

TAMILNADU AGRICULTURAL UNIVERSITY

44th RESEARCH COUNCIL MEETING

Agenda No.1

Confirmation of the proceedings of the 43rd Research Council meeting

The proceedings of the **43rd Research Council** meeting held on **March 4, 2010** 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 43rd meeting.

Agenda No.2

ACTION TAKEN ON THE RECOMMENDATIONS OF 43rd RESEARCH COUNCIL MEETING (MARCH 4, 2010)

CROP IMPROVEMENT

1. ***Work on development of high yielding late maturity hybrids in maize for rainfed conditions may be continued and suitable hybrids identified (Action: Director, CPBG, CBE)***

Two single cross high yielding maize hybrids CMH-08-259 (9.2 t/ha) and CMH-08-282 (9 t/ha) with downy mildew disease resistance and enhanced seed weight (38- 42 g/100 seeds) have been identified and nominated to test under ARTs during *kharif* 2010 in rainfed ecological conditions. In addition, two hybrids from Coimbatore centre (CMH-08-266, 287), two hybrids from Vagarai centre (VMH 08-013, 014) and one hybrid from Madurai centre have been nominated for testing under rainfed ecology in different research stations of Tamil Nadu. A total of 400 FLDs were organized throughout the state and a field day was organized at Ariyur, Trichy district with the help of KVK, Sirugamani on 3.11.2009. (CPBG)

2. ***ART can be conducted in farmers field and during harvest time field day may be conducted and adequate publicity may be given by mass media so that many farmers would get benefited (Action: Director, CPBG, CBE)***

ART – Cotton

During 2009-10, 102 Front Line Demonstrations on cotton were conducted in farmers' field and field days were conducted for the benefit of the farmers by giving adequate publicity. During 2010-11, 60 Adaptive Research Trials are being conducted in 6 Districts and 6 KVKs and the field days will be conducted at the time of harvest after giving adequate publicity to benefit the farmers.

S.No	Crop	ART		FLD		No. of Field days
		Entries	No. of locations	Entries	No. of locations	
1	Rice	AS 06034	149	CORH 3	16	5
		CB 06732		Co(R) 48	4	
		CB 06535		CO(R) 49	5	
		TP 08010				
		CB 05002				
		CB 06651				
		TM 07275				
		TNRH 180				
		TNRH 174				

2	Sorghum	TNSH 482	63			1
3	Pearl millet	TNBH 07516	140	CO (Cu)7	63	1
		TNBH 07523				
4	Maize			Co H(M)5	400	1
5	Small millet	TNAU 1008	40	TNAU 1008	100	2
		TNAU 1018		TNAU 1018		
		DPI 0300701		DPI 0300701		
6	Cotton	TCH 1705	60	Agronomy experiments	102	2
		TCH 1608				
		TCHH 2251				
		TCHH 2322				
		TCHB 4510				
7	Redgram	CRG 0802	40	CO(Rg) 7	20	1*
8	Greengram	CGG 973		Co(Gg) 7	20	
9	Blackgram	CBG 757		CO 6	20	
10	Groundnut	ICGV 00351	80			1
11	Sunflower			TNAU Sunflower hybrid CO2	20	
12	Forage crops			CO(CN) 4	4	2
				CO(gg)3	4	
				CO(Fs) 29	4	
				African tall	4	
				CO(Fc)8	4	

*Interactive meeting between farmers and scientists were organized with the help of Pothigai channel (CPBG)

Groundnut

A bunch groundnut ICGV 00351 was tested in Adaptive Research Trials during kharif and Rabi 2010 at 40 locations each. A field day was conducted on 03.11.10 at Poonachi village of Ammapet block in Erode district. Dr. S. N. Nigam, Groundnut breeder, ICRISAT and scientists from Dept. of Oilseeds participated.

Sunflower

Newly released TNAU Sunflower Hybrid CO 2 was demonstrated along with private hybrids at Kangeyam, Erode District under 20 Front line Demonstration. An increased yield of 18 per cent over private hybrids was recorded.

The high yielding cultures redgram CRG 08-02, greengram CGG 973, blackgram CBG 757 are being evaluated in ART with the help of officials from Department of Agriculture. 40 trials were laid in the farmers holding with the help of scientists from KVK. (Oilseeds)

During kharif and rabi seasons 20 FLD trials each in redgram, greengram and blackgram were conducted in the farmers field. Interactive meeting between farmers and scientists were organized with the help of Pothigai channel. Field days were organized to popularise the varieties and technologies. (Pulses)

3. Work on fine grain rice variety for export may be continued and suitable varieties evolved (Action: Director, CPBG, CBE / Director, TRRI, Aduthurai)

Medium duration rice variety CO (R) 49 (C 20/RNR 52147) with a duration of 130-135 days, having semi dwarf, non lodging stature with high grain yield was released during 2008. The variety recorded mean grain yield of 6286 kg/ha. It is moderately resistant to yellow stem borer, GLH, blast and RTD. It has medium slender white fine rice. It has superior cooking quality. Variety is suitable for late Samba/thaladi season in Tamil Nadu and 16.0 t of CO (R) 49 was distributed to farmers of Tamil Nadu.

Fine grain rice hybrid TNRH 174 (TNAU CMS 10A/CB 174R) was developed with 33% higher yield than BPT 5204. Hybrid recorded an average yield of 7348 kg/ha. Hybrid is proposed for release in 2011 as TNAU Rice Hybrid CO 4.

Short duration rice culture CB 06732 (BPT 5204/ARC 5954//Kavya) was tested in Rice 3 / 2010-11. It has recorded an average grain yield of 6539 kg/ha in MLT with 18.9, 10.2, 18.9 and 7.7 per cent higher yield over ASD 16, ADT 36, ADT 43 and ADT (R) 45 respectively. The culture has recorded high milling (64.3%) and volume expansion (7.0 ml) after cooking. It has intermediate amylose, GT and soft GC. It is moderately resistant to WBPH and blast.

Medium duration fine grain rice culture CB 06651 (JGL 384/Rasi) was tested in Rice 15/2010-11 Special. CB 06651 recorded a mean grain yield of 5650 kg/ha with 21.3 and 13.4 percent increased yield over the check varieties BPT 5204 and CO (R) 49 respectively. The culture has high milling (60.9%). It has high LER (2.0), BER (1.22), volume expansion (5.1) and soft GC. It is moderately resistant to blast.

TM 07275 (WGL 32100/Swarna) was tested in Rice 15/2010-11. Culture recorded a mean grain yield of 5789 kg/ha with 24.3 and 16.2 percent increased yield over the check varieties BPT 5204 and CO (R) 49 respectively. The culture has high milling (63.1%). It has high LER (1.50), BER (1.37) and soft GC. It is moderately resistant to blast and sheath rot. (CPBG)

A medium duration fine grain rice variety TNAU Rice ADT 49 (AD 01260) (CR 1009 / Jeeraga Samba) has been approved for release during 2011. The yield of this variety is 6173 kg/ha from 156 locations. The corresponding yield increases over BPT 5204, ADT 38 and ADT (R) 46 is 10.5, 11.0 and 2.3 per cent respectively. The culture is having moderate resistances to blast, sheath rot and sheath blight (score 5) and resistance (score 3) to RTD under controlled conditions. Under field condition, it is moderately resistant to brown spot and moderately susceptible to leaf folder (score 5). The rice is white, medium slender with a 1000 grain weight of 14.0g. The milling yield and head rice yield is higher than the checks viz., BPT 5204, ADT 38 and ADT (R) 46. Cooked rice is non-sticky with good taste. It is an all purpose rice suitable for consumption as meals, for making tiffin, sweets and savouries. (TRRI)

CROP MANAGEMENT

1. **Research undertaken on response farming may be extended to encompass the pest and disease forecast especially in banana and Cassava may be continued (Action: Director, SCMS, CBE)**

Response farming trials are undergoing only in Maize crop at Vagarai and at Coimbatore. There are no trials taken under response farming in banana and cassava.

2. **Experiment on night soil composting may be continued (Action: Director, SCMS, CBE)**

- 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 odourless 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 2.00 dSm⁻¹. The C/N ratio of the compost was 16.2: 1 and it is found to be optimum for land application. To study the effect of human waste compost (Ecosan compost) on changes in soil properties and crop production, an incubation experiment, pot culture (Marigold) and field experiments Paddy (Andhra ponni-1st crop) were conducted during the 2009-2010. In these experiments, Ecosan compost was compared with Vermicompost and MSW compost. In general, Ecosan compost and vermicompost at various doses and in combination were found to increase the soil fertility status. Among these, the performance of Ecosan compost @ 10t / ha was found to be superior to the rest of the treatments in terms of enhancing the soil available NPK status. The heavy metals in the post harvest soil were very low and in some samples it is below detectable limit. The results of the pot culture and field experiment are similar and in both the experiments Ecosan compost @ 10 t/ha and 7.5 t/ha recorded the highest yield and quality parameters. Followed by for test verification, Maize Hybrid (NK-6240) and Paddy (Andhra ponni- 2nd crop) were planted during this season using Ecosan compost. The experiments are in progress.
- Well water samples were collected around the human waste compost applied field of Musiri, Trichy (Dt) from four locations from June 2009 till now and it is found that there is no changes in the water quality due to the application of Ecosan compost. It indicates that there are no harmful pathogen *E.coli*, *salmonella* and metals in the compost.
- To study the effect of human waste compost on fruit crops Sapota, Guava and Lime seedlings were planted with Banana and drip irrigation system was laid for application of human liquid waste. The experiment is in progress. (NRM)

- 3. *Studies on influence of climatic changes on the crop growth and pest and diseases is to be continued (Action: Director, SCMS, CBE / Director, CPPS, CBE)***

Influence of climate change on the crop growth and pest and disease is in progress at ACRC. Weekly roving survey are under progress for major pest and diseases of paddy. Pest surveillance report are also collected at ACRC and correlation with pest is in progress to develop weather based pest and disease forewarning models. (SCMS)

WATER MANAGEMENT

- 1. *The research on fertigation schedule to the main and inter crop may be continued (Action: Director, WTC, CBE / Director, SCMS, CBE)***

Field trial on fertigation in main and intercrop is in progress at Agricultural Research Station, Bhavanisagar. Results will be discussed when the trials are completed. (WTC)

- 2. *Sub surface drip irrigation trials may be conducted in dry areas like Sivagangai, Virudhunagar, Thoothukudi, Ramanathapuram for field crops and vegetables (Action: Director, WTC, CBE / Director, SCMS, CBE)***

- Under TN-IAMWARM Project, the performance of sub-surface drip (SSD) in sugarcane was evaluated in 100 ha involving 70 farmers holding in Sivagangai district of Tamil Nadu. The variety chosen was COC 86032. The results indicated that the adoption of SSD resulted in an increase of productivities of cane as well as water. The SSD registered a maximum cane yield of 152 t ha⁻¹ with a minimum of 79 ha⁻¹ as against the maximum of 83 ha⁻¹ and minimum of 37 ha⁻¹ with the conventional surface irrigation practice. The waetr requirement was 1750 mm in SSD practice while it was 2600 mm under surface irrigation method.
- Intensive research on optimizing row spacing for mechanized cane cultivation, optimizing irrigation water requirement and evauating 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.
- Results of two years field trials conducted at Wetlands of TNAU indicated that the sub-surface drip system can also be successfully used for aerobic rice crop giving a mean higher grain yield of 15-20 per cent than the surface drip irrigation system with higher water productivity values. (WTC)

- 3. *Research on micro sprinkler system is to be continued (Action: Director, WTC, CBE / Director, SCMS, CBE)***

Research conducted at TRRI, Aduthurai and SWMRI, Thanjavur indicated that the provision of sprinkler irrigation for pulses as a measure of providing supplemental irrigation during flowering and pod formation phase resulted in significant increase in the yield. 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 improved the grain yield by 24 per cent. However, caution should be taken to use pure quality water while using micro sprinklers for irrigation purpose. The trial will be continued using micro-sprinkler for boosting the yield in rice-fallow pulses. 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. ***Pestigation studies to be continued and appropriate crop and material(s) specific prescription is to be made (Action: Director, CPPS, CBE / Director, WTC, CBE / Director, SCMS, CBE)***

Action is now initiated to strengthen the research activities on pestigation aspects in the appropriate crops / pests / diseases for bringing out the prescription details in consultation with the Director, CPPS. (WTC)

HORTICULTURE

1. ***Work on alternate variety for PKM 1 tamarind may be continued (Action: Dean, HC&RI, Periyakulam)***

- In order to release an alternate variety for PKM-1 tamarind, red tamarind and sweet tamarind accessions were collected and are being evaluated. Among the red tamarind accessions, one accession RT-3 is found to be superior and efforts are taken up to multiply and propose to release it as a variety. Among the 78 sweet tamarind accessions, accession No.ST.4, ST.17, and ST.34 were found to be early bearers. Observations on growth and yield parameters are being recorded.
- Besides the above, plus trees of tamarind were also identified in the Cumbum Valley and grafted. 50 nos. of those grafts were separated and planted at HC&RI, Periyakulam for further evaluation. (HC&RI, Periyakulam)

2. ***Work on supply of quality mother plants in banana and cassava to the private entrepreneurs may be continued for tissue culture plant multiplication (Action: Dean, HC&RI, Coimbatore)***

- Mass multiplication of quality mother plants of Banana varieties Grand Naine, Red Banana, Robusta, Rasthali, Neypoovan is being taken up in commercial scale in the Tissue Culture Unit of TNAU, Coimbatore and around 3000 plants of Grand Naine and Red Banana have been supplied to the farmers.
- Mass production of virus free hill banana mother plants is aimed in the tissue culture unit and so far 170 plants have been supplied to the farmers of lower pulney hills for planting in their field for further collection of virus free suckers for cultivation.
- Virus free cassava plant production is taken up through meristem culture in the tissue culture unit and planted in protected structures as mother plants, for further mass multiplication of virus free plants for supply to farmers and private entrepreneurs.

AGRL. MARKETING

1. ***The price forecast for banana may be disseminated to farmers through NRCB also (Action: Director, CARDS)***

Price forecast of banana will be disseminated to NRCB as and when the forecast is developed. (CARDS)

POLICY

1. ***Policy note on water harvesting by desilting of tank and water harvesting at dwellings has to be submitted to the Govt. of Tamil Nadu (Action: Director, WTC, CBE / Director, CARDS, CBE /Dean AEC&RI, CBE)***

- Tanks are one of the important sources of irrigation in Tamil Nadu.
- There are about 39000 tanks in our state, out of the total of 39000 tanks in the state, 78 percent are Panchayat Union tanks and 22 percent are PWD tanks.
- In a 10 year cycle, only in three years, the tanks get full storage, five years deficit storage and in the remaining two years, the tanks fail to fill up. 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. Hence partial desilting can be done.
- Farmers may be allowed to remove silt at nominal rate and use it for agriculture purpose only. The rate of silt may be fixed at Rs.200/ m³ (meter cube). Considering the cost around Rs.200/m³ 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
- With regard to desilting of supply channel and strengthening of bunds of tanks, funding is already provided by Public Works Department or Water Resources Organization under IAMWARM project (CARDS).

43rd Research Council Meeting recommendations

CROP IMPROVEMENT

1. ***Pure line selection can be made from the long duration redgram variety grown in Theni and Dindigul districts (Action: Director, CPBG, CBE)***

A survey was conducted on cultivation of Redgram in Theni and Dindigul districts. Farmers generally cultivate long duration Redgram cultivar G 3. Since this type is being cultivated for many years, a lot of variations have been observed. Seed samples were collected from local types raised in the villages Kuppayampatti, Okkaraipatti, Kongayampatti, Andipatti, Kandamanur area. The collected seed samples were raised on 17.08.2010 in progeny rows. The crop is

in flowering stage. Promising individual plants were selfed to get pure seed. Further evaluation of selected types and purification is in progress. (CPBG)

2. *Fine quality rice varieties suited for saline water may be evolved (Action: Director, CPBG, CBE)*

- Medium duration medium slender grain type and saline tolerant culture TR 03008 (TS 29 / ASD 16) was tested in ART Rice 13/2010-11 (Salt stress –Medium) . It recorded a mean grain yield of 2948 kg/ha with eight percent increased yield over the check variety, TRY 1. It has high milling (65%) and is moderately resistant to stemborer, leaf folder and blast.
- Fine grain culture saline tolerant culture TR 06057 (IR 64//IR 4630-22-2-5-1-3/IR 9164-45-2-2)was also tested in ART Rice 13/2010-11. This culture recorded a mean grain yield of 2697 kg/ha with 11.1 and 26.3 percent increased yield over the check varieties TRY 1 and TRY 2 respectively. The culture has high milling (61.7%) and is moderately susceptible to WBPH, brown spot and RTD. (CPBG)

CROP MANAGEMENT

1. *Combined essential micronutrient mixtures may be supplied to farmers for different crops (Action: Director, SCMS, CBE)*

Presently in the Department of Soil Science and Agricultural Chemistry, the formulation of new micronutrient mixtures for different crops are being taken up under the ICAR – 50 crore – Frontier areas of Research. In this project, improvement in the existing micronutrient mixtures of the State Govt of Tamil Nadu as well as developing new mixtures for the uncovered crops are attempted. The findings will be submitted to the Government for inclusion in the list of approved fertilizer mixtures of the Government of Tamil Nadu.

Since the fertilizer mixtures are coming under the Fertiliser Control Order of the State Government, manufacturing of the fertilizer mixtures and their sales to farmers require license and sales tax registration; and hence the activity is not feasible. The micronutrient fertilizer mixtures for different crops are being manufactured by the State Government Factory at Kudumiyamalai, Pudukkottai Dt. and sold to farmers through Agricultural Depots in all the blocks of the State. (SCMS)

2. *Action may be taken to get pest surveillance data from all the blocks through the Agrl. Department extension officials (Action: Director, CPPS)*

In CPPS, the pest data received from all districts of Tamil Nadu are compiled and pest forewarning is given every month to all JDAs and a press note is being published in leading Tamil and English dailies for the benefit of the farmers.

3. Varieties and technologies should be patented immediately after development (Action: Director, CARDS)

Varieties

Department of Trade and Intellectual Property in co-ordination with the Department of Plant Genetic Resources is undertaking the task of register; the following TNAU varieties as extant varieties under the PPVFR Act.

1. Rice

Table -1 Varieties to be registered under PPV as extant varieties

Name of the varieties	Years of release
RMD (R) 1	2006
CO (R) 49	2008
PMK (R) 4	2009
CO (R) 50	2010
TRY (R) 3	2010

2. Sorghum

Table - 2. Varieties to be registered under PPV as extant varieties

Name of the varieties	Year of release
CO(S)30	2010

3. Pearl Millet

Table -3. Varieties to be registered under PPV as extant varieties

Name of the varieties	Year of release
CO(cu)H8	2001

4. Red gram

Table -4. Varieties to be registered under PPV as extant varieties

Name of the varieties	Year of release
APK1	1999

5. Green gram

Table -5. Varieties to be registered under PPV as extant varieties

Name of the varieties	Year of release
K1	1998

Patent:

The following TNAU inventions were filed for patent

TNAU Inventions Filed for Patent

S. No	Title of the Invention	Date of sending the application	Application Number
1.	Export packaging technology for jasmine (<i>Jasminum sambac Ait.</i>) flowers	6.5.2010	1370/CHE/2010
2.	An equipment to continuously remove the seeds from Aonla Fruit	25.6.2010	1711/CHE/2007 Dt:03.08.2007
3.	Pink Pigmented Facultative Methylo troph (PPFM) Supplementation Technology for Mitigating Terminal Drought in Rice (<i>Oryza sativa L.</i>)	19.7.2010	2137/CHE/2010
4.	Drip Fertigation Technology for Aerobic rice (<i>Oryza sativa</i>)	19.7.2010	2138/CHE/2010
5.	A chimeric cry2A protein of <i>Bacillus thuringiensis</i> with higher insecticidal activity and a method for its development	30.8.2010	1329/CHE/2006 Dt:28.07.2006 Patent Issued dated 7/12/2010
6.	Synthetic DNA sequence for production of insecticidal Cry 2AX1 proteins in plants	4.11.2010	3331/CHE/20/10
7.	Multiplication of effective antifungal compound for the control for sugarcane red rot	In the process of preparation of claims	-
8.	Biological process for conversion of silk worm bio-waste to value added	In the process of preparation of claims	-
9.	Process for producing a natural yellow pigment by submerged fermentation of a fungi <i>Thermomyces</i> sp	In the process of preparation of claims	-

(CARDS)

WATER MANAGEMENT

1. ***Precision farming in transplanted redgram may be developed (Action: Director, WTC/Director, SCMS/Director, CPBG)***

Detailed field experiment has been initiated at National Pulses Research Centre, Vamban on the technology development for transplanted redgram cultivation under drip fertigation system in the precision farming approach involving three varieties (Vamban 2, LRG 41 and G 3) under three irrigation system (Conventional and Surface and Sub-surface drip fertigation system). One month

old seedlings were transplanted in the main field. Drip irrigation was given once in two days. Preliminary results indicated that under sub-surface drip fertigation method, number of branches and stem girth increased by 18 and 40 per cent respectively over the conventional method of irrigation. The crop came to flowering during first week of January, 2011 and the trial is in progress. (WTC)

CROP PROTECTION

1. ***Liquid formulation of biocontrol agents like Pseudomonas may be popularized among farmers and action should be taken to patent it (Action: Director, CPPS/ Director, CARDS)***

The concerned scientist was contacted and discussed for filing of liquid formulation of bio-control agent pseudomonas as provisional patent. (CARDS)

- Liquid formulation of Pseudomonas fluorescens (Pf 1) having a shelf life of 270 days has been popularized in banana and sugarcane crops through NADP project in the districts of Sivagangai, Cuddalore and Pudukkottai.
- Under IPM–TATA Trust scheme, liquid formulation has been popularized in chilly crop at Ambilikkai, Ottanchatram, Dindugul districts.
- Studies on the extended shelf life of Pseudomonas in liquid formulation are under progress. After completion of this study, action will be initiated to patent it.

HORTICULTURE

1. ***As advised by the Vice-Chancellor to examine the cause for non flowering of tamarind trees in the forest area as expressed by the Chief Conservator of Forest, a committee may be formed with Director of Research, Chief Conservator of Forest and Dean, HC&RI, Periyakulam, Dean, FC&RI, Mettupalayam (Action: Dean, HC&RI, Periyakulam)***

- As per the recommendations of the RC, a committee was formed for the survey of non flowering tamarind trees and got approved by the Vice-Chancellor. Further, correspondence was made to get funds from the Chief Conservator of Forest to meet out the expenses for survey.
- Meanwhile, a team of scientists from Horticultural College and Research Institute, Periyakulam visited and studied the non flowering types of tamarind in forest areas of Lower Camp and Cumbum areas. It was observed that the tamarind plantations in the forest were seedling progenies and were closely planted at a spacing of 3 X 3 m. Due to close spacing, the trees were linear, lanky and growing upright. No trees were with umbrella shape. Sunlight inception inside the canopy was very poor. Hence, even in the trees which flowered, flowering was seen only in the peripheral branches which received sunlight. Only 4 to 5 fruits were found in the interior branches. There was competition for root growth. In order to identify the nutrient status of the tree, plant and soil samples were collected and analysis is in progress. The results of the analysis will be presented during the meeting.
- For taking up further survey and analysis, funds are awaited from the department of Forestry. (Periyakulam)

2. Vice-Chancellor suggested to recommend TNAU tamarind varieties for forest areas in Tamil Nadu (Action: Dean, HC&RI, Periyakulam)

PKM-1 tamarind is the only variety released by TNAU. Utilising the funds released by the GOI- NHM scheme, grafted plants of this variety are being produced and distributed to the farmers. As per the recommendations of the RC, the details of availability of grafts along with the salient features was communicated to State Agricultural Universities, District Forest Officers, Department of Agriculture and Horticulture and Krishi Vigyan Kendras with a request to popularize the variety among farmers. Based on this, The District Forest Officer, Vellore District has requested 4500 grafts. Recently, another request from KVK, MYRADA for 1500 grafts of PKM-1 tamarind has been received. Further indent for plants are awaited. (Periyakulam)

FORESTRY

1. From Thenkanikottai, the high yielding pungam trees can be identified as pointed out by the Chief conservator of Forest (Research) and used for cultivation (Action: Dean, FC&RI, Mettupalayam)

Four plus trees in *Pongamia pinnata* were selected from Thenkanikottai. Superior trees are high yielders and the selection parameters are furnished for kind information.

1.Species Name	<i>Pongamia pinnata</i>	<i>Pongamia pinnata</i>	<i>Pongamia pinnata</i>	<i>Pongamia pinnata</i>
Location / Source	Gulletti village, Denkanikottah Taluk, Krishnagiri District,	Nagappa Farmer Field,Gulletti village, Denkanikottah Taluk, Krishnagiri District,	Gulletti village, Denkanikottah Taluk, Krishnagiri District,	Gulletti village, Denkanikottah Taluk, Krishnagiri District,
Height	18 m	25 m	20 m	23 m
DBH	210 cm	172.5 cm	180 cm	170 cm
Crown length	20 m	13 m	13 m	15 m
Tree Yield	700 kg	1000 kg	450 kg	400 kg

EXTENSION

1. The Vice-Chancellor informed the members that Agri tech portal was appreciated by the Vice-Chancellor’s of various states in the Vice-Chancellor’s Conference. While appreciating the scientists for developing Agri Portal, Vice-Chancellor suggested to get more funds under NADP (Action: DEE, CBE)

A separate proposal has been submitted to Government for getting additional budget under NADP component for sustaining the TNAU Agritech Portal. The details about the proposal are given below;

Sustaining e-Agricultural Extension Service through TNAU AGRIC TECH Portal

Present Initiatives: TNAU AGRIC TECH PORTAL (under NADP)

- First of its kind in India farm technology portal designed and launched integrating allied sectors includes Agriculture, Horticulture, Sericulture, Seed Sector, Marketing, Fisheries, Forestry and Animal Husbandry is now available. The launched portal (www.agritech.tnau.ac.in) have feature of dynamic and multimedia based content coverage for the benefit of field extension officials and farmers in bi-lingual (Tamil & English) mode covers around 2 lakhs web pages. The portal has been dedicated to the service on 27th October, 2009 by Honorable Deputy Chief Minister and Honorable Agricultural Minister. It holds A to Z of farming information for decision making at the field level. Further, the project has the component of linking all the centers of TNAU (34 ARS + 14 KVKs + 8 Academic Campus + 4 PCCs) through Video Conferencing Facility to build an interface mechanism with Research Institutions and Farmers. TNAU HUB center has the future of up linking the conference connectivity to 385 AECs centres across Tamil Nadu through TNSWAN connectivity (Tamil Nadu State Area Wide Network).
- The Government of Tamil Nadu is now equipping the State Agricultural Department with the State-of-the-art ICT infrastructures under NADP project which will facilitate to establish TNSWAN connectivity to all the Agricultural Extension Centres, District Headquarters, State Headquarters and TNAU research centre. A budget of Rs.1.35 crores have been allotted under NADP-2007-08.
- Daily market information is being provided (both online and mobiles) which includes wholesale and retail prices (for 160 perishable commodities) in 13 different markets, with the funding support of Ministry of IT & Communication.
- This portal and infra will give connectivity only to Block level Agriculture Extension Centre, District headquarters and State level head offices where the information can be shared and accessed through TNSWAN connectivity.

