOPTION

##### 1. IPM for the management of serpentine leaf miner *liriomyza trifolii* burgess in vegetables

###### Details of Technology

- Removal of alternate host plants of fabaceae, solanaceae and cucurbitaceae
- Planting one row of sorghum / maize at every 10 m of tomato / brinjal
- Install yellow sticky trap @ 1-2 traps / cent
- Spray NSKE 5% (50g/lit) or azadirachtin (0.3%) @ 3.0 ml/lit alternated with chlorpyrifos 20 EC @ 2.5 ml/lit or triazophos 40 EC @ 1.0 ml/lit
- Conservation and augmentation of the larval parasitoid, *Chrysonotomyia rexia*

###### Benefits

- 20 to 40% less damage
- Minimum use of insecticides
- Conservation of natural enemies
- Low cost of production
- Environmental protection

###### Economics

- Cost Benefit Ratio (CBR) = 1 : 2.9

##### 2. Management of Tea Mosquito Bug, *Helopeltis antonii* on Cashew

Profenophos 0.05% was effective for the management of Tea Mosquito Bug with a net gain of Rs.17, 440 / ha.

Treatment	Cost of spraying	Yield (kg/ha)	Add. Yield	Cost of addl. Yield	Net gain (Rs/ha)	BCR
Standard spray	3560	1320	600	24000	20,440	5.7
Chlorpyrifos 0.05%	2960	1160	440	17600	14,640	4.9
Triazophos 0.1%	6160	1080	360	14400	8,240	1.3
L- Cyhalothrin 0.003%	2560	1040	320	12800	10,240	4.6
Profenophos 0.05%	3360	1240	520	20800	17,440	5.2
Untreated control	--	720	--	--	--	--

**Recommendation:** Profenophos 0.05% is recommended for the management of Tea Mosquito Bug.

### 3. Management of Basal rot of onion

On farm trials were conducted in three different locations viz., Bhavanisagar, Madurai, Periyakulam in Randomized Block Design with four treatments and five replications to assess the efficacy *Trichoderma viride* and VAM on basal rot of onion revealed that bulb treatment with *T.viride* @ 4g/kg+ SA @2.5 kg/ha+VAM 12.5 Kg/ha effectively reduced the onion basal rot (58.27 %) with a net gain of Rs. 3710 / ha.

Treatments	Basal Rot Incidence (%)*	Disease reduction (%)	Bulb yield t/ha	Net gain (Rs/ha)
T <sub>1</sub> - T.v (BT 4g/kg)+ SA 2.5/kg/ha	23.60	53.17	6.1b	1554
T <sub>2</sub> - T.v (BT 4g/kg)+ SA 2.5/kg/ha+VAM 12.5kg/ha	21.03	58.27	7.1a	3710
T <sub>3</sub> - Carbendazim (BT 2 g/kg) +SD(0.1%)	18.17	63.94	7.7a	3690
T <sub>4</sub> - Control	50.39	-	4.5c	-

- Mean of five replications; Pooled mean of 3 locations;
- BT-Bulb treatment, SA-Soil Application ,

**Recommendation:** Bulb treatment with *T.viride* @4g/kg+ SA @2.5+VAM 12.5 Kg/ha effectively reduced the onion basal rot.

### 4. Management of Tosspovirus incidence in tomato

Imidacloprid 0.0375% on 7 days after planting (DAP); *Pseudomons fluorescens* + Buttermilk on 15 DAP; Monocrotophos on 30 DAP; *Pseudomons fluorescens* + Buttermilk on 45 and 60 DAP has recorded reduced incidence of tomato spotted wilt with the maximum yield of 40.9 tonnes/ha and with a net gain of Rs. 6,290 per ha.

Treatment	75 DAT		90 DAT		Yield (t/ha)	Net gain (Rs./ha)
	Disease incidence (%)	Thrips (No./pt)	Disease incidence (%)	Thrips (No./pt)		
T1 <i>P. fluorescens</i> 2%	5.9	7.6	5.9	6.3	32.0	3,600
T2 Imidacloprid 0.0375%	8.5	6.3	9.4	5.3	31.5	4,300
T3 Combination*	0.87	4.7	0.87	4.0	40.9	6,290
T4 Buttermilk 30 ml/l	16.4	7.3	16/4	6/3	27.7	2,300
T5 Control	19.3	12.0	23.5	10.8	23.2	-

Combination\*:Imidacloprid 0.0375% on 7 days after planting (DAP); *Pseudomons fluorescens* + Buttermilk on 15 DAP; Monocrotophos on 30 DAP; *Pseudomons fluorescens* + Buttermilk on 45 and 60 DAP.

**Recommendation:** Imidacloprid 0.0375% on 7 days after planting (DAP); *Pseudomonas fluorescens* + Buttermilk on 15 DAP; Monocrotophos on 30 DAP; *Pseudomonas fluorescens* + Buttermilk on 45 and 60 DAP is recommended for the management of Tospovirus in tomato.

## 5. Management of root-knot nematode in snakegourd

Neem Cake @ 30 g/plant as spot treatment 10 days prior to sowing reduced nematode population (48.5% in soil and 66.3% in root) and increased the yield (26.4%).

Treatment	Final nematode population (No.)		Gall Index	Yield (t/ha)	Net gain (Rs./ha)
	Soil (200 cc)	Root (5 g)			
T1 Neem cake 30 g/plant	281.6	57.7	3	141.3	14,850
T2 Mustard cake "	380.1	72.3	4	120.7	4,550
T3 Castor cake "	404.3	76.6	4	119.1	3,750
T4 Carbofuran 3G 10 g/plant	303.8	59.4	3	140.9	12,450
T5 Untreated Control	546.6	171.1	5	111.8	-
CD (P=0.05)	40.32	6.92	-	11.09	-

**Recommendation:** Neem Cake @ 30 g/plant as spot treatment 10 days prior to sowing is recommended for the management of root-knot nematode in snakegourd.

## 6. Biomangement of Nematode disease complex in medicinal coleus

Medicinal coleus cuttings dipped in 0.1% *Pseudomonas fluorescens* at planting + marigold (*Tagetes erecta*) intercrop uprooted at the time of earthing up (60-70 DAP) effectively reduced the nematode population by 66.7 %, root rot disease incidence by 45.3 % and increased the yield by 45.3 % with a net gain of Rs 22,150/ha.

Treatment	Nematode control efficiency (%)	Gall Index	Root rot disease control efficiency (%)	Root tuber yield (t/ha)	Net gain (Rs./ha)
Cuttings dipping in 0.1% <i>P. fluorescens</i> + marigold intercropping	73.4	1.7a	45.3	6.92b	22,150
Cuttings dipping in 0.1% <i>P. fluorescens</i> + marigold intercropping + <i>Pseudoplus</i> drenching	77.8	1.6a	50.4	7.07b	19,850
Chemical check (Carbofuran + Carbendazim)	55.1	2.7b	59.2	7.31a	17,650
Control		4.0c		3.78c	

(Pooled mean of two on farm trial)

**Recommendation:** Dipping of coleus cuttings in 0.1% *Pseudomonas fluorescens* at planting + marigold (*Tagetes erecta*) intercrop uprooted at the time of earthing up (60-70 DAP) is recommended for the management of nematode disease complex in medicinal coleus.

## B. FOR ON FARM TESTING

### 1. Management of banana nematodes by PGPR consortium

Treatments	Soil nematode population/ 250 cc				Bunch weight /plant (kg)	CB ratio
	<i>Helicotylenchus</i>	<i>Radopholus</i>	<i>Pratylenchus</i>	<i>Meloidogyne</i>		
<i>P. fluorescens</i> (Pfbv22) paring & pralinage @ 10g / corm & SA @ 2.5kg / ha	114.5 (2.06)	88.7 (1.95)	70.8 (1.85)	65.3 (1.82)	14.94	1:3.16
<i>B. subtilis</i> (Bbv 57) @ 10g / corm & SA @ 2.5kg / ha	123.5 (2.09)	103.1 (2.01)	81.5 (1.91)	74.3 (1.87)	13.05	1:3.14
Consortia-Pfbv 22 + Bbv57 each paring & pralinage @ 5g / corm & SA @ 1.25kg / ha each	97.0 (1.99)	73.5 (1.87)	62.2 (1.80)	57.5 (1.76)	16.73	1:3.50
Carbofuran paring & pralinage @ 33g / corm & SA @ 1kg a.i/ ha	127.5 (2.11)	106.7 (2.03)	84.9 (1.93)	77.7 (1.88)	12.85	1:2.60
Control	202.5 (2.31)	212.3 (2.32)	178.5 (2.25)	144.6 (2.15)	10.79	-

Application of Pfbv22 plus Bbv57 @ 2.5 kg/ha on 90, 180, 270 and 300 days after treatment significantly reduced the populations of burrowing, spiral, root knot and lesion nematodes in banana. It also significantly increased plant growth parameters viz., plant height, pseudostem girth, number of leaves and bunch yield were recorded in the treatment Pfbv22 plus Bbv57 @ 2.5 kg/ha. The treatment resulted in a cost benefit ratio of 1: 3.5. Hence the OFT is proposed with the following treatments.

#### Treatments

- T<sub>1</sub> - Consortia-Pfbv 22 + Bbv57 each paring & pralinage @ 5g / corm & SA @ 1.25kg / ha each
- T<sub>2</sub> - Pf 10g/ plant at planting
- T<sub>3</sub> - Carbofuran3G 40g /plant
- T<sub>4</sub> - Control

#### Observations to be recorded

- Growth parameters
- Nematode population in soil and root
- Yield

**Centres:** Coimbatore, Periyakulam and Madurai

## 2. Management of downy mildew disease in bitter gourd

Treatment	Downy mildew (PDI)	Yield (Kg/ha)	CB Ratio
Seed treatment with Ridomil MZ 72 0.25 % + 3 foliar sprays of Mancozeb 0.25% at 10 days interval in bower system	16.67	8595	4.90
Seed treatment with Ridomil MZ 72 0.25 % + 3 foliar sprays of Ridomil MZ 72 at 10 days interval in bower system	9.49	8900	3.92
Control	62.50	5444	-

Seed treatment with Ridomil MZ 72 0.25 % + 3 foliar sprays of Ridomil MZ 72 at 10 days interval in bower system recorded the lesser disease incidence of 9.49 Percent Disease Index and increased the yield significantly.

### Treatments

- T<sub>1</sub> - Seed treatment with Ridomil MZ 72 0.25 % + 3 foliar sprays of Mancozeb 0.25% at 10 days interval in bower system
- T<sub>2</sub> - Seed treatment with Ridomil MZ 72 0.25 % + 3 foliar sprays of Ridomil MZ 72 at 10 days interval in bower system
- T<sub>3</sub> - UntreatedControl

**Replication:** Six

**Variety:** CO 1

**Time of application:** As soon as initial disease symptoms appears

### Observations to be recorded:

1. PDI of Downy mildew incidence
2. Yield (t/ha) and BC ratio

**Centres:** Coimbatore, Madurai, Bhavanisagar

# AGRL. ENGINEERING

## A. FOR ADOPTION

### 1. Improved TNAU Dhal Mill

Conditioning	:	Reduced conditioning time of 4-6 hrs compared to 12 hrs
Power capacity	:	One H.P single phase motor
Efficiency	:	Milling and grading efficiencies are more than 90%
Capacity of the unit	:	30 kg/hr
Cost of operation	:	Rs.1/- per kg
Cost of unit	:	Rs.25,000/-

#### Special Features

- Suitable for splitting, cleaning and grading of pulses into dhal
- Capable of dry milling of cereals into powder (by changing into cast iron rolls)
- The unit has pitting unit for enhancing the preconditioning process

### 2. Twin row precision organic manure cum fertilizer applicator

Coverage	:	1 ha / day
Cost of Unit	:	Rs. 50,000/-

#### Special Features

- Suitable for accurate and controlled application of organic manure/mulch directly below the root zone of crop
- Adjustable spacing between furrows enables the use at different row spacing
- Simultaneous precise placements of organic manure and inorganic fertilizer

### 3. Worker friendly arecanut stripper

Capacity	:	Can strip 650-950 Kg of arecanut per hour
Efficiency	:	Stripping efficiency is 99.5%
Cost of operation	:	Rs.0.16 per Kilogram
Cost of unit	:	Rs.15,000/-

#### Special Features

- Suitable for stripping both green and riped arecanut
- Damage caused to the stripped arecanut is eliminated
- More saving in cost (66%) and time (77%) when compared to conventional arecanut stripping



#### **4. Multi row power weeder for SRI**

Coverage	:	Can weed 0.75 to 1.0 ha per day
Power capacity	:	Two rotary weeding units powered by 1.5 HP engine
Cost of unit	:	Rs.35,000/-

#### Special features

- Weeder for SRI rice at row spacing of 22 to 26cm
- Light weight weeder ( 17 Kg) on sled suitable for all soils
- Two or three rows can be weeded in a single pass
- Self propelled weeder – no need to push or pull
- Can be operated and lifted by one person easily to change rows
- Complete cutting of weeds at a depth of 3 to 4 cm with less than 1% plant damage

### **B. FOR ON FARM TESTING**

- Studies on supplemental irrigation with sprinkler irrigation system in dryland farming
- Area tree climber
- Mango destoner
- Farm level tomato grader
- Engine operated weeder for rice
- Rice transplanter for SRI
- Coconut harvesting equipment

# FORESTRY

## I. TREE IMPROVEMENT

### A. FOR ADOPTION

#### 1. Grain Amaranth (*Amaranthus hypochondriacus* L.) var. Suvarna

Grain amaranth belongs to the family Amaranthaceae. It is one of those rare plants whose leaves are eaten as vegetables while the seeds are used as pseudo-cereals. The ancient people of the Andes called it "The Sacred grain". In India it is called "Ramdana" or "God's own grain"

It can yield up to 1.0-1.5 tons of grain /hectare when grown in monoculture. The vegetable yield of grain amaranth is 4.5 tons /hectare after four weeks of sowing. It is a warm season crop and can be grown in a variety of soil types. It grows better on well-drained fertile soils. It is a short duration crop, which matures in 80-85 days.

The grain contains 63 per cent carbohydrate and 12.6-17.6 per cent crude protein. This is 2-3 times higher than in most conventional cereals. It also contains five per cent lysine and 4.4 per cent sulphur amino acids, which are limiting amino acids in other grains. None of the common grains contain an adequate amount of lysine to meet the human dietary needs. The other qualities which make amaranth a super grain are high fibre and abundance of calcium, iron and vitamin C.

#### 2. Rice Bean (*Vigna umbellate* (Thumb.) Ohwisohashi) var. RBL1

Rice Bean is native of South and South East Asia. In India, its distribution is mainly confined to tribal regions of North Eastern Hills, Western and Eastern Ghats. It has rich genetic diversity with high nutritive potential and could be grown well even in marginal lands, under hot and humid climates. The duration of the crop is 65-85 days and it yields 8-10 q/ha. The seed protein varies from 18 to 21 per cent, whereas methionine and tryptophan are considerably high as compared to other *Vigna* species. It is also rich in Ca and low in fat compare to other traditional pulses.

Rice bean can be utilized as whole rice bean, rice bean dhal and flour in various pulse based products by adopting different methods of cooking like roasting, boiling, steaming and frying. It can be used as an alternate crop for black gram.

#### 3. Promotion of *Casuarina Junghuhniana* as a source of pulp/pole/energy in Tamil Nadu

Three *Casuarina junghuhniana* clones viz., FC&RI 27, 29 and 30 have been proved significantly superior to the existing *Casuarina equisetifolia* clones. The yield improvement was 50-60 tonnes against 40 tonnes. Hence these three clones may be adopted across the state.

Parentage	: Clonal selection
Duration	: 3 years and above
Utility	: Pulp, post and pole
Average yield	: 50-55 kg/tree
Highest yield recorded	: 72 kg/tree
Area of Adoption	: Throughout Tamil Nadu except hilly zones.

#### 4. **Simaruba (*Simarouba glauca* L.) clone MTP SGF 1**

- Fast growing evergreen species
- Drought tolerant
- Comes to bearing from 3<sup>rd</sup> year
- Oil content : 56.7 % (Kernel basis)
- Yield : 25-40 kg of seeds/tree from 8<sup>th</sup> year onwards
- Oil : Suitable for edible/biodiesel
- Wood : Suitable for match wood and ply sheets
- Leaves and bark : Decoction useful for curing amoebiasis

## B. FOR ON FARM TESTING

### 1. Evaluation of *Melia dubia* for pulp and match wood

*Melia dubia* has been identified as a potential species for pulp wood (49% and above pulp yield), veneer and match industries. Accordingly, plus trees have been identified and ten promising selections have been screened for on farm testing. Hence these selections may be forwarded to On farm testing. The pulping characteristics of *Melia dubia* are furnished.

S.No.	Parameters	Unrefined pulp	Refined pulp
1.	Pulp yield	50.5	50.3
2.	Kappa number	19.60	19.60
3.	Acid insoluble lignin	24.7	24.7
4.	Hollow cellulose	73.7	73.7
5.	Bulk (g/cm <sup>3</sup> )	1.70	1.42
6.	Tensile index (Nm/g)	49.2	86
7.	Tear index (mN.m <sup>2</sup> g)	5.2	10.1
8.	Free ness (ml CSF)	540	300
9.	Burst index (kPa.m <sup>2</sup> /g)	2.4	5.8
10.	Brightness (% ISO)	80	82
11.	Opacity (%)	83.4	79.2
12.	Scattering coefficient (m <sup>2</sup> /kg)	48.4	38.5
13.	Yellowness (%)	8.9	9.2

### 2. Introduction and evaluation of thornless Bamboos

Three bamboo species viz., *Bambusa vulgaris*, *B. balcooa* and *Dendrocalamus giganteus* have been proved superior in terms of pulp yield coupled with strength properties. Hence these bamboo species can be tested under on farm conditions for productivity studies.

#### Pulping characteristics of Bamboo species

Sl. No.	Species	Chemical charge as Na <sub>2</sub> O (%)	Unbleached pulp yield (%)	Screen rejects (%)	Screened yield (%)	Kappa number	Black liquor			
							pH	Total solid (gpl)	TTA * as Na <sub>2</sub> O	RAA* as Na <sub>2</sub> O
1	<i>Dendrocalamus giganteus</i>	16	40.5	0.60	40.2	20.6	11.7	227	30.7	5.30
2	<i>Bambusa balcooa</i>	16	42.6	0.41	42.3	20.1	11.5	220	33.7	6.95
3	<i>Bambusa vulgaris</i>	16	41.3	0.52	41.1	20.8	12.1	226	32.9	7.12
4	<i>Bambusa bambos</i>	16	38.5	0.25	38.0	20.3	12.5	223	34.7	7.45
5	<i>Eucalyptus hybrid</i>	16	43.9	0.21	43.8	21.4	12.2	229	30.4	4.30

\* TTA and RAA as Na<sub>2</sub>O are calculated at 200 gpl Total solids basis  
Cooking Conditions Temp : 170°C Time : 90 min.

### 3. Testing and Evaluation of *Jatropha* hybrid clones for higher productivity

The hybrid clonal evaluation trial conducted at Forest College and Research Institute, Mettupalayam indicated that five hybrid clones recorded significantly higher yield compared to the existing *Jatropha curcas* seed sources. All the hybrid clones recorded flowering and fruiting within 4 to 6 months and the yield recorded was between June 08 to June 09. The yield details are furnished

S.No	Hybrid Clone	Seed Yield ( g ) / Plant	Oil content (%)
1	FC & RI HC 21	728.01	36.16
2	FC & RI HC 22	620.28	28.94
3	FC & RI HC 10	638.95	38.94
4	FC & RI HC 9	466.31	34.68
5	FC & RI HC 18	479.17	31.65

Hence these five clones may be tested as On Farm Trials in the farmer/Institute/Bio-fuel industrial lands.

### 4. Testing and Evaluation of Pungam clones for higher yield and oil content

Thirty candidate plus tree have been identified based on yield and oil content. Among the selections, five promising clones viz, FC&RI 1, 2,7,11 and 16 have been screened based on mother tree yield and oil content. These clones need to be tested under on farm conditions by multiplication through cleft grafting.

Parent age : Clonal selection  
Propagation : Cleft grafting  
Planting season : October – November  
Mother tree yield : 100 kg and above  
Oil content : 28 % and above

## II. TREE MANAGEMENT

### A. FOR ADOPTION

#### 1. Suitable intercrops for *Pongamia* based agroforestry system

It was found that the following intercrops viz., cowpea, blackgram and groundnut are found to be suitable intercrops for pungam based agroforestry system. The above mentioned intercrops have got the BCR of more than 2. In addition to higher productivity, the soil fertility in terms of available N, P and K has increased under pungam based agroforestry.

#### Yield of intercrops under Pungam (Kg ha<sup>-1</sup>)

Intercrops	Grain yield (Kg ha <sup>-1</sup> )				BCR
	Under 1 yr old	2 yrs old	3yrs old	Mean yield	
Blackgram	800	710	690	733	2.10
Greengram	650	605	580	612	1.80
Redgram	800	750	600	716	1.50
Cowpea	700	670	650	673	2.20
Groundnut	1250	1200	1150	907	2.15
Sunflower	550	520	500	523	1.80
Grain amaranth	800	680	620	700	1.40

Hence, it is recommended that cowpea, groundnut and blackgram are the suitable intercrops for pungam based agroforestry system for western region of TamilNadu.

#### 2. Microbial consortia for quality seedling production

Application of VAM consortia (*Glomus mosseae*, *Glomus macrocarpum*, *Glomus fasciculatum*, *Glomus geosporum*, *Gigaspora margarita*, *Acaulospora laevis* and *Acaulospora longula*) @ 10 g/plant, *Azospirillum brasilense* 5g/plant and *Pseudomonas striata* 5g/plant under nursery conditions improved secondary roots and collar diameter tremendously coupled with seedling vigour. Hence the above said microbial inoculants are recommended for quality seedling production.

#### 3. Biofuel based consortia

Field level evaluation of plant specific microbial inoculants on the growth of one year old *Jatropha curcas* plants revealed that application of plant specific *Azospirillum brasilense* (20g), *Azotobacter chroococcum* (20g), *Beijrenckia* (20g), *Pseudomonas striata* (20g) and VAM consortia (40g) per plant enhanced plant height (25%), collar diameter (20%) and number of branches (10%) over uninoculated control. Hence the microbial consortia can be adopted for *Jatropha* based biofuel plantation establishment.

#### **4. Microbial inoculam for bamboo seedling production**

Nursery level evaluation of plant scientific inoculants on the growth of bamboo seedlings showed that inoculation of one month old wildings (natural seedlings) with 5g *Azotobacter chroococcum*, 5g *Azospirillum brasilense*, 5g *Beijrenckia spp*, 5g *Pseudomonas striata*, 10g VAM consortia and 5g Vermicompost per seedling improved root formation (20%), shoot length (50%) and total dry matter production (200%) greatly over control. Hence the consortia are recommended for adoption.

#### **5. Microbial symbionts for casuarina clonal plants production**

Application of Soil+vermicompost (1:1) + 5g *Azospirillum brasilense* + 5g *Pseudomonas striata*+ 10 g VAM consortia coupled with 2 ml nodule suspension are recommended for improving rooting efficiency and plant vigour of *Casuarina equisetifolia*. Hence it is recommended for adoption.

### **III. TREE PROTECTION**

#### **B. FOR ON FARM TESTING**

##### **1. Screening gall resistance Eucalyptus clones**

Two Eucalyptus clones *viz.*, FC&RI 53 and 56 showed resistance towards Eucalyptus gall wasp in a comparative trial established using 10 clones. On an evaluation to a scale from 0 to 4, the above two clones had very low grading index of less than 0.01 while FC&RI 104 scored maximum of 4. These two clones need to be tested under on farm condition for further screening.

##### **2. Testing and Evaluation of Microbial consortia for *Casuarina junghuhniana***

It is proved by two nursery experiments that the combined application of *Casuarina junghuhniana* sprigs with plant specific cultures *viz.*, *Azotobacter chroococcum* (5g / sprig) + *Beijerinckia spp* (5g/sprig) + *Azospirillum brasilense* (5g/sprig) + VAM consortia (10 g sprig) + *Pseudomonas striata* (5g/sprig) + Nodule suspension (2 ml /sprig) has promoted rooting of sprigs and proved effective against soil borne pathogens over uninoculated plants and it has to be test verified under different soil conditions in farmer's holdings.

## **For information**

### **CENTRE FOR AGRL. RURAL DEVELOPMENT STUDIES**

The Centre for Agricultural and Rural Development Studies, Tamil Nadu Agricultural University (TNAU), is implementing the NAIP-ICAR a project entitled, "Establishing and Networking of Agricultural Market Intelligence Centres in India" with an outlay of Rs.620 lakhs for a period three years (2009-12). It covers 10 States in India with 11 State Agricultural Universities in providing market intelligence for paddy, wheat, maize, coarse grains, groundnut, sunflower, gingelly, coconut/copra, red chillies, turmeric, pepper, cardamom, major vegetables, etc.

A forecast on three crops viz., maize, groundnut and gingelly to be sown in Tamil Nadu during "Adipattam" has been prepared. The forecasted price for maize is Rs.820-880 per quintal, Rs.2300-2400 per quintal of pods for groundnut and Rs.40-44 per kg for red gingelly for the month of October-December 2009. This has been sent to all the leading dailies, officials of State Department of Agriculture, Agriculture Marketing, Regulated markets, Research Stations, KVKs, All India Radio and Doordharsan for dissemination. Efforts are initiated to disseminate market information through mobile SMS to the Presidents of Water Users Association of Tamil Nadu.

## **Department of Agricultural Economics**

### ***Studies on Commodity Marketing and Marketing Efficiency***

Commodity report- Maize : The supply response for maize, price transmission, price volatility and price adjustments for the international, central and regional markets of maize have been analysed. The markets are integrated exhibiting unidirectional causality from the international maize prices and evidence of price transmission is found such that, maize prices have influenced the chicken meat and egg prices. Prices are highly volatile in the international markets than that in the domestic market. Since there is a positive growth in the meat and egg consumption and also maize supply has not matched with its demand, there is adequate scope for increasing maize area in Tamil Nadu. Contract farming and futures trading in maize need to be promoted. Grower broiler/layer/ live stock feed industry integration needs to be promoted.