Proposal

- The band width and the connectivity charges for the period from 27.10.2009 to 26.10.2010 have been met from the budget already allotted during 2007-2008. The 60 TNAU centres have been interconnected with video conferencing facility and the portal has been the first of its kind in India; the extension workers, farmers and industries shall derive immediate benefits out of it; the communication system within TNAU shall be shifted from telephone mode to video conference mode. Live webcast and streaming video is possible in non connected TNAU centres. At the same time, the respective end user should have the facility of Broad Band connectivity.
- The charges for the connectivity for 60 University Centres including KVKs, ARS, HRS, content management, updation and workshop to fine tune the portal may be around Rs.350.00 Lakhs every year. Agricultural and Horticultural Department may contribute Rs.300.00 Lakhs every year and ICAR may support with Rs.50.00 Lakhs every year so as to enable the ARS, HRS & KVKs on the TN State can really become the knowledge centre for the district. The budget detail is given below:

(Budget in Lakhs)

Sl. No	Particulars	Budget
1.	Broad band width and connectivity	200.00
2.	Contractual Services (RA / SRF / JRF)	25.00
3.	Server (Podcast / Messaging / Quick time Streaming / XSAN distributor storage / Windows Media server / Multi conferencing service / video conferencing systems)	40.00
4.	Contingency, consumables, operational, domain expert charges & miscellaneous cost	35.00
Total		300.00

Norms for working the Budget

- Domain Expert and Content Generation for the portal costs have been calculated based on the actual expenditure incurred for TNAU portals and website.
- Budget for Bandwidth, Video Conferencing and other operational costs have also been worked out based on actual expenditure incurred in the e-learning project and TNAU Portal programme.
- Updating and maintenance of Connectivity to TNAU Research Centres and Colleges which includes server, workstations and software tools costs have also been worked out based on the competitive rates approved by the TNAU and e-learning programme.

Deliverables

- Updating and development of Interaction part of the portal i.e., chat, forums, podcasting. Deployment of further information like Weather forecast & weather based cropping advise, Pest & Disease Information and forecast, Soil Test Database.
- Updating and development of e-Governance services of the Department, deployment of services like Online Expert Advise, Online chat, discussion & messaging, podcasting, Schemes and subsidies info.
- Updating and deployments of services like weather based crop advisories, Market information, e-commerce services, e-governance services, document management services.

Expected Outcome

- Continuous Transfer of technologies to the last milestone of the farming community
- On the spot farm advisory service through ICT
- Timely delivering of latest and need based information to the farming community (anywhere, anytime service)
- Field problem diagnosis through Video Conferencing mode and giving farm advisory services
- Providing information on updated Government Schemes, Programmes, and Announcements for the benefit of the target farmers.

- Updating the extension personal knowledge, skill and attitude towards agriculture and allied subjects then and there through e connectivity.
- Establishing effective linkage between line Departments, KVKs, Research stations
- Dissemination of agricultural information through internet radio mode.
- Updating Market news and Ag Meteorology news for taking appropriate decision for improving crop yield.
- Continuous training on ICTs to the rural youth, rural women, farmers and unemployed as employment generating activities.
- Continuous use of portal for monitoring and evaluation, e-governance, tele-agriculture, tele-education, tele-medicine purposes. (DEE)

2. Expert Member Th.Venkataramani Govindan, requested to increase the queries by farmers through linking with popular search engines. In the agri tech portal, global warming can be included and the level of CO₂ gas evolved by different crops may be given (Action: DEE, CBE)

- More Linkage with search engine may be facilitated for getting more queries and information by the farming community:
TNAU agritech portal is recognized as largest agritech portal in the country and World Bank team has also recognized it is one of the best in the world. So, the information in the TNAU agritech portal can be obtained from browsing any search engine across the global. Inbuilt google search engine option is also given in the TNAU agritech portal front page.
- Information about global warming may also be given in the TNAU Agritech Portal

Detailed information on global warming has been given in the TNAU Agriportal
Copenhagen: Seize the chance

- Distress call
- Global Warming
- What is Global Warming?
- Causes - Signs
- EL Nino and LA Nina
- Ozone Depletion
- Acid rain
- Global Warming Potential

GREEN HOUSE EFFECT

What is Green House Effect?

Important Green House Gases

The above information can be obtained from the following link of agritech portal
http://www.agritech.tnau.ac.in/environment/envi_pollution_globalwarming_what.html

- Information on Carbon_sequestration may be given in the Agritech Portal
Carbon Sequestration and Carbon Trading were also given the agritech portal in the following links
http://www.agritech.tnau.ac.in/environment/envi_pollution_globalwarming_what.html (DEE)

POLICY

1. ***The Vice-Chancellor suggested to write to Govt. about desilting of supply channel, strengthening of tank bunds and restriction of dwellings along supply channel. The cost of desilting supply channel and strengthening of bunds may be worked out and funds may be sought from the World Bank (Action: Director, WTC, CBE /Director, CARDS, CBE / Dean, AEC&RI, CBE)***

- Tanks are one of the important sources of irrigation in Tamil Nadu.
- There are about 39000 tanks in our state, out of the total of 39000 tanks in the state, 78 percent are Panchayat Union tanks and 22 percent are PWD tanks.
- In a 10 year cycle, only in three years, the tanks get full storage, five years deficit storage and in the remaining two years, the tanks fail to fill up. 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. Hence partial desilting can be done.
- Farmers may be allowed to remove silt at nominal rate and use it for agriculture purpose only. The rate of silt may be fixed at Rs.200/ m³ (meter cube). Considering the cost around Rs.200/m³ 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
- With regard to desilting of supply channel and strengthening of bunds of tanks, funding is already provided by Public Works Department or Water Resources Organization under IAMWARM project. (CARDS)

2. ***As opined by the Superintending Engineer (Agrl. Engineering) Coimbatore, soil conservation works may be carried out in catchment areas and prevent silt deposit. The Vice-Chancellor suggested that a policy note be prepared and sent to Govt. to allow farmers to remove silt and use the silt by them [Action: Director, WTC, CBE / Dean, AEC&RI, CBE / Superintending Engineer (Agrl. Engineering), CBE / Director, CARDS, CBE]***

While furnishing policy note for permitting farmers to carry out silt drawal from water storage structures and applications in their fields the following 2 points are to be considered.

- Silt removal from the reservoirs / water harvesting structures will improve the water storage capacity of the structures.
- Unless soil conservation works are carried out in the catchment area the siltation will be a permanent problem for the water harvesting structures. Hence, carrying out soil conservation works in the catchment area of the reservoirs / water storage structures along with the removal of existing silt in the water harvesting structures will alone be found suitable for the present day situation.

As far as the catchment areas are concerned, all types of lands viz agricultural land, forest land and waste land including drainage lines have to be treated with proper soil conservation measures based on need and site condition. An integrated need based treatment package has to be evolved without having an eye on cost limitation.

Agenda No.3

New Schemes sanctioned from Feb. 2010 to December 2010

(Rs. in lakhs)

Sl. No.	Title of the Project	Name of the Sponsoring agency	Location	Duration	Budget
1.	Fund for infra Structural Development of Agro Climate Research Centre	FIST	ACRC, CBE	March 2011	59.00
2.	Climate Change and Agriculture: Developing Adaptation and Mitigation Strategies	NAIP	ACRC, CBE	March 2011	5.30
3.	Forecasting Agricultural Output using Space, Agrometeorology and Land based observations	FASAL	ACRC, CBE	Dec. 2012	53.03
4.	Augmenting productivity of lead crops / activities through adoption of sustainable agricultural practices	NABARD	ACRC, CBE	May 2013	53.00
5.	Effect of elevated temperature on physiology and productivity of rice under upland and lowland ecosystems	DST	ACRC, CBE	Jan. 2014	20.61
6.	Greenhouse Evaluation of BASF transgenic rice events	M/s. BSAF India Ltd, Mumbai	Biotech, CBE	2010-11	12.00
7.	Bio-efficacy and baseline studies with <i>Helicoverpa armigera</i> and <i>Spodoptera litura</i> for Wide strike cotton	M/s. Dow Agro Sciences India (P) Ltd. Mumbai	Biotech, CBE	2010-11	13.31
8.	Evaluation of BASF transgenic rice events exhibiting yielding enhancing traits under transgenic greenhouse condition	M/s. BSAF India Ltd, Mumbai	Biotech, CBE	2010-11	8.05
9.	Genetic diversity of tospoviruses and thrips in horticultural crops in seven agro-climatic zones of Tamil Nadu and development of eco-friendly management practices for thrips	DBT, New Delhi	Biotech, CBE	2010-13	22.76
10.	Transgenic Approaches to Improve Sesame (<i>Sesammum indicum Linn</i>) oil quality with omega3 fatty acid	DBT, New Delhi	Biotech, CBE	2010-13	11.05

11.	Engineering novel disease resistance in wheat and rice by silencing disease susceptibility genes	DBT, New Delhi	Biotech, CBE	2010-13	100.63
12.	Puccinia triticina genomics network on de Novo genome sequencing fitness, variation and pathogenicity	DBT, New Delhi	Biotech, CBE	2010-15	41.50
13.	Isolation and validation of salt tolerant genes in Ragi (<i>Eleusine coracana L.</i>)	DBT, New Delhi	Biotech, CBE	2010-13	17.65
14.	Identification of consistent QTLs for fiber quality traits in cotton (<i>Gossyplum hirsutum L.</i>) based on two-mapping populations and four environments	DBT, New Delhi	Biotech, CBE	2010-13	39.95
15.	Marker assisted introgression of sub1 locus conferring tolerance to flooding into elite rice varieties of Tamil Nadu	DBT, New Delhi	Biotech, CBE	2010-13	15.26
16.	Development of insect resistance technology for crop plants	M/s. Bioseed Research India(P) Ltd, Hyderabad	Biotech, CBE	2010-13	31.43
17.	Sustaining rice production in a changing climate, testing climate uncertainties and validating selected adaptation techniques on farmer's field.	CLIMARICE (Govt. of Norway)	ARS, Bhavanisagar	May 2010 – Dec 2010	6.50
18.	Management of Papaya mealybug, <i>Paracoccus marginatus</i> with biocontrol agents and newer chemicals	ATMA- Mealy bug (GOI)	ARS, Bhavanisagar	Oct. 2010 – April 2011	0.50
19.	Adaptive research trial	AED, GOI	ARS, Bhavanisagar	Mar.2011 – Feb. 2012	1.95
20.	Development of Extra long staple <i>G.barbadense</i> cotton to meet the requirements of industry.	TMC MMI	Cotton, CBE	2010-11	5.58
21.	Identification of <i>G.hirsutum</i> genotypes suitable for machine picking and development of agronomic package	TMC MMI	Cotton, CBE	2010-11	5.58
22.	Development and validation of IPM/IRM strategies for Bt and conventional cotton under different ecosystems.	TMC MMI	Cotton, CBE	2010-11	5.58
23.	Development, validation, utilization & commercialization of biopesticides and bioinoculants	TMC MMI	Cotton, CBE	2010-11	6.66

24.	Evaluation of Bt cotton hybrids evaluation and monitoring	Private Agencies and ICAR funded scheme	Cotton, CBE	2010-11	7.30
25.	Multisite of heat stresses and paddy microclimate under various climates under multilateral research exchange project for securing food and agriculture		Crop Physiology, CBE	Jan 2010 to March 2011	4.48
26.	Field evaluation of chlormequat chloride 50% SL (Lihocin) in onion		Crop Physiology, CBE	Aug 2010 to July 2011	1.45
27.	Field evaluation of Allwin Top Drip special under fertigation in bhendi		Crop Physiology, CBE	Sep 2010 to March 2011	1.98
28.	Studies on the effects of biostimulant (NovoBAC) on morpho- physiological characters and yield in maize, cowpea and chilli		Crop Physiology, CBE	Nov 2010 to Oct 2012	6.01
29.	Bioefficacy and phytotoxicity of Fusilade 12.5 EC (Fluazifob-P_butyl 13.4 EC) in cotton, groundnut and Krishmat 75 WG (Ametryn 73.12% + Triasulfuran 1.85%) on sugarcane	Private Agency Scheme	SRS, Cuddalore	Oct. 2010 to March 2013	5.34
30.	Farmer's participatory large scale roll-out and adaptive trials on conservative agriculture in Tamil Nadu	CSISA / CIMMYT	DARS, Chettinad	Oct. 2010 to Nov. 2011	2.38
31.	Barnyard Millet Advanced Varietal Trail (BAVT)	ICAR	DARS, Chettinad	2010 - 11	0.10
32.	Characterization of bio-diesel to assess the feasibility for power generation and storage study to find out influence of external factors on bio-diesel quality during storage.	Young Scientist Fast Track-DST	DARS, Chettinad	2010 - 12	11.10
33.	Evolution of Lucerne genotype possessing high biomass and chlorophyll content		Forage Crops, TNAU, CBE	June, 2010 to May, 2015	13.03
34.	Outreach of Technologies for Temperate Fruit Crops	ICAR- Network	HRS, Kodaikanal	2009-12	3.00
35.	V 60 GK Production of vermicompost, honey, mushroom spawn and nutrient analysis of soil and water analysis.	VCS	HRS, Kodaikanal	2010-13	1.65
36.	Production of planting materials	NHM	HRS, Kodaikanal	2010-11	

37.	Dept. of Agrl. Extension BPD – Establishment of Entrepreneurial Hubs	ICAR	Madurai	April 2010 to March 2012	5.00
38.	Dept. of Agrl. Entomology Testing the Bioefficacy of HGW 86 10% OD against insect pests of Okra	EI DuPont India Pvt.Ltd, Coimbatore	Madurai	Dec.2010 to Nov. 2011	2.20
39.	Testing new insecticide formulation, Thiamethoxam 75% SG for its crop vigour effect in cotton, sugarcane and groundnut	M/s Syngenta India Ltd., Mumbai	Madurai	February 2010 to March 2011	3.00
40.	Evaluation of bio-efficacy of Alika 247 ZC and Thiamethoxam 30% FS against insect pests of groundnut, maize and Bengal gram	M/s Syngenta India Ltd., Mumbai	Madurai	Oct.2010 to March 2012	4.00
41.	Biological testing of sulfoxaflor 24 SC w/v against rice sucking pest complex and their natural enemies	M/s Dow AgroSciences India	Madurai	Oct.2010 to Jan. 2012	3.85
42.	Testing the efficacy of Seme against sucking pests of Chilli and Target against Spodoptera and Heliothis in Okra	Biotic Life Sciences India Pvt.Ltd, Coimbatore	Madurai	Dec. 2010 to Nov.2011	2.30
43.	Department of Seed Science Technology Popularization of TNAU Crop booster and tonic for agricultural crops	TNSCST	Madurai	Nov2010 to March 2011	0.15
44.	Awareness Programme on global warming and its mitigations through Agricultural interventions	TNSCST	Madurai	Nov2010 to March 2011	0.20
45.	Dept. of Plant Pathology Evaluation of Bioefficacy of Power Guard against grape downy mildew and Swipe against Chillies powdery mildew	Biotic Life Sciences India Pvt.Ltd, Coimbatore	Madurai	Dec.2010 to Nov. 2012	3.30
46.	Dept.of Agrl. Microbiology Training on mass production of Arbuscular Mycorrhizal fungi responsible for crop nutrition	TNSCST	Madurai	Dec.2010 to March 2011	0.20
47.	Private agency scheme Development of newer inoculation for N and P nutrition and evaluation of their stability in nanoclay formulations	M/S. Novozymes, Canada	Agrl. Microbiology, CBE	01.01.2011 31.12.2013	74.00

48.	Screening, isolation and evaluation of secondary metabolites producing <i>Streptomyces</i> sp., against spider mite <i>Tetranychus urticae</i> on Okra.	Private Agency	Agri. Microbiology, CBE	01.01.2011 31.12.2013	11.22
49.	Investigations on diversity of Arbuscular mycorrhizae fungi in Agricultural soils of Tamil Nadu for improved inoculant development	GOI BRNS	Agri. Microbiology, CBE	26.1.2010 to 25.11.2013	15.18
50.	Assessment of the potential for biochar as substrate for microorganisms used for the biofertilization of soils as transfer of technology	Foreign Agency	Agri. Microbiology, CBE	June, 2010 to Feb.2011	7.76
51.	Collection, evaluation and genetic improvement of Mahua for high yield, oil content as well as superior oil quality	NOVOD BOARD	FC&RI, Mettupalayam	3 years (2010-13)	11.03
52.	Scheme on Demonstration of improved varieties and key technologies in groundnut	NADP	Coimbatore, Vridhachalam, Tindivanam	1 year (2010-11)	20.25
53.	Early detection and bioarsenal development for the management of sugarcane red rot caused by <i>Colletotrichum falcatum</i>	Sugar Development Fund, New Delhi	VRS, Palur	3 years	36.24
54.	Quality seed production and storage in pulses (Blackgram and Greengram)	TNSCST, Chennai	VRS, Palur	3 days	0.20
55.	Eco-friendly approaches for the management of sugarcane red rot	Sugar Development Fund, New Delhi	VRS, Palur	3 years	70.26
56.	Disease free Sugarcane nursery programme for the farming community of Tamil Nadu	Sugar development Fund	VRS, Palur	3 years	24.71
57.	Popularisation of new, high yielding varieties of brinjal and snakegourd for adoption through on-farm testing and result demonstration	Navajbai Ratan Tata Trust, Mumbai	VRS, Palur	3 years	10.90
58.	Development of gynoeocious lines in <i>Cucumis</i> sp. using <i>ACR/acr</i> sex linked marker.	DBT, New Delhi	VRS, Palur	3 years	19.76
59.	Pre harvest management of horticultural and agricultural crops by using Excel crop care chemicals and products for better management and yield	Private Agency Excel Crop Care Limited, Mumbai	HC&RI, Periyakulam	June 2010 to May 2011	15.00

60.	Bioefficacy testing of Tebuconazole 25 WG as pre harvest spray in grapes for pre and postharvest management	Private Agency	HC&RI, Periyakulam	July 2010 to Nov. 2011	2.70
61.	Evaluation of bio-efficacy of Emamectin Benzoate 5% WG against cabbage insect pests	Private Agency	HC&RI, Periyakulam	April 2010-Mar. 2011	1.60
62.	Testing the bio-efficacy of Ampligo 150 ZC against pest complex in Okra and Brinjal and Vertimec 1098 EC against mites and thrips in brinjal and chilli	Private Agency	HC&RI, Periyakulam	2010-2012	5.10
63.	Bio-efficacy, Phyto toxicity and effect on natural enemies for some new chemicals	Private Agency	HC&RI, Periyakulam	2010-2011	1.72
64.	V60GC Strengthening commercial Food Processing Training Programme including Production of value added products	VCS	HC&RI, Periyakulam	2010-11	2.00
65.	VCS-Production of high yielding seed and plan materials of spices and coconut	VCS	HC&RI, Periyakulam	2010-2012	1.00
66.	VCS-Coconut Tonic	VCS	HC&RI, Periyakulam	2010-2011	1.00
67.	Production of ornamental and medicinal plants	VCS	HC&RI, Periyakulam	2010 - 2013	1.61
68.	GOI - "Minimizing the global warming potential of flooded paddy using methanotrophs"	GOI – DST, New Delhi	HC&RI, Periyakulam	2010 - 2013	14.72
69.	Collection, development of production technologies of Moringa and its documentation	ICAR – AICRP	HC&RI, Periyakulam	June 2010 to March 2012	1.00
70.	AICRP on Spices (Voluntary centre)	ICAR	HC&RI, Periyakulam	Nov 2010 to Mar 2011	0.50
71.	Development of organic production techniques for noni (<i>Morinda citrifolia</i>) under varying water regimes through drip irrigation for higher yield and post harvest quality	World Noni Research Foundation (WNRF), Chennai.	HC&RI, Periyakulam	Three years	10.00
72.	Developing progressive farming technologies to enhance the productivity in mundu type chilli in Ramanathapuram District	NABARD Funded project under Lead crop scheme	ARS, Paramakudi	2010-11 to 2012-13	8.56
73.	IAMWARM Scheme – Palar Sub basin	IAMWARM Scheme	ARS, Paramakudi	2010-11 to 2011-12	16.72

74.	Marker Assisted Selection for resistance to biotic and abiotic stresses in rice	ICAR – DRR	Rice, CBE	2010 - 2013	14.00
75.	Net Work Project on Hybrid Rice	ICAR – DRR	Rice, CBE	2010 - 2013	9.00
76.	Multi location testing, Seed multiplication and CMS maintenance in the Exotic Rice Genotypes	Private agency	SRS, Sirugamani	2010-12	1.50
77.	Farmers participatory seed production in pulses and oilseeds	NADP (RKVY) Seed	Seed Centre, TNAU, Coimbatore	2010-11	46.00
78.	Investigation on the performance of seed treatment with shukra formulation on water stress tolerance in corn and wheat	Private agency	Seed Centre, TNAU, Coimbatore	2010-11	1.035
79.	Preparation of District Level Contingency Plans for Tamil Nadu	ICAR Adhoc Project	Dept. of SS&AC Coimbatore	April 2010 to March 2011	1.00
80.	Efficiency of Bio-release micronutrient fertilizer Zinc (Micromac) on yield and zinc nutrition of different crops in India	ICAR-AICRP-Micronutrients, IISS, Bhopal	Dept. of SS&AC Coimbatore	July,2010 to June 2011	2.67
81.	PMS Fertilizer for Potash, Magnesium and Sulphur Nutrition and Yield of Different Crops in India	ICAR-AICRP-Micronutrients, IISS, Bhopal	Dept. of SS&AC Coimbatore	July,2010 to June 2011	2.762
82.	Exploiting the genotypic efficiency for effective Zn sequestration by green gram in Zn deficient soils.	UGC, New Delhi	Dept. of SS&AC Coimbatore	April 2010 to Mar. 2013	8.48
83.	Preparation of GPS and GIS based soil fertility maps for selected districts of the Country – Tamil Nadu	GOI	Dept. of SS&AC Coimbatore	April 2011 to March 2012	48.50
84.	Southern Regional Seminar cum Training to Soil Testing Personnel	GOI	Dept. of SS&AC Coimbatore	April 2010 to March 2011	0.54
85.	Erection of mist chamber, hardening chamber and improving irrigation facilities	NHM	FRS, Thovalai	2010-11	3.00
86.	Solar street lighting	ICAR	FRS, Thovalai	2010-11	1.00
87.	Small Nursery for aromatic plants	NHM	FRS, Thovalai	2010-11	1.13
88.	Commercialization of anthurium and heliconia among the farmers	NABARD	FRS, Thovalai	2010-12	8.31
89.	Production of Quality Planting Materials in Ornamentals, Commercial Flower Crops, Aquatic Ornamentals and Inputs for Flower crops	VCS	FRS, Thovalai	2010-13	2.45

90.	Seed production of rice, pulses, oilseeds, vegetables and flowering ornamentals	VCS	RRS, Tirur	April,2010-March,2011	1.00
91.	Vermicompost and vermin wash production	VCS	RRS, Tirur	April,2010-March,2011	1.00
92.	Multi Location testing, seed multiplication and CMS maintenance in the exotic rice genotypes	Foreign Agency	RRS, Tirur	2010-2012	1.00
93.	Testing of rice hybrids developed by Bayer Bioscience (P) Ltd.,	Foreign Agency	RRS, Tirur	2010-2011	0.26
94.	Economic Impacts of Climate Change on Yield Variability of Major Food Crops in Tamil Nadu	Foreign Agency	Dept. of TIP, CBE	April 2010 – Oct. 2011	6.90
95.	Yield gap analysis of tapioca growers and developing strategies to increase the production and productivity for their economic upliftment in Tamil Nadu	TNSCST,Chennai	Dept. of TIP, CBE	May' 2010 – Aug' 2012	1.87
96.	Dissemination of Improved Tapioca Production technologies and value addition techniques among SC/ST tapioca growers for their Economic upliftment in Salem District of Tamil Nadu.	GOI, DBT, New Delhi	Dept. of TIP, CBE	Dec' 2010 – Sep' 2013	18.07
97.	Development of a Rice Knowledge management portal	NAIP	TRRI, Aduthurai	1 year	2.30
98.	Evaluation of PHI Rice hybrids for their yield performance and resistance against pests and diseases under field conditions	Foreign Agency	TRRI, Aduthurai	1 year	1.73
99.	Evaluation of Nuziveedu Rice varieties for their yield performance and resistance against pests and diseases under field conditions	Foreign Agency	TRRI, Aduthurai	1 year	2.76
100.	Organizing Trainings on Quality seed production in rice, pulses and groundnut through seed Village Concept to the farmers of Thanjavur District	NABARD	TRRI, Aduthurai	3 years	8.61
101.	Studies on the feasibilities of drip irrigation on the productivity of rice.	Netafim, Corporation India	TRRI, Aduthurai	1 year	5.52
102.	Testing climate uncertainties and validating selected adaptation techniques on farmers field	Norway Embassy	TRRI, Aduthurai	2 years	6.50