### ***Commodity report- Maize***

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## **Commodity report – Sunflower**

The supply response for sunflower, price transmission, price volatility and price adjustments for the central and regional markets have been analysed. Own lagged prices of sunflower and prices of competing crops influenced the domestic supply of sunflower seeds. Domestic market prices exerted influence on the central market prices implying the uniqueness of the quality of seeds obtained from sunflower grown in Tamil Nadu. The results of study encouraged promotion of cultivation of sunflower in the state.

Delivery and Dissemination of New Drought Tolerant Rice Varieties and their Impact on Socio Economic Conditions of Rice Farmers in Drought Prone Rainfed Ecosystems of Tamil Nadu.

Growing drought tolerant rice variety is an important dry land technology adopted by the farmers compared to other drought tolerant technological practices. All the sample farmers in Paramakudi block and 80 per cent of the sample farmers in Ramnathapuram block adopted drought tolerant rice varieties. Hence, developing and disseminating rice varieties suitable for dry and semi dry types of cultivation is crucial. Increase in yield in the case of Drought Tolerant rice (PMK 3) was about

Seven percent more than the existing high yielding varieties of rice. Further, farmers realized better product price for PMK 2 and PMK 3. On an average, farmer sold land races at Rs.600 per quintal during 2005-06, while other varieties fetched at Rs.875 per quintal including marketing costs. Market prices of PMK 2 and PMK 3 were Rs.1100 and Rs.1050 respectively, which are higher by 26 and 20 per cent respectively compared to other HYV's. On an average, net profit of Rs. 16776 and Rs.10257 per hectare can be obtained from cultivation of PMK 2 and PMK 3 respectively in Ramnathapuram block, while it was Rs.11697 and Rs.9189 respectively in Paramakudi block. At present, TNAU research stations in this region supply seeds of PMK 2 and PMK3 with available seed production capacity. The Department of Agriculture can take up production and distribution of PMK 2 and PMK 3 seeds on need basis.

## **Department of Agricultural and Rural Management**

The e-Velanmai model of technology transfer is found to be effective on the lines of solving problem based queries of farmers in irrigated environs. Paid extension services provided to the farmers using ICT Tools. So far 870 farmers were enrolled as member in Aliyar, Palar and Varahanadhi sub basins. Time bound detection of problems and adoption of remedial measures may increase the productivity of crops.

In the Precision Farming following Production and marketing risks were identified and prioritized for further research.

Production risks viz., assurance of the quality of seeds/seedlings, water scarcity due to poor rainfall during the year, non availability and higher price of water soluble fertilizers and skilled labour problem. In respect of marketing risks are unavailability of assured market, high price fluctuation, quality and price difference between the produce produced under precision farming and traditional farming are very low/ minimum, asymmetric market information and absence of support from the organised retailers.

### ***Sustainable Management of Water Resource***

In Tank irrigation system, due to the lack of well defined water use rights and its enforcement is poor in PU (Panchayat Union) tanks than that of in PWD tanks. Regarding use & control rights, except the division the other rights such as access, withdrawal, management and exclusion were well defined in more than half of the tanks. Higher Collective Action (CA) in the majority of the PWD tanks than PU tanks was observed due to functioning of Water Users Association (WUA). Collective Action in majority of Tanks found to be higher at level. Competition among the farmers group was found to be high in both PU & PWD tanks followed by the fishing rights, duck rearing rights for the use of tank water.

### ***Impact of Women Groups on Technology Adoption***

Farm women groups are still successful in adoption of agricultural technology. Currently, contact with officials had been reduced and training on need based agriculture technology from Department of Agriculture is low when compared to TANWA Phase II period and it leads to lack of technology transfer. The farm women insisted that access to resources is the major constraints. Financial activities of farm women have been increased after joining in the groups besides agricultural activities. With regard to capacity building of women groups, self confidence, risk taking ability, decision making skills and social exposure has been increased.

### **Dept. of Agricultural Extension and Rural Sociology**

The Department of Agricultural Extension and Rural Sociology, CARDS, has implemented the programme entitled “Lemelson and Mentoring Programme (L-RAMP)” for innovators, a joint initiative by the Indian Institute of Technology (IITM), and Rural Innovations Network (RIN), Chennai with the financial support of Lemelson Foundation, USA. This programme mainly envisages identification of grass root innovators who will contribute for fulfilling the basic needs of the people, besides enhancing people’s capacity in improving and sustaining their living conditions.

Accordingly, the Department of Agricultural Extension and Rural Sociology has identified four innovations from farming community, rural artisans and entrepreneurs which are detailed below.

<b>S.No</b>	<b>Title of the innovation</b>	<b>Locale of identified innovation</b>	<b>Practical utility</b>
1	Mini weeder	Dharmapuri	This is a small petrol powered machine meant for weeding operations in crops like turmeric, sugarcane, banana, etc., which are planted in rows and with the spacing of 2 feet between rows.
2	Seed pelletizer	Coimbatore	Seeds are pelletized by using electric motor. Seeds get moisture by ULV water sprayer after that seeds are coated with small soil particles by using blower. Then, the seeds are allowed for shade drying before sowing.

3	Air-Jet pump	Coimbatore	It is a light weight pump having compressor which is used to lift water without any vibration. Air and water mixture is lifted up to 2feet height inside the pump. The Air and Water mixture is separated by gravitational force. The pump is made up of rust proof material and having no moving part which makes maintenance easy.
4	Ergonomic cutter for tender coconut	Coimbatore	It is a simple machine used to cut the tender coconut. It is operated with one small electric motor along with one round blade.

## **CENTRE FOR PLANT MOLECULAR BIOLOGY**

### **Dept. of Plant Molecular Biology and Biotechnology**

Bt brinjal open pollinated varieties (OPV) in the background of Co2, PLR1, KKM1 and MDU1 were developed. Two Multi Location Research Trials with the above Bt brinjal OPVs were conducted during October 2007 to May 2008 at HC&RI, Coimbatore and AC&RI, Madurai. Results of these multi-location research trials indicated that the Bt brinjal OPVs offered adequate level of resistance to BFSB and produced significantly higher marketable fruit yield. Bt brinjal OPVs showed a significantly lower damage resulting from FSB feeding in comparison to non-Bt counterparts. Bt brinjal OPVs did not have any effect on non-target insects and beneficial insects.

Three types of indigenous *cry2A* genes, viz., *cry2Aa*, *cry2Ab* and *cry2Ac* were cloned from new potent isolates of Bt and a chimeric *cry2Ax* gene has been constructed to improve toxicity against cotton bollworm, *Helicoverpa armigera*. Plasmid construct was made with codon optimized synthetic *cry2Ax* gene to produce the chimeric Cry2Ax protein in plants. Experiments are in progress to validate expression of the newly made synthetic *cry2Ax* gene in plants.

### **Agricultural Microbiology**

#### ***Azophosmet Cocultured bioinoculant***

A new bio-inoculant formulation that combines the three important bio-inoculants together has been developed. This newly developed formulation has the benefits of harnessing from three bio-inoculants together. Nitrogen fixing bacterium - *Azospirillum*, phosphate solubilizing bacterium – Phosphobacteria and Plant Growth Hormone Synthesizing Bacteria (PGPR) *Methylobacterium* were co-cultured in a common growth medium (Azophosmet). During co-culturing the survival of *Azospirillum*, Phosphobacteria and PPFM maximum in Yeast Extract Mannitol broth supplemented with 0.5% methanol was found optimum for biofertilizer standards. The shelf life studies of Azophosmet in lignite carrier based formulation assessed for four months indicated that *Azospirillum*,

Phosphobacteria and PPFM had cell load of  $10^8$  cfu  $g^{-1}$ . Crop response studies conducted with cotton have indicated the benefits of Azophosmet over single inoculant formulations. Moreover sixty six percent (66%) of cost saving on biofertilizer was recorded. The new formulation has opened new avenue in bio-inoculant formulation that can be exploited commercially and will be a boon for crop improvement from farmers point of view.

### ***Use of Pink Pigmented Facultative Methylo trophs (PPFM) for mitigation of terminal drought in rice***

Application of PPFM as seed treatment, soil application and foliar spraying at panicle initiation and flag leaf stage has helped in mitigation of terminal water stress in rice in general and in SRI practice in particular, owing to its cost effectiveness and eco friendly cytokinin producing biofertilizer.

## **WATER TECHNOLOGY CENTRE**

### **Mitigation of terminal water stress in rice**

In rice, foliar spray of Pink Pigmented Facultative Methylo troph (106) during panicle initiation and flowering stages mitigated the ill-effects of terminal drought in both SRI and transplanted ecosystems.

### **Drip fertigation schedule for aerobic rice**

For aerobic rice, drip fertigation scheduled at 125 % Pan Evaporation + 100 % Recommended NPK fertilizer + biofertigation of *Azophosmet* increased the grain yield by 16 per cent in comparison with the conventional method of irrigation and fertilizer application.

### **Improved water management strategies for increasing water use efficiency and increased farm income in Tamil Nadu**

The results of the on-farm demonstrations to assess the impact of improved irrigation practices clearly indicated that micro irrigation recorded higher yield in crops ranging from 40 to 70 per cent compared to the conventional irrigation practice irrespective of the locations tested. Similar to the yield increase, gross income and net returns were also higher under micro irrigation. The main advantage of micro irrigation was water saving which ranged from 23 to 67 per cent in different crops. Besides, increased water use efficiency was also noticed invariably in all farm holdings.

From the observations observed in the on-farm demonstrations, it could be concluded that the production was almost doubled in most of the crops tested under the improved irrigation practices combined with latest art of fertigation technology in comparison with the conventional crop management practices. The yield was stable even during the unfavourable cropping season which made it possible to take up cultivation through out the year.

## **Technologies for augmenting groundwater supplies through enhanced recharge in hydrologically critical areas**

- The recharge structure is dry for eight months up to August 2007 as the rainfall in the study area does not contribute much runoff towards the structure.
- Water level decrease of 2 to 4.6 m was observed in the observation points during the period of January - August 2007.
- Water level increases of 1.63 to 5.48 metres were observed during the northeast monsoon in almost all the observation wells
- Percolation percentage reduced to 71 and evaporation increased to 29 % compared to the water balance during 2005 and 2006 mainly due to the activity carried out in the catchment which induced soil erosion and sedimentation in the water spread area of the recharge structure.
- Water level fluctuation is varied between 3 to 7m over the years 2005, 2006 and 2007.
- No significant recharge in the study area during south west monsoon in all the three years 2005, 2006 and 2007 due to absence of water in the recharge structure.
- Recharge during North east monsoon in the 2005, 2006 and 2007 is found to be 5.94, 13.24 and 5.00 per cent respectively.
- Increase in recharge due to structures is 30 per cent.
- Groundwater fluctuation in wells within a radius of 100 metres in the downstream was very limited irrespective of the season which is a good sign of sustainability of groundwater supply resulted by the artificial recharge in the study area.

## **Study on groundwater balance to assess the quantity of water available for development in the Noyil basin**

### ***Technology Transfer***

It is observed that about 29 per cent of ponded water goes as evaporation loss and any effort to decrease this portion will enhance the utility of the recharge structure. Therefore, details of recharge shaft have been communicated to the State Agricultural Engineering Department (AED) and Central Ground Water Board (CGWB) for adoption in the existing percolation ponds in Coimbatore and Vellore district. This has accelerated the recharge process and thereby reduced the evaporation loss from the ponds.

### ***Groundwater draft***

Groundwater draft in the basin is mostly from the energized irrigation wells and varies from year to year depending on the availability of water, electric supply as well as irrigation, domestic and industrial needs. There are 13 administrative blocks in the basin in which nine blocks are coming under Coimbatore district and four blocks are in Erode district. The long term water level trend data for the period 1994-2003 has been considered for assessment of net groundwater availability, domestic and industrial draft, irrigation draft, stage of development and categorization of the block for the basin. Out of 13 blocks, seven blocks are over-exploited blocks, one block is critical block, three blocks are semi-critical blocks and two blocks are safe blocks where the groundwater development exceeds 100, between 90 - 100, 70 - 90 and less than 70 per cent respectively. The groundwater draft and net groundwater availability in the basin were 394.28 and 45.76 MCM respectively during 2003.

## **Estimation of groundwater recharge in Noyil river basin**

- The boundary map of the Noyil basin with geological formation and streams were delineated and digitized.
- The sub-thematic layers viz. Soil map, Geomorphological map and Lithological map of Noyil river basin were generated.
- The Noyil basin consists of a wide range of high grade metamorphic rocks of the peninsular gneissic complex, which are extensively weathered and are overlain by recent valley fill material at places underlies the area.
- Groundwater occurs in the porous granular colluvial material and weathered mantle as well as in the joints, fissures and fractures that occur at shallow depth in the partly weathered rocks and in the deep-seated fractures developed in the fresh rocks.
- Groundwater draft in the basin is mostly from the energized irrigation wells and also from domestic and industrial wells. The number of non-energized irrigation wells is very few and are scarcely used.
- Totally there are 13 administrative blocks in the Noyil river basin in which nine blocks are coming under Coimbatore and four blocks are in Erode districts of Tamil Nadu. Out of 13 blocks, seven blocks are over-exploited blocks where the groundwater development exceeds 100 per cent, one block is critical block where the groundwater development is between 90 and 100 per cent, three blocks are semi-critical blocks where the groundwater development is between 70 and 90 per cent and two blocks are safe blocks where the groundwater development is less than 70 per cent. The groundwater draft in the basin was 394.28 MCM in 2003.
- The monthly water level data were collected for the period from 1998-2005. The Noyil river basin has been divided into three regions viz., Head, Middle and Tail for estimation of recharge based on the hydrological condition.
- The average water level fluctuation in the head region was 1.78 to 3.91m, in the middle region was 1.94 m to 4.44 m and in the tail region was 1.74 m to 3.72 m.
- The average seasonal rainfall of the basin ranges from 343.32 to 902.6 mm. The natural recharge for head region ranges from 9.6 to 13.7 per cent, for middle region from 11.8 to 14.9 per cent and for tail region from 7.9 to 13.8 per cent.

## **Conjunctive use of surface and groundwater sources in the Lower Bhavani Project Command**

### ***Water balance approach***

It is indicated that in each cropping season the runoff plus deep percolation was several times as high as evapotranspiration due to the huge utilization of groundwater. Through fieldwork, it was also found that farmers preferred to groundwater due to good reliability and maneuverability. But, huge exploitation of groundwater for irrigation seemed to be unseasonable.

The seepage loss in the head, middle and tail reaches of the LBP main canal were 17.1, 14.2 and 9.3 per cent respectively. In the distributaries, the seepage losses were 16.3, 15.2 and 13.7 percent. In the unlined field channels, the seepage losses were 13.8, 11.2 and 9.6 percent. In the lined distributary, it ranges from 0.1 to 4.2 per cent.

### ***Assessment of performance evaluation of agricultural pump sets***

- The demand for surface pumps for agriculture purposes had been declining because of scanty rainfall and due to falling water table.
- The reasons for poor pumping efficiency included the damaged impellers that are also out of adjustment, pump bowls designed for a higher pumping rate, incorrect power unit selection and failure to perform required maintenance
- Pump performance needs to be monitored when maintenance is required. About 30-35 per cent of the energy actually used by irrigation pumping could be saved by modifying the pump sets. Against the maximum achievable efficiency of 54 per cent for electric pump sets and 20 per cent for diesel pump sets, observed efficiencies are sometimes as low as 13 and 5 per cent respectively.
- It is also shown that three important modifications can be easily done in the system to improve the efficiency of the ground water pumping. They are:
  - Decreasing the discharge velocity
  - Improving the pump efficiency by better selection and design
  - Improving the motor efficiency by better selection and design
- Power consumed by agricultural pumping is 36000 MW and about 10080 MW is wasted amounting to cost Rs 40,320 crores extra
- By installing efficient pumping systems, an energy of 896 MW could be saved potentially costing Rs 3584 crores.

### **Effect of industrial effluent on the groundwater quality of Noyil river basin**

#### ***Quality of irrigation water in the polluted water resources soluble salts***

The reaction of water samples varied among the seasons. The pH values ranged from 5.3 to 9.1 in surface water and 5.7 to 9.2 for the ground waters. During December 2006, the values pH of the surface water sample including river and tanks were high where as during April 2007, raise in pH was noticed in the wells.

#### ***Anions***

Carbonate content of the surface water ranged from 0.0 to 13.3 meL<sup>-1</sup> and in ground water, it varied from 0.0 to 17.8 meL<sup>-1</sup>. Higher contents of carbonate and bicarbonate were noticed in the water samples during December, 2006 in river, tank and wells (pumping). Among the non-pumping wells, bicarbonate content was high during April, 2007.

Chloride concentration in river water fluctuated during different periods of collection. The values ranged from 2.0 to 160.0 meL<sup>-1</sup> in surface water and 1.0 to 388.0 meL<sup>-1</sup> in the case of ground water. Chloride content in tanks and wells were high during December 2006 and April 2007.

Content of sulphate varied from 0.1to 27.7 meL<sup>-1</sup> in surface water and 0.2 to 100.9 meL<sup>-1</sup> for the ground water and the contents were higher during April 2007 and August 2006.

## **Cations**

Concentration of sodium varied from 0.4 to 132.6 me L<sup>-1</sup> in the surface water. In ground waters, the content ranged from 2.0 to 139.1 me L<sup>-1</sup> and was high during August 2006. Potassium content varied from 0.1 to 4.5 me L<sup>-1</sup> in surface water and 0.1 to 19.0 me L<sup>-1</sup> in the ground water. Calcium content of the surface and ground water ranged from 0.6 to 8.5 and 0.1 and 32.0 me L<sup>-1</sup> respectively especially during August 2006.. Magnesium concentration of the water samples of river and tanks ranged from 0.3 to 11.5 me L<sup>-1</sup> and that for the well water, it was between 0.4 and 46.0 me L<sup>-1</sup> with the higher content during April 2007 in river, tank and pumping wells. But, non-pumping wells showed higher content of magnesium during August, 2006.

## **Residual Sodium Carbonate**

Content of Residual Sodium Carbonate (RSC) was high during December 2006 in the samples collected from river and tanks. Higher RSC values were observed at Orathupalayam (19.19 me L<sup>-1</sup>) and Sular small tank (20.20 me L<sup>-1</sup>) among the river points and tanks respectively. In the pumping wells of Kodumudi area, the RSC values were high during December 2006 but increased value was noted in April 2007 (24.81 me L<sup>-1</sup>) and for the non-pumping wells at Arthanaripalayam, the values were slightly higher (30.20 me L<sup>-1</sup>). It could be inferred that the RSC present in the ground water showed vulnerability for causing hazards to the crop production.

## **Effect on soil properties**

Among the surface soil samples, majority of the soils (>90 per cent) possessed the EC values of <1.0 dSm<sup>-1</sup>. The soil pH values ranged between 6.95 and 8.91. The pH of majority of the soils of surface samples (79 Per cent) and sub-surface (about 82 %) were between 7.0 and 8.0. Most of the polluted wells near the Noyyal river were not used for irrigation. Hence, there was no drastic impact on the soil properties like EC and pH.

## **Effect of dilution of polluted water on soil and crops**

Pot culture experiments with textile and dye industry effluents of varied dilutions were carried out in two different soils. The results of the study showed that Plant height, dry matter and seed yield decreased with the increase in EC values of the diluted polluted water in red soil (*Irugur* series). Whereas in black soil (*Periya-naickenpalayam* series), plants were taller upto 4 dSm<sup>-1</sup> dilution and haulm and seed yields increased upto 6 dSm<sup>-1</sup> dilution.

At flowering, chlorophyll content increased upto 4 dSm<sup>-1</sup> dilution and maintained thereafter in red soil. There were no marked variations in chlorophyll content in the black soil. The values of CSI increased upto 6 dSm<sup>-1</sup> dilution in red soil and 8 dSm<sup>-1</sup> in the case of black soils. Proline content increased upto 8 dSm<sup>-1</sup> dilution in both the soil types but black soil exhibited higher proline content than the red soil. The content of RWC increased upto 2 dSm<sup>-1</sup> dilution and decreased thereafter in red soils, while increasing trend was evident in the black soil upto 8 dSm<sup>-1</sup> dilution.

Plant height, dry matter and seed yield were decreased with the increase in EC values of the diluted polluted water in red soil (*Irugur* series). Whereas, in black soil



(*Periyanaickenpalayam* series), plant height, haulm and seed yields showed an increasing trend upto  $4\text{dSm}^{-1}$ . Chlorophyll content increased upto  $4\text{dSm}^{-1}$  and maintained thereafter in red soil. There was no marked variation in chlorophyll content due to the dilution of polluted water in black soil. Values of CSI increased upto 6 and 8  $\text{dSm}^{-1}$  in red and black soils respectively.

Proline content increased upto  $8\text{dSm}^{-1}$  in both the soil types; however, black soil exhibited higher proline content than the red soil. Increased values of RWC were often observed for the red soil upto  $2\text{dSm}^{-1}$  and decreased thereafter; whereas, in the case of black soil, increasing trend of proline content was noticed even upto  $8\text{dSm}^{-1}$ .

## HOME SCIENCE

Home Science College and Research Institute is full-fledged with five departments. The Five departments are involved in productive research in their respective area. The department of Food Science and Nutrition involves in research work pertaining to exploitation of green lentil, technological packaging for healthy herbal tea, utilization of hybrid coconut with high copra and oil for chocolate making, application of nanotechnology to enhance bioavailability of phytochemicals in health foods, Design and development of on-farm precooling system for fruits and vegetables which are being funded by various agencies. The technologies developed had been disseminated through trainings under venture capital scheme.

The Department of Human Development conducts research in Economic empowerment of rural women through promoting micro enterprises where Skill oriented training programmes are being conducted. From the trainings about 24 members have agreed to commercialize the technology.

The Family Resource Management Department carries out research in the area of ergonomic Interventions to promote Occupational Health and Safety among Workers Employed in Small Scale Dyeing and Printing Units and empowerment and capacity building of self help group women through establishment of Agro Processing Centre (APC's). The Department of Apparel Designing and Fashion Technology carries out research on the area of Consumer perceptions about handloom Vs power loom fabrics for apparels at Madurai City. The Department of Home Science Extension concentrates on popularizing low cost technology and resource saving technologies.

This college is currently operating external agency projects funded by Saskatchewan Pulse Growers Development Board, Canada, Department of Science and Technology, University Grant Commission, NMPB and 50 crore project.

### **Exploitation of Green Lentil as a substitute for Indian pulses**

Lentil (*Lens culinaris*) belonging to the family Leguminosae is a rich source of protein, carbohydrate, calcium, phosphorous, iron, B vitamins and fibre and its inclusion contributes to a wholesome and balanced diet. The advantage of lentils is that they are quick cooking compared to other pulses and possess a distinct flavour. The characteristics of lentils also lend for usage of lentils in Indian cuisine in total or partial replacement of other commonly consumed Indian pulses.

This scheme is funded by the Saskatchewan Pulse Growers Development Board, Canada. Under this scheme a methodology seminar was conducted on 7.10.2008 at Home Science College and Research Institute, Madurai, during which pulse traders, processors and scientists from various parts of Tamil Nadu participated and shared their experiences with regard to pulse trading.

Survey was conducted in 10 Districts of Tamil Nadu at Household, Traders, Processors and End user level to illicit information on lentil utilization in Tamil Nadu. Value added products from lentil such as sweets, savories and convenience foods were standardized which recorded sensory scores on par with the control. The products were packed in three different packaging materials viz., polyethylene, polypropylene and metallised polypropylenes pouches with and without vacuum and were stored at room temperature, under refrigeration and in the frozen state to study the storage stability of the lentil based products. Further work is in progress.

The administrative body of the Saskatchewan Pulse Growers Association and the Scientists of the University of Saskatchewan, Canada visited Home Science College and Research Institute, Madurai from 20.02.2009 to 24.02.2009. A one day interactive meeting was conducted on 23.02.2009 between the Canadian delegates, TNAU Scientists and the pulse traders of Tamil Nadu. The meeting was presided by the Registrar, Tamil Nadu Agricultural University, Coimbatore.

During the interaction the traders viewed that the Indian consumers would favour lentil if priced lower than Indian pulses and that lentil has the added advantage of being quick cooking and nutritionally superior. The traders also expressed the constraints felt in lentil trade being huge investments needed for modernization of the pulse processing plants and the problems of irregular supply of lentil which leads to price fluctuation in turn greatly influencing lentil trade.

### **Development of Hybrid in coconut with high copra and oil for chocolate making**

The hybrid coconut varieties were procured from Coconut Research Station, Veppankulam and Aliyar Nagar and used for preparation of powder by using osmotic dehydration process. The storage behaviour of coconut flour is in progress.

### **Application of nanotechnology to enhance the bioavailability of phytochemicals in health foods**

Tomatoes were purchased and maintained at 2-8°C for 24 hours and pulped. Concentrate was prepared by heating the tomato pulp to evaporate the water. The samples were prepared and lycopene was estimated within 24 hours. Lycopene was extracted from tomato juice, tomato pulp and tomato concentrate by different organic solvents. Tomato pulp and tomato concentrate were used to extract the lycopene with enzymes. Different enzymes were used to enhance the extraction of lycopene with organic solvents. Solvent extracted lycopene samples were mixed with Malto Dextrin at 4 .0 % levels and homogenated. The homogenated samples were passed through spray drier. Further work is in progress.

## **Design and development of on-farm precooling system for extending economic life of harvested fruits and vegetables**

On - farm evapocooling system was developed. The temperature of the cooling chamber was 27°C whereas room temp was 34°C. Preliminary trial was made with moringa and amaranthus. The moringa had the marketability value upto 15 days when kept at evapocooling chamber whereas it was only one week at room temperature. In amaranthus the freshness was maintained for 24 hours in Evapo Cooling Chamber (ECC) and for 6 hours at room temperature.