103.	Evaluation of granular soil nutrient supplements and foliar bio enzyme composite on growth and yield of rice, banana and vegetable crops	SWAROOP AGRO Industries, Nashik	TRRI, Aduthurai	3 years	5.52
104.	SRI –II Adoption level of System of Rice Intensification in Cauvery Delta Zone	IWMI	TRRI, Aduthurai	1 year	1.75
105.	BPD Entrepreneurial hub-Central Region	NAIP	TRRI, Aduthurai	2 years	5.00
106.	Evaluation of Potassic fertilizers (MOP&SOP) on growth, yield and quality parameters in Rice	Potash Research Institute of India, Gurgoan	TRRI, Aduthurai	2 years	1.99
107.	Demonstration of suitable pulp wood species for Cauvery old Deltaic region.	TNPL	TRRI, Aduthurai	3 years	2.53
108.	Standardizing packages and practices for Organic cotton	GOI	TRRI, Aduthurai	2 years	2.57
109.	TNAU-IICT collaborative Out reaching initiative pheromone application technology (PAT) for the management of Sugarcane internode borer and groundnut life miner.	IICT, Hyderabad	TRRI, Aduthurai	1 year	1.20
110.	FLD on Pheromone technology in rice under AICRIP	GOI	TRRI, Aduthurai	1 year	0.65
111.	Custom hiring services of Maize combine Harvester and its demonstration as communing machinery	VCS	MRS Vagarai	Jan. 2010- Dec. 2012	4.00
112.	Evaluation of Monsanto hybrids in Maize	Private agencies	MRS Vagarai	April 2010 to Mar.2011	1.60
113.	Farmers Participatory large scale rollout and Adaptive research trial on Conservation Agriculture in Tamil Nadu	CIMMYT/IRRI	MRS Vagarai	Oct. 2010 to Nov. 2011	1.22
114.	Mass production of Cassava Mosaic Virus free setts of Cassava in non-traditional area	NADP Cassava project	ARS, Vaigai Dam	2010-2013	0.30
115.	Testing of new fungicide Sedaxane 500 FS against major diseases of rice	Syngenta	TNAU, CBE	2010-2012	4.18
116.	Genetic variability in Kera Keralam coconut population	ICAR-AICRP (Palms)	CRS, Veppankulam	Jan. 2011 - Dec. 2011	2.00
117.	Network project for establishment of nucleus seed gardens for production of quality planting materials of recently released coconut cultivars	CDB, Kochi	CRS, Veppankulam	2010-11 - 2012-13	6.96

118.	Establishment of two nucleus dwarf coconut seed gardens in 4 ha	CDB, Kochi	NPRC, Vamban	2010-11 - 2012-13	12.00
119.	Evaluation of T x T and D x D coconut hybrids for copra yield and good quality tender nut water	ICAR-special grant	CRS, Veppankulam	June 2009 – June 2012	2.25
120.	Nutritional Management strategies for Bt cotton –A boon for Bt cotton growers	M/S.Monsanto Mahyho Bio Tech India Ltd.	CRS, Perambalur	June 2010 – May 2013	6.52
121.	Mass production of Bio control Agents	VCS	CRS, Perambalur	2010 -2013	0.95
122.	Development of wilt resistant hetrotic gene pool in castor (<i>Ricinus communis</i> L) through induced mutagenesis	BRNS, Mumbai	TCRS, Yethapur	2010-2013	12.83
123.	Yield Gap Analysis of Tapioca growers and Strategies for increasing the production and Productivity in Salem district.	TNSCST, Chennai	TCRS, Yethapur	2010-2012	1.89
124.	Dissemination of improved tapioca production technologies and value addition techniques among SC& ST tapioca growers for the economic upliftment in Salem District in Tamil Nadu	GOI-DBT, New Delhi	TCRS, Yethapur	2010-2013	18.00
125.	Identification and standardization of spice blends of region specific ethnic cuisines of Tamil Nadu	GOI	HSC&RI, Madurai	Dec. 2010 and Sept. 2011	3.00

Agenda No.4

RESEARCH HIGHLIGHTS

Abstract of Research Findings

LIST OF NEW CROP VARIETIES AND FARM IMPLEMENTS RELEASED DURING 2010

Varieties

1. TNAU Rice CO 50
2. TNAU Rice TRY 3
3. TNAU Wheat COW 2
4. TNAU Sorghum CO 30
5. TNAU Blackgram CO 6
6. TNAU Groundnut CO 6
7. TNAU Sunflower Hybrid CO 2
8. TNAU Sugarcane SI 7
9. TNAU Coconut ALR 2
10. TNAU Brinjal VRM 1
11. TNAU Tomato Hybrid CO 3
12. TNAU Chilli Hybrid CO 1
13. TNAU Celery OTY 1

Farm implements

1. Needle type tray seeder for vegetable nursery
2. Trailer mounted steering for power tiller – trailer system

Management technologies

1. Sorghum composite biscuits

RESEARCH HIGHLIGHTS – AGRICULTURE

I. CROP IMPROVEMENT

A. FOR ADOPTION

RICE - CO (R) 50

Parentage	:	CO 43/ ADT 38
Duration	:	130-135 days
Season	:	Late Samba / Thaladi
Grain yield	:	6338 kg /ha
Highest yield obtained	:	10,662 kg/ha
Area of adoption	:	Throughout Tamil Nadu except Virudhunagar, Ramnad, Sivaganga and Nilgiris district

Special Features

- Moderately resistant to stem borer, leaf folder and gall midge under field condition, as well as the diseases blast, sheath blight, brown spot, BLB and RTD.
- Medium slender white rice with intermediate amylose, soft gel consistency and moderate gelatinization temperature.
- It produces good quality cooked rice and also found suitable for idly making.

RICE – TRY (R) 3

Parentage	:	ADT 43 / Jeeraga Samba
Duration	:	135 days
Season	:	Samba / Late Samba / Thaladi
Grain yield	:	5833 kg /ha
Area of adoption	:	Throughout Tamil Nadu

Special Features

- Highly suitable for 'Idli' making
- Moderately tolerant to sodicity
- High milling (71.3%) and Head Rice Recovery (66%)
- High out turn of rice flakes (82.2 per cent)
- Resistant to major pests viz., Leaf folder, Stemborer and BPH
- Resistant to major diseases viz., Blast, Brown spot, Sheath rot and Sheath blight

WHEAT - COW (SW) 2

Parentage	:	A mutant of NP 200 through Gamma irradiation (200 Gray)
Duration	:	110 days
Season	:	Irrigated : 15 th October to 4 th of November
Grain yield	:	4040 kg /ha
Highest yield obtained	:	5500 kg/ha

Area of adoption : Irrigated and medium rainfall areas of plains and hills in Tamil Nadu

Special Features

- High degree of resistance against rusts and *Fusarium* wilt
- Heat tolerance hence suitable for plains of Tamil Nadu

SORGHUM – CO (S) 30

Parentage : APK 1 x TNS 291
Duration : 100 - 105 days
Season : Kharif, Rabi and Summer
Grain yield : Irrigated : 3360 kg /ha
Rainfed : 2800 kg / ha
Straw yield : Irrigated : 9290 kg / ha
Rainfed : 6990 kg / ha
Area of adoption : Throughout Tamil Nadu

Special Features

- Dual purpose variety suited for grain and fodder
- Creamy white grains
- High dry matter digestibility
- Moderately resistant to shoot fly and stem borer
- Resistant to downy mildew

BLACKGRAM – CO (Bg) 6

Parentage : DU 2 x VB 20
Duration : 60-65 days
Season : Rabi (September – October)
Yield : 733 kg/ha
Area of adoption : Irrigated and medium rainfall areas of plains and hills in Tamil Nadu

Special Features

- Determinate plant type and non- shattering of pods
- Bold seed with mean 100 seed weight of 5.5 gram
- Good batter qualities and organoleptic traits
- Moderately resistant to mungbean yellow mosaic virus (MYMV) and stem necrosis and root rot
- Field tolerance to sucking pests like aphids, stemfly and spotted pod borer

GROUNDNUT – CO (Gn) 6

Parentage : Derivative of the cross CS 9 x ICGS 5
Duration : 125 -130 days
Season : Kharif rainfed (May – June)
Pod Yield : Rainfed : 1914 kg/ha
Area of adoption : Rainfed tracts of Namakkal district

Special Features

- Tolerance to drought
- Shelling outturn : 73.5 %
- Oil content : 49.5 %
- Acceptable pod traits

SUNFLOWER hybrid – CO (SFH) 2

Parentage	:	COSF 1A × CSFI 99
Duration	:	85 - 90 days
Season	:	Kharif and Rabi / Summer
Yield	:	Kharif : 1950 kg/ha Rabi / Summer : 2230 kg /ha
Area of adoption	:	Entire Tamil Nadu

Special Features

- High oil content (39.8 %)
- High volume weight (48 g / 100 ml)

SUGARCANE – COSi (SC) 7

Parentage	:	CO 99043 × COG 93076
Duration	:	300-330 days
Maturity group	:	Early
Season	:	Early season
Yield	:	155 t / ha
Area of adoption	:	Entire Tamil Nadu

Special Features

- High cane yield, CCS% and sugar yield
- Moderately resistant to red rot and smut
- Tolerant to early drought and late water logging
- Non flowering clone suitable for early season
- Suitable for mechanical harvest

COCONUT – ALR (CN) 2

Parentage	:	Tiptur Tall - Received from CPCRI, Kasargod for evaluation under Gen 1 project entitled utilization of existing germplasm and description of Varieties during 1988-89
Maturity group	:	Tall category with the life longevity of even upto 100 years
Yield	:	109 nuts / tree / year and 18988 nuts / ha / year
Area of adoption	:	Suitable for Irrigated and rainfed coconut belts of Tamil Nadu and Karnataka state

Special Features

- Copra yield 135 g / nut
- Oil content – 64.7 %
- Drought tolerant
- Moderately resistant to late blight, rhinoceros beetle

B. FOR ON FARM TESTING

RICE

AD 04001

Parentage	:	ADT 36/IR 36
Duration	:	114 days
Yield (kg/ha)	:	6047 kg/ha with 10.0 per cent increase over ADT 43 and ASD 16 (5497 kg/ha)
Special features	:	It has high head rice recovery of 62.9%. The Linear elongation ratio upon cooking is 1.6 times while BER is less (1.33 times). It has soft gel consistency. It is resistant to gall midge; moderately resistant to RTD and sheath blight (score 5)

AD 03005

Parentage	:	ADT 36/IR 36
Duration	:	120 days
Yield (kg/ha)	:	5965 kg/ha with 16.5 and 9.7 per cent increase over ASD 16 (5121 kg/ha) and ADT 39 (5437 kg/ha)
Special features	:	Medium slender grains with 59.8% head rice recovery. The Linear elongation ratio upon cooking is 1.6 times while BER is less (1.3 times). It has soft gel consistency. It has moderate resistance to blast and BLB (score 5). Leaf folder damage- 5.31%

TM 05091

Parentage	:	ADT (R) 45/CO (R) 47
Duration	:	115 days
Yield (kg/ha)	:	5787 kg/ha with 27.7 per cent increase over ADT 43 (4531 kg/ha)
Special features	:	Medium slender grains with 50.3% head rice recovery and high milling (76.3%). It has soft gel consistency and intermediate amylose. It has resistance to stem borer and whorl maggot; moderate resistance to GLH and sheath blight.

ACM 01010

Parentage	:	MDU 5/ACM 96136
Duration	:	111 days
Yield (kg/ha)	:	5236 kg/ha with 9.5 per cent increase over ADT 43.
Special features	:	Medium slender grains with soft gel consistency. It has moderate resistance to BPH.

ART

Rice 3 / 2009-10 Transplanted (Sornavari/Kar/Kuruvai, April- July) 100-110 days

Repeat

i. AS 06034 (IET 19571)

The culture AS 06034 has recorded an average grain yield of 6194 kg/ha in Station trial and MLT with 8.0, 12.5, 29.3 per cent higher yield over ADT 36, ADT (R) 45 and ADT 43 respectively. It has recorded high head rice recovery (60.9%), more LER (1.86), more volume expansion (5.8 ml) after cooking. It has high GT.

ii. CB 06732 (BPT 5204/ARC 5954//Kavya)

The CB 06732 has recorded an average grain yield of 6539 kg/ha in MLT with 18.9, 10.2, 18.9 and 7.7 per cent higher yield over ASD 16, ADT 36, ADT 43 and ADT (R) 45 respectively. It has recorded high milling (64.3%) and volume expansion (7.0 ml) after cooking. It has intermediate amylose, GT and soft GC. It is moderately resistant to WBPH and blast.

New

iii. CB 06535 (ADT 43/IET 17090)

The culture CB 06535 has recorded an average grain yield of 6055 kg/ha with 10.2 per cent higher yield over ASD 16 and ADT 43. It has recorded high milling (63.1%) and LER (1.7 times). It is resistant to blast and moderately resistant to hoppers.

iv. TP 08010 (ASD 16/ADT 37)

The culture TP 08010 has recorded an average grain yield of 6315 kg/ha with 14.9 per cent higher yield over ASD 16 and ADT 43. It has soft GC. It is moderately resistant to BPH and GLH.

v. Checks : ADT 43 and ASD 16

To be tested in all districts except Virudhunagar, Ramnad, Sivagangai and The Nilgiris

Rice 4 /2009-10 Transplanted (Oct 25 – Nov 10, 110 to 125 days)

Repeat

i. AS 06016 (ADT 39 / ASD 16)

The culture recorded an average grain yield of 5780 kg/ha with 15 per cent higher yield than ASD 16. It has good LER (1.8), more volume expansion (6.8 ml) and soft GC. It is found to be moderately resistant to stemborer.

ii. Checks : ADT 39 and ASD 16

To be tested in all districts except Virudhunagar, Ramnad, Sivagangai, and The Nilgiris

Rice 5/2009-10 Transplanted (September sowing, 125 to 140 days)

Repeat

i. CB 05022 (CO 43/ADT 39)

The culture recorded a mean grain yield of 6507 kg/ha in 133 days with 13.6, 11.8 and 17.3 percent increased yield over ADT (R) 46, CO (R) 48 and BPT 5204 respectively. It 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.

ii. Checks : ADT(R) 46 and CO(R) 50

To be tested in all districts except Virudhunagar, Ramnad, Sivagangai, Kanyakumari and The Nilgiris

Rice 6/ 2009-10 Transplanted (Aug. 15 – Sept. 10 sowing) 140 days and above

Repeat

i. AD 02235 (BPT 5204/CR 1009)

This culture recorded an average grain yield of 5132 kg/ha with 5.3, 9.2 and 20.1 per cent increase over CR 1009, ADT 44 and BPT 5204 respectively. It is moderately resistant to WBPH. It has high HRR (63.0%), intermediate amylose, GT and soft GC.

ii. Check : CR 1009

To be tested in Cuddalore, Trichy, Perambalur, Karur, Pudukkottai, Thanjavur, Thiruvarur and Nagapattinam

Rice 11/2009-10 Upland (August - September sowing)

Repeat

i. ACM (ABT) 06048 (IR 20 / Nootripathu)

This culture recorded an average grain yield of 1104 kg/ha in 109 days duration with 14.2, 3.0 and 9.6 per cent increase over PMK (R) 3, PMK 1 and TKM (R) 12 respectively. It has less BER (1.28) and intermediate GT. It is moderately resistant to BPH, GLH and moderately susceptible to WBPH.

ii. PM 04022 (N 22/RR 20-5)

This culture recorded an average grain yield of 1092 kg/ha in 96 days duration with 12.9, 1.8 and 8.4 per cent increase over PMK (R) 3, PMK 1 and TKM (R) 12 respectively. It has high milling (72.6%), HRR (58.8) and GT. It is moderately resistant to GLH and moderately susceptible to WBPH. To be tested in Sivaganga, Ramnad, Madurai, Thiruvallur, Kanyakumari, Coimbatore districts.

iii. Checks : PMK (R) 3 and PMK (R) 4

Rice 13/2009-10 Salt stress Medium (September sowing)

Repeat

i. TR 03008 (TS 29 / ASD 16)

This culture recorded a mean grain yield of 2948 kg/ha with eight percent increased yield over the check variety, TRY 1. It possesses medium slender grain type. It has high milling (65%). It is moderately resistant to stemborer, leaf folder and blast. It has field level resistance for mites.

ii. TR 04029 (IET 15683/IET 15687)

This culture recorded a mean grain yield of 2882 kg/ha with 14.6 percent increased yield over the check variety, TRY 2. It has high milling (60.6%) and HRR (51.5%). It is moderately resistant to WBPH and moderately susceptible to GLH and blast.

iii. TR 06057 (IR 64/IR 4630-22-2-5-1-3/IR 9164-45-2-2)

This culture recorded a mean grain yield of 2697 kg/ha with 11.1 and 26.3 percent increased yield over the check varieties TRY 1 and TRY 2 respectively. It possesses medium slender grain type. The culture has high milling (61.7%). It is moderately susceptible to WBPH, brown spot and RTD.

iv. Checks : TRY 1 and TRY 2

To be tested in Trichy, Karaikal, Ramnad, Nagapattinam, Thoothukudi Thiruvallur

Rice 15 / 2010-11 Special transplanted (September-October sowing:125-140 days)

New

i. CB 06651 (JGL 384/Rasi)

This culture recorded a mean grain yield of 5650 kg/ha with 21.3 and 13.4 percent increased yield over the check varieties BPT 5204 and CO (R) 49 respectively. It has high milling (60.9%). It has high LER (2.0), BER (1.22), volume expansion (5.1) and soft GC. It is moderately resistant to blast.

ii. TM 07275 (WGL 32100/Swarna)

This culture recorded a mean grain yield of 5789 kg/ha with 24.3 and 16.2 percent increased yield over the check varieties BPT 5204 and CO (R) 49 respectively. It has high milling (63.1%). It has high LER (1.50), BER (1.37) and soft GC. It is moderately resistant to blast and sheath rot.

iii. Checks : CO (R) 49 and BPT 5204

To be tested in all districts except Virudhunagar, Ramnad, Sivagangai, Kanyakumari and The Nilgiris

Rice 17/2009-10 Hybrid rice – Medium, transplanted (September-October sowing)

Repeat

i. TNRH 174 (TNAU CMS 10A/CB 174R)

This hybrid recorded an average grain yield of 6354 kg/ha in 131 days with 15.8 and 23.4 percent increased yield over 27P11 and CO (R) 49 respectively. It has high milling (72.3%) and HRR (62.5%). It has intermediate amylose, GT and soft GC. It is resistant to blast, leaf spot and glume discoloration.

ii. Checks : 27P11 and CO (R) 49

To be tested in all districts except Virudhunagar, Ramnad, Sivagangai, Kanyakumari and The Nilgiris.

MILLETS

SORGHUM

Two promising hybrids TNSH 482 and TNSH 483 are being evaluated under ART from 2008-09 and being continued in 2009-10 to check conform its wide adaptability in Tamil Nadu. These hybrids registered (2553 kg/ha) 8.45% and

(2431kg/ha) 8.15% higher yield than the check Co H 4 (2253 kg/ha) and a private hybrid MSH 51 (2242kg/ha) respectively. Of this, TNSH 482 has been identified for release during the year 2011.

PEARLMILLET

A high yielding and early maturing pearl millet hybrid, TNBH 0642 was developed from a cross between ICMA 93111A and PT 6029-30. It has been tested extensively in Tamil Nadu and in other states under MLT, ART, OFT and ALL India coordinated programme. It performed well both under rainfed and irrigated situations in Tamil Nadu. This hybrid is medium in stature (160 -180 cm) and early in duration (Matures in 80 days). The hybrid is highly resistant to downy mildew under both normal and sick plot condition. This new hybrid recorded a mean grain yield of 3317 kg / ha under irrigated conditions, (26 and 20 percent increase over the checks X 7 and NH 07 respectively). The mean grain yield under rainfed conditions is 2905 kg /ha (19 per cent increase over X 7 and NH 07). This culture will be proposed for release during 2010-2011.

Two pearl millet hybrids viz., TNBH 07516 and TNBH 07523 have been identified for testing under ART during 2010-2011. The hybrid TNBH 07516 (ICMA 92888 / PT 6033) matures in 88 days and gave an average yield of 3169 kg/ha. This hybrid has bold grains and is resistant to downy mildew. Another hybrid TNBH 07523 is a cross between ICMA 92888 x PT 6040 registers an average yield of 3060 kg/ha and matures in 90 days.

MAIZE

Maize Hybrid CMH 08 - 259

It is a single cross hybrid matures in 115 days. It gives an average yield of 8336 Kg/ha with 35.6, 15.2 and 2.3% increased grain yield over checks viz., COH (M) (6148 kg/ha, 105 days), 900 M (G) (7235 kg/ha, 100 days) and NK 6240 (8147 kg/ha, , 110 days) respectively. It is moderately resistant to sorghum downy mildew disease. The cobs are completely covered with husk and the percentage of seed set is very high (shelling 81%). The grains are bold and yellow semident is textural.

Maize Hybrid CMH 08 -282

It is a single cross hybrid matures in 110 days. It gives an average yield of 8304 kg/ha with 35.1, 14.8 and 1.93% increased grain yield over checks viz., COH (M) 5 (6148 kg/ha, 105 days), 900 M (G) (7235 kg/ha, 110 days) and NK 6240 (8147 Kg/ha, 110 days) respectively. It has multiple disease resistance to many disease. The cobs are fully covered with husk with uniform placement. The grains are bold and yellow semident is textural. It has high shelling (81.2%) and test weight (36.2/100 seeds). It showed 7th rank among the 56 hybrids tested in 26 centres in India during kharif 2009. It is promoted from IET to AET 1st year for testing in kharif 2010 under All India Trials.

SMALL MILLETS

Three ragi cultures viz. TNAU 1008, TNAU 1018 and DPI 03 – 007 – 01 have been identified **for testing under ART during 2010- 2011**. The salient features of the cultures are as follows.

i. Ragi culture TNAU 1008

This was developed by hybridization and selection from the cross combination CO 11 x PR 202. This culture is drought tolerant and matures in 102 days with an average yield of 2868 kg/ha.

ii. Ragi culture TNAU 1018

This culture is a derivative of the cross between CO 9 x DPI 2011. It matures in 103 days. This culture has bold grains and registers an average yield of 2759 kg/ha

iii. Ragi culture DPI 03-007-1

It was developed by hybridization and selection from CO12 x GPU 28. This culture matures in 110 days with an average yield of 3350 kg/ha. It has incurved fingers and is moderately resistant to blast. This culture is suited to rainfed conditions.

PULSES

REDGRAM

Kharif 2010 (Short duration : 115 days)

The redgram culture CRG-08-02 a cross derivatives of CRG 9407 x ICPL 83027. This culture is short duration of 115 days with SMD resistant. This culture has recorded the highest grain yield of 1188 kg/ha while the local check Co(Rg)7 recorded 1049 kg/ha which is 11.70 per cent yield increase over the check Co(Rg)7. This culture is recommended for organising ART along with Co(Rg)7 used as common check.

It is decided to supply the seeds of CRG-08-02 redgram culture to following JDAs (60 locations) viz., Villupuram, Vellore, Thiruvannamalai, Cuddalore, Dharmapuri, Krishnagiri, Salem, Namakkal, Coimbatore, Erode, Trichy, Perambalur, Virudunagar, and Sivagangai and , Thirunelveli and to the Professor and Heads, KVKs (40 locations) viz., Vamban, Sirugamani, Kuntrakudi, Madurai, Ramnad, Virudhachalam, Tindivanam, Virunjipuram , Paparapatti and Tirur for laying out ART trials in redgram during m kharif 2010 season.

BLACKGRAM

Kharif 2010

The blackgram cultures namely VBG 04-003 (KU 341 x VBN 2) and ACM 05-007 (Co 5 x VBN(Bg) 4) are high yielding with MYMV resistant cultures which is suitable for kharif season cultivation. The duration of the culture is 65-70 days. This cultures VBG 04-003 and AACM05-007 has recorded the grain yield of 950 and 892 kg/ha while the local check VBN(Bg)5 recorded 792 kg/ha which is 19.95 and 12.63 per cent yield increase over the check VBN(Bg)5 respectively. This blackgram variety VBN(Bg) 5 used as common check.

Rabi 2010

The blackgram cultures namely CBG 757 (COBG 671 x P 11) and VBG 06-016 (VBN 3 x *V.mungo* var.silvestris-1) are high yielding, determinate and yellow mosaic virus resistant types suitable for rabi season with duration of 65-70 days. This cultures CBG 757 and VBG 06-016 has recorded the highest grain yield of 707 and 755 kg/ha while the local check VBN(Bg)5 recorded 655 kg/ha which is 7.94 and 15.27 per cent yield increase over the check VBN(Bg)5 respectively. The blackgram variety COBG653 used as common check

GREENGRAM

Kharif 2010

The greengram cultures namely CGG973 (COGG923 X VC6040A) and VGG06-001 (Co4 X VRM(Gg)1) are high yield, determinate and MYMV resistant suitable for kharif season with duration of 65-65 days. This cultures CGG973 and VGG06-001 has recorded the highest grain yield of 952 and 991 kg/ha while the local check VBN(Gg)3 recorded 859 kg/ha which is 10.81 and 15.32 per cent yield increase over the check VBN(Bg)5 respectively. The greengram variety CO(Gg)7 used as common check.

Rabi 2010-11

The greengram culture VGG06-001 (Co4 X VRM(Gg)1) is high yield with MYMV resistant suitable for rabi season also with duration of 65-65 days. This culture VGG06-001 has recorded the highest grain yield of 991 kg/ha while the local check VBN(Gg)3 recorded 712 kg/ha which is 11.15 per cent yield increase over the check VBN(Gg)3. The greengram variety VBN(Gg)3 used as common check.

In blackgram and greengram both kharif and rabi seasons, It is decided to supply the seeds of VBG 04-003, ACM05-007, CBG 757 and VBG 06-016 blackgram cultures and CGG973, VGG06-001 greengram cultures to following JDAs (60 locations) Viz., Villupuram, Vellore, Thiruvannamalai, Cuddalore, Dharmapuri, Krishnagiri, Salem, Namakkal, Coimbatore, Erode, Trichy, Perambalur, Virudunagar, Sivagangai, Thirunelveli, Karur, Perambalur, Madurai, Theni and Dindigul and to the Professor and Heads, KVKs (40 locations) viz., Vamban, Sirugamani, Kuntrakudi, Madurai, Ramnad, Virdhachalam, Tindivanam, Virunjipuram, Paparapatti and Tirur for laying out ART trials in redgram during kharif 2010 season.

OILSEEDS

GROUNDNUT

TVG 0004

This Spanish bunch groundnut culture is derived from the cross ICG 2044 x ICG 2271. It takes 100-105 days to mature. It yields 1825 kg/ha under rainfed conditions which is 12.2 and 14.0 % superior to TMV (Gn)13 and Co(Gn) 4. Similarly under irrigated conditions it has registered an average yield of 2400 kg/ha which is superior to TMV (Gn)13 and Co(Gn)4 by 12.3 and 14.7 percents. It has a shelling out turn of 74.0%

and oil content of 50.0 per cent. The pods are smooth without reticulation and attractive. It has tan coloured testa. This culture is also tolerant to leaf miner and *Prodenia*. It is being tested in the ART and OFT.

TVG 0602

This is also a Spanish bunch groundnut culture maturing in 100-105 days. It is developed from the cross TMV 7 x VRI 2. It has registered a mean pod yield of 1675 kg/ha during kharif season and is superior to VRI(Gn) 6 by 14.3 per cent. During rabi/summer season, the culture has yielded 2685 kg/ha which is superior to VRI(Gn) 6 by 16.5 per cent. It has tan coloured testa. It is medium sized, the 100-kernel weight being 46 gm. It has an oil content of 50.5 % and shelling out turn of 73.5 per cent. This culture is being tested in the MLT during 2010-2011.

ICGV 02266

This Spanish bunch groundnut is derived from the cross ICGV 94143 x ICGV 94136. It matures in 100-105 days. It has yielded 1695 and 2575 kg/ha, under rainfed and irrigated conditions, respectively. The culture has surpassed in yield VRI(Gn)6 by 15.7 and 11.9 percents during kharif and rabi/summer seasons. It has tan coloured testa. The shelling out turn and oil content of this culture are 74.0% and 50.0 per cent, respectively. This culture is being evaluated in MLT during 2009-2010.

Groundnut ICGV 00351

A high yielding culture ICGV 00351 recorded high pod yield (2453 kg/ha) than the check variety VRIGn 6 (1952 kg/ha) and TMVGn 13 (1691 kg/ha) in multilocation trial during Kharif 2009. This is an increased pod yield of 25.7 and 45.0 per cent than VRIGn 6 and TMVGn 13 respectively. This culture is being tested in adaptive research trails during 2010-11.

SESAME

VS 07-023

This is a white seeded sesame culture derived from the cross SVPR 1 x TKG 87 recorded a mean seed yield of 586 kg/ha with 19.9 % increased yield over the check variety SVPR 1(white seeded)(489 kg/ha).The culture is tolerant to stem rot and Phyllody diseases. In the Multilocation trials conducted during Kharif 2009, it has recorded a mean yield of 629 kg/ha with 10.7 % increase over VRI (Sv) 2(568 kg/ha)and 5.2 % over SVPR 1(598 kg/ha).

COTTON

Winter Irrigated ART - *G.hirsutum* variety

1. An intra *hirsutum* hybrid TCHH 2322 was tested under ART in four districts. It has recorded a mean seed cotton yield of 2091 kg/ha which was 11.1 % increase over the check hybrid Bunny (1911 kg/ha) over 36 trials comprising station trials, OFT and ART. Under fibre quality parameters, TCHH 2322 has recorded 33.2 mm of span length and 23.2 g of bundle strength.

2. Another intra *hirsutum* hybrid TCH 2251 was also proposed for evaluation under ART during 2009-10 in five locations each of Dharmapuri, Salem, Erode, Theni and Perambalur districts, 10 OFTs through KVKs of TNAU and 5 OFTs conducted by the Research Station. The hybrid TCHH 2251 recorded a mean seed cotton yield of 2195 kg/ha which was 18.3 % increased yield over the check Bunny (1855 kg/ ha). With regard to fibre quality parameters, TCHH 2251 has 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.
3. The culture TCH 1705 which was 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 by the Research Station. It has recorded a seed cotton yield of 1522 kg/ha which was 12.6 % increased yield over the check MCU 13 (1351 kg/ha). It has 30.4mm of span length and 23 g/tex of bundle strength.
4. The elite culture, TCH 1710 is proposed for ART during 2010 - 11 in five locations each of Theni, Coimbatore, Erode, Dharmapuri and Perambalur districts, 20 OFTs through KVKs of TNAU. It has recorded a mean seed cotton yield of 1768 kg/ha which was 22.2 % increased yield over the check MCU 13 (1351 kg/ha). It has 31.2mm of span length and 22.7 g/tex of bundle strength.

Winter Rainfed ART - *G.hirsutum* variety

- The cotton culture TSH 2005 was evaluated in ART (2009 - 2010) in 20 locations of winter rainfed cotton tracts of Tamil Nadu. It has recorded a seed cotton yield of 1165 kg/ha which was 8.1 % increased yield over the check KC 3 (757 kg/ha). It has 27.1mm of span length and 23.2 g/tex of bundle strength . So far, the result has been received from three Districts of 15 locations and the data revealed that TSH 2005 has increased yield of 4.2 % over KC 3 and this variety was proposed for evaluation during 2010 – 11 also.
- The cotton culture TAH 235 was evaluated in ART (2009 - 2010) in five locations each of Tirunelveli, Tuticorin, Virudhunagar, Perambalur and Madurai districts and 20 OFTs through KVKs of TNAU. It has recorded a seed cotton yield of 932 kg/ha which was 8.1 % increased yield over the check SVPR 2 (705 kg/ha). It has 27.4mm of span length and 22.6 g/tex of bundle strength. The ART results of 2009 – 10 are awaited. Since the number of results is inadequate, the entry was proposed for ART for one more year in the ensuing 2010 – 11.

Winter Rainfed ART – *G.arboreum* variety

- The culture TKA 9102/3 is proposed for ART during 2010 - 11 in five locations each of Tirunelveli, Tuticorin, Virudhunagar, Perambalur and Madurai districts, 10 OFTs through KVKs of TNAU. It has recorded a mean seed cotton yield of 617 kg/ha which was 18.9 % increased yield over the check K11 (519 kg/ha). It has 28.0mm of span length and 21.8 g/tex of bundle strength.

Summer Irrigated ART - Intra *hirsutum* Hybrid

- The two summer irrigated Intra *hirsutum* hybrids viz., TSHH 0442 and TSHH 0629 are proposed for evaluation under ART during 2010-11 in five locations each of Tirunelveli, Tuticorin, Virudhunagar, Madurai, Dindigul, Salem, Erode, Thanjavur, Trichy and Nagapattinam districts and 10 OFTs through KVKs of TNAU. The hybrids TSHH 0442 and TSHH 0629 recorded a mean seed cotton yield of 2179 kg/ha and 2154 kg/ha which was 15.0% and 13.4 % increased yield over the check Bunny (2256 kg/ ha) respectively. With regard to fibre quality parameters, TSHH 0442 had recorded 28.3mm of span length and 22.6g/tex of bundle strength and TSHH 0629 had 28.4 mm fibre length with 22.4 g/tex of fibre strength.

BREEDER SEED PRODUCTION

With reference to the above, I am to furnish the details of Breeder Seed Production and Distribution in different crops for the year 2009-10 for further action.

Breeder Seed Production and supply made during 2009-10

(Unit in kg)

Crop	State		GOI		Private		Total	
	Indent	Supply	Indent	Supply	Indent	Supply	Indent	Supply
I. PADDY	20656	21902	3650	4655	78065	88722	102371	115279
II. MILLETS								
<i>Sorghum</i>	18	68	-	-	30	89	48	157
<i>Maize</i>	310	295	-	-	-	368	310	663
<i>Cumbu</i>	47	55	-	-	20	159	67	214
<i>Ragi</i>	28	28	-	-	-	-	28	28
Millets Total	403	446	-	-	50	616	453	1062
III. PULSES								
<i>Redgram</i>	660	531	950	300	5	526	1615	1357
<i>Blackgram</i>	5768	5912.5	500	100	996	2591	7264	8603.5
<i>Greengram</i>	2050	2422.5	1800	1000	150	1071	4000	4493.5
<i>Cowpea</i>	742	1882	-	-	-	238	742	2120
<i>Horsegram</i>	200	200	-	-	-	105	200	305
<i>Bengalgram</i>	150	150	-	-	-	25	150	175
Pulses Total	9570	11098	3250	1400	1151	4556	13971	17054
IV. Oil seeds								
<i>Groundnut</i>	24000	30115	11000	5771	-	1200	35000	37086
<i>Sesame</i>	759	789	35	-	4	435	798	1224
<i>Sunflower</i>	600	601	170	-	-	-	770	601
<i>Castor</i>	100	103	70	-	5	35	175	138
Oilseeds total	25459	31608	11275	5771	9	1670	36743	39049
V. COTTON	220	220	-	-	138	221	358	441
VI. FORAGE CROPS	-	-	-	10	-	-	-	10
Grand Total	56,308	65,274	18,175	11,836	79,413	95,785	1,53,896	1,72,895

II. CROP MANAGEMENT

A. FOR ADOPTION

RICE

1. Direct Planting System (DPS)

Direct Planting System recorded higher grain yield of 8683 kg /ha and straw yield of 9583 kg /ha. It recorded higher number of panicles hill⁻¹ (24), number of panicles m⁻² (427) and filled grain panicle⁻¹ (126), which contributed to higher grain yield.

2. Rotational herbicidal weed management in transplanted rice- rice cropping system

Pre-emergence herbicide namely butachlor 0.75 kg / ha on 3 DAT + 2,4-DEE 0.4 kg / ha on 20 DAT for Ist rice (*kharif* or *kuruvai*) and pre-emergence herbicide pretilachlor 0.75 kg/ ha on 3 DAT + 2,4-DEE 0.4 kg / ha 20 DAT for IInd rice (*rabi* or *thaladi*) with 100% inorganic nitrogen (150 kg/ha) for broad-spectrum weed control and high productivity in *kharif* rice grain yield of 6125 kg/ha ; *rabi* rice grain yield of 5938 kg/ha.

3. Enhanced K for managing negative K balance in rice soils of Anaimalai block

Application at 80 kg K₂O ha⁻¹ increased the yield by 24.3 % over farmers fertilizer practice (30 kg K₂O) and 10.7% over the existing recommended K (50 kg K₂O/ha). An additional income of Rs.9454 and Rs. 6197 was realized over farmers fertilizer practice and recommended K₂O, respectively. The above practices maintained the K balance positively in the soils. This is recommended for adoption in the Anaimalai block.

4. Drip biofertilization in rice

Drip biofertilization in rice with 20 x 10 cm spacing at 125 % PE + 100 % RDF (150:50:50 kg N, P₂O₅, K₂O kg/ha) + Humic acid @ 500 ml ha⁻¹ + Azophosmet @ 500ml ha⁻¹ through drip fertigation for clay soils recorded a grain yield of 5621 kg/ha at Coimbatore and at 150 % PE + 100 % RDF through drip fertigation + Humic acid @ 500 ml ha⁻¹ + Azophopmet @ 500ml ha⁻¹ for sandy / sandy loam soils recorded a grain yield of 5487 kg/ha at Madurai is recommended for adoption.

MILLETS & FORAGES

1. Tillage and IWM in Maize

Conventional tillage (One disc plough + cultivator + rotavator ploughing) integrated with pre emergence application of atrazine @ 0.5 kg ai/ha on 3 DAS with one hand weeding on 45 DAS for higher productivity irrigated maize (5472 kg/ha & B:C ratio 2.61) as compared to ZT (4964 kg/ha B:C ratio 2.07)

2. Fertilizer schedule for hybrid maize

Optimized balanced fertilizer schedule for irrigated hybrid maize is 250:75:75 kg N, P₂O₅ and K₂O ha⁻¹ for getting higher yields and net income.

PULSES

1. Foliar spraying to mitigate moisture stress

Foliar spraying of 2%KCl + 100 ppm Boron during dry spell as mid season management practice in black gram during *Rabi* season increased the yield by 20.5 % over KCl spray alone with a BC ratio of 2.01.

SUGARCANE

1. Ideal plant geometry for Mechanized Cane Cultivation under Low Cost Sub Surface Drip Fertigation System

Lateral spacing of 180 cm with double side planting of two budded setts (8 per running metre) recorded the maximum cane yield of 185.3 t/ha with B:C ratio of 3.02 under sub-surface fertigation system in clay loam soil.

2. Sustainable multi ratooning in sugarcane

The variety CoC 23 found to be most ideal for multi ratooning (four ratoons) by registering the highest mean ratoon cane yield(111.6 t/ha), CCS per cent (13.12 %)and sugar yield (14.6 t/ha). In addition the paired row system of planting (150 + 40 x 15 cm) recorded the maximum cane yield(106 t/ha), commercial cane sugar(12.56 t/ha) and sugar yield (13.39 t/ha) as compared to conventional method of planting (80 cm) with 99.69 t/ha of cane yield.

3. Designer fertilizer mixtures for balanced fertilization to crops (sugarcane, cotton, groundnut, sunflower and sesame)

Balanced fertilization is one of the prime factors for maintaining soil health and sustaining agricultural production besides controlling the fertilizer use efficiency and quality food production. Micronutrients removal is also higher in the high yielding varieties which indicates that there is a need for regular application of micronutrients in order to match their depletion from the native soil reserve. An alarming increase in the extend of the micronutrient deficiencies during the recent years in Tamil Nadu soils have been observed. Further, the occurrence of multi-micronutrient deficiencies are becoming common. The availability of the straight fertilizers, particularly the micronutrients to farmers become scanty in villages and remote areas and the farmers have no choice except to go for one or two major straight fertilizers more particularly nitrogen alone. Hence, the use of crop specific micronutrient fertilizer mixtures will largely help the farmers to go for balanced fertilization thereby increasing the productivity of their farm holdings.

Details of the Technology

Enriched Micronutrient Mixtures for Sugarcane (basal application)

TNAU MN mixture @ 50 kg /ha as Enriched FYM

Enriched Micronutrient Mixtures for Cotton (basal application)

Rainfed crop - TNAU MN mixture @ 7.5 kg /ha as Enriched FYM

Irrigated (variety) - TNAU MN mixture @ 12.5 kg /ha as Enriched FYM

Irrigated (hybrid) - TNAU MN mixture @ 15 kg /ha as Enriched FYM

Enriched Micronutrient Mixtures for Oilseed Crops (basal application)

Groundnut

Rainfed crop - TNAU MN mixture @ 7.5 kg /ha as Enriched FYM

Irrigated crop - TNAU MN mixture @ 12.5 kg /ha as Enriched FYM

Sunflower (Variety / Hybrid)

Rainfed crop - TNAU MN mixture @ 7.5 /10.0 kg /ha as Enriched FYM

Irrigated crop - TNAU MN mixture @ 12.5/15.0 kg /ha as Enriched FYM

Sesame

Rainfed crop - TNAU MN mixture @ 7.5 kg /ha as Enriched FYM

Irrigated crop - TNAU MN mixture @ 12.5 kg /ha as Enriched FYM

(* Enriched FYM prepared at 1:10 ratio of the MN mixture and FYM, mixed at friable moisture and incubated for one month in shade)

Benefit

Application of TNAU MN mixture increased the yield of crops by 14.6% in sugarcane, 28% in irrigated cotton, 44% in rainfed cotton, 14% in hybrid cotton, 31-54 % in irrigated groundnut, 35.7 % in rainfed groundnut, 20-26% in irrigated and rainfed sunflower and 10% in rainfed sesame.

Economics

Application of TNAU MN mixture increased the B:C ratio and additional net return to 2.25 and Rs. 17,185/ ha respectively in sugarcane, 1.50 and Rs.4325/- in rainfed cotton , 1.45 and Rs.4865/- in irrigated cotton, 2.26 and Rs.9050/- in hybrid cotton, 2.41 and Rs. 9340/- in rainfed groundnut, 2.34 and Rs. 10620/- in irrigated groundnut, 2.34 and Rs. 4180/- in sunflower variety, 2.91 and Rs. 5340/- in sunflower hybrid , 3.59 and Rs. 1120/- in rainfed sesame.

NON CROPS

1. TNAU Low cost Vermicomposting technology

Vermicomposting of organic wastes becomes an eco - friendly way of waste recycling for the production of manure. The methods for culturing of earthworms and the techniques of production of vermicompost by utilizing these worms are standardized. The technology of utilizing the silpaulin vermibed for vermicomposting offers new scope for extending the adoption of the technology due to its advantages such as UV Stabilized as per IS I 46 I I : I 1998, flexible and economical, easy to handle and erect, available with nets for cross ventilation and also provision of outlet in the bottom corner for the collection of vermi wash. In order to promote the vermicomposting technology among the rural women who can afford to prepare the compost at small scale with the available organic wastes, a portable silpaulin vermibed is introduced and the method of vermicomposting using this portable bed is standardized. Low cost portable vermibag can be easily installed in a shady area. Any decomposed organic and farm waste and cow dung can be added and initially 10 kgs of earthworms are released for two tonnes of partially decomposed organic waste. In 120 days, 1200 kg of vermicast can be collected and these processes can be continuously done by adding partially decomposed organic wastes into the vermibag. Drainage provision at the bottom of the bag collects the excess water as vermiwash (which is recycled in the vermibag) during vermicomposting process and hence optimum moisture content of 50-55% is maintained. Optimum temperature and aeration are maintained in the vermibag due to the 2' depth of vermibag for two tonnes of wastes. Due to the maintenance of optimum conditions throughout the vermicomposting period, activity of earthworms gets increased and the nutrient content is enhanced to the level of 16-20%.

The cost of this silpaulin bag is Rs. 1500 and the revenue generated by using this bag is Rs. 16,320 per year through the sale of 12 kgs of earthworms and 3.6 tonnes of vermicompost.

2. Integrated Pest and Disease Management package for silkworm

Details of the technology

Package for management of 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 chloromphenical @ 500 ppm during third, fourth and fifth instar.

C. IPM package for uzifly management

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

Benefits

- Reduced incidence of grasserie, flacherie and uzifly. Overall the cocoon yield of silkworm increased by 22% in the IPDM implemented trials compared to farmers' practice in Coimbatore regions. Whereas in Erode region, the increase was 49% over control.
- The economic parameters *viz.*, larval weight, cocoon weight, shell weight, shell ratio were higher in IPDM trials when compared to farmers' practice, both in Coimbatore and Erode regions.

Economics

Sl. No.	Treatment	Cocoon Yield / 100 dfls (kg)	Additional cost incurred	Net Return*	Incremental Benefit Cost Ratio (ICB)
1	IPDM implemented places	84.17	Rs. 601.00	Rs. 2833.75	4.71
2	Control	62.50			

*Cost of cocoon price = Rs. 125 / kg.

OILSEEDS

Micronutrient mixture for Castor

Rainfed castor: Application of TNAU MN mixture @ 7.5 kg ha⁻¹ as EFYM for variety and 10 kg ha⁻¹ as EFYM for hybrid registered an yield increase of 16 per cent over check with net additional return of Rs. 2650/- and Rs. 5209/- and with B:C ratio of 2.17 and 4.05 respectively.

Irrigated castor: Application of TNAU MN mixture @ 12.5 kg ha⁻¹ as EFYM for variety and 15 kg ha⁻¹ as EFYM for hybrid registered an yield increase of 26 and 14 per cent over check with net additional return of Rs. 9523/- and Rs. 8828/- and with B:C ratio of 2.39 and 3.83 respectively.

B. FOR ON FARM TESTING

RICE

1. Evaluation of aromatic rice in rice growing regions

Treatments

Three varieties

- Pre release aromatic rice culture
- Mugad sugand
- Jeeraga samba

Nutrients

- Organic only (12.5 t ha^{-1}) – any source,
- Inorganic only (Recommended NPK) 150: 50 : 50 kg NPK ha^{-1}
- 50% of recommended organic and 50% of recommended Inorganic
- Control

Centres : Ambasamudram, Aduthurai, Tirur, Coimbatore, Madurai, Killikulam, Bhavanisagar

Co-ordinator : Professor and Head, Dept. of Agronomy, Coimbatore

2. Effect of Rotary weeding in SRI in sodic soils

T₁- Conventional planting + Rotary weeding

T₂- SRI planting + rotary weeding.

T₃- Conventional planting + Rotary weeding + Azophosmet at 2.2 kg/ha + PPFM foliar spray @ @ 500 ml /ha

T₄- SRI planting + rotary weeding + Azophosmet at 2.2 kg/ha + PPFM foliar spray @ @ 500 ml /ha

Centres : Trichy (Manikandam block)

Co-ordinator : Professor and Head, Dept. of Agronomy, Coimbatore

3. On farm testing of SRI Power weeder

Observation

- Labour requirement
- Cost of operation
- Coverage
- Depth of operation
- Weeding efficiency
- Crop damage

Centres : Aduthurai, Coimbatore, Madurai, and Kumulur

Co-ordinator : Professor and Head, AMRC, Coimbatore

The following Action Plans / OFT initiated during 2009 will be continued with same set of treatments

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

Treatments

a) Wetland rice

T₁ - Check (Rec. dose of NPK)

T₂ -T₁ + 12.5 kg MN mix. of DoA as straight chemical fertiliser

T₃ -T₁ + 12.5 kg MN mix. of TNAU as straight chemical fertiliser

T₄ -T₁ + 12.5 kg MN mix. of TNAU as EFYM

T₅ -T₁ + 25 kg MN mix. of TNAU as straight chemical fertiliser

T₆ -T₁ + 25 kg MN mix. of TNAU as EFYM

b) Rainfed rice

T₁ - Check (Rec. dose of NPK)

T₂ -T₁ + 6.25 kg MN mix. of DoA as straight chemical fertiliser

T₃ -T₁ + 6.25 kg MN mix. of TNAU as straight chemical fertiliser

T₄ -T₁ + 6.25 kg MN mix. of TNAU as EFYM

T₅ -T₁ + 12.5 kg MN mix. of TNAU as straight chemical fertiliser

T₆ -T₁ + 12.5 kg MN mix. of TNAU as EFYM

Centres :

a) Wetland rice : Coimbatore, Aduthurai, Trichy, Paiyur, Bhavanisagar, Thanjavur, Madurai, Killikulam, Tirur and Ambasamudram

b) Rainfed rice : Ramnad & Paramakudi

Coordinator : Professor and Head, Dept. of SS&AC, TNAU, Coimbatore

MILLETS & FORAGES

1. Integrated weed management for rainfed finger millet

Treatments

T₁- Pre emergence application of pendimethalin @ 0.75 kg a.i /ha + one hand weeding (20 DAS)

T₂- Pre emergence application of oxyfluorfen @ 0.05 l a.i/ha + one hand weeding (20 DAS)

T₃- Farmer's method (Two hand weedings at 20 and 35 DAS)

T₄- Unweeded control.

Centres : Coimbatore and Paiyur

Co ordinator : Professor and Head, Agronomy, Coimbatore.

2. Mycorrhiza inoculation to improve Zn status of maize

Soil inoculation of vermiculite based mycorrhizal fungal culture (*Glomus intraradices*) at the rate of 2 g per plant just prior to sowing improves Zn nutrition of maize.

- Treatments** : 1. Uninoculated + ZnSO₄@37.5 kg/ha
2. VAM Inoculated (- Zn fertilization)
3. Control
- Centres** : MRS, Vagarai, ARS, Bhavanisagar
- Action** : Professor and Head (NST), Coimbatore

PULSES

1. IWM for enhancing productivity of pulses

Treatments

- T1 - Pendimethalin 1kg / ha on 3 DAS + Handweeding on 25 – 30 DAS
- T2 - Pendimethalin 1kg / ha on 3 DAS + power weeder weeding on 25 – 30 DAS
- T3 - Pendimethalin 1kg / ha on 3 DAS + Imazethapyr 60 g a.i. / ha on 15 - 20 DAS
- T4 - Pendimethalin 1kg / ha on 3 DAS + Quizalofop ethyl 50 g a.i./ha on 15 - 20 DAS
- T5 - Pendimethalin 0.75 kg + Imazethapyr 60 g a.i. / ha on 15 DAS + Quizalofop ethyl 50 g ai / ha on 20 DAS.

Centres

Redgram	Green gram / Black gram	Soybean
Coimbatore, Paiyur, Vamban, Tindivanam	Coimbatore ,Vamban, Pattukottai, Thanjavur,	Coimbatore

Co-ordinator : Professor and Head (Agronomy), Coimbatore

2. Mechanization in rainfed redgram

Treatments

1. Seed drill sowing + Power weeding + Threshing using multi crop thresher
2. Farmers' practice

Spacing : 90 x 30 cm, 120 x 30 cm

Centres : Farmers holding at Coimbatore

Co-ordinator : Professor and Head (AMRC), Coimbatore

3. Effect of Rhizobium + Phosphobacterium (PBS) + Methylobacterium as seed treatment for blackgram

Treatments

T1 – 100% RDF

T2 – 50% RDF

T3 – 50 % RDF Rhizobium + Phosphobacterium (PBS) + Methylobacterium

Centres : NPRC, Vamban, TRRI, Aduthurai, ORS, Tindivanam

Co-ordinator : Professor and Head (Agrl. Microbiology), Coimbatore

4. Effect of Foliar application of Methylobacterium for drought tolerance in Pulses

Treatments

T1 – 2% KCl foliar spray + 100 ppm boric acid on 30 DAS

T2 – Seed treatment and foliar application of Methylobacterium on 30 DAS

T3 – Control

Centres : NPRC, Vamban, TRRI, Aduthurai, ORS, Tindivanam

Co-ordinator : Professor and Head (Agrl. Microbiology), Coimbatore

5. Effect of biofertilizers on seed treatment of pulses

Treatments

T1 : 100 % RDF

T2 : 50 % RDF

T3 : 50 % RDF+ Rhizobium + Phosphobacterium + Methylobacterium

Crops : Blackgram and Greengram

Centres : NPRC, Vamban, TRRI, Aduthurai, ORS, Tindivanam

Co-ordinator : Professor and Head (Agrl. Microbiology), Coimbatore

COTTON

1. Nutrient management for yield maximization and mitigating leaf reddening in cotton

Treatments

T1: TNAU NPK mixture

Irrigated: variety : 80:40:40 kg/ha with 50 % N as Urea top dressing
 Bt : 120:60:60 kg/ha with 50 % N as Urea top dressing

Rainfed : variety : 40:20:40 kg/ha
 Bt : 60:30:60 kg/ha

T2 : T1+ TNAU MN Mixture** + TNAU cotton plus spray @ 1.25 % at square & boll formation stages

** Irrigated: variety : 12.5 kg / ha as E FYM
Bt : 15kg / ha as E FYM

Rainfed: variety : 7.5 kg / ha as E FYM
Bt : 10 kg / ha as E FYM

Centres: Coimbatore, Salem, Paiyur, Aruppukkottai, Srivilliputhur, Veppanthattai & Kovilpatti

Coordinators

Professor & Head, Department of Soil Science and Agricultural Chemistry,
Professor & Head, Crop Physiology, Coimbatore

OILSEEDS

1. **Yield maximization in castor through improving pistillate flower production using plant growth regulator (PGR) consortia**

Genotypes : Hybrid : YRCH1

Treatments:

T₁ - Foliar application of plant growth regulator consortia at 10 days before appearance of flowering

T₂ - Control (no spray)

Centre : TCRS, Yethapur

Locations : Three each in Salem and Namakkal districts.

Co-ordinator : Professor & Head, TCRS, Yethapur

2. **Castor based intercropping systems with onion under irrigated condition**

Treatments

T₁ - Castor spacing 1.5 x 1 m + onion 2 rows (60 x 30 x 60 cm) leaving 60 cm on either side with 20 cm intraspace

T₂ - Castor pure crop 1.5 x 1 m

Crops : Hybrid castor (YRCH1), onion

Centre : TCRS, Yethapur

Locations : Three each in Salem and Namakkal districts.