## ***Economic empowerment of rural women through promoting micro enterprises - A pragmatic approach***

Two southern districts namely Madurai and Virudhunagar were selected for study purpose based on the area under cultivation of millets. Totally 200 farm households were selected for the study purpose. An interview schedule was framed to collect the information. Based on the information collected, totally 25 millet based value added products like snacks mixes, vadagam, millet based fermented snacks, breakfast / lunch foods, malted health mix, multi grain adai mix and ada payasam mix were standardized. The products which had more than 80 per cent of the acceptability were selected for providing skill training to the selected members. A hand out on processing of value added millet based products was prepared. Skill oriented training programme along with demonstrations was conducted on processing of millet based products for the benefits of self help group members. The training was conducted on 11<sup>th</sup>, 14<sup>th</sup> & 15<sup>th</sup> March 2008, 4<sup>th</sup> & 24<sup>th</sup> September 2008, 31<sup>st</sup> October 2008 and 3<sup>rd</sup> & 4<sup>th</sup> March 2009. Totally 8 training programmes were conducted and 162 self help group member were attended. Among the trained members 24 members have agreed to commercialize the technology. With the approval of the Vice Chancellor, Tamil Nadu Agricultural University, Coimbatore, (the technology nutrition label, details of the packaging, nutrient content of the products, shelf life of the products etc.) has been transferred to 24 self help group members. To commercialize the technology, millet based products like adai mix, puttu mix, paniyaram mix, kali mix, murukku mix and karasev mix were prepared in bulk and kept at departmental stores like Remuki, Nilgiri's, Nila fruits, and M/s. Saravana stores in Madurai, by fixing the sale price (with the approval of sales price committee).

The trained self help groups are commercially producing and selling the products in the departmental stores, exhibitions and bakery shops etc. Based on the recommendations of the DST review meeting, it was planned to the conduct the training programme in collaboration with KVK's of Tamil Nadu Agricultural University, Thiruvannamalai 17.04.2009, Salem 07.05.2009, Chennai 23.05.2009 and Trichy 28.05.2009 to the self help group members, entrepreneurs and industrialist.

## **Ergonomic interventions to promote occupational health and safety among workers employed in small scale dyeing and printing units**

Ergonomic Interventions to promote Occupational Health and Safety of workers employed in Small Scale Dyeing and Printing Workers is functioning in the Department of Family Resource Management. Dyeing activity involves lots of awkward postures which strain the dyer's muscles. To reduce the postural stress, an ergonomically designed dyeing tub has been designed to improve the worker's postures. The modified tub has feature such as provision of wooden block at both end of the dyeing tub to fix the

saree to be dyed firmly. Proprietors and workers were motivated to use the improved dyeing tub during the course of work. Comparison studies on the conventional and improvised tub indicated that ergonomically designed tub reduce the postural stress of the workers, which is evident from the Heart Rate studies. In addition to it, Body Part Discomfort Mapping also revealed a reduction in the fatigue level. However, the productivity can be improved over a period of time.

### **Empowerment and capacity building of self help group women through establishment of Agro Processing Centre (APC)**

Kodaikanal, a hill station, produces large quantities of agricultural and horticultural crops. There is enormous amount of post harvest losses due to its perishability and for lack of awareness of appropriate processing techniques by the people living there. A project entitled “Empowerment and capacity building of self help group women through establishing Agro Processing Centre” funded by Department of Science and Technology is functioning at department of Family Resource Management Home Science College and Research Institute, Madurai. Its prime objective is to empower women belonging to weaker sections (Tribes- Mudgas and Palaiyars) for entrepreneurial activities. This project aims at increasing the commercial production of various value added products using the available agricultural and horticultural products. Hence an Agro Processing Centre was established at Thadiyankudisai Research Station. Machineries that are necessary for commercial production of fruit and vegetable production were purchased and installed.

### **Consumer perceptions about handloom Vs power loom fabrics for apparels at Madurai City**

The subjects were consumers (aged 20-60 years) visiting retail shops and also from households in Madurai city. Data collection is in progress. The decision of selecting the apparels is done by women, 70% of them are impulsive buyers. About 90 % of the consumers enquire the salesman for identification of the fabric as handloom or powerloom. Of them 70% prefer silk materials from handloom. At the same time 100 % of the consumers prefer synthetic materials from powerloom. Though Handloom fabrics have certain limitations, it is still selected for its design/ motif, prints, comfort, brand and for the pride of wearing. Both handloom and power loom fabrics consumers are influenced by friends & peers, traditional practice of purchase, commercial shows and displays in mass media. These factors are more influential in the purchase of powerloom fabrics than handloom.

## **DIRECTORATE OF AGRI BUSINESS DEVELOPMENT**

### **Venture Capital Scheme**

Venture Capital scheme is an innovative programme of TNAU with twin objectives of helping farmers with provision of quality agricultural inputs and generation of revenue to the University through sale of products. In the year 2008-09, totally 129 Venture Capital schemes were operated at various Colleges/ Research stations/ KVKs. From the above schemes agricultural inputs viz., breeder and TFL seeds of improved varieties of agricultural crops, Hybrid seeds of agricultural and horticultural crops,

seedlings and grafts of fruit crops, biocontrol agents, biofertilizers, vermicompost, forestry seedlings etc., were produced and sold to the farmers, private and Government organizations. Besides production of agricultural inputs, trainings were also offered to the farmers and entrepreneurs on production of vermicompost, mushroom cultivation, food processing, urban horticulture etc. From the above schemes, 25 % of the total receipts i.e. Rs.60.70 lakhs was received towards institutional charges to the University as revenue. Remaining 75% of the receipts were utilized by the respective institutions for developmental activities like creating lab facilities, infrastructure development, purchase of farm equipments and machinery, etc.

### **Consultancy Services**

A total number of 29 consultancy services were offered from TNAU during the year 2008-09, in the areas of bio-energy, environment sciences, entomology, mushroom production, soil mapping, value addition and quality improvement of agro products, establishment of biofertilizer, mushroom, food processing units, precision farming on oil palm and medicinal crops. A net revenue of Rs.96.0 lakhs was realized during 2008-09.

### **Technology Commercialization**

With the objectives of technology transfer and generation of revenue to the university, the process of commercialization was initiated. During 2008-09 three TNAU products, viz., TNAU Panchagavya, TNAU – Insect Removal Device from stored products and TNAU-Ready to cook mix from pearl millet (Technology and machine were commercialized through private firms) were commercialized through private firms. In order to create and promote Public Private Partnership for seed production, the “**TNAU – Private seed Sector Research and Technology Consortium**” was launched in 2008. In collaboration with ICRISAT, a MoU was signed between TNAU and ICRISAT for establishing an **Agri-Business Incubator (ABI-TNAU)** to promote agribusiness and this **ABI-TNAU** is to be launched in TNAU on 07.08.2009.

## **DIRECTORATE OF STUDENTS WELFARE**

The Directorate of Students' Welfare (DSW) in Tamil Nadu Agricultural University, Coimbatore, is the hub of students' counseling and placement activities for all ten constituent colleges of the university. The DSW is functioning with a prime objective of to promote capacity building and employability of agri-graduates. Our vision is to build confidence and competence in graduates to enable them to globally competitive and promote employability at national and international levels. The core activities of DSW encompass Placement, Higher Education Abroad and Career Counseling.

### **Placement**

The placement activities include registration and monitoring of graduating students, conduct of campus interviews & job fairs, visit to agro-based industries and placement melas.

## Registration and Monitoring

Students who are in the final semester of any degree programs will register at the Placement Cell by paying annual fee of Rs. 200 which is valid for one calendar year. The biodata of students are entered into the computer-aided database in order to ensure that students receive the information about career opportunities, job fairs and campus interviews. In the past four years (2006-08), about 2977 fresh graduates (2006, 609; 2007, 724; 2008, 804; 2009, 840) had registered in the roll. Recently, RFID (Radio Frequency Identity Card) system has been introduced in order to provide job opportunities for all our graduates while preventing duplication of employment. All students in the final semester in UG, PG and Ph.D. programs have to register for placement regardless of their career options to track down graduating students of TNAU.

## Placement Registration

No	Year	UG	PG	Ph.D.	Total
1	2006	447	151	11	609
2	2007	429	272	23	724
3	2008	510	273	21	804
4	2009	540	260	40	840

## Campus Interviews & Job Fairs

Campus Interviews are being conducted in a regular basis in order to promote employability of agriculture graduates. Based on the indent received from various agro-based industries, banking sectors, commodity marketing, NGOs and corporate sectors, campus interviews are being organized once in a month. In the past three years 2006-09, more than 57 campus interviews had been conducted which helped about 1400 graduates to get employed in various organizations involving 232 companies, banks and Institutes. The companies recruit students through three phases of selection process namely Written Test, Group Discussion and Interview. The campus interviews facilitate the employers to select candidates of desired skill, apart from offering a platform for job seekers to opt from plethora of industries and commodity traders. Besides campus interviews, Job Fairs are conducted annually during March - April which coincided with the completion of academic programs. So far three job fairs had been conducted which benefited fresh graduates to acquire employment well before get their graduation.

## Campus Interviews

No	Year	No. of Campus Interviews conducted	No. of Job Fairs	No. Companies / Banks participated
1	2006	19	1	47
2	2007	10	1	68
3	2008	16	1	57
4	2009	12	1	60
	<b>Total</b>	<b>57</b>	<b>4</b>	<b>232</b>

## Sector-wise Students Placement

No	Sectors	UG			PG & Ph.D		
		2006	2007	2008	2006	2007	2008
1	Agro-industries	281	111	221	92	3	76
2	Seed Industry	8	12	12	2	19	3
3	Food Industry	15	2	6	13	10	3
4	Fertilizer industry	-	2	-	0	4	-
5	NGOs	4	15	-	3	0	-
6	Plantations	2	-	-	-	-	-
7	Banking	7	13	6	23	92	84
	<b>Total</b>	<b>317</b>	<b>155</b>	<b>245</b>	<b>133</b>	<b>128</b>	<b>166</b>

### Industrial visits

The Director (Students' Welfare) and Professor (Students' Welfare) have visited agro-based industries in Hyderabad during October 16-19,2007 and interacted with HRD personnel in order to gain feed back about the performance of TNAU graduates and besides attracting them Campus Interviews for recruitment. During our visit to Hyderabad, we briefed about our university, courses offered, capacity building of students and special features in our curriculum which makes an edge over other degree programs. We visited a wide range of agro-based industries which include Bioseeds, Vibha Seeds, Agri-business Incubator, Seed Works (US Agri-Seeds), Prabhat Agri Biotech, Heritage Foods, Nagarjuna Fertilizers & Chemicals Ltd, ikisan besides Sathguru Consultants and CRIDA (details of the visit enclosed). The visit helped us to attract at least 12 companies for upcoming Campus Interviews or Job Fairs. We also sensitized the performance of our students already working in various seed industries. Many employers expressed that our graduates are doing excellently well and their performance was consistently commendable invariably in all sectors.

### Overseas Employment Unit (OEU)

In order to promote globalization in agricultural education and employment, OEU was anchored in October, 2005 with a view to provide opportunities for TNAU graduates in the international market. About 44 graduates have registered in the unit and international companies are being contacted for campus recruitment through telephonic interviews or videoconferencing. Thirty five graduates (2006, 12; 2007, 17; 2008, 4; 2009, 2) have already placed in Middle-East (Dubai, Muscat, Kuwait, and Madagascar) and African Countries. There is a overwhelming response from students and international agro-industries across the globe.

### Career Counseling

#### *Spoken English for Career Skills*

Spoken English for Career Skills for a period of 4 months is organized with the help of Freelance Teachers and Professors of reputed .institutions in Coimbatore. Certificates are given to the students who had successfully passed the tests for group discussion, interview skills and presentation skills. It is widely accepted that communication skills of agriculture graduates are weak which make them disadvantage in seeking jobs in export oriented companies, corporate sectors and commodity trading.

In order to remove this attitude from the mind of HRD personal and employers, the spoken English course is orchestrated in such a way that how best the TNAU graduates can be shaped up to fulfill the goals and aspirations of the changing scenario in agriculture industry.

### **Banking Sector**

To meet out the requirement of banking sectors, students are given coaching classes utilizing the services of external experts in this field. Three batches of students comprising 35-40 had taken this course. Premier nationalized banks such as State Bank of India, Canara Bank, Syndicate Bank, Bank of India, Lakshmi Vilas Bank and Indian Bank conducted on-campus interviews and recruited 225 TNAU graduates in the past three years and 183 graduates recruited in 2008-09. Besides national banks, Lakshmi Vilas, ING Vysya, HDFC and ICICI Banks are also bestowing interest to expand their operations in farm sector and would prefer to recruit abundance of agri-graduates in the near future.

### **UPSC Civil Service Examination**

The civil service coaching is offered to the students in the evening hours to help them to be competitive in the national level examinations. In the past four years, 70 students (2005, 24; 2006, 16; 2007, 17; 2008, 23) have cleared civil service (mains) which is about 40% of the candidates selected in the State of Tamil Nadu. Coaching is given to students with a fee of Rs. 1500 for a period of six months during two academic semesters. Books and reading materials have been assembled in the Directorate for the convenience of the students. Besides reading materials, CD-ROMs are available for students to take up tests for self-evaluation. Mock tests are conducted three times during the course to assess the progress of students.