Co-ordinator : Professor & Head, TCRS, Yethapur

3. **Intercropping of groundnut in sugarcane**

Treatments

T₁ – Sugarcane + groundnut simultaneous sowing in broad bed furrows

T₂ – Sugarcane + groundnut simultaneous sowing in ridges and furrows

T₃ – Sole crop of sugarcane

Centre : RRS, Viriddachalam

Locations : Three

Co-ordinator : Professor & Head, RRS, Viriddachalam

III. CROP PROTECTION

A. FOR ADOPTION

RICE

1. Indigenous pheromone lure for Yellow stem borer management in rice (TNAU YSB lure)

The rice yellow stem borer, *Scirpophaga incertulas* (Walk.) is a major menace in rice production and is considered as national pest causing upto 80 % yield loss under out break condition. Sex pheromone is a key regulating element in IPM and has been proved to be valuable monitoring tool and insect control agent either in mating disruption strategies or in lure and kill system. Considerable precision in timing of insecticide application, bio control agents augmentation and bio pesticide usage in IPM.

Pheromone application technology (PAT) has been developed for the management of YSB and indigenous TNAU YSB lure has been developed and evaluated at Aduthurai, Trichy, Coimbatore, Tirupathisaram, Madurai, Killikulam and Tirur as on-farm experiments. The results revealed that the TNAU YSB lure was effective in terms of moth catch, reduction in dead heart and white ear damage and attracting YSB male moths (Table 1,2, & 3). The TNAU YSB lure was also found effective over commercial lures available in the market in terms of field performance and persistency.

Performance of TNAU PVC dispensers against yellow stem borer (Samba/ Thaladi/ Kannipoo/ Summer season)

Trap Efficacy Parameters	Locations				
	ADT	TRY	CBE	TPS	Tirur
Mean trap catches in the interception period	22.67 (3 to 32)	22.67 (1 to 26)	34.5 (0- 32)	19.8 (0- 42)	24 (2-26)
Per cent reduction in Dead Heart Damage	14.8%	4.62%	22.4%	18.6%	32.80%
Per cent reduction in White ear damage %	80.52	25.68	44.50	22.80	44.50
No. of lure replacement (Interception at 25,46,57 DAT)	Three	Two	One	Three	Three
Cost of interception /ha (@ Trap Rs 20; lure Rs 6)	760	640	520	760	760
Yield gain kg/ha (mean)*	225	152	-	124	241

Comparative Performance of TNAU PVC dispensers
(Samba season)

Firm	Mean moth catch /trap/day*
PCI	27.00a
PC	25.33a
Abisek	24.67a
Chem	4.00b
Indigenous lure	28.00a
CD (P= 0.05)	1.07

Field persistence of TNAU PVC dispensers (GC analysis)
(Sample draw on 40 days after installation)

Firms	Peak area	Std	Amt (mg)	% remained
PCI	726.4	1224.27	0.59	19.78
Chem Expo	315.29	1224.27	0.26	8.58
Abisek	474.235	1224.27	0.39	12.91
TNAU	782.976	1224.27	0.64	21.32
Phero Chem	560.905	1224.27	0.46	15.27
Std	3660.12	1224.27	2.99	99.65

Recommendation

The TNAU YSB lure was also found effective over commercial lures available in the market in terms of field performance and persistency

2. Management of major rice diseases with Metominostrobin 20 SC (Met 20 SC)

To study the effect of metominostrobin (met 20 SC) against rice diseases field trials were conducted in locations. Three sprayings of metominostrobin 20 @ 0.1% (1ml/lit) at fortnightly intervals immediately after appearance of disease was found effective in reducing the severity of blast (20.1%), brown spot (20.7%) and sheath rot (15.9%) and increased the grain yield (4926 kg/ha) with a CB ration of 1:2.24.

Metominostrobin 20 SC on the management of major diseases of rice

Treatments	Diseases severity (%)			Yield (kg/ha)	BC ratio
	Blast	Sheath rot	Brown spot		
Metominostrobin 20 SC (1 ml/l)	20.1	15.9	20.7	4926	2.24
Tricyclazole (1 ml/l)	24.0	19.6	28.0	4597	2.07
Untreated control	37.8	38.0	41.2	3788	-

Mean of four locations

Recommendation

Metominostrobin 20 SC (Met 20 SC) sprayed @ 0.1 % at fortnightly intervals is recommended for the management of rice diseases.

COTTON

1. Economic threshold levels on bt cotton against *Helicoverpa armigera*

ETL for *Helicoverpa armigera* was worked out for Bt Bunny for the last three years (2007-08, 2008-09, 2009-10)

Year	ETL (larva/plant)
2007-08	0.70
2008-09	0.72
2009-10	0.62
Mean	0.68

Infestation under caged condition revealed that in Bt Bunny *Helicoverpa* damage was noticed significantly only after 100 DAS indicating the need for insecticidal spray around 100 DAS through careful monitoring.

Recommendation

ETL for *Helicoverpa armigera* for cotton Bt Bunny is found to be 1 larva/plant.

2. Biocontrol based IPM for stem weevil

Among the five treatments, ST with chlorpyrifos @ 10 ml/kg + *Beauveria* @ 20 g/kg + drenching collar region with chlorpyrifos @ 2.5 ml/lit on 15 and 30 DAS + soil application of *Beauveria* @ 5.0 kg/ha on 20 DAS and earthingup subsequently recorded lowest stem weevil incidence of 9.4 per cent, maximum yield of 531 kg/ha with a B:C ratio of 1:1.94 compared to 23.8 per cent in untreated check with a kapas yield of 262 kg/ha.

Biocontrol based IPM for cotton stem weevil (Rainfed cotton-KC2)

S.No.	Treatment	Stem weevil %	Yield kg/ha	B:C ratio
T1	ST with chlorpyrifos @ 10 ml/kg + drenching collar region with chlorpyrifos @ 2.5 ml/lit on 15 and 30 DAS and earthingup	12.8	509	1:1.92
T2	ST with chlorpyrifos @ 10 ml/kg + <i>Beauveria</i> @ 10 g/kg + drenching collar region with chlorpyrifos @ 2.5 ml/lit on 15 and 30 DAS + soil application of <i>Beauveria</i> @ 5.0 kg/ha on 20 DAS and earthingup	11.6	516	1:1.89
T3	ST with chlorpyrifos @ 10 ml/kg + <i>Beauveria</i> @ 20 g/kg + drenching collar region with chlorpyrifos @ 2.5 ml/lit on 15 and 30 DAS + soil application of <i>Beauveria</i> @ 5.0 kg/ha on 20 DAS and earthingup	9.4	531	1:1.94
T4	ST with <i>Beauveria</i> + Pf 1 each 20 g/kg + soil application of <i>Beauveria</i> @ 5.0 kg/ha on 15 DAS and earthingup	14.7	502	1:1.74
T5	Untreated control	23.8	262	

Recommendation

Seed treatment (ST) with chlorpyrifos @ 10 ml/kg + *Beauveria* @ 20 g/kg + drenching collar region with chlorpyrifos @ 2.5 ml/lit on 15 and 30 DAS + soil application of *Beauveria* @ 5.0 kg/ha on 20 DAS and earthingup is recommended for the management of cotton stem weevil.

3. Efficacy of different chemicals in the control of mealybugs in cotton

Among the treatments, Buprofezin 70 WP @ 2g/lit effectively controlled the mealybug (*Paracoccus marginatus*) at Coimbatore. Dimethoate 30 EC at 2 ml /lit alone and in combination with Azadirachtin 1 % (2 ml /lit) were found to be effective against *Phenacoccus solenopsis* at Madurai and Srivilliputhur. At Coimbatore the incidence occurred at boll bursting stage

Management of Mealybugs in cotton

Treatments	Damage Grade	Plants infestation (%)		Seed cotton yield (Q / ha)		B:C Ratio	
		CBE <i>P.</i> <i>marginatus</i>	MDU <i>P.</i> <i>solenopsis</i>	CBE	MDU	CBE	MDU
		Profenophos 50 EC @ 2 ml /lit	1	8.33	28.2	14.45	6.20
Profenophos 50 EC (2 ml /lit) + Azadirachtin 1 % (2 ml /lit)	1	7.50	27.8	14.48	6.60	1:2.63	1:1.42
Chlorpyrifos 20 EC @ 5 ml /lit	3	30.00	22.7	13.80	6.82	1:2.77	1:1.57
Chlorpyrifos 20 EC (2.5 ml /lit) + Azadirachtin 1 % (2 ml /lit)	2	15.83	18.2	14.35	6.86	1:2.69	1:1.56
Dimethoate 30 EC @ 2ml/lit	3	32.50	8.8	13.75	8.04	1:2.77	1:1.91
Dimethoate 30 EC (2 ml /lit) + Azadirachtin 1 % (2 ml /lit)	2	17.50	4.4	13.94	8.67	1:2.54	1:2.03
Buprofezin 70 WP @ 2g/lit	1	5.83	34.3	14.51	6.70	1:2.51	1:1.29
Untreated check	4	51.67	83.8	13.35	4.63	1:2.29	1:1.22

Recommendation

Buprofezin 70 WP @ 2g/lit, Dimethoate 30 EC at 2 ml /lit alone and in combination with Azadirachtin 1 % (2 ml /lit) is recommended for the management of mealybug.

PALMS

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

Braconid, Bethylid parasitoids and Anthocorid predator (Salem, Dindigul, Villupuram)

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 ^b	19.0 ^c	6.27 ^b	1.56 ^b	2.09 ^a	8500.9 ^a	2.53
Pf-1+AH-1+ <i>Beauveria</i>	6.71 ^a	13.3 ^a	4.76 ^a	0.61 ^a	1.97 ^a	8675.8 ^a	2.65
Carbendazim - Chlorpyriphos	12.8 ^b	15.05 ^b	4.25 ^a	0.19 ^b	1.09 ^b	6859.3 ^b	1.31
Control	45.05 ^c	47.8 ^d	35.24 ^c	6.05 ^b	1.01 ^b	6453.8 ^c	-

(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 proposed

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

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), 30, 45 and 60 DAP
Centres	: Trichy, Madurai, Aduthurai and Killikulam

2. Integration of TNAU pheromone blend as a component in rice IPM centres

T1 : Yellow stem borer pheromone technology integrated rice IPM

Components

- Seed treatment with *P. fluorescens* Pf1+AH1+ *Beauveria bassiana* consortia (10g/kg)
- Soil application of *Pf* consortia 2.5 kg /ha
- Foliar spray on 35 & 45 days after planting
- *Trichogramma japonicum* release based on moth catches in pheromone traps
- Pheromone traps 3/ac for monitoring & 8/ac when catches increases to 8/trap.
- Need based application of Azadirachtin 1% (1 ml/lit)
- Need based application of insecticide by profenophos (2ml/l) / chlorpyriphos (2.5ml/l)

PULSES

1. Microbial consortia for the management of Podborer complex in Pigeonpea

The incidence of pod borer complex at Coimbatore and Vamban were heavy and the microbial consortia were not found to be effective at the recommended dose. Hence, the following modifications was made in the treatment structure.

- T₁ - Consortia (B.b +P.f) FA each @ 10 g /lit at 50 % flowering/ pod formation stage
- T₂ - Consortia (B.b +P.f) FA each @ 10 g /lit at 50 % flowering + pod formation stage- 2 spray second at 15 days after I spray
- T₃ - Indoxacarb 18 EC 0.75 ml/lit at 50% flowering
- T₄ - Untreated check

Replication: Four

Test variety: Ruling variety

Observation to be recorded

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

Centres: Coimbatore, Vamban, Paiyur, and Trichy

2. Evaluation of newer molecules against pod borer *Helicoverpa armigera* in pigeonpea

Under new insecticide evaluation against pod borer, the treatments with Flubendiamide 48 g ai/ha, Indoxacarb 75 g ai./ha and Chlorantraniliprole 60 g ai/ha were found to be effective against *Helicoverpa armigera* pod damage (19.00 to 21.60%) as against the untreated check (43.60%). Hence it is proposed for on farm testing against *Helicoverpa armigera* with the following treatments: (for alternate to Indoxacarb to avoid insecticide resistance).

- T₁ - Flubendiamide 48 g ai/ha at 50% flowering/pod formation
- T₂ - Indoxacarb 75 g ai /ha at 50% flowering/pod formation
- T₃ - Chlorantraniliprole 60g ai/ha at 50% flowering/pod formation
- T₄ - Endosulfan 0.07% at 50% flowering/pod formation
- T₅ - Untreated check

Variety: Ruling variety

Replication: Four

Observation to be recorded

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

Centres: Coimbatore, Vamban, Aruppukottai and Killikulam

3. Evaluation of TNAU *Helicoverpa armigera* pheromone lure

The *Helicoverpa armigera* pheromone lure formulated at TNAU, Coimbatore was found promising in the attraction of *Helicoverpa armigera* adults (0-45/ trap/ week). Hence, it is proposed for on farm testing evaluation in the different centers of TNAU. The pheromone lure will be supplied by the Department of Agricultural Entomology, TNAU, Coimbatore.

Number of traps	: 10 traps/ha
Trap height	: Crop canopy
Lure replacement	: Once in three weeks
Trap observation	: Two times a week
Centres	: Coimbatore, Vamban, Aruppukottai and Trichy

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

As the results were inconsistent in respect to insect pest and disease incidence, the trial will be repeated by increasing the microbial consortia load with the 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 10 g/Kg of seed + FA 30 DAS each 10g/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 3rd, 7th, 10th day after spraying
- Per cent Pod (Cumulative) damage at harvest
- Foliar diseases- Powdery mildew, Leaf spot in PDI
- Yield and C: B ratio

Centres : Coimbatore, Vamban, Aruppukottai and Kovilpatti

5. Management of powdery mildew of blackgram and greengram

A field trial was conducted to manage the fungal foliar diseases of greengram using fungicides and plant oil formulations. Among the different treatments, foliar spraying of Propiconazole (0.1%), Difenconazole (0.1%) and winter green oil (*Gultheria procubens*) 30 EC 0.2 per cent recorded the least disease incidence (Table1.) Hence, an OFT was proposed with the following treatments.

Management of fungal foliar diseases of greengram

S.No	Treatment	Dosage	Powdery mildew (PDI)*	Yield (Kg/ha)
1	Carbendazim	0.1%	16.5 d	760.0 b
2	Mancozeb	0.25%	20.0 e	705.0 c
3	Difenconazole	0.1%	12.0ab	765.0 b
4	Propiconazole	0.1%	10.0 a	788.0 a

5	Hexaconazole	0.1%	14.0 c	750.0 b
6	Chlorothalanil	0.2%	22.0 f	685.0 d
7	Wintergreen oil 30EC	0.2%	18.0 d	712.0 c
8	Eucalyptus oil 30EC	0.2%	20.0 e	700.0 c
9	Control	-	72.5 g	265.0 e

Treatment details:

- T₁ – Difenconazole - 0.1%
T₂ – Propiconazole - 0.1%
T₃ - Wintergreen oil 30EC – 0.2%
T₄ – Wettable sulphur – 0.25%
T₅ – Untreated control

Replications : 4

Design : RBD

Variety : Local susceptible check

Observation to be recorded

- Powdery mildew incidence In PDI on 30 and 45 DAS
- Yield and C:B ratio

Centre: Coimbatore, Vamban, Aruppukottai, Kovilpatti and Bhavanisagar

6. Management of Yellow Mosaic Virus in blackgram and greengram

A field trial was conducted to manage the YMV in black gram and green gram using insecticide and plant extract. The black gram seeds were treated with leaf extract of *Vitex negunda* (10 %) and imidacloprid 5 ml / kg and in that, Notchi and imidacloprid has exhibited a healthy stand of the crop when compared with the other treatments (Table 2). Hence, an OFT was proposed with the following treatments.

Management of YMV through AVP and micronutrients

S.No	Treatment	Method of application	YMV (%)	Yield (kg/ha)
1.	<i>Vitex negunda</i> (10%)	ST + FS	8.50 b	415.0 b
2.	Borax (0.2 %)	ST + FS	18.90 d	234.0 d
3.	Mg SO ₄ (0.3 % .)	ST + FS	19.30 c	297.0 c
4.	Imidacloprid	ST	2.50 a	763.0 a
5.	Control	-	21.0 e	223.0 e

Treatment details

- T1 – ST with Imidacloprid 5 g/kg
T2 – ST with 10% Leaf extract of *Vitex negundo* + Foliar spray on 30 DAS
T3 – ST with Imidacloprid 5 g/kg + Foliar spray of 10% Leaf extract of *Vitex negundo* on 30DAS
T4 – ST with Imidacloprid 5g/ kg + Spray winter green oil on 30 DAS
T5 – Untreated control

Replications : 4
Design : RBD
Variety : Local susceptible check

Observation to be recorded

- YMV incidence in % on 30 and 60 DAS
- White fly populations
- Yield and C:B ratio

Centre: Coimbatore, Vamban, Ambasamudram (Panpozhi), Aruppukottai, Kovilpatti and Bhavanisagar

7. Management of root rot and cyst nematode complex in black gram using microbial consortia.

A management trail was conducted to manage root rot and cyst nematode complex in blackgram using microbial consortia at TNAU Coimbatore during Kharif 2009. Soil application of *Pseudomonas fluorescens* + *Trichoderma viride* @ 1.25 kg each/ha effectively reduced the root rot incidence and Nematode population with enhanced yield. Hence an OFT in proposed with following treatments.

- T₁ – ST with *Trichoderma viride* (4g/kg) *Pseudomonas fluorescens* (10g/kg) and soil application of *T.v.* + *P.f.* @ each 1.25 kg/ha
- T₂ - ST with Carbendazim @ 2g/kg + Soil application of Carbofuran 1 kg /ha.
- T₃ - Control

Replication: 6

Variety : Co5

Observation to be recorded

- Root rot incidence on 30 and 60 DAS
- Nematode population in soil.
- Yield

Centre : Coimbatore & Vamban

COTTON

1. Management of reniform nematode-Root rot complex in cotton

Soil application of *Pseudomonas fluorescens* @ 2.5 kg ha⁻¹ recorded highest reduction of nematode populations both in soil and root consequently in two field experiments. Hence, it is proposed for OFT.

S. No.	Treatment	INP	Final nematode population		Percent root rot incidence	yield (kg/ha)
			/200 cm ³ soil	/5g root		
1.	<i>P. fluorescens</i> ST 20 g/kg	445.0	293.9	28.6	11.4	1977.5
2.	<i>T. viride</i> ST 4 g/kg	434.0	318.7	33.8	11.9	1878.5
3.	<i>P. lilacinus</i> ST 10 g/kg	419.0	307.8	37.1	13.2	1805.0

4.	<i>P. fluorescens</i> SA 2.5 kg/ha	437.5	226.3	13.8	7.80	2160.5
5.	<i>T viride</i> SA 2.5 kg/ha	492.5	307.8	17.7	7.90	1916.0
6.	<i>P. lilacinus</i> SA 2.5 kg/ha	456.0	324.3	24.8	11.3	1904.5
7.	Carbofuran 3G @ 1.0 kg a.i./ha	448.0	299.0	21.9	14.5	1877.5
8.	Control	495.5	655.6	58.3	24.4	1447.5

Treatments

T1: Consortia formulation of Pfbv 22+Bbv 57 @ 2.5 kg h-1

T2: *Pseudomonas fluorescens* @ 2.5 kg h-1

T3: Carbofuran 3 G @ 1 kg a.i. h-1

T4: Untreated control

Replications: Five

Time of application: Basal

Observations to be recorded

- Initial nematode populations
- Germination count
- Final nematode population in soil (200 g) and root (5 g)
- Percent root rot
- Kapas yield and C:B ratio

Centres : Coimbatore, Trichy & Arupukottai

RESEARCH HIGHLIGHTS – HORTICULTURE

I. CROP IMPROVEMENT

A. FOR ADOPTION

SPINY BRINJAL (MULLUKATHIRI) – VRM (BR) 1

Parentage	:	Pure line selection from Elavambadi Village of Vellore Dist.
Duration	:	140-150 days
Season	:	Kharif, Rabi and Summer
Yield	:	44 t/ha
Area of adoption	:	Vellore and Tiruvannamalai districts.

Special features

- Rich in protein (1.97%) and vitamin C content (10.5 mg/100g)
- Flesh content is more and seed content is less
- Performs well under wide range of soil with good drainage facility
- It is cluster bearing in nature
- Fruits are oval in shape, glossy pink in colour with green tinge in the distal end
- Single fruit weight about 100-150 g
- Highly resistant to leaf spot

TOMATO HYBRID – CO (TH) 3

Parentage	:	HN 2 / CLN 2123A
Duration	:	145 - 150 days
Season	:	Feb. – March, May-June and Nov. – Dec.
Yield	:	96.2 t/ha (9.76, 42.24 and 100.58% increase over COTH 2, Lakshmi and CO 3 respectively)
Highest yield obtained	:	38 t/ha
Area of adoption	:	Coimbatore, Salem, Cuddalore, Thanjavur, Madurai, Theni, Kancheepuram, Thoothukudi, Dindigal, Trichy, Dharmapuri, Krishnagiri, Vellore and Thiruvannamalai districts.

Special features

- Suitable for cultivation without pesticide spray
- Plants are semi determinate and suitable for high density planting
- Fruits are smooth round, medium sized, unripe fruits light green, ripe fruits bright red coloured and borne in clusters of 3-5.
- High yielding and resistant to leaf curl virus disease and moderately resistant to root knot nematode

CHILLI HYBRID – CO (CH) 1

Parentage	:	Selection 1 / CA 97
Duration	:	195-205 days
Season	:	June-July, Sept.-Oct. and Jan, -Feb.
Yield	:	Green fruit yield : 28.10 t/ha Dry fruit yield : 6.74 t/ha
Area of adoption	:	Thiruvannamalai, Salem, Kancheepuram, Dharmapuri, Krishnagiri, Coimbatore, Madurai, Thoothukudi, Thanjavur, Trichy and Theni districts under irrigated condition

Special features

- Moderate resistance to fruit rot disease
- Fruits are smooth, elongated, tapering
- Semi tall, spreading and highly branched
- The capsaicin content was 0.58% and the oleoresin content was 14.0%, ascorbic acid content was 120 mg/100 g fruit.

CELERY – OOTY (CE) 1

Parentage	:	Selection from the six germplasm types
Duration	:	115 days
Season	:	Throughout the year
Yield	:	30.5 t of green leaves per ha
Area of adoption	:	Nilgiris

Special features

- High yield potential
- The seed oil content is 1.71% where as in the local culture the seed oil content is only 0.56%
- Green leaves and stalks possess excellent aroma and cooking quality
- Resistant to leaf blight diseases
- Leaves contain about 1g of protein, 3g of carbohydrate, 88mg sodium, 1% iron and 4% calcium per 100 gm.

Chrysanthemum

The accession Acc. 103 (Indira of IIHR) consistently performed well under Tamil Nadu conditions and is recommended for commercial cultivation in Tamil Nadu. It has recorded 2.95 kg of flowers in main crop and 2.10 kg in ratoon crop with a total yield of 5.05 kg where as CO.1 recorded an yield of 2.87 kg / plot size of 1.44 m².

B. FOR ON FARM TESTING

1. Banana

H-531 (AAB): It is a cross between Poovan and Pisang Lilin and it is akin to Poovan. It recorded a bunch weight of 16.3 kg with 9 hands and 115 fingers in a bunch. Individual fruit weight is 98 g. TSS content is 22.50° Brix. It is resistant to nematode and *Fusarium* wilt.

2. Cassava – H740 / 92

This culture was obtained from CTCRI, Thiruvananthapuram. It is a high yielding variety with high starch content. It has got conical /cylindrical tubers with mean tuber length of 25.2 cm, tuber girth of 20.7 cm and tuber weight of 338.45g. It has compact tuber arrangement with 6-7 tubers / plant. The tubers possess brown skin and light cream rind with white flesh. It recorded the dry matter content of 31-34 %, HCN content of 48.2µg/100g and Starch content of 27.8%. It recorded the tuber yield of 55.26 t/ha and duration of this variety ranges from 220 - 300 days.

3. Sweet potato

IGSP 14: The culture IGSP-14 is a vigorous and high yielding type with low sugar content. Tubers are attractive pink in colour with creamy white flesh. It has round elliptic tubers. It produces 2-3 tubers / plant each weighing 350-500 g. The yield potential is 25.42 t/ha. Tubers recorded 23.28% root dry matter and 1.29% total sugars. It matures in 100-110 days.

440038: The culture 440038 is a vigorous and high yielding type. The tubers have attractive orange flesh with white skin. This entry is having high carotene and less weevil infestation. It has long elliptic tubers with white skin and pale orange flesh. It produces 4-5 tubers / plant each weighing 300-450g. The yield potential is 26.42 t/ha. Tubers recorded 18.27% root dry matter and 3.25% total sugars and 20.02 µg/g β-carotene. It matures in 110-120 days.

4. Turmeric – CL 101

It is a clonal selection from Erode type maintained in the germplasm. It has a high rhizome yield potential of 42.20 tonnes per ha with a curcumin content of 4.14 percent which is 20.2 percent higher yield over check variety BSR-2 (35.17 tonnes per ha and curcumin content of 3.5 percent). This high yielding turmeric culture has been approved for variety release by the co-ordinated programme of AICRP on Spices during XX workshop held from 6-8, June 2009 at Tamil Nadu Agricultural University, Coimbatore.

Mean performance of cultivar CL 101 over check BSR 2

Particulars	2006-07		2007-08		2008-09	
	CL 101	BSR 2	CL 101	BSR 2	CL 101	BSR 2
Mother rhizome weight (g)	134.0	77.0	142.0	85.0	136.0	75.0
Primary rhizome weight (g)	410.0	324.0	425.0	320.0	408.0	322.5
Secondary rhizome weight (g)	182.0	123.0	205.0	130.5	194.5	129.5
Single plant yield (g)	726.0	524.0	772.0	535.5	738.5	527.30
Yield / ha (tonnes)	39.7	35.2	41.80	34.4	46.90	37.33

This high yielding accession will be forwarded for MLT / ART testing.

5. *Coleus forskohlii* - Cf 36

The improved culture Cf 36 performed well in terms of higher tuber yield and forskohlin content during the past three years. The yield in Cf36 was 36.04 per cent higher when compared to the local check and showed tolerance to root gall index under field condition as well tuber rot and wilt. This culture will be tested in farmers field at Salem and evaluated for yield and tolerance to wilt

6. Davana - AP 7 : (*Artemisia pallens*)

The culture AP 7 was evaluated under ART in different farmers fields (18 locations in Dindigul, Theni and Madurai) which registered the maximum pooled green herbage yield (17.07 t / ha). The culture registered 36.40 per cent higher yield over local check. The essential oil yield was also high (10.74 kg / ha) compared to the local check (8.81 kg / ha).

7. Tube Rose

Among single types of tuberose, 'Phule Rajani' registered the highest number of spikes/plant (8.65) with increased number of 45.24 florets / spike. Similarly among double types 'Suvasini' excelled others in yield by registering 8.78 spikes/plant with 50.45 florets/spike. These two varieties have been found to be good performers under Coimbatore conditions.

II. CROP MANAGEMENT

A. FOR ADOPTION

1. Chrysanthemum

Micronutrients for in chrysanthemum : Application of FeSO_4 0.8% recorded the earliest flowering (100.40 days) and increased flower yield (133.27 g/plant and 2.03 kg / plot against 92.40 g / plant and 1.36 kg / plot in control). Application of FeSO_4 also recorded the longest flowering duration of 50.67 days.

2. Anthurium

Slow release fertilizers in anthurium variety Red Dragon: Application of Basacote plus 6m @ 6g/pot once in six months have increased the number of spikes / plant (7.75), suckers / plant (7.45), stalk length (52.65 cm) and longevity of flower on plant (19.50 days) in the variety Red Dragon. This treatment also showed increased plant height (56.65 cm), plant spread (24.35 cm) and no. of suckers (7.45). The stalk length (52.65 cm) was also more in this treatment compared to Standard check (NPK 30:10:10 @ 0.2%) wherein the stalk length was only 40.00 cm.

Bio fertilizers in Anthurium : Application of FYM 200g/pot + decomposed coir compost 100g, vermicompost 100g/pot as basal at the time of planting, Biofertilizers (VAM+ Azospirillum+ phosphate solubilising bacteria) @2g each/pot at an interval of two months *Trichoderma viride* 20g/pot (applied after mixing with the above mentioned farm yard dose, slightly moist and covered with polythene sheet for a week) + 3% Vermiwash spray at fifteen days interval is recommended for the variety Verdun Red for increased yield under Yercaud conditions.

Post harvest management in Anthurium : Pre-transit pulsing treatment with Sodium hypochlorite (500 ppm) (P_3) recorded increased vase life (19.83 days). Further this treatment showed reduction in blackening of the top of spadix, blueing of specter, loss of glossiness of spathe and per cent of loss in weight among other treatments. Effect of holding solutions on keeping quality of Anthurium flowers was studied. In this, increased vase life of 17.40 days was obtained with spikes held in sucrose (5%) + Kinetin (25 ppm) + $\text{Al}_2(\text{SO}_4)_3$ (300 ppm). Control flowers have a reduced vase life of 11.33 days only.

3. Marigold

Application of biostimulants : Application of humic acid (0.2%) + sea weed extract (0.25%) at 30 and 45 DAT enhanced xanthophyll content to 1.62g/100g (against 1.44g/100g in control) in marigold.

4. Carnation

Fumigation technology for protected cultivation of carnation: Application of Dazomet ($30\text{g}/\text{m}^2$) recorded reduced *Fusarium* wilt incidence (1.3% compared to 13% in control) and weed growth (64 weeds/ m^2 compared to 209 in control).

Management of calyx splitting in carnation: Foliar spray of 0.1 % Borax at 15 days intervals from one month after planting reduced the incidence of calyx splitting from 32.63% (in control) to 3.13%.

III. CROP PROTECTION

A. FOR ADOPTION

FRUITS

GRAPES

1. **Effect of Profiler 71.14 % WG (Fluopicolide 4.44% + Fosetyl Aluminium 66.7 % - 71.14 % WG) against grapes downy mildew**

S. No.	Treatment	Leaf infection (PDI)	Bunch infection (PDI)	Yield t/ha #	C:B ratio
1.	Profiler 71.14% WG (Fluopicolide 4.44% + Fosetyl Aluminium 66.7% - 71.14% WG) @ 0.225 %	25.23 (57.24)*	24.32 (46.63)	13.63 (76.43)**	1: 2.2
2.	Ridomil MZ 72 WP (Metalaxyl 8% + Mancozeb 64%) @ 0.250 %	29.83 (49.42)	30.32 (33.49)	7.70 (58.35)	1: 1.4
3.	Control	59.20	45.58	3.25	--

* Per cent disease reduction over control

** Per cent yield increase over control

Mean of two field trails

Recommendation

Foliar application of Profiler 71.14% WG @ 0.225 % three times [First spray 15 days after pruning (at 4-5 leaf stage) and the second and third spray at 10 days interval depending upon disease severity.

BER

1. **Management of ber black leaf spot disease caused by *Isariopsis indica***

Two foliar sprays either with Propiconazole or Difenconazole @ 0.1 per cent at the initiation of the disease and 10 days later is effective against black leaf spot of ber

Treatments	Per cent Disease Index *	Per cent disease reduction over control
Mancozeb (0.2%)	11.3	78.3
Carbendazim (0.1%)	9.1	82.6
Copper oxy chloride (0.2%)	13.0	75.1
Propiconazole 0.1%	2.6	95.0

Difenconazole 0.1%	3.6	86.4
Neem oil (3%)	19.1	63.5
Untreated control	52.3	-

Recommendation

Two foliar sprays either with Propiconazole or Difenconazole @ 0.1 per cent at the initiation of the disease and 10 days later is recommended for the management of black leaf spot

CITRUS

1. Management of acid lime leaf miner

Application of two rounds of acephate at 0.1125% (15.58%) or imidacloprid at 0.005% (15.99%) or thiodicarb at 0.075% (16.03%) or thiamethoxam followed by NSKE 5% (18.44%) during new flush formation resulted in minimum incidence of leaf miner.

Effect of synthetic chemicals and organic materials against leaf miner in acid lime

Treatments	Mean leafminer damage (%)							Pooled mean (%)
	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	
Acephate 75 SP (0.1125%)	12.67	14.67	14.33	6.1	23.4	26.4	11.5	15.58
Imidacloprid 200 SL (0.005%)	12.17	10.67	10.00	11.9	34.8	21.6	10.8	15.99
Thiodicarb 75 WP (0.075%)	12.83	14.67	14.00	11.4	26.6	21.2	11.5	16.03
NSKE 5%	16.17	20.00	20.30	14.3	40.4	42.2	14.8	24.02
Thiamethoxan (0.005%) f.b. NSKE 5%	11.17	9.33	9.50	12.6	41.3	35.4	09.8	18.44
Untreated check	33.50	38.67	48.67	29.2	72.1	68.4	30.3	47.03

Recommendation

Application of two rounds of acephate at 0.1125% or imidacloprid at 0.005% or thiodicarb at 0.075% or thiamethoxam at 0.005 % followed by NSKE 5% during new flush formation is recommended for the management of leaf miner.

2. Eco-friendly management of butterfly pest of acid lime

Application of two rounds of *Bacillus thuringiensis* 0.1% (13.29%) or NSKE 5% (13.91%) or neem oil 1% (13.99%) during new flush formation minimized the leaf damage caused by citrus butterfly.

Effect of non chemicals on butterfly leaf on acid lime

Treatments	Mean leaf damage caused by butterfly pest (%)							
	2003-04	2004-05	2005-06	2006-07	2007-08	2008-09	2009-10	Pooled Mean
Endosulfan 0.07%	14.00	9.44	10.27	12.4	6.3	5.4	10.2	9.72
<i>Bacillus thuringiensis</i> 0.1%	15.33	10.37	11.33	15.4	13.9	15.2	11.5	13.29
NSKE 5%	11.33	13.33	16.00	18.4	12.9	10.4	15.0	13.91
Neem oil 1%	14.83	13.51	16.00	11.5	14.4	13.2	14.5	13.99
Control	27.00	35.74	37.33	28.2	19.7	21.5	33.7	29.02

Recommendation

Application of two rounds of *Bacillus thuringiensis* 0.1% or neem oil 1% during new flush formation is recommended for the management of citrus butterfly.

VEGETABLES

ONION

1. Integrated Pest and Disease Management Module for Onion

Onion IPDM module with the following components viz.,

- Bulb treatment - PGPR consortia (5 g/kg) + *Trichoderma viride* (5 g/kg)
- Soil application of PGPR consortia (1.25 kg/lit) + *T. viride* (1.25 kg/lit) + VAM (12.5 kg/ha) + Azophos 4kg/ha+Neem cake 250 kg/ha
- PGPR (5 g/lit)+ *Beauveria bassiana* (10 g/lit) on 30 DAP
- Azadairachtin 1 % (2 ml/lit) on 40 DAP & 50 DAP
- NBA of Profenophos (2 ml/lit) or Dimethoate 2ml/lit/Hostathion 2ml/lit for thrips/leaf miner/cutworm management.
- NBA of Mancozeb (2 g/lit)/ Tebuconazole (1.5 ml/lit)/ Zineb (2 g/lit)
- Yellow sticky traps 12/ha
- Pheromone trap (*S.litura*) 12/ha

Registered significantly lower thrips population (10.68/plant), leaf miner (13.20%) and cutworm damage (5.48%), bulb rot (0.92%), purple blotch incidence (27.10 PDI) and smudge (38.10 PDI) coupled with higher bulb yield (16.67 t/ha) and Cost benefit ratio (1:2.38) compared to Farmers' Practice (Chemical control) with higher pest and disease incidence, low yield and C:B.

Evaluation of Onion IPDM module

Treatment	Thrips Population (no./plant)	Leaf Miner (%)	Cut worm (%)	Bulb rot (%)	Purple blotch (PDI)	Smudge (PDI)	Bulb Yield (t/ha)	C:B
IPDM Module	10.68	13.20	5.48	0.92	27.10	38.10	16.67	1:2.38
Farmer's Practice	16.49	23.61	9.13	4.30	47.64	72.20	13.98	1:2.07

(Mean of three Locations)

Recommendation

Onion IPDM module is recommended for the management of onion pests and diseases.

TOMATO

1. **Rouging' as a management tactic against *Peanut bud necrosis virus* in tomato**

Location	Cv	% DI at 90 DAT (PBNV)			Fruit Yield (t/ha)		
		Rouged	Unrouged	% increase	Rouged	Unrouged	% increase
I	US 618	19.06	59.73	213	14.75	9.25	59.46
II	Laxmi / 5005	17.87	47.47	165	16.50	12.10	36.36
III	S 44	18.64	51.63	176	15.00	10.75	39.53
IV	Laxmi / 5005	16.10	41.80	160	15.40	11.35	35.68
Mean	17.92	50.16	180	15.41	10.70	44.02	

Recommendation

Rouging of PBNV infected plants upto 45 days of planting recorded significantly low incidence of PBNV and higher fruit yield.

SPICES

CASHEW

1. **Management of Cashew Stem and Root Borer (*Plocaederus ferrugineus*)**
 - a. **Prophylactic control**

Among various treatments evaluated, swabbing tree trunk with neem oil 5% thrice during January-February, May-June, and September-October was the most

effective treatment against CSRB by registering 4% damage as against 20% in untreated control.

	Treatment	No. of trees treated	No. of trees infested	% damage	Cost of treatment/tree
1.	Swabbing with Neem Oil 5% once during January-February	25	3	12	12.00
2.	Swabbing with Neem Oil 5% Twice during January-February and May-June	25	2	8	24.00
3.	Swabbing with Neem Oil 5% Thrice during January-February, May-June and September-October.	25	1	4	36.00
4.	Control	25	5	20	-

b. Curative control

Among the curative treatments, maximum recovery of 71.4% was noted in chlorpyriphos (0.2%) treated trees, followed by monocrotophos (0.2%) treated trees with 70.0% recovery. Neem Oil 5% Treatments with carbaryl and CNSL lead to 57.1% and 28.6% recovery respectively.

	Treatment	No. of trees treated	No. of trees without reinfestation	Mean % recovery of trees from CSRB	Frequency of treatment	Cost of treatment/tree
T ₁	Carbaryl (1%)	21	12	57.1	3	55.0
T ₂	Chlorpyriphos (0.2%)	21	15	71.4	3	46.0
T ₃	Monocrotophos (0.2%)	20	14	70.0	3	48.0
T ₄	Treated check (Neem Oil 5%)	18	12	66.7	3	48.0
T ₅	Untreated check (removal of grubs)	14	02	14.3	3	30.0
	Total	108	59	-	-	-

Recommendations

Prophylactic Measure: Swabbing the basal tree trunk up to one metre height with Neem Oil 5% three times during January-February, May-June, and September-October is recommended to prevent infestation of cashew stem and root borer.

Curative Measure: Phytosanitation and by removal of grubs from early stage infested trees and drenching the wound portion with Chlorpyriphos 0.2% or Neem Oil 5% is recommended to contain reinfestation of cashew stem and root borer.

2. Management of Tea Mosquito Bug (*Helopeltis antonii*) in Cashew

Spray schedule involving three rounds of spray viz., first spraying with Profenophos (0.05%) at flushing stage, second spraying with Chlorpyriphos (0.05%) at flowering and third spraying with Carbaryl (0.1%) at fruit set stage was most effective.

Insecticidal Schedule		TMB Score Pre-treatment	TMB Score at 30DAS	Nut yield (Kg/ha)	Cost of protection per ha (Rs.)	BCR
T-1.	Profenophos 0.05%	0.78	1.38	1920	1080	1.75
T-2.	Chlorpyriphos 0.05%	0.67	1.10	2180	1150	3.13
T-3.	Carbaryl 0.1%	0.74	1.90	1425	1860	1.10
T-4	T-1, T-2 & T-3	0.70	0.00	2525	4090	2.54
T-5	Standard Sprays	0.68	0.00	2480	4210	2.47
T-6	Untreated control	0.76	3.70	0690	0.00	----

* Standard spray = Monocrotophos (0.05%), Endosulfan (0.05%) and Carbaryl (0.1%).

Recommendation

Spray schedule involving three rounds of spray viz., first spraying with Profenophos (0.05%) at flushing stage, second spraying with Chlorpyriphos (0.05%) at flowering and third spraying with Carbaryl (0.1%) at fruit set stage is most effective for management of tea mosquito bug.

MEDICINAL PLANTS

NONI

1. Management of leaf blight disease in Noni (*Morinda citrifolia*)

Treatment ***	Leaf Blight (PDI)	Anthracnose (PDI)	Yield (t/ha)	C:B ratio
PF1+EPC8 (<i>Bacillus subtilis</i>)+TV1+Azospirillum (SA+FS)	19.28 (65.82%)*	15.38 (70.53%)*	93.75 (27.2%)**	1:2.5
Chlorathalonil (0.2%)	15.20 (73.05%)*	7.80 (85.05%)*	82.50 (17.27%)**	1:2.2
Control	56.41	52.18	68.25	-

- % disease decrease over control ; ** % increase of yield over control
- *** Values are the mean of three trials

Recommendation

Soil application of vermicompost (400g) and neem cake (500g) along with PF1+EPC8+TV1+Azospirillum (250g each) in 8:1:1 ratio respectively as pre-monsoon application (August) and post monsoon application (January) combined with four foliar application of PF1 and EPC8 at 45 days interval from August.

B. FOR ON FARM TESTING

FRUITS

MANGO

1. Evaluation of biocontrol agents against mango nut weevil

S. No	Treatments	Nut weevil infestation (% fruit damage)	
		Paiyur (Dharmapuri)	Unchavelampatti (Pollachi)
T ₁	Raking the soil followed by soil application of <i>Beauveria bassiana</i> @ 300 g (1x10 ⁸ CFU/g) + 5 Kg. FYM; swabbing tree trunk and foliar application of <i>Beauveria bassiana</i> 1x10 ⁸ CFU/ml.	18.18 (25.29) ^b	17.23 (24.49) ^b
T ₂	Raking the soil followed by soil application of <i>Pseudomonas fluorescens</i> @ 300 g + 5 kg FYM; swabbing tree trunk and foliar application of <i>Pseudomonas fluorescens</i>	22.70 (28.45) ^c	22.05 (27.99) ^c
T ₃	Tying of red ant colony @ 5/tree	25.43 (25.43) ^c	24.23 (29.46) ^c
T ₄	Insecticidal check Carbaryl 2 g/lit followed by malathion 2 ml/lit at 15 days interval during peanut stage of fruits	10.25 (10.25) ^a	10.95 (19.30) ^a
T ₅	Untreated check	57.90 (57.90) ^d	56.86 (48.97) ^d

- T₁. Raking the soil followed by soil application of *Beauveria bassiana* @ 300 g (1x10⁸ CFU/g) + 5 Kg. FYM; swabbing tree trunk and foliar application of *Beauveria bassiana* 1x10⁸ CFU/ml.
- T₂. Insecticidal check (Carbaryl 2 g/lit followed by malathion 2 ml/lit at 15 days interval during peanut stage of fruits)
- T₃. Untreated check

Observations to be recorded

- Per cent infestation
- Yield
- C:B ratio

Centres: Paiyur, Periyakulam, Coimbatore, Pechiparai.

BANANA

1. Biological control of Panama wilt and nematode complex diseases of Banana

The application of liquid formulation of *P. fluorescens* Pf1 @ 4 lit /ha had effective control of *Fusarium* wilt and nematode population in the banana field through drip system and also enhanced the fruit yield.

Liquid formulation of *P. fluorescens* against Panama wilt and nematode complex disease

Treatments	Fusarium wilt (PDI)	Nematode population 250 cc soil	Yield (t/ha)	B:C ratio
<i>P. fluorescens</i> Pf1 2 lit/ha	5.88	80.78	62.44	1:4.53
Pf1 3 lit/ha	3.91	69.67	82.21	1:7.70
Pf1 4 lit/ha	3.15	61.64	91.91	1:8.26
Control	7.96	140.50	52.42	-

Treatments proposed

1. *P. fluorescens* (Pf1) @ 4 lit/ha
2. Carbendazim (0.1%)/Capsule application
3. Untreated check

Observation to be recorded

- Disease and nematode incidence
 - Growth and yield attributes
 - CB ratio
- Centres: Coimbatore, Periyakulam, Cuddalore

2. Management of banana sigatoka leaf spot disease with oil based formulations

Three sprays of propiconazole (0.05%) with petroleum based mineral oil (1%) effectively controlled the sigatoka leaf spot disease (12.6 PDI) compared to untreated check (44.92PDI).

S. No	Treatments	PDI	Yield (t/ha)
T1	Untreated check	44.92a	69.0
T2	Propiconazole 1ml/lit	16.18f	108.0
T3	Mancozeb 2.5g/lit	27.1cd	87.0
T4	Tridemorph 1 ml /lit	22.3e	98.3
T5	Propiconazole 0.5 ml/lit + Petroleum based mineral oil 1%	12.6g	111.7

Treatment details

1. Propiconazole 0.5 ml/lit + Petroleum based mineral oil 1%
2. Propiconazole 1ml/lit
3. Tridemorph 1 ml /lit
4. Untreated check
(Each fungicide at 20 days intervals three sprays during crop vulnerable stage)

Observations to be recorded

- Youngest leaf spotted (YLS)
 - PDI, Yield
- Centres: Coimbatore, Bhavanisagar

3. Management of banana nematodes by PGPR consortium

Treatments	Soil nematode population/ 250 cc				Bunch weight /plant (kg)	CB ratio
	<i>Helicotyl enchus</i>	<i>Radoph olus</i>	<i>Pratyle nchus</i>	<i>Meloi dogy ne</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 proposed

- T₁ - Consortia-Pfbv 22 + Bbv57 each paring & pralinage @ 5g / corm & SA @ 1.25kg / ha each
- T₂ - Pf 10g/ plant at planting
- T₃ - Carbofuran3G 40g /plant
- T₄ - Control

Observations to be recorded

- Growth parameters
 - Nematode population in soil and root
 - Yield
- Centres: Coimbatore, Periyakulam and Madurai

PAPAYA

1. Integrated management of Papaya ring spot virus disease

Spraying dimethoate 1.5 ml/lit combination with Zn SO₄ (0.5%) + Boron (0.1 %) recorded minimum Papaya Ring SpotVirus incidence was of 9.07 per cent up to 3rd month when compared to control. The yield parameters also appreciable in the above treatment.

S. No	Treatments	Disease incidence up to 3rd month	Plant height at first flowering (cm)	TSS(%)	Total yield/plant /year
1	Neem seed kernal extract(2%) at 15 days interval 30 days after planting	25.06c	72.83c	11bc	32.53c
2	Dimethoate1.5ml/lit	18.60b	74.36c	10.36c	32.43c
3	Neem oil 1%+Dimethoate 1.5ml/lit	17.06b	119.20a	11.6b	37.76b
4	T2+Zn(0.5%) and Boron(0.1%)	9.07a	93.53b	12.8a	45.53a
5	Control	96.0d	56.66d	9.13d	21.86d
6	CD at 5%	3.81	8.45	0.70	2.98

Treatment details

1. Neem seed kernal extract (2%) at 15 days interval at 30 days after planting
2. Dimethoate1.5ml/lit at monthly interval at 30 days after planting
3. Neem oil 1%+Dimethoate 1.5ml/lit at monthly interval 30 days after planting
4. T2+Zn(0.5%) and Boron(0.1%) at 3rd and 7th month of crop
5. Humic acid application (soil & foliar spray)
5. Control

Practices to be followed

Papaya seedlings should be raised in insect proof net house and spraying of dimethoate 1.5 ml/lit 3 days before planting should be done. Two rows of border crop of maize should be raised one month before planting of papaya. Common application of FYM 10kg/plant.

Observations to be recorded

1. Incidence of disease on leaf and fruit
2. Plant growth and yield and quality characters

Centres: Coimbatore, Periyakulam

VEGETABLES

BRINJAL

1. Pheromone technology for brinjal shoot borer

- TNAU formulated BSB lure for quality and timely supply in collaboration with IICT, Hyderabad
- Lures will be supplied by Dr. C. Durairaj, Professor of Entomology
Centres: Trichy, Palur, Periyakulam, Madurai, Coimbatore and Paiyur

2. Flubendiamide 20WG against shoot and fruit borer in brinjal

Flubendiamide 20 WG @ 75 g a.i. ha⁻¹ was found to be superior in recording minimum damage of shoot and fruit borer *Leucinodes orbonalis*; had no adverse effect on the natural enemy population and also registered higher yield with CB ratio of 1:3.88.

Treatments proposed

Sl. No.	Chemical	Dose (g a.i./ha)
1.	Flubendiamide 20 WG	75
2.	Emamectin benzoate 5 SG	9
3.	Spinosad 45 SC	75
4.	Untreated Check	-

Design : RBD
Replications : 5
Plot size : 25 m²
Rounds of spray : Three

Observations to be recorded

1. Observations on healthy and damaged shoot and fruits to be recorded from five randomly selected plants per plot before and on 5, 10 and 14 days after each spray
2. The population of spiders to be recorded before, 5 and 10 days after each spray from 10 randomly tagged plants
3. Yield

Centres: Coimbatore, Periyakulam, Palur, Bhavanisagar

TOMATO

1. Flubendiamide 20WG against fruit borers in tomato

Flubendiamide 20 WG @ 50 g a.i. ha⁻¹ was found to be superior in recording minimum damage of fruit borers viz., *Helicoverpa armigera* and *Spodoptera litura*; had no adverse effect on the natural enemy population and also registered higher yield with CB ratio of 1:3.62.

Treatments proposed

Sl. No.	Chemical	Dose (g a.i./ha)
1.	Flubendiamide 20 WG	50
2.	Spinosad 45 SC	75
3.	Indoxacarb 14.5 SC	75
4.	Untreated Check	-

Design : RBD
Replications : 5
Plot size : 25 m²
Rounds of spray : Three

Observations to be recorded

1. Observations on healthy and damaged fruits to be recorded from five randomly selected plants per plot before and on 5, 10 and 14 days after each spray
2. The population of coccinellids to be recorded before, 5, 10 and 14 days after each spray from 10 randomly tagged plants
3. Yield

Centres: Coimbatore, Periakulam, Paiyur

CHILLIES

1. Flubendiamide 20WG against fruit borers in Chillies

Flubendiamide 20 WG @ 60 g a.i. ha⁻¹ was found to be superior in recording minimum damage of fruit borers *viz.*, *Helicoverpa armigera* and *Spodoptera litura*; had no adverse effect on the natural enemy population and also registered higher yield with CB ratio of 1: 4.21.

Treatments proposed

Sl. No.	Chemical	Dose (g a.i./ha)
1.	Flubendiamide 20 WG	60
2.	Spinosad 45 SC	90
3.	Indoxacarb 14.5 SC	75
4.	Untreated Check	-

Design : RBD
Replications : 5
Plot size : 25 m²
Rounds of spray : Three

Observations to be recorded

1. Observations on healthy and damaged fruits to be recorded from five randomly selected plants per plot before and on 5, 10 and 14 days after each spray
2. The population of coccinellids to be recorded before, 5 and 10 days after each spray from 10 randomly tagged plants
3. Yield

Centres: Coimbatore, Paramakudi, Kovilpatty

BITTERGOURD

1. 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 proposed

- T₁ - ST with Ridomil MZ 72 0.25 % + 3 foliar sprays of Mancozeb 0.25% at 10 days interval in bower system
- T₂ - ST with Ridomil MZ 72 0.25 % + 3 foliar sprays of Ridomil MZ 72 at 10 days interval in bower system
- T₃ - Untreated Control

Observations to be recorded

- PDI of Downy mildew incidence
- Yield (t/ha) and BC ratio

Centres: Coimbatore, Madurai, Bhavanisagar

CABBAGE

1. Flubendiamide 20 WG against diamond back moth in cabbage

Flubendiamide 20 WG @ 25 g a.i. ha⁻¹ was found to be superior in recording minimum damage of diamond back moth *Plutella xylostella*; had no adverse effect on the natural enemy population and also registered higher yield with CB ratio of 1:3.23.

Treatments proposed

Sl. No.	Chemical	Dose (g a.i./ha)
1.	Flubendiamide 20 WG	25
2.	Indoxacarb 14.5 SC	25
3.	Spinosad 2.5 SC	25
4.	Untreated Check	-

Design : RBD
Replications : 5
Plot size : 25 m²
Rounds of spray : Two

Observations to be recorded

1. Observations on healthy and damaged fruits to be recorded from five randomly selected plants per plot before and on 3, 7, 14 and 21 days after each spray
2. The population spiders and coccinellids to be recorded before 7, 14 and 21 days after each spray from 10 randomly tagged plants
3. Yield

Centres: Coimbatore, Kodaikanal, Palur

FLOWER CROPS

JASMINE

1. **Management of Bud worm (*Hendecasis duplifascialis* (Pyraustidae: Lepidoptera) in Jasmine**

Effect of insecticide for management of jasmine bud worm for different intervals

	Treatments	Mean	Yield/ ha (kg)	CB ratio
T ₁	Thiochlorid	4.53 (12.20)	2100	1.6
T ₂	<i>Bacillus thuringiensis</i>	6.04 (14.18)	1900	1.4
T ₃	Monocrotophos	8.33 (16.73)	1600	1.2
T ₄	Spinosad	4.66 (12.39)	2050	1.6
T ₅	Profenophos	6.86 (15.14)	1860	1.4
T ₆	Novaluran	6.25 (14.41)	1875	1.4
T ₇	Indoxacarb	7.08 (15.40)	1750	1.3
T ₈	Lambda cyhalothrin	7.73 (16.12)	1700	1.3
T ₉	Neem oil	9.04 (17.48)	1570	1.1
T ₁₀	Azadirachtin	12.62 (20.78)	1500	1.0
T ₁₁	Control (Water spray)	19.70 (26.31)	1400	0.9

Thiochlorid 500ml/ha sprayed plots recorded less bud worm population (4.53%) followed by *Bacillus thuringiensis* 3ml/lit treated plots (6.04%) as compared to untreated plots (19.70%). Thiochlorid 500ml/ha sprayed plots recorded the maximum yield of 2100 kg/ha. of flowers with the maximum CB ratio of 1:1.6 followed by *Bacillus thuringiensis* 3ml/lit sprayed plots (1900 kg / ha.) as compared to untreated plots (1400 kg/ ha).

S. No.	Treatments	Concentration
T ₁	Thiochlorid 240 SC	2 ml/lit
T ₂	<i>Bacillus thuringiensis</i>	10000 IU/ha
T ₃	Spinosad 45 SC	0.75 ml/lit
T ₄	Profenophos 50EC	2 ml/lit
T ₅	Novaluran 10 EC	3 ml/lit
T ₆	Azadirachtin 10000ppm	3 ml/lit
T ₇	Control (Water spray)	

Observations to be recorded

- Per cent damage
- Pest population
- Yield
- C:B ratio

Centres: Paramakudi, Periyakulam, Paiyur and Coimbatore.

CARNATION

1. Management of red spider mites (*Tetranychus urticae*) in carnation

Treatment	Treatment details	Mean
T ₁	Dicofol	17.18 (24.39)
T ₂	Propargite	16.16 (23.59)
T ₃	Fenazaquin	15.38 (22.98)
T ₄	Abamectin	9.73 (18.01)
T ₅	Azadirachtin	19.81 (26.36)
T ₆	Wettable sulphur	20.06 (26.53)
T ₇	Fenpyroximate	20.07 (26.54)
T ₈	Diafenthiuron	18.06 (25.05)
T ₉	Bio pesticide	14.22 (22.01)
T ₁₀	Spiromesifen	12.03 (20.09)
T ₁₁	Control (Water spray)	30.39 (33.41)

Among the eleven treatments, Abamectin 1.8EC 0.05% recorded less mite Incidence (9.73%) followed by Spiromesifen 240 SC 0.8ml/lit. (12.03%) as compared to untreated field (30.39%).

Treatments proposed

Treatment	Chemical name	Strength of Formulations	Concentration (%)
T ₁	Dicofol	18.5 EC	0.037
T ₂	Abamectin	1.8 EC	0.05
T ₃	Azadirachtin	10000 ppm	1.00
T ₄	Fenpyroximate	5 SC	0.005
T ₅	Spiromesifen	240 SC	0.4
T ₆	Control (Water spray)		

Observations to be recorded

- Population of mite
- Per cent damage
- Yield
- C:B ratio

Centres: Ooty, Yercaud, Kodaikanal, Coimbatore

MARIGOLD**1. Eco – friendly management of *Helicoverpa armigera* in marigold**

Treatments	Chemical Name/ Bio agents	Mean	Yield/ ha (kg)	CB ratio
T ₁	<i>Bacillus thuringiensis</i>	18.77 (25.35)	9.24	2.2
T ₂	<i>Trichogramma</i> egg parasitoid	34.55 (35.99)	8.89	2.0
T ₃	Thiodicarb	15.51 (22.81)	9.96	2.6
T ₄	Cartap hydrochloride	22.27 (27.96)	9.02	2.2
T ₅	Spinosad	13.52 (21.15)	10.25	3.0
T ₆	Novaluron	15.69 (22.92)	9.67	2.4
T ₇	HaNPV	19.68 (26.10)	9.34	2.3
T ₈	Control (Water spray)	38.69 (38.46)	8.50	1.9

Among the eight treatments Spinosad 45SC 0.75ml/lit. recorded less bud borer population (13.52%) followed by Thiodicarb 75WP 2g/lit. treatment (15.51%) as compared to untreated plots (38.69%). Spinosad 45SC 0.75ml/lit recorded the maximum yield of 10.25 t/ha. of marigold flowers with the maximum CB ratio of 1:3.0 followed by Thiodicarb 75WP 2g/lit. (10.01 t / ha.) as compared to untreated plots (8.5 t/ ha).

Treatments proposed

Treatment	Chemical Name/ Bio agents	Strength of formulation	Concentration (%)
T ₁	<i>Bacillus thuringiensis</i>	10000 IU	3 ml/lit
T ₃	Thiodicarb	75WP	2g/lit
T ₅	Spinosad	45SC	0.75ml / lit
T ₆	Novaluron	10EC	3ml / lit
T ₈	Control (Water spray)		

Observations to be recorded

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

Centres: Madurai, Coimbatore, Bhavanisagar, Paiyur.

2. Eco-friendly Management of Alternaria leaf spot in Marigold, HC& RI, CBE

Treatment	Leaf spot (PDI)	Yield (t/ha)	CB ratio
Root dipping with <i>Pseudomonas fluorescens</i> @10g/lit for 30 min+ soil application @25g/m ² + foliar spray @ 0.5% at monthly intervals	12.83	10.21	1:3.1
Root dipping with Dithane M-45 @ 2g/lit + foliar spray @0.2%	22.67	9.01	1:2.9
Untreated control	42.43	7.00	-

Root dipping with *Pseudomonas fluorescens* @10g/lit for 30 min+ soil application @25g/m² + foliar spray @ 0.5% at monthly intervals recorded the least disease intensity of 12.83 PDI with maximum yield of 10.21 t/ha and the highest C:B ratio of 1:3.1 as compared to control.

Treatments proposed

- T1 - Root dipping with *Pseudomonas fluorescens* @10g/lit for 30 min+ soil application @25g/m² + foliar spray @ 0.5% at monthly intervals
- T2- Root dipping with Dithane M-45 @ 2g/lit + foliar spray @0.2%
- T3- Untreated control

Replication: Seven

Observations to be recorded

- Disease intensity
- Yield (t/ha)
- C:B ratio

GERBERA

1. Nematode management in gerbera

Biofumigation with mustard followed by soil application of *Pseudomonas fluorescens* @1.25kg/ha at the time of planting reduced the root knot nematode population in gerbera by 67.61 % and increased the flower yield by 46.09% with a CBR OF 1:1.5

Treatments	Flower yield/plant/month	Soil nematode population	Root gall index	Cost Benefit Ratio
Biofumigation with mustard	6.50	314.34	4	1:1.34
<i>P. fluorescens</i> (SA)-2.5kg/ha	7.47	270.44	3	1:1.41
<i>Trichoderma viride</i> (SA)-2.5kg/ha	5.65	325.85	4	1:1.26
Biofumigation+ <i>P. fluorescens</i> (SA)- 1.25kg/ha	8.31	132.32	2	1:1.50
Biofumigation+ <i>T. viride</i> (SA)-1.25 kg/ha	5.83	237.07	3	1:1.35
<i>P. fluorescens</i> + <i>T. viride</i> (SA)-2.5 kg/ha	7.13	251.80	3	1:1.39
Cartap hydro chloride-10 kg/ac	6.67	212.33	3	1:1.25
Carbofuran-12kg/ac	7.15	155.92	2	1:1.41
Untreated control	4.48	408.49	5	-

Treatments Proposed

- T1- Biofumigation with mustard (1month)+ *Pseudomonas fluorescens* (SA)- 1.25kg/ha
- T2- *Pseudomonas fluorescens*(SA)- 2.5kg/ha
- T3- Carbofuran 1kg a.i. /ha
- T4- Untreated control

Observations to be recorded

- Initial Soil Nematode Population
- Soil Nematode population after biofumigation with mustard
- Final soil nematode population
- Root gall index
- Stem length
- Flower Yield

Centres : Ooty, Yercaud and Kodaikanal

SPICES

ONION

1. Efficacy of Tebuconazole (Folicur 250 EC w/v) against onion purple blotch

Two to three foliar sprayings of Folicur (Tebuconazole 250 EC) @ 1.5 ml / lit immediately after the initiation of disease and subsequently at 10 days interval was found to be effective in minimizing the severity of purple blotch (26.7%) coupled with highest bulb yield (12.57 t/ha) and cost benefit ratio (1: 2.15) compared to untreated check which registered the highest severity of purple blotch (70.0%) with reduced bulb yield (8.58 kg/ha) and cost benefit ratio (1: 1.62).

Efficacy of Folicur 250 EC (Tebuconazole) against purple blotch of onion

Treatment	Dose (g or ml/lit)	Purple blotch (PDI)	Bulb yield (t/ha)	C:B
Folicur (Tebuconazole) 250 EC	1.50	26.7	12.57	1: 2.15
Contaf (Hexaconazole) 5 EC	1.25	41.7	11.46	1: 2.03
Tilt (Propiconazole) 25 EC	1.25	42.3	11.19	1: 1.96
Untreated control	-	70.0	8.58	1: 1.62

Treatments proposed

- T1- Tebuconazole (Folicur 250 EC w/v) @ 1.5 ml/lit
- T2- Propiconazole 25 EC (Tilt) @ 1 ml/lit
- T3- Hexaconazole 5 EC (Contaf) @ 1 ml/lit
- T4 - Mancozeb 75% WP @ 2.0 g/lit
- T5- Untreated check

Observations recorded

- Disease incidence to be recorded on 0-9 scale and expressed as PDI
- Bulb yield
- C:B ratio

Proposing centre : ADAC & RI, Trichy
Coordinating centres : Trichy, Bhavanisagar, Periyakulam, Coimbatore, Veppanthattai

BLACK PEPPER

1. Management of nematodes in black pepper through PGPR consortium

Soil application of *P. fluorescens* (Pfbv22) + *B. subtilis* (Bbv 57) each @ 5g / vine was found to be effective in reducing the *Meloidogyne incognita* and *Radopholus similis* population in Black pepper varieties karimunda and panniyur.

Treatments	Population of root-Knot nematode (J2)		Population of Burrowing nematodes		Yield Kg/Vine
	Soil (250cc)	Root (1 g)	Soil (250cc)	Root (1 g)	
<i>P. fluorescens</i> (Pfbv22) + <i>B. subtilis</i> (Bbv 57) @ 5g / vine each	188.6 (13.73)	10.4	237.6	93.4	12.8
Carbofuran + Carbendazim	297.8 (17.26)	21.4	278.6	106.0	7.6
Untreated control	622.6 (24.95)	29.6	403.4	122.2	9.4

Proposed treatment

- T1 - Soil application of Pfbv 22 + Bbv 57 each 5 g/vine
- T2 - Soil application of Pf 1 @ 10 g/vine
- T2 - Carbofuran @ 1 kg/ha + Carbendazim @ 1g/lit
- T3- Untreated control

Observations to be recorded

1. *M. incognita* female population, soil population, egg mass and gall index
2. *Radopholus similis* root population and soil population
3. No of spikes/vine and Yield, CB ratio

Centres: Yercaud, Thadiyankudisai and Gudalur

TURMERIC

1. Management of Rhizome rot and foliar diseases of turmeric (ARS, BSR)

Treatment	Rhizome rot (%)	Leaf spot (PDI)	Yield (t/ha)	CB ratio
Rhizome treatment with Metalaxyl @2g/lit.+ <i>Pseudomonas fluorescens</i> @10g /lit. Soil drenching with 0.2% Metalaxyl (90DAP) foliar spray with Mancozeb +Carbendazim @2g/lit (120DAP). Foliar spray with Tebuconazole @ 0.1%on 150DAP	12.3	22.9	34.00	1:3.15
Control	33.3	65.10	24.50	-

The results revealed that the following module was effective against rhizome rot and leaf spot of turmeric.

- Rhizome treatment with Metalaxyl @2g/lit+Pseudomonas fluorescens @10g /lit. (30 min. dipping)
 - Soil drenching with 0.2% Metalaxyl (90DAP)
 - Foliar spray with Mancozeb +Carbendazim @2g/lit (120DAP)
 - Foliar spray with Tebuconazole @ 0.1%on 150DAP
- Centre:** HC & RI, Coimbatore

Treatment	Leaf spot (PDI)	Leaf blotch (PDI)	Yield (t/ha)	CB ratio
Rhizome treatment with Propiconazole @ 0.1%+ Foliar spray with 0.1 % Propiconazole on 120 and 150 DAP	23.33	14.67	34.00	1:4.36
Control	67.33	34.00	20.00	-

The results revealed that the following module was effective against leaf spot and leaf blotch of turmeric.

- Rhizome treatment with Propiconazole @ 0.1%
- Foliar spray with 0.1 % Propiconazole on 120 and 150 DAP

Treatments proposed

T1 - Rhizome treatment with Metalaxyl @2g/lit+ Pseudomonas fluorescens @10g /lit. Soil drenching with 0.2% Metalaxyl (90DAP) foliar spray with Mancozeb +Carbendazim @2g/lit (120DAP) Foliar spray with Tebuconazole @ 0.1%on 150DAP.

T2 - Rhizome treatment with Propiconazole @ 0.1%+ Foliar spray with 0.1 % Propiconazole on 120 and 150 DAP

T3 - Untreated Control

Observations to be recorded

- Per cent incidence of rhizome rot
- PDI of Leaf spot and leaf blotch
- Yield (t/ha) and BC ratio

Centres: Coimbatore, Bhavanisagar

MEDICINAL PLANTS

COLEUS

1. Biomangement of root knot nematode & root rot disease complex in medicinal Coleus

Soil application of *Trichoderma viride* @ 2.5 kg/ha is most effective for the management of nematode fungal disease complex. The treatment suppressed the root gall index and per cent disease incidence by 60 and 66 per cent respectively and increased the tuber yield by 49.60 per cent over untreated control.

Treatments	Lengths (cm)		Weight (gm)		Root gall index	Female with egg masses	Per cent disease incidence
	Shoot	Root	Shoot	Tuber			
T1 Super <i>Pseudomonas</i> @ 2.5 kg/ha	120.62	81.87	958.12	223.75	2.25	12.38	35.62
T2 <i>Pseudomonas fluorescens</i> @ 2.5 kg/ha	120.60	75.00	883.12	212.20	2.37	14.50	36.87
T3 Consortial formulations of Pfbv 22+ Bbv 57 @ 2.5 kg/ha	113.12	72.50	886.87	201.25	2.50	16.00	38.12
T4 <i>Trichoderma viride</i> @ 2.5kg/ha	125.00 (77.05)	85.60 (44.50)	994.37 (30.46)	235.62 (49.60)	2.00 (60.00)	10.00 (78.72)	31.87 (66.00)
T5 <i>P. fluorescens</i> + <i>T. viride</i> each 1.25 kg/ha	113.12	70.62	813.87	190.00	3.12	21.50	46.87
T6 Carbofuran 3G @ 1 kg a.i./ha+ Drenching with Bavistin (1g/lit water)	101.87	68.75	772.50	185.00	3.37	26.13	51.25
T7 Untreated control	70.60	47.50	762.18	157.50	5.00	47.00	93.75
CD (P=0.05)	10.53	4.21	22.70	10.52	0.78	2.40	3.54

Treatments Proposed

- T1- *Trichoderma viride* 2.5kg/ha
T2- Super *Pseudomonas* @ 2.5 kg/ha
T3- Carbofuran 1kg a.i. /ha + Drenching with Bavistin (1g/lit)
T4- Untreated control

Observations to be recorded

- Initial Soil Nematode Population
- Soil and root Nematode population at harvest
- Root gall index
- Percent Disease Incidence
- Tuber Yield
- Centre : Coimbatore, Yercaud, Madurai

RESEARCH HIGHLIGHTS – AGRIL. ENGINEERING

A. FOR ADOPTION

1. NEEDLE TYPE TRAY SEEDER FOR VEGETABLE NURSERY

Salient features

- Vegetable growers prefer pro-tray grown seedlings
- To mechanize placement of seeds in the pro-tray cells
- Singulated raw/ pelleted seeds placed in all the cells in a single stroke
- Cost of operation is Rs. 280 for sowing 750 trays /day
- Saving in time is 300% and savings in labour is 60 %
- Cost of equipment is Rs.10,000 including the vacuum source

2. TRAILER MOUNTED STEERING FOR POWER TILLER – TRAILER SYSTEM

Salient features

- Avoids the operator, getting down and turn the power tiller trailer system.
- All the controls are well within the reach of the operator.
- Shorter turning radius, enabling the operator to take turns even in very narrow space
- Operator feels comfortable while taking a turn.
- Reduced discomfort to the operator through elimination of lateral and vertical swing of the handle.
- Cost of the steering system is Rs.1,000/= only.

3. SORGHUM COMPOSITE BISCUITS

Salient features

- Sorghum contains more energy, protein, fat, high fiber, when compared to rice.
- Sorghum in general are rich sources of B-complex vitamins, 2 to 9% fiber and antioxidants.
- Sorghum has a Low glycemic index which helps to reduce the glucose level of diabetics.
- Sorghum Lowers the incidence of cardiovascular diseases and reduce gastro-intestinal complications.
- Level of incorporation of sorghum flour upto 50% and 5% defatted soy flour.
- Keeping quality of the product is 15 days.
- Cost of the sorghum composite biscuit Rs 10.50 per 100 gm

B. FOR ON FARM TESTING

1. Studies on supplemental irrigation with sprinkler Irrigation system in dryland farming

On farm trials were conducted with supplemental irrigation for various dryland crops in various districts under the NADP scheme on dryland development and maximizing crop productivity during North-East monsoon season. The yield improvements for grain and fodder were recorded with varying number of supplemental irrigations in different districts. The crop response is summarized in the following table.

Crop Response of Supplemental Irrigation for Dryland Crops

Sl. No	Name of the Farmer	Area (ha)	Crop	Variety	No of Irrigations	Yield per Ha with supplemental Irrigation (kg)		Yield per Ha with- out supplemental Irrigation (kg)	
						Grain	Fodder	Grain	Fodder
District Name: Salem, Block Name: Kadayampatti, Village Name: Kongupatti and K.N.Pudhur									
1	Sami Naidu	2.4	Cowpea	PUSA152	2(Sprinkler)	490	1450	250	740
2	Thangaraj	1.1	Ragi	GPU 28	2 (Surface)	1800	2400	1180	1325
3	Murugan	0.4	Ragi	GPU 28	1 (Surface)	1600	2000	1200	1300
District Name: Salem, Block Name: Gangavalli, Village Name: Annayampatti and Todavur									
4	Arul.S	1	Maize	NK6240	3(Sprinkler)	4000	6000	2525	4500
5	Selvam.K	1	Maize	NK6240	3(Sprinkler)	3500	5500	2600	4600
District Name: Trichy , Block Name : Musiri, Village Name : Thiruthiyamala, Mooveli									
6	Shankar.K	1	Cholam	CO S 28	2(Sprinkler)	750	2100	450	1750
7	Selvam.K	2	Cholam	CO S 28	2 (Surface)	650	2000	470	1650
8	Ravi.C	2	Cumbu	ICMV 221	2 (Surface)	900	1450	450	800
9	Perumal	1	Cumbu	ICMV 221	1 (Surface)	420	875	250	650
10	Chidaparam	1	Cholam	CO S 28	2 (Surface)	650	1900	455	1700
11	Periyasamy.S	1	Cholam	CO S 28	2 (Surface)	780	2175	490	1750
12	Mukkaiyaammal	0.5	Cholam	CO S 28	2 (Surface)	690	1850	470	1700
District Name: Coimbatore, Block Name : Sulthanpet, Village Name: Poorandampalayam									
13	Kathiravan	1	Cumbu	ICMV 221	3(Sprinkler)	1480	1300	840	900
District Name: Coimbatore, Block Name : Palladam, Village Name: Chithambalam									
14	Karuppusamy	2	Maize	CP 818	3 (Surface)	3850	5925	2900	4800

- From the field investigations, it was found out that there was an increase of productivity (grain & fodder) for all chosen crops viz., cowpea, ragi, maize, cholam and cumbu.
- With two supplemental sprinkler, irrigations, there was a mean increase of grain yield of 96% for cowpea, 66.7% for cholam with three sprinkler irrigations, there was an increase of grain yield by 32.7 to 58.4% for maize and 76.2% for cumbu compared to rainfed conditions without supplemental irrigation.
- In general, it was noticed that the sprinkler irrigation performed better than surface irrigation in increasing yields of various dryland crops. In the case of cholam 66.7% increase with sprinkler irrigation compare to 46.7% increase with surface irrigation.
- As the farm ponds were used for supplemental irrigation there was an increasing trend of crop response (productivity) with number of irrigations, based upon the water availability.

2. **Areca tree climber (Farm Machinery)**

On farm testing and safety awareness programmes of the areca harvester was conducted extensively in farmer's areca plantations at Athur, Valapadi, Vedapatty, Thondamauthur and Kalampalayam regions. The farmers/plantation workers have expressed their satisfaction with respect to safety comfort and output of the unit. The opinion of the user is that the areca harvester with safety features is a ready to use device that can be put to use even by unskilled agricultural worker without any prior training.

3. **Mango destoner (F&APE)**

The mango destoner unit was tested at M/s. Selva Surya Agro Products India Limited, Dharmapuri. Adequate quantity of raw materials and other facilities were extended by the firm. The capacity and pulping efficiency of the unit were found to be 850 kg/h and 96%, respectively for totapuri variety. The unit was tested with Neelum variety and the capacity and pulping efficiency were found to be 1150 kg/h and 98%, respectively. The recovery of pulp by mechanical destoner was 20% higher than the manual method. The performance of the unit was much appreciated by the pulping industry.

4. **Farm level tomato grader (PHTC)**

Trails were conducted at farmers filed at Deverayapuram village of Thondamuthur and Farmers market, R.S. Puram. The efficiency of the unit is 92% and the capacity is 250kg/hr. The cost of operation is paise 20 / kg.

5. **Engine operated weeder for rice (AMRC)**

The engine operated weeder for rice was tested at four different locations of farmers holdings as well as University fields. The performance details of the unit tested are given below

Sl. No	Place	Trials			
		ARS, Bhavanisagar	Farmers field, Anamalai	Wetland TNAU	TRRI Aduthurai
1	Area Covered, ha	0.30	0.20	0.20	1.5
2	Field capacity, ha/hr	0.09	0.08	0.075	0.09
3	Weeding efficiency, %	68	70	64	68
4	Performance of the weeder	Good	Good	Good	Good

- a. Cost of operation, Rs/ha : 980
- b. Comparative savings in cost : 80%
- c. Coverage, ha/day : 0.08

The two row power weeder for SRI developed by Department of Farm machinery was demonstrated at Aduthurai, Attur, Madurai and Lalgudi.

6. Rice transplanter for SRI (AMRC)

The Yanji sakthi 8 row rice transplanter was modified with suitable nursery system in collaboration with m/s. VST tiller and tractors (p) Ltd., Bangalore. The field trials were conducted in farmers field with modified Transplanter and template seeded nursery nursery system in following four sub basins incollabration with IAMWARM Project is being implemented by TNAU.

1. Aliyar sub basin
2. Varaganathi sub basin
3. Upper veller sub basin
4. Agniyar sub basin

7. Cocounut harvesting equipment (AMRC)

The on farm testing of the coconut tree climber was conducted in five locations covering 203 trees. Further, the climber was supplied to 184 persons in Tamil Nadu and the feedback was collected. Details of the feasibility test conducted on the coconut tree climber are given below.

Details of test conducted with coconut tree climber

Sl. No.	Place	No. of coconut trees covered
1.	Velliankadu, Karamadai Tk, Coimbatore dt	11
2.	Thaliyur, Thondamuthur, Coimbatore dt	9
3.	Kanjampatti, Pollachi Tk, Coimbatore dt	13
4.	Mettupalayam Main Road, Narasimanaicken palayam, Coimbatore	50
5.	Kilakuthottam, Vadachittur Village, Pollachi, Coimbatore	120

The performance of the coconut tree climber is given below.

The performance of the coconut tree climber

Sl. No.	Parameters		Coconut Tree Climber					Farmer practice (Manual)
			1	2	3	4	5	
1.	No. of trees climbed		11	9	13	50	120	-
2.	Labour requirement, Man-h/100 trees		16	18	17	16	17	10
3.	No. of trees / h		6	5	6	6	6	10
4.	Height of the trees (average), m		10	14	12	10	11	-
5.	Girth variation, cm (trunk circumference)	Max:	114	109	99.5	119	117	-
		Min:	92	77	81.5	79	75	-
6.	Straightness of the tree		Maximum inclination of the tree : 10 - 15°					-
7.	Effective height of operation, m		10 -12					-
8.	Field efficiency, %		86	72	85	86	85	-
9.	Cost of operation, Rs. / Tree		5.5	6.5	5.5	5.5	5.5	10
10.	Cost of operation, Rs. / ha		1050	1250	1050	1050	1050	1900
11.	Breakdown of equipment		No breakdown. Only operational adjustments					-
12.	Remarks of the farmer	Provision should be made for easy adjustment to suit different diameter of the trees	Satisfied		Satisfied		-	

RESEARCH HIGHLIGHTS – FORESTRY

I. TREE IMPROVEMENT

A. FOR ADOPTION

1. Promising casuarina *junghuhniana* clone

The studies conducted at the fields of Seshayee Paper Board, Pallipalayam Erode, during the last 30 months resulted in superiority of 5 clones viz., 14, 16, 23, 24, and 25 in terms of over all yield. These clones are recommended for adoption and as a source of pulp, energy and pole.