### **Coaching classes conducted by the DSW**

No	Programs	UG			PG & Ph.D		
		2006	2007	2008	2006	2007	2008
1	Civil Services	28	18	28	10	11	6
2	Banking	-	30	35	-	-	-
3	Spoken English	32	36	-	-	-	-
4	IELTS, TOEFL, GRE	61	25	27	-	-	1
5	C Programm	70	18	1	53	8	21
6	German	25	-	-	-	-	-
7	Hindi	46	20	-	-	-	-
	<b>TOTAL</b>	<b>262</b>	<b>147</b>	<b>91</b>	<b>63</b>	<b>19</b>	<b>28</b>

### **Career Guidance Workshop**

Motivation lectures and personality development seminars are also given by experts in order to enthuse the students to be successful in their career. Personality development is a key factor for success. In the job market, the candidates with high level of motivation and energy, with aptitude to work, optimism, excellent communication skills and self-esteem are very much required to acquire jobs in industries. The Directorate of Students Welfare organized a series of special lectures to mould the students to match with the needs of industries. In the year 2008, the Directorate of Students' Welfare



conducted a two day Workshop on "**Career Guidance Workshop**" during April 11-12, 2008 at the Agricultural College & research Institute, Madurai, and February 27, 2009 at AC & RI, Coimbatore, in order to facilitate the out-going undergraduate students to get themselves prepared for immediate placement. About 500 fourth year students from all disciplines of ten constituent colleges of TNAU along with their Placement Officers attended the workshop. This workshop was designed to suit the current need in the context of changing scenario in job market for farm graduates. The program was scheduled prior to the **JOB FAIR** to provide opportunity for agri graduates to get employed and benefit the out-going graduates.

### **Higher Education Abroad**

Counseling for higher education abroad is given to interested students. Students had undergone computer-based tests for higher education abroad such as TOEFL, ORE and IELTS. In the past four years, 110 students (2006, 23; 2007, 23; 2008, 36; 2009, 28) have gone to the countries such as USA, UK, Australia, Canada and Taiwan in order to undertake their Masters, Ph.D., and post-doctoral programs. It is worth mentioning that TNAU graduates bagged the most prestigious "Commonwealth and Erasmus Mundus scholarships for the past three years in a row. Internet based "Greengroup" has been established with 700 members of TNAU alumni working or studying abroad which facilitates in exchange of information on fellowships or assistantships or job opportunities available across the globe (tnausw2006@yahoogroups.com).

### **Infrastructure developed**

#### ***Communication laboratory***

The communication skills play a pivotal role in promoting employability of graduates in any educational programs. The Communication Laboratory is a hub where the teacher and students are bridged through a cable networking system for effective learning. It is an innovative method of teaching foreign languages particularly English with assistance of sophisticated software that facilitates interactive teaching and precise learning. The lab carries audio and video systems which add value to the effective learning process. About 300 UG, 100 PG and 28 Ph.D. students have visited the laboratory to equip themselves in communication skills.

#### ***Communication Laboratory***



## Benefits of Communication Laboratory

- Effective learning of English
- Improves communication skills of students
- Multi-functional facility (can be used for undertaking mock testing of TOEFL, IELTS, GRE, Civil Services)
- Videoconferencing can be done
- Instant learning from foreign lab is possible
- Can be used as a class room for teaching computer courses and other languages (Hindi, French, German etc.)

## DIRECTORATE OF OPEN & DISTANCE LEARNING

The Directorate of Open and Distance Learning, one of the constituent units of the TNAU started during April 2005 is vested with the responsibility of offering distance learning programmes through correspondence mode.

The Directorate offered

Certificate Courses	:	22 (Tamil)
Certificate courses	:	5 (English)
PG Diploma programmes	:	3
PG Degree programmes	:	3

For the benefit of various segments of the farming community, entrepreneurs, self help groups and other learners who aspire for correspondence education and interested in establishing agro based industries in rural areas.

### List of candidates enrolled for the year 2009 – 2010

Sl. No.	Course	No. of candidates enrolled
	<b>PG Degree</b>	
1.	MBA	42
2.	M.Sc. (Environmental Management)	19
3.	M.Sc. (Sugarcane Technology)	26
	<b>PG Diploma</b>	
1.	Food Biotechnology	4
2.	Production and Quality Control in Medicinal Plants	1
3.	Bioinformatics	1
	Certificate Courses (Tamil)	1200
	Certificate Courses (English)	64

The State Bank of India has sanctioned an amount of Rs.2.00 lakhs as 2/3 financial contribution to 200 Self Help Group women towards offering certificate courses on open and distance learning mode.

Two MoUs were finalized by the Directorate of Open and Distance Learning, TNAU. One with M/s. Rasi Seeds, Salem for offering the certificate course on Vegetable

Seed Production Technology. Yet another MoU with M/s. AGRO-BIOTECH, Kottayam, Kerala for offering certificate courses on

1. Production of Biofertilizers and Biocontrol Agents
2. Integrated Nutrient Management
3. Integrated Pest Management
4. Organic Farming

A proposal was sent to the Distance Education Council, New Delhi for the development grant. A grant to a tune of Rs. 30 lakhs was sanctioned. The amount was spent towards the following.

- Development of Self Instructional Material
- Student Support Services
- Staff Training and Quality Assistance
- Application of ICT facilities (Research and Development and downlink facilities) & Computerization
- Library
- Research and development

Another proposal for obtaining the grant from DEC for the year 2009 – 2010 has also been sent for approval.

Dr.Sabine Grunwald, Associate Professor (Soil Science) & Distance Education Programme Coordinator, University of Florida, USA visited the Directorate of Open and Distance Learning, TNAU from 21.07.2009 to 23.07.2009 under the staff training programme and shared her experiences on the development of Reusable Learning Objects (RLO) in agriculture.

An international workshop was conducted on “ODL Content Development Methodologies” by the Directorate of ODL from 27.05.2009 to 29.05.2009 with the participation of the following scientists Dr. Suresh Babu, IFPRI, USA, Dr.V.Balaji, Global Leader, ICRISAT, Hyderabad, Dr. Jana Janakiram, Consultant on Distance Education, Canada, Dr. Ranga Ramanujam, IGNOU, New Delhi and Dr. K. Murugan, Tamil Nadu Open University, Chennai.

A proposal to NAIP to a tune of 1.2 crores is on pipeline to be implemented from 2009 – 2012. The Director, ODL participated in the discussion arranged by ICRISAT, Hyderabad on 13.07.2009 at ICRISAT towards the implementation of the proposed project on “Technology Mediated Open and Distance Learning in Agro Horticulture for enhancing livelihood opportunities to rural masses”.

### **Publication Division**

The Publication Division of the TNAU is functioning as an important component of the Directorate of Open and Distance Learning. This unit is vested with the responsibility of printing important publications of the University. This Division has printed the following items:

- University publications (Books & Booklets) : 46,000
- Brochures : 27,000
- TNAU Newsletter : 3,300
- Audit Report : 500
- Annual Accounts : 500
- Field note books for farmers : 36,600
- Certificate for the students & farmers : 10,000 impressions
- Answer sheets for the university with bar code: 10,00,000 impressions
- University stationery : 15,00,000 impressions  
(forms, registers, DSR, muster roll, bill books, TA bills, calendars etc.)
- All the course materials pertaining to Distance learning programmes viz., PG Degrees, PG Diploma programmes and Certificate courses are being printed at this unit.

### **Educational Media Centre**

This unit is poised to co-ordinate with Doordarshan and other private channels like, NDTV, Makkal TV involving them to shoot their own desired plans. EMC is coordinating to videograph important programmes and events of the University. This unit is also engaged in production of television programmes periodically for telecast through Doordarshan Kendra, Chennai. About 60 video CDs on various subject matter areas were produced by this unit for the benefit of farmers and extension functionaries. Achievements of the centre during the period under report are as follows:

- Video & audio CD lessons sold - 653
- Video shows arranged - 46
- Telecast of TV programmes - 10
- Video coverage's made on important University activities - 112
- Video programmes produced - 21
- Coordinated programmes produced - 2
- Audio & video editing - 6
- Video CD lessons prepared - 19
- Video training organized - 6

## Agenda No.5

### NEW ACTIVITIES

Tamil Nadu Agricultural University (TNAU) has been constantly reorienting its activities of Agricultural Education, Research, Extension, Agricultural Human Resource Management and policy interface to meet the objectives of not only sustaining the self sufficiency in food production but also exploring the agricultural potential for export thereby improving the rural economy.

TNAU Take up research on need based problems that are brought out from various fora like Scientific Workers' Conference and Annual Crop Scientists' Meet. These research projects are funded by Government of Tamil Nadu, Government of India and various National and International donors. To facilitate the research in dryland agriculture a new Dryland Agricultural Research Station was established at Chettinad, Sivagangai district in May 2008. To cater the needs of flower growers, a new Floriculture Research Station was established at Thovalai, Kanyakumari district.

TNAU is focusing its research activities in areas *viz.*, development of genetically modified crops and crop hybrids with resistance to major pests and diseases in crops like cotton, brinjal, banana and rice. With assistance from ICAR under the special grant of Rs.50 crores, infrastructural facilities are developed in research stations as well as in teaching campuses of TNAU. Scientists have been sent abroad for specialized training in newer areas like biotechnology, nanotechnology etc.

During 2009-10, eleven new crop varieties - Rice - Anna (R) 4, Kudiraivali - CO(KV) 2, Greengram - VBN (Gg) 3, Sesame - TMV (Sv) 7, Castor - YRCH 1, Cotton - SVPR 4, Sugarcane - COC (SC) 24, Guinea Grass - CO(GG) 3, Brinjal - COBH 2, Snake Gourd - PLR (SG) 2 and Cashew - VRI (CW) H 1 were released for cultivation by farmers. During this period, four new farm implements were also released for use by the farming community.

Economically viable technologies and products like Coconut tonic, Sugarcane Booster, Seri Dust, Biomineralizer, Master trap and Tomato and Brinjal Seed Extractor were developed by TNAU and identified for commercialization through private entrepreneurs.

A new *Bacillus* formulation has been developed for the management of Ganoderma wilt of coconut. In addition, a liquid formulation of *Pseudomonas* has been developed for application through drip irrigation in crops like banana and vegetables and is under large scale demonstration.

### CROP IMPROVEMENT

#### Department of Rice

- Development of submergence tolerant rice varieties
- Evolution of blast resistant breeding lines through gene pyramiding using Marker Assisted Selection.
- Development of new rice varieties with medicinal values.

## **Department of Forage Crops**

***National Crossing Programme on Bajra Napier Hybrid Grass:*** The hybridization between promising Bajra lines and elite Napier grass accessions is initiated. The hybrid seeds of the crosses will be collected and sent to the 16 AICRP centres for further evaluation.

***National Hybridization programme on Hybrid Bajra:*** To evolve fodder hybrid bajra, hybridization between promising A lines and R lines is started involving four other AICRP centres.

***National off season nursery in fodder Cowpea:*** To expedite the breeding process, an off season nursery for evolving fodder cowpea is initiated at this centre.

### **SEED CENTRE**

In Seed Centre, a total of 11 Research Sub-Projects are being handled at present, including 5 network projects on various aspects of seed production, seed testing and seed quality enhancement aspects.

A total quantity of 1,73,684 kgs of breeder seeds were produced and supplied against the indent of 1,51,124 kgs during 2008-09 and a quantity of 1,55,048 kgs of breeder seeds were supplied upto December 2009. In addition, a quantity of 7,49,525 kgs of foundation and TFL seeds were also produced and supplied during 2008-09 and it is programmed to produce about 9,21,315 kgs of foundation and TFL seeds during the year 2009-10.

### **CROP MANAGEMENT**

- Evaluation of bio- efficiency and residue Study of Glyphosate in Transgenic (GM) Corn
- Evaluation of bio-efficacy, residue, phytotoxicity and carryover of potassium salt of glyphosate formulation on transgenic stacked cotton hybrids
- Efficacy evaluation of pre-emergence herbicide pendimethalin for weed control in cotton and their residual effect on the succeeding crops
- Development of drip fertigation schedule for different crops
- Evaluation of suitable herbicide for tropical sugarbeet
- Evaluation of bio-efficacy & phytotoxicity of Tembotrione+ surfactant against mixed weed complex in maize crop
- Development of sugarcane production technologies

### **CROP PROTECTION**

- Development of new biopesticide formulation against rice pests, diseases and nematodes
- Bioefficacy testing of new pesticide molecules against major insect pests, disease and nematodes of crops
- Development of diagnostic kit for detection of aflatoxin and its management
- Molecular diagnosis of coconut root wilt pathogen and its management
- Fine tuning of IPM for major insect pests of crops
- Cataloguing of insect pests of crops
- Nematode management using biopesticides in rice, fruit and vegetable crops

- Development of management practices for pests and diseases of Mulberry
- Mass production of "Seri Dust", a new formulation

## **HORTICULTURE**

In Horticulture in order to fill the research gaps, the following new research initiatives are taken up with financial support from different agencies.

- Breeding for biotic stress in banana and papaya
- Scheme on Value Chain in Mango to study marketing channel
- Scheme on value chain in flowers to study cut flowers and loose flowers
- Collaborative research on onion and Garlic to address the research issues
- Collaborative research on Cocoa with Cadbury India
- Development of F<sub>1</sub> hybrids in tomato, brinjal and gourds
- Virus elimination in cassava and mass multiplication of disease free plants
- Facilitation centre for medicinal plants
- Network project on outreach of technologies for temperate fruit crops at Kodaikanal and Ooty
- Evaluation of Biostimulants in chilli
- Rootstock investigation in black pepper for biotic stress

The following high density planting techniques were recommended for adoption to Department of Horticulture.

***High density planting in mango:*** In mango, 5 x 5 x 10m spacing in double hedge row system is promoted and must be integrated with proper training and pruning practices to increase the average productivity from 4.55 MT to 9.0 MT / ha.

***High density planting in banana:*** Banana is grown normally at a spacing of 1.8 x 1.8 m (6' x 6') by planting one sucker per pit. HDP can be achieved in Cv. Robusta or Grand Nain by planting three suckers / hill spacing of 1.8 x 3.6 m (4629 plants/ha). In Cv. Nendran, a spacing of 2 x 3 m with 2 suckers per pit (3330/ha) is recommended.

***High density planting in cashew:*** Conventionally cashew is planted at a spacing of 7x7 m. In high density planting system, the spacing adopted is 5x4 m accommodating 500 plants/ha. In high density planting, due to less exposure of ground to sunlight, the soil temperature during peak summer season is reduced resulting in reduced soil moisture loss through evaporation and better moisture conservation.

## **BIO-TECHNOLOGY**

In the Dept. of of Plant Molecular Biology and Biotechnology, CPMB, TNAU, Coimbatore efforts have been made to initiate research activities towards improving major crop varieties for biotic and abiotic stress tolerance and nutritional quality through genetic transformation and marker assisted breeding.

New research programmes have been initiated to engineer resistance against viral diseases namely, ring spot disease in papaya, mosaic disease in cassava and yellow mosaic disease in mungbean through a novel molecular technique called RNAi

technology. These new initiatives are being funded by Dept. of Biotechnology, New Delhi and Indian Council of Agricultural Research, New Delhi.

Efforts have been initiated to improve popular rice varieties of Tamil Nadu namely CO 43, White Ponni and ADT 43 for salinity tolerance (by introgressing a QTL called "SALT" from the tolerant Pokkali derived FL 478), submergence tolerance (by introgressing a QTL called "Sub 1" from the tolerant FR 13A) and drought tolerance through Marker Assisted Selection. These research programs are being funded by Rockefeller Foundation, USA and Dept. of Biotechnology, New Delhi. On farm trials are also planned to test the adaptability and also to demonstrate the superiority of submergence tolerant versions of rice varieties viz., IR 64 sub-1, Swarna sub-1, Samba mahsuri sub-1 and CR 1009 sub-1.

Research activities have been initiated to isolate genes conferring abiotic stress tolerance namely, DREB1A, DREB1B, DREB2 and Osmotin to engineer drought and salinity tolerance in crop plants. These research activities are being supported by University Grants Commission, New Delhi.

## **NANOTECHNOLOGY**

An advanced laboratory for nanotechnological research in agriculture is being established with the financial assistance from the ICAR (Rs.50 crore projects). Eight research projects in nanotechnology applications in agriculture viz., synthesis of nanofertilizer, nanoencapsulations of herbicides for weed management in dryland agriculture, non destructive method of viability testing of seeds, bio-nanosensor for disease detection, nanomembrane for enhancing the shelf life of processed food, enhancement of the bioavailability of phytochemicals in health foods, neem based nanopesticides, biosynthesis of nanoscale zero valent ion are being in operation.

**Soil health maintenance:** Nanoparticles can adsorb on to the clay lattice thereby preventing fixation while releasing nutrients into the solution that be utilized by plants. This process improves soil health and nutrient use efficiency by crops.

**Slow-release nano-fertilizers and nano-composites:** Nano-fertilizer technology is an innovative strategy to improve the fertilizer use efficiency of crops. Fertilizer particles can be coated with nanomembranes that facilitate in slow and steady release of nutrients.

**Nanoherbicides for effective weed control:** Nano-encapsulated herbicide molecules will destroy weeds even when they are buried in soil. The polymer coating of herbicides split open in the presence of moisture in the soil and release the chemicals which circumvent weed seeds from germinating.

**Carbon nanotube to improve germinability of seeds:** Single and multi-walled carbon nano-tubes are commercially available to carryout smart delivery of water, nutrients and medicines etc. Since CNT carries extensive surface area, they have the potential to regulate the moisture under constraints of irrigation or drought conditions.



**Nanosensors:** Nanosensors detect the availability of nutrients and water precisely which is very much essential to achieve the mission of precision agriculture.

**Smart delivery system for early detection of diseases:** Implanting nano-particles in the plants could determine the health status in plants and which help us to undertake suitable remedial measures well before the malady causes yield reduction in crops.

**Nano-Food Industry:** Nanofilm technology will pave for efficient packaging to extend the shelf life of food stuffs.

## **BIOFUEL**

Under the Promotion of Biofuel programme in Tamil Nadu, the scheme on Introduction of Jatropha cultivation is being implemented during 2009-10. So far an area of 15901 ha was covered under this project upto January 2010. Similarly 45 numbers of farmers training and 20 numbers of Trainer's training to AO & AAO were organised in different parts of Tamil Nadu upto January 2010.

## **PRECISION FARMING**

The turn key project on Precision Farming was implemented by Tamil Nadu Agricultural University in 400 ha at Dharmapuri and Krishnagiri district between 2005 and 2007. In view of the fact that the project has empowered the farmers technically, economically and socially by doubling the productivity, enhanced the market value, economized water and electricity usage and less dependency on labour. The programme was further demonstrated by Tamil Nadu Agricultural University in 500 ha @ 20 ha /district in 20 district across the state during 2006 – 2007. Under National Agriculture Development Programme (NADP) the project was further scaled up in 12,800 ha during 2007 - 2008 and 9,400 ha during 2008 – 2009 and 10,400 ha during 2009 -2010.

About 1000 ha have been covered under this project in each district of Tamil Nadu. In as much as the project has become fully technology driven and farmer driven. Now the Union Planning Commission has identified the project as 'flag ship' programme. Now it has been scaled up across the country.

The success was primarily due to the cluster approach ie through Precision Farming farmers registered societies at cluster level. This has led to establishment of Dharmapuri Precision Farming Agro Services Limited and Erode Precision Farming Producers Company Limited. Now the farmers are incorporating Tamil Nadu Precision Farming Marketing Company Limited to undertake marketing of their produce on their own.

## **TNAU AGRITECH PORTAL**

Tamil Nadu Agricultural University has taken the initiative to develop AGRITECH PORTAL exclusively for promoting the Transfer of Technology process so that the extension functionaries' located at 385 blocks and district head quarters shall get the technical information at touch of the keyboard. For the first time, not only crop based technologies but also the information / knowledge of all aspects under agriculture have been integrated in the portal. It has nearly two lakh pages under the category of Agriculture, Horticulture, Agricultural Engineering, Forestry,

Fisheries, Animal Husbandry, Agricultural Marketing, Sericulture and Seed Certification. There is provision in the portal to instantaneously interact with the Subject Matter Specialist at University and Indian Council of Agricultural Research Institutions (ICAR).

### **Key features of portal**

- Information related to agriculture published in major dailies are scouted and up loaded daily.
- Nearly 300 success stories have been documented for sharing the information among the farmers.
- Video clippings on major technologies and working of farm machineries and special types of cultivations like Precision Farming and System of Rice Intensification are also available.
- Audio documentation of important agricultural issues has been developed for nearly 400 hours of streamed audios for the use of the clients.
- Nutritional status of crop, value addition, processing and recipe for various food article preparations are added with relevant procedural process.
- Input availability (seeds, fertilizers, chemicals) at Government, Private and Tamil Nadu Agricultural University centres are available.
- All the Government Programmes and Schemes, Banking and Credit facility are able access under one umbrella.
- e-copy of Uzhavarin valarum velanmmai both current and past issues are made available in the portal.

The portal will be useful not only to the Agricultural Extension Functionaries, but also to the innovative farmers and public who have computer knowledge can access the information. The multimedia portal has been dedicated to service on 27<sup>th</sup> Oct'2009. Further, e-Extension Centre has linked with 60 Centres of TNAU (10 Academic Campus + 36 Research Stations and 14 Krishi Vivayan Kendra) through Multiple Video Conferencing facility.

### **POST GRADUATE RESEARCH**

- Admission to masters and doctoral programs for the academic year 2009-10 have been completed. The following number of students were admitted.  
Masters program - 355  
Doctoral program - 102
- Mr. Eric Rubayita, First Secretary of Rwandan Embassy, New Delhi visited TNAU on 15.4.09 to discuss about the higher education of Rwandan students in TNAU. School of Post Graduate Studies is following up on the discussions and 10 students from Rwanda have been selected for admission to various masters programs in TNAU.
- Mr. T. Sampathkumar, III Ph.D. student in Agronomy, Coimbatore has been awarded with a scholarship by the Israel Government to carryout the thesis research in Hebrew University at Jerusalem, Israel and is in Hebrew University from Jan. 2009 onwards working on Water Use Efficiency.
- Two faculty from Texas Tech University, USA viz., Dr. Sukant Misra, Associate Dean for research and Dr. Norm Hopper, Associate Dean for Academic and student program visited TNAU on 15.4.09 to provide information regarding the higher education and visiting scholarship opportunities in the College of Agricultural Sciences and Natural Resources at Texas Tech. University to the

PG students of TNAU. A concept paper has been developed. Further progress will be made in areas of mutual interests.

- Two faculty from La Trobe University, Australia viz., Dr. Peter Sale and Dr. Mark Jois visited TNAU on 17.4.09 exploring possibility of PG students of TNAU to pursue higher studies in Australia.
- Ms. Karthiba, I Ph.D. student in Plant Pathology and Ms. Prabha, first year masters student in Plant Breeding and Genetics have attended a Summer School on " Studies and Research on Sustainability in Agriculture, Water and Area Management " from June 21, to July 4, 2009 at Center of Applied Plant Biotechnology, Leibniz Universität, Hannover, Germany.
- Sixteen M.Sc. (Forestry) of TNAU were selected for IFS, the highest number of students from any single college to get this distinction in a selection.
- A new Ph. D. program in Agribusiness and Development Management is being offered from this academic year in the Department of Agril. And Rural Management, TNAU, Coimbatore-3.
- Ms. E. Tamil Selvi and G. Sindhumathi, II Ph.D. students in Food Science and Nutrition, HSC&RI, Madurai have carried out a part of thesis research in University of Saskatchewan, Canada from Oct. – Dec. 2009.
- Mr. G. Vivek, I year M.Sc. Horticulture student has been selected for research internship in centre for Urban Greenary and technology, National Parks Board, Singapore. He is presently carrying out thesis research at Singapore from July 2009.
- The prestigious Jawaharlal Nehru Award of Indian Council of Agricultural Research (ICAR), New Delhi was bagged by Dr. S.Balasubramanian, formerly Ph.D. scholar of Department of Food and Agricultural Process Engineering, Agricultural Engineering College and Research Institute, TNAU, Coimbatore for his Ph.D. thesis research.
- A Special lecture on "Technology Commercialization and Entrepreneurship" by Dr.Jitendra Kumar, Vice-President, ICICI Knowledge Park, Hyderabad has been organized by School of Post Graduate Studies at Golden Jubilee Hall on 5.8.2009 for the benefit of post graduate students and faculty.
- A publication writing workshop was jointly organized by Durban University of Technology, Durban, South Africa and School of Post Graduate Studies, TNAU, Coimbatore for three days. Twenty staff members from main campus and research stations have participated in the workshop. Dr. D. Gansen Pillay, Professor, Durban University of Technology, Durban conducted the workshop.
- A seminar on Monsanto Beachell – Borlaug International Scholars program was organized on 4.12.09 for the benefit of PG students carrying out thesis research in rice and wheat.

### ***Future Policy Focus on PG Teaching***

- Introduction of online examination in masters and doctoral programs.
- Intake more number of foreign students to pursue masters and doctoral program in TNAU.
- Entering into collaboration with many leading National and Foreign Institute for student exchange programs to make the students of TNAU globally competitive.
- All PG students attended an interaction meeting with Dr. Mylswamy Annadurai Project Director, Chandryan I and II, ISRO, 1 on 23.11.09.

A seminar on Nuclear Energy for National Development was organized jointly with Centre for Soil and Crop Management Studies on 4.12.09 to create awareness about the importance Nuclear Energy on Agriculture as well as in National development among the PG students and faculty.

### **VENTURE CAPITAL SCHEME**

Venture Capital schemes is an innovative programme of TNAU with twin objectives of helping farmers with provision of quality agricultural inputs and generation of revenue to the University through sale of products. In the year 2009-10, totally 135 Venture Capital schemes were operated at various Colleges/ Research stations/ KVKs. Out of the total seed money released (Rs.197.39 lakhs), Rs.151.32 lakhs is received back upto 2009-10. From the Venture Capital Schemes agricultural inputs viz., quality seeds of improved varieties and hybrids of agricultural and horticultural crops, seedlings and grafts of fruit crops, biocontrol agents, biofertilizers, vermicompost, fodder crops, forestry seedlings etc., were produced and supplied to the farmers, private and Government organizations. Besides production of agricultural inputs, trainings were also offered to the farmers and entrepreneurs on production of vermicompost, mushroom cultivation, food processing, urban horticulture etc. From the above schemes, Rs.20.11 lakhs as institutional charges was received for the year 2009-10. Remaining 75% of the receipts was utilized by the respective institutions for the developmental activities like improvement of lab facilities and other infrastructure development, purchase of farm equipments and machineries, tractors, vehicles etc. to enable for the improved activities of the centres concerned.

### **PART II PLAN SCHEME**

During 2009-10, from the net grant of Rs.4913.47 lakhs provided by Government of Tamil Nadu an expenditure Rs.4299.28 lakhs has been made under plan schemes and with this grant 115 plan schemes including 9 temporary non-plan are operated.