Promising Clones	:	FC&RI CJ 14, 16, 23, 24 & 25
Parentage	:	Clonal selection
Propagation	:	Clonal multiplication through sprigs
Duration	:	30 – 36 Months
Suitability	:	Pulp, Pole and energy utility
Average yield	:	50 – 55 Kg / tree
Highest yield recorded	:	74 Kilo
Area of adoption	:	Through out TamilNadu except hilly and water logged area.
Special features	:	Fast growing sterile variety suitable for pole and pulp. The clones have recorded pulp recovery of 44 – 48%

2. Grain Amaranth (*Amaranthus hypochondriacus* L.) var. BGA 2

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 as sole crop. The vegetable yield of grain amaranth is 4.0 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.

Table 1. Mean performance of IVT of Grain Amaranth (Plains – Kharif)

Genotypes	Grain Yield (q/ha)	Days to 50% flowering	Days to maturity	Plant height (cm)	Seed Volume Wt. (g/10 ml)	Dis. Inci. (%)	Pest Inci. (%)
IC 035370	5.86	62.3	95.3	143.75	7.83	8.50	10.25
IC 035399	4.69	65.0	96.5	145.45	7.88	9.50	10.25
IC 035440	7.31	61.0	100.5	114.95	7.85	9.25	9.75
IC 035626	5.52	59.5	101.5	141.25	7.85	9.50	9.00
IC 035675	8.11	62.8	101.0	124.25	7.85	9.50	9.00
RMA 23	10.60	61.8	95.5	137.67	7.88	9.50	10.00
RMA 27	11.54	62.5	94.5	125.15	7.80	9.50	10.25
PRA 2004	11.77	48.5	93.5	91.40	8.35	10.00	9.50
BGA 3	11.68	61.5	98.5	138.85	7.75	11.25	8.50
BGA 9	13.98	57.5	100.5	113.65	7.73	11.75	11.25
BGA 14	12.57	60.5	98.0	143.20	7.80	10.50	11.50
BGA 20	11.54	59.5	101.0	125.90	7.85	10.75	11.75
BGA 26	14.03	62.5	102.0	148.90	7.88	11.75	11.25
RGA 1	10.20	49.5	101.3	94.10	7.88	12.75	10.50
SKNA 701	8.75	62.5	103.5	149.35	7.75	12.50	9.75
SKNA 702	9.47	61.5	95.5	156.40	7.78	12.00	8.25
SKNA 703	10.55	64.5	88.8	138.85	7.53	11.25	9.00
MGA 507	13.65	62.5	89.5	132.85	7.83	10.50	9.75
GA-1(C)	7.88	62.0	104.3	132.05	7.45	10.75	10.75
GA-2(C)	10.29	64.5	104.3	154.90	7.78	11.75	11.25
Suvarna (C)	9.56	63.5	105.8	153.70	7.65	11.25	8.50
BGA 2 (C)	14.54	61.3	87.0	136.05	7.00	10.75	8.00
Mean	10.26	60.61	98.02	134.33	7.77	10.70	9.84
CD(0.05)	1.14	0.95	1.04	5.77	0.07	0.76	0.85
CV (%)							
Error	7.90	1.11	0.75	3.04	0.67	5.05	6.09

3. Promising Annato clone for natural dye

Investigations on screening *Bixa orellana* clones for bixin content indicated that clone no KLB – 1 has superiority in terms of Bixin content which could be deployed for further adoption and popularization.

Promising Clones	:	KLB - 1
Parentage	:	Clonal selection
Propagation	:	Through rooting of cuttings
Suitability	:	Dye – Non timber forest products
Area of adoption	:	Through out Tamil Nadu
Special features	:	Higher Bixin content with early flowering characters.

4. New Eucalyptus clones suitable for Paper Industry

Three year old Clonal evaluation trial indicated that two clones viz., FC & RI 10, 53 & 56 expressed higher yield and resistance towards gall incidence and these clones are recommended for adoption.

Promising Clones	:	FC&RI 10, 53 & 56
Parentage	:	Clonal selection
Propagation	:	Clonal multiplication through coppice shoot cuttings
Duration	:	60 Months and amenable for 3 coppices
Suitability	:	Pulp, Pole and energy utility
Average yield	:	40 – 50 Kg / tree
Highest yield recorded	:	64 Kilo
Area of adoption	:	Through out TamilNadu
Special features	:	Fast growing suitable for pole and pulp. The clones have recorded pulp recovery of 44 and above. The clones expressed resistant towards gall.

B. FOR ON FARM TESTING

1. Superior Clones of *Simarouba glauca*

Ten potential female clones (> 50% oil content), as detailed below, have been identified. They can be promoted for OFT to test their performance across agroclimatic zones.

S. No.	Clone No	Oil Content (%)
1.	FCMSFC 4	58.08
2.	FCMSFC 10	58.62
3.	FCMSFC 11	59.78
4.	FCMSFC 15	56.34
5.	FCMSFC 17	56.24
6.	FCMSFC 24	57.80
7.	FCMSFC 26	59.36
8.	FCMSFC 29	57.22
9.	FCMSFC 33	56.68
10.	FCMSFC 42	56.28

2. Testing and Evaluation of *Jatropha* hybrid clones

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. 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 forwarded for as On Farm Testing in the farmer/Institute/Bio-fuel industrial land for final recommendation.

3. Evaluation of Leucaena genetic resources as a source of pulp and energy

The leucaena genetic resources have been proved parity with existing hardwood species as a source of pulp wood. Hence, the leucaena genetic resources may be forwarded for on farm testing in order to screen short rotation and high yielding genetic resources.

S.No.	Parameters	Unrefined pulp	Refined pulp
1.	Pulp yield	49.4	49.0
2.	Kappa number	20.7	20.5
3.	Acid insoluble lignin	18.3	18.0
4.	Hollow cellulose	70.2	69.0
5.	Bulk (g/cm ³)	1.69	1.48
6.	Tensile index (Nm/g)	35.4	73.0
7.	Tear index (mN.m ² /g)	6.2	7.6
8.	Free ness (ml CSF)	540	300
9.	Burst index (kPa.m ² /g)	1.9	4.6
10.	Brightness (% ISO)	81.8	79
11.	Opacity (%)	83.2	78.2

II. TREE MANAGEMENT

A. FOR ADOPTION

1. Macro Propagation of *Bixa orellana* through Air Layering

Select six months old side branches (preferably dormant semi hardwood) of 1.2-1.5 cm diameter (3.7-4.7 cm girth) from middle portion of the tree.

Remove a Ring of barking to a length of 1-1.5cm at 15-20 cm below the tip of the branches in order to give injury to cambium cells and break translocation of nutrients from stem to branches.

Coat the upper end of ring barked area with the IBA 3000 ppm (60% rooting and 90% survival).

Cover the ring barked area of layer with a handful of slightly moistened sphagnum moss as rooting media and tie by using thick transparent polythene sheets of 100 gauge thickness.

Detach the rooted air layers from the mother plant and transplant them in the polybags with standard nursery mixture. Keep them in the mist chamber for 10 days and hardening chamber for 30 days.

Carry out the layering work during November with maximum (90%) successful air layers.

Effect of different concentrations of IBA powder on Success of air layers

Treat ments	Callus Induction (%)				Rooting Success (%)			
	30 days	45 days	60 days	Mean	30 days	45 days	60 days	Mean
T ₁	28.63	41.70	50.88	40.40	4.25	22.25	34.00	20.17
T ₂	42.50	64.75	73.88	60.38	16.50	39.38	66.38	40.75
T ₃	52.63	74.50	89.63	72.25	25.30	58.13	90.88	58.10
T ₄	38.40	54.00	69.00	53.80	8.25	29.50	48.50	28.46
T ₅	32.50	49.13	57.50	46.38	7.38	27.38	41.00	25.54
T ₆	11.79	29.63	34.75	25.39	1.00	8.00	27.38	12.13
Grand mean	34.41	52.28	62.60		10.45	30.77	51.35	
SE.d	1.66	1.90	1.26		1.61	3.28	2.24	
CD (0.05)	3.49	3.99	2.65		3.39	6.89	4.71	

Effects of different concentrations of IBA on mean number primary roots and root length of air layers

Treatments	No. of primary roots				Primary root length			
	30 days	45 days	60 days	Mean	30 days	45 days	60 days	Mean
T₁	0.5 (3.16)	2.0	3.0	1.83	0.23	1.50	2.23	1.32
T₂	2.0 (7.99)	4.3	9.5	5.25	0.55	1.99	3.75	2.10
T₃	3.8 (11.15)	7.8	13.8	8.42	0.93	2.89	4.08	2.63
T₄	0.8 (3.76)	2.5	5.0	2.75	0.30	1.68	2.79	1.60
T₅	0.8 (3.76)	2.0	3.5	2.08	0.25	1.40	2.50	1.38
T₆	0.0 (0.58)	1.5	1.8	1.08	0.25	0.75	1.84	0.95
Grand mean	1.29	3.33	6.08		0.42	1.70	2.86	
SE.d	0.51	0.61	0.84		0.11	0.20	0.12	
CD (0.05)	1.07	1.29	1.77		0.22	0.43	0.25	

(Values are means of four replications)

(Figures in parenthesis indicate sine value transformation)

Effects of different concentrations of IBA on Success of air layers

Treatments	Survival (%)	Height of air layered material (cm)
T₁	42.13	15.75
T₂	83.38	23.63
T₃	90.63	27.38
T₄	58.75	17.50
T₅	56.88	16.00
T₆	31.50	14.13
Grand mean	60.54	19.06
SE.d	4.84	0.95
CD (0.05)	10.16	2.01

Seasonal variation in air layering success per cent in *Bixa orellana*

Months	Per cent of Success
January	83.13
February	80.63
March	75.88
April	46.75
May	44.13
June	48.63
July	50.50
August	54.75
September	60.88
October	73.00
November	89.63
December	85.75
Grand mean	63.47
SE.d	3.73
CD(0.05)	7.56

2. Clonal Propagation of *Pongamia pinnata* through Stem cuttings

Age of the mother for collecting stem cuttings	: 12-15 years
Type of cutting	: Semi Hardwood
Size of cutting	: 15 x 2.5cm
Treatment	: IBA 3000 ppm
Root initiation	: 15 days
Rooting Media	: Sand : Soil: VAM (2:1:1)

Pongamia pinnata semi hardwood cuttings of size of 15 cm x 2.5 cm dipped in IBA 3000 ppm (higher rooting (89 %), root number per cutting (18.67), root length per cutting (20.70 cm) and greater survival (84 %)) planted in sand : soil: VAM (2:1:1) is suitable for enhancing rooting and survival percent of stem cuttings. It is the easiest and cheapest method of vegetative propagation. The technique evolved would be most handy and could be applied anywhere in its habitat.

Optimization of IBA concentration for rooting in *Pongamia pinnata*

S. No.	Treatments	Rooting %	No of primary Roots per cutting	Root length (cm)	Survival (%)
1.	T1 - 1000 ppm	66.33	7.33	11.00	51.33
2.	T2 - 2000 ppm	76.00	12.33	13.67	63.17
3.	T3 - 3000 ppm	89.00	18.67	20.70	84.00
4.	T4 - 4000 ppm	73.00	12.00	16.33	64.00
5.	T5 - 5000 ppm	65.33	8.33	15.67	54.00
6.	T6 - control	34.00	6.00	6.33	25.33
Grand Mean		67.28	56.97	13.94	10.78
SEd		5.62	3.29	1.69	1.30
C.D (0.5)		12.25	7.18	3.68	2.84

Effect of size of stem cuttings on clonal propagation of *Pongamia pinnata*

S. No.	Treatments	Rooting %	No of primary Roots per cutting	Root length (cm)	Survival Per cent
1.	T1 – 10 cm x 1.5cm	36.00	4.67	5.67	24.00
2.	T2 – 10 cm x 2.0 cm	38.00	7.00	8.67	27.67
3.	T3 - 10 cm x 2.5 cm	41.00	9.67	12.33	35.67
4.	T4 - 15 cm x 1.5 cm	52.67	11.00	15.00	46.67
5.	T5 - 15 cm x 2.0 cm	61.67	13.00	17.33	54.33
6.	T6 - 15 cm x 2.5 cm	83.33	16.67	19.33	74.00
7.	T7 - 20 cm x 1.5 cm	70.00	11.33	18.67	60.00
8.	T8 - 20 cm x 2.0 cm	64.00	10.00	17.67	53.33
9.	T9 - 20 cm x 2.5 cm	57.33	11.00	17.00	45.33
Grand Mean		56.00	10.48	14.63	46.78
SEd		2.99	1.52	1.79	2.21
C.D (0.5)		6.29	3.20	3.76	4.64

Influence of rooting media on clonal propagation of *Pongamia pinnata*

S. No.	Treatments	Rooting %	No of primary roots	Root length (cm)	Survival %
1	T1 - Sand alone	66.00	11.33	13.67	52.67
2	T2 - Soil alone	50.67	7.00	9.70	41.00
3	T3 - Sand : Soil (1:1)	70.00	13.70	15.30	57.33
4	T4 - Sand: Soil: VAM (2:1:1)	86.00	15.30	19.33	69.00
5	T5 - Sand: Soil: VAM (2:1:1)	50.00	5.33	8.67	36.67
Grand Mean		64.53	10.50	12.70	51.33
SEd		2.99	1.17	1.45	3.35
C.D (0.5)		6.68	2.61	3.22	7.46

3. Simaruba with Tulsi based agroforestry model for Tamil Nadu

Among the five medicinal plants viz., sarpagandha, isabgol, ashwagandha, senna and tulsi raised as intercrops under simaruba, tulsi was found to be compatible with simaruba. Hence, tulsi is recommended as a suitable medicinal plant for simaruba based agroforestry system.

Yield of medicinal plants under 3 year old Simaruba (Kg ha⁻¹)

S.No	Medicinal plants (Intercrops)	Yield under Intercropping (Kg ha ⁻¹)	Yield under Sole cropping (Kg ha ⁻¹)
1	Ashwagandha	500 (23%) (Roots)	650
2	Tulsi	9250 (9%) (Leaves)	10200
3	Senna	700 ((18%) (Leaves)	830
4	Sarpagandha	1100 (15%) (Roots)	1300
5	Isabgol	400(33%) (Seeds)	600

SEd 35.00 CD 70.00

4 . Profitable Pungam based agroforestry model for higher productivity

Among the seven intercrops tried under pungam, cowpea and groundnut were found to be compatible intercrops for Pungam. With regard to soil fertility, soil available nitrogen was increased under pungam based agroforestry system The carbon content in main stem of pungam trees varied from 2.30 ton ha⁻¹ to 3.60 ton ha⁻¹. The result showed that a significant amount of carbon could be sequestered by pungam trees. It is recommended that cowpea and groundnut could be the suitable intercrops for Pungam based agroforestry system.

Yield of intercrops under Pungam based agroforestry system

Intercrops	Age of the Pungam trees (yrs)				
	1 yr old	2 yrs old	3 yrs old	4 yrs old	5yrs old
Black gram	710 (11%)	689 (16%)	650 (20%)	610 (22%)	580 (25%)
Green gram	505 (8%)	456 (15%)	430 (18%)	410 (20%)	400 (21%)
Red gram	750 (12%)	650 (21%)	580 (25%)	510 (32%)	470 (35%)
Cowpea	770 (5%)	640 (7%)	620 (10%)	610 (11%)	590 (12%)
Groundnut	900 (7%)	860 (12%)	850 (14%)	800 (15%)	780 (16%)
Soy bean	310 (23%)	233 (33%)	210 (40%)	-	-
Sun flower	480 (15%)	410 (23%)	380 (28%)	350 (30%)	320 (31%)
Grain amaranth	680 (16%)	620 (23%)	600 (24%)	580 (26%)	570 (27)

SEd 23.50 18.30 17.00 18.20 13.40
 CD 47.00 36.60 34.00 36.40 26.80

5. Nutrient dynamics in teak (*Tectona grandis*) ecosystem

The litter fall in teak ecosystem increased nutrient gains in soil than stem fall, through fall and rainfall in an eighteen year old teak plantation at Forest College and Research Institute, Mettupalayam. The total annual return of various nutrients viz., N, P, K, Ca and Mg from the litter components were 110.26, 17.50, 35.03, 348.97 and 78.46 kg ha⁻¹, respectively. Of the total annual return, leaf litter contributed a major share of 74.38, 12.51, 27.95, 311.91 and 65.95 kg ha⁻¹ of N, P, K, Ca and Mg, respectively. The total annual litter fall of the teak ecosystem accounted for 11,255 kg ha⁻¹ of which leaf litter alone contributed 9216 kg ha⁻¹. The highest litter fall was recorded during January to June contributing 77 per cent to the total annual litter fall.

6. Soil Fertility Assessment under different Agroforestry systems

A field experiment was conducted at FC &RI farm for five years (2004,05,06,07,08 and 09) to assess the tree crop interaction on fertility status of the soil, growth of intercrops as influenced by different trees and to evaluate the suitability of intercrops. The experimental results revealed that, there was a slight decline in the pH of the soil compared to initial soil, little built up in soluble salt content, available N and organic carbon, maintenance in available P and a slight decline in available K status as compared to the initial soil fertility status. Grain cowpea and fodder maize were found to be the suitable intercrops for the following tree species viz., silver oak, teak and simaruba in terms of soil fertility status and yield of intercrops in the Inceptisols of Tamil nadu.

7. Standardization of Integrated Nutrient Management for *Bambusa vulgaris* (var) *vulgaris* saplings

Studies were taken up to elicit information on INM on saplings of *Bambusa vulgaris* (var) *vulgaris*. After vegetatively propagated of culm cuttings in beds they were transplanted in to polybags of sizes 25cm X 15cm and INM treatment was applied while filling of soil mixture of 2:1:1 of soil: sand: FYM. The results revealed that application of Urea, SSP and MOP@500 mgs: 1000mgs:250mgs + 10gms of VAM+5gms Azospirillum+5gms of Phospobacterium+ 5gms of micro nutrient for polybags (T9) of size 25cm X 15cm. Maximum shoot length (94.27 cm), root length (41.16 cm), total dry matter (11.35gms) was obtained compare to control where it was (32.51 cm), (29.49 cm) and (3.891 gms) respectively. The cost for 1000 seedlings was Rs 10,220/- under this treatment compared to Rs 9964/- under control. By INM quality bamboo seedlings could be produced in the shortest period.

Effect of INM treatments on Seedling growth characteristics and quality parameters (120 DAP)

Treatments	Shoot length Cm	Root length Cm	Mean Collar Diameter Cm	Total Dry matter Production (gm)	Volume Index	Quality Index
T1	32.51	24.49	1.66	3.891	54.060	0.182
T2	46.87	32.27	2.03	5.102	95.148	0.201
T3	37.78	25.48	1.76	4.192	66.398	0.177
T4	43.45	30.14	2.14	4.745	93.213	0.211

T5	55.86	33.08	2.17	6.837	121.380	0.237
T6	50.32	26.34	1.92	6.141	96.619	0.204
T7	48.22	26.20	2.06	5.982	99.616	0.219
T8	38.67	29.84	1.72	4.323	66.696	0.716
T9	94.72	41.16	2.66	11.359	252.280	0.299
T10	72.22	35.06	2.09	9.490	150.879	0.255
T11	44.51	27.27	1.98	4.591	88.260	0.182
S.Ed	1.24	1.07	0.06	0.152	4.372	0.008
CD (0.05)	2.58	2.22	0.13	0.317	9.067	0.018

Cost analysis for production of 1000 *Bambusa vulgaris* seedlings due to INM treatments

Treat-ments	Height Measurement (cm) 120 DAP	Projected no.of days for 32.51 cm growth	Basic cost (Rs)	Mainte-nance cost (Rs)	Fertilizer cost (Rs)	Total Cost (Rs)	Per Seedling (Rs)
T1	32.51	120	9004	960	-	9964.00	9.96
T5	55.86	70	9004	520	184.06	9708.06	9.70
T6	50.32	78	9004	632	190.37	9826.37	9.83
T9	94.72	42	9004	332	884.06	10220.06	10.22
T10	72.22	54	9004	456	890.37	10350.37	10.35

8. Integrated nutrient management studies on *Bixa orellana* linn. (annatto) seedlings

An investigation was undertaken with Annatto (*Bixa orellana* Linn) as the test tree species to standardize ideal Integrated Nutrient Management (INM) techniques for improving the growth and quality of seedlings and to reduce the nursery period. A nursery experiment was conducted by raising *Bixa orellana* Linn., seedlings in polybags filled with standard soil mixture 2:1:1 (Soil: Sand: FYM) with three levels of nitrogen (100, 200 and 300 mg N per seedling) as urea, three levels of phosphorus (200, 300 and 400 mg P₂O₅ per seedling) as single super phosphate and three levels of potassium (100, 200 and 300 mg of K₂O per seedling) as muriate of potash along with Farm Yard Manure (100g) per seedling, *Azospirillum* (5g) per seedling, *Phosphobacteria* (5g) per seedling and Vermicompost (5g) per seedling.

The results revealed that the application of N, P₂O₅ and K₂O (200: 300: 200 mg) along with Vermicompost (5g), *Azospirillum* (5g) and *Phosphobacteria* (5g) per seedling (T₁₁) proved to be the ideal dose to improve the shoot length, root length, collar diameter and total dry matter. INM treatments were found to improve the N, P and K content of *Bixa orellana* seedlings. The significant increase in the total N,P and K uptake was noticed due to the incorporation of N, P₂O₅ and K₂O (200: 300: 200 mg) along with Vermicompost (5g), *Azospirillum* (5g) and *Phosphobacteria* (5g) per seedling (T₁₁) over the control. Similarly The INM treatments positively influenced the available soil nutrient status compared to the control. The cost analysis indicated that the identified INM

treatment (T₁₁) reduced the nursery period by 74 days and produced good quality seedlings with the amount of Rs.1030.47/1000 seedlings.

Effect of INM treatments on growth parameters and dry matter production of *Bixa orellana* seedlings

Treatments	Shoot length (cm)	Root length (cm)	Mean Collar Diameter (cm)	Total Dry matter Production (gm)
T1	24.10	23.59	0.658	7.38
T2	31.41	29.01	0.833	9.64
T3	29.18	28.22	0.789	10.42
T4	31.53	31.07	0.843	11.08
T5	32.29	29.66	0.838	11.10
T6	34.10	31.09	0.880	13.19
T7	30.43	31.65	0.776	11.37
T8	32.18	30.83	0.828	13.07
T9	29.46	27.48	0.806	12.82
T10	35.11	34.05	0.889	14.12
T11	38.69	41.78	0.914	16.17
T12	31.14	31.89	0.790	11.56
T13	33.07	30.40	0.825	11.46
T14	30.75	30.33	0.803	12.11
T15	30.44	30.74	0.789	11.42
T16	31.23	27.41	0.825	11.23

B. FOR ON FARM TESTING

1. Precision Silviculture Management for Pulp wood species.

The Two pulp wood species viz., Casuarina and Eucalyptus mayl be forwarded for on farm testing through drip fertigation system in order to recommend fertilizer and irrigation schedule for the species under different agro climatic zones for higher productivity.

Species	:	Casuarina and Eucalyptus clone
Area	:	0.8 Ha in each zone
Treatments	:	17
Design	:	RBD
Location	:	West, NE, NW, CDZ and Southern zone

2. Precision Silviculture Management for Match wood species.

One match wood species viz. *Ailanthus excelsa* may be forwarded for on farm testing through drip fertigation system in order to recommend fertilizer and irrigation schedule for the species under different agro climatic zones.

Species	:	Ailanthus excelsa
Area	:	0.2 Ha in each zone
Treatments	:	17
Design	:	RBD
Location	:	West, NE, NW, CDZ and Southern zone

III. TREE PROTECTION

B. FOR ON FARM TESTING

1. Management of Ailanthus Pest under field condition

Ailanthus pest management studies were conducted in the Ailanthus plantations of Mr. Rajesh, Pethalapettai, Tiruverumbur, Trichy.

The experiment was carried out during January – March 2010 on 18 month old plantations with the following treatments comprising chemical and biological control agents on 20 trees for each treatment.

Commonly available insecticides in the market to represent organophosphorous (chlorpyrifos 20 EC), carbamates (Carbosulfan 20 EC and neonicotinoids (imidacloprid (17.8 EC) along with TNAU formulation of *Beauveria bassiana* obtained from Department of Plant Pathology, TNAU, Coimbatore were topically applied at two different doses to identify a short term measure to manage the severe incidence of leaf webber (*Atteva fabricella*) and noctuid defoliator (*Eligma narcissus*). The plantations also had the infestation of leaf miner (*Acrocercops* sp) and also snail (*Achetina* sp.). Snails were found mostly on the stem portion at the leaf base as they are nocturnal feeders. The treatments with chemical pesticides expressed very good control on the pest. However, these treatments need to be tested on a large scale through on farm testing for final recommendation and adoption.

Treatments adopted were as follows

S. No	Treatment	Dose (ml or g /lit)
1	Chlorpyrifos	2
2	Chlorpyrifos	3
3	Carbosulfan	2
4	Carbosulfan	3
5	Imidacloprid	0.5
6	Imidacloprid	1.0
7	<i>Beauveria bassiana</i>	10
8	<i>Beauveria bassiana</i>	15
9	Untreated check	

2. Management of mealy bug in Jatropha

The epidemic status of mealy bug in Jatropha will be managed through treatment with physical chemical and biological control measures. The early successful control of chemical pesticides will be tested on a large scale under Jatropha plantation for final recommendation and adoption.

Location : Forest College
Treatments : Physical, chemical and biological control measure

For information

CENTRE FOR AGRIL. RURAL DEVELOPMENT STUDIES

NAIP - Domestic and Export Market Intelligence Cell

DEMIC cell expanded its activities to 10 consortium centers in 9 SAUs under NAIP funding from July, 2009. The total budget for TNAU is Rs.116.55 lakhs.

The achievements of the project are

18 commodity price forecasts were disseminated to farmers for taking up well-informed planting as well as storage decisions. These market advisories were published in 44 leading dailies having readership of more than one lakh (i.e.) at lower side whereas nearly 10 lakhs farmers read our forecasts. Besides news papers - as on 14.5.2010, 61,245 viewers use our web site (www.tnagmark.tn.nic.in), and 5000 farmers directly received our market advisories through text SMS. Apart from that 18600 hard copies of the forecast were sent to Agricultural department officials for dissemination among farmers.

Based on the impact study conducted entitled "Impact of market advisory dissemination on farmer income- with reference to turmeric" revealed that among the Thirty sample farmers ,eighteen farmers followed the NAIP-DEMIC advice and gained additional income of Rs.35,33,149/-

Eight farmers' trainings and seven Officers' trainings were organized to improve the capacity of farmers and officials in use of price, product and place intelligence provided by NAIP-DEMIC Centres. So far, 400 farmers and 350 officers were trained directly.

To improve the capacity of consortium partners in planning, use of different forecasting models, developing market advisories, dissemination and conducting