### **TN-IAMWARM PROJECT**

The Tamil Nadu - Irrigated Agriculture Modernization and Water Bodies Restoration and Management (TN-IAMWARM) Project will be continued in another 30 sub basins during 2010 -2011 with an outlay of 2100.00 lakhs. This project was initiated in 2007-08 in 25 sub basins and demonstrated the advantages of water saving technologies viz., SRI in 24000 ha., and Precision Farming in 1000 ha. Besides, Tamil Nadu Agricultural University also demonstrated the productivity enhancement through improved production technologies in pulses, maize, sunflower, cotton and groundnut in all the sub basins.

### **NATIONAL AGRICULTURAL DEVELOPMENT PROGRAMME (NADP)**

The National Agricultural Development Programme (NADP) was continued and implemented by TNAU in 2009-10 along with the line departments with an additional outlay of Rs.105.00 lakhs, for implementing the schemes on precision farming, establishment of agri clinics cum mini soil testing laboratories, agricultural mechanization, dry land development and maximizing crop productivity, promotion of organic farming and organic manure production, strengthening of quality seed

production and distribution and augmenting pulses production through DAP spray and new schemes viz., introduction of mini portal sprinkler irrigation system for the coastal sandy soils of Tamil Nadu and production and Supply of Cassava Mosaic Virus free planting natural.

### **NATIONAL AGRICULTURAL INNOVATIVE PROJECT (NAIP)**

Under the ICAR's National Agricultural Innovation Project (NAIP), five research projects with TNAU as the leading partner with an outlay of Rs.978.31 lakhs and twelve research projects with TNAU as co-partners with a funding of Rs.561.72 lakhs have been taken up. The following are the list of the NAIP project being implemented:

#### *TNAU as lead centre*

1. Development of e-courses for B.Sc (Ag.) degree programme
2. Establishing and networking of agricultural market intelligence centres in India
3. A value chain on industrial agroforestry in Tamil Nadu
4. Value chain on flowers for domestic & export markets
5. Establishment of Business planning and development

#### *TNAU as cooperating centre*

1. Visioning policy analysis and gender (V-page)
2. Development of e-courses for B.Sc.(Hort.) degree program
3. Mobilizing mass media support for sharing agro-information
4. Value chain on biomass based decentralized power generation for agro enterprises
5. A value chain on wild honey bee
6. A Novel food chain using by-products of milling industry to enhance nutritional security
7. Soil organic carbon dynamics vis-à-vis anticipatory climatic changes and crop adaptation strategies
8. Risk assessment and insurance products for agriculture
9. Understanding the mechanism of off seasonal flowering and fruiting in mango under different environmental conditions
10. Development of decision support systems for major insect pests of rice and cotton based cropping systems
11. Standardization of selected ethanol fermented foods and beverages by rationalization of indigenous knowledge
12. A value chain on mango and guava for domestic and export markets

### **DOMESTIC AND EXPORT MARKET INTELLIGENCE CELL (DEMIC)**

DEMIC cell expanded its activities to 10 consortium centers in 9 SAUs under NAIP funding from July, 2009.

#### ***Workshops – 4***

Inaugural Workshop- June 22-27, 2009 attended by 23 scientists from other consortium centres

Post Kharif Workshop –December 7-10, 2009 attended by consortium partners  
Pre Rabi Workshop - December 7-10, 2009 attended by consortium partners  
NAIP- Procurement Workshop – September 3-4, 2009.

### **Forecasts and Dissemination**

#### **Lead centre**

Number of forecasts – 9  
(Sunflower, Maize, Groundnut, Gingelly, Cotton, Red chilli, Chana, Coriander and Cumbu)

#### **Dissemination**

Press publication- 36  
(The Hindu, Business line, Indian Express, Dinamalar, Daily Thanthi and Dinamani)  
Trough Post - Market Committee, Joint Director of Agriculture, Deputy Director (Agriculture marketing & Agribusiness)  
Brochure – Price forecast on Maize and Groundnut – 3000 copies –sent to 20 district Joint Director of Agriculture and Deputy Director to disseminate among the IARMWARM farmers  
E mail – All Agriculture Research Stations of TNAU, KVKs and other Stake holders  
SMS – Price forecast on Maize and Groundnut- 1000 farmers

#### **Consortium centre**

Guided 15 price forecasts of consortium centres  
(Pepper, Cardamom, Chillies, Maize, Coconut, Groundnut, Mustard/Toria, Potato, Sunflower, Tur, Coriander, Cotton, Paddy and Chana)

#### **Trainings**

Official Training: 7 (Attended by AAO, DAO, AO, HO, ADA, ADH, JDA, DD)  
Farmers Training: 6 (Arrupukottai, Salem, Ramnad, Dharmapuri, Paiyur and Viruthachalam)  
Farmers Training in TNAU-4 (Farmers from Vellore, Salem and Krishnagiri)  
Training to the SRF s from consortium centers- 2 –September 24-25, 2009 & November 23-24, 2009

#### **Exhibition**

AGRI INTEX EXPO -2009 at CODDISSIA  
Farmers Day – October, 27, 2009 at TNAU

#### **Publications**

NAIP-DEMIC INFO series- 1-12  
NAIP-DEMIC News letter- 1-3  
Commodity Reports -3  
Technical report -1  
Technical Papers – 6

## **INTELLECTUAL PROPERTY RIGHTS (IPR) CELL**

IPR cell is playing a facilitative role for filing patent application by TNAU scientists individually in the patent office with legal counsel from International Patent Attorney (Krishna & Saurastri, Bangalore). Till now, six patents were obtained and fourteen patent application were filed and follow up action is being taken for issuance of patent at the earliest. Further, IPR cell conducted eighteen training programmes and initiated action to register extant crop varieties of TNAU. The joint Registrar, Protection of Plant Varieties and Farmers Rights Authority, New Delhi has identified IPR Cell as a nodal agency for imparting trainings and sensitizing all stakeholders on IPR related issues.

## **DYNAMIC MARKET INFORMATION THROUGH MOBILE AND INTERNET**

It is the joint initiative of Tamil Nadu Agricultural University and Centre for Development of Advanced Computing (C-DAC), Hyderabad. Daily price information of 160 perishable commodities including Vegetables, Fruits, Flowers and Species are provided through mobile phone and Web Pages. Thirteen major markets in South India are chosen such as Chennai, Bangalore, Cochin, Coimbatore, Ottanchatram, Trichy, Hosur, Kumbakonam, Madurai, Mettupalayam, Panruti, Thalaivasal and Thirunelveli.

Following are the services extended to farmers through DMI

- Back-up database facility: The present information delivery system is not advocating the price forecasting information. Instead of that it provides back up data facility from the date of inception.
- Market profiles of the thirteen markets with photographs explains auction time, preferred package details, toll gate charges etc.,
- All Tamil Nadu Uzhavar Santhai market information web page is linked with DMI site for the benefit of consumers
- Trader's database from each market includes name, contact number and the commodity he /she is dealing.
- Farmers association details
- Best practices adopted by other successful farmers
- Minimum Support Price of major commodities
- Regulated Market details in Tamil Nadu
- Krishi Vigyan Kendras (Farm Science Centers) in India and Tamil Nadu
- Analyze the Market Trends: From 18<sup>th</sup> Dec, 2008 dynamic market are available and trend of price behaviours could be analyzed crop wise and market wise.
- View Photo Gallery of Markets/Commodities: Commodity wise photo clippings and market infra photographs are linked with pages for the benefit of farmers and users.

Right now around 6000 farmers and 200 scientists are availing the free SMS for the registered commodities in free of cost.

**List of MoUs signed between TNAU and other academic institutions and private companies from March 2009 to January 2010**

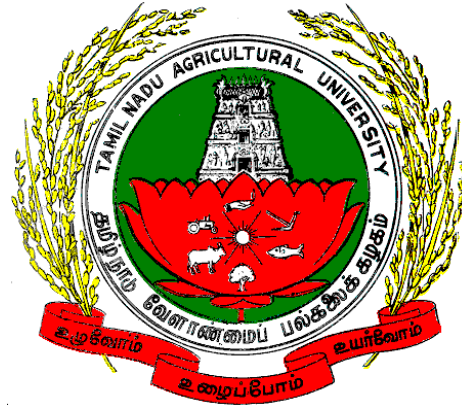
Sl. No.	Name of the institutions / companies / firms with which MoU signed	Name of the project / study / scheme etc.	PI incharge of the project	Duration (with date of comments)
1.	Madurai Kamaraj University	Consultancy project on Landscaping at Madurai Kamaraj University	Dr.T.Arumugam Dr.S.Balakrishnan Dr.K.Vairavan	2009 – 2011 Two years
2.	World Noni Research Foundation, Chennai	Development of organic production techniques for noni ( <i>morinda citrifolia</i> ) under varying water regimes through drip irrigation for higher yield and postharvest quality	Dr.V.Ponnuswami	January 2010 to 2013
3.	International Rice Research Institute (IRRI), Philippines	Cereal Systems Initiative for South Asia	Dr.N.Venkatesa Palanichamy	Oct. 2009 to Nov. 2011
4.	South Asian Network for Development and Environmental Economics (SANDEE), Nepal	Economic Impact of Climate Change on Yield Variability of Major Crops in Tamil Nadu	Dr.V.Saravanakumar	18 moths (February 2010)
5.	NAIP-ICAR	Establishing Business Planning & Development (BPD) Unit in TNAU	Dr.R.Ganesan	2 years 6 months October 1, 2009
6.	National Science & Technology Entrepreneurship Development Board, DST, New Delhi	Technology Business Incubator at TNAU	Dr.R.Ganesan	Approved
7.	Mission Biofuels India Pvt Ltd, Mumbai	Development of Jatropha Hybrids for Higher Seed and Oil Yield	Dr. K.T. Parthiban	5 Years 01.07.2009
8.	World Noni Research Foundation, Chennai	Development of organic production techniques for noni ( <i>morinda citrifolia</i> ) under varying water regimes through drip irrigation for higher yield and postharvest quality	Dr.V.Ponnuswami	January 2010 to 2013
9.	Roots Industries India Limited, R.K.G. Industrial Estate, Ganapathy, Coimbatore	Indo-German Development of an Innovative and Cost-Efficient Biogas Plant by Applying the Strategies of Frugal Engineering	-	06.07.2009
10.	Indian Institute of Crop Processing Technology, Thanjavur	To facilitate a collaborative program of Research, Training, Curriculum, Institutional Development, Information dissemination and exchange of faculty, Students and staff	-	28.08.2009



11.	M/s. Kerala Chemicals and Proteins Ltd. Cochin	Seed and Seed crop fortification with KCPL secondary proteins	Dr.R.Umarani	30.7.2007 to 29.6.2009
12.	M/s.Rasi Seeds, Attur	Development of fortified seed pelleting technology for cotton	Dr.A.S.Ponnuswamy	4.12.2008 to 3.12.2009
13.	PHI, Hyderabad	Development of mechanized integrated seed coating technology for maize and pearl millet	Dr.P.Renganayaki	June 2008 to May 2010
14.	Incotec Pvt. Ltd.,	Evaluation of DISCO brand seed coating polymer of INCOTEC on major agronomic crops for storability	Dr.A.S.Ponnuswamy	June 2008 to May 2009
15.	Department of Biotechnology	Empowerment of rural farm women through knowledge transfer on maize hybrid seed production techniques and seed entrepreneurship at community level	B.Selvi	22.12.2006 to 22.12.02009
16.	M/s Monsanto India Limited, Mumbai	Evaluation of Monsonto <i>Bt</i> corn hybrids	Dr.G.Nallathambi, Professor (Maize)	2009-10
17.	M/s. Rice-Tec Inc.	testing their hybrids in Tamil Nadu	Dep. of Rice	2009-10
18.	Indian Council of Agricultural Research (ICAR-NAIP)	Network Project on Development of Expert System for Crop and Animal Enterprises	Dr.E.Vadivel	Three years 18.12.2008
19.	Indian Council of Agricultural Research (ICAR-NAIP)	Mobilizing Mass Media Support for Sharing Agro Information	Dr.E.Vadivel	Three years 15.05.09
20.	Indian Council of Agricultural Research (ICAR-NAIP)	Development of ICT tools/technology towards an interactive multimedia agricultural advisory system	Dr.E.Vadivel	Three years 04.10.09
21.	IRRI, Philippines	Cereal System Initiative for South Asia (CSISA)	Dr.T.Jayaraj	25 months 18.1.2010
22.	Pioneer Hi-Bred International Inc.	Pioneer Hi-Bred Research International Scholarship	--	Two years 1.12.2009
23.	Syngenta Crop Protection AG, Basel, Switzerland	Investigations on beneficial safety of Pymetrozine 50 WG, a new molecule identified effective against rice Brown Plant Hopper (BPH), <i>Nilaparvata lugens</i>	Dr.G.Ravi Dr.S.Md. Jalaluddin	

**43<sup>rd</sup>**  
**RESEARCH COUNCIL**  
**MEETING**

**4<sup>th</sup> March, 2010**



**AGENDA NOTES**

**DIRECTORATE OF RESEARCH**  
**TAMILNADU AGRICULTURAL UNIVERSITY**  
**COIMBATORE – 641 003**

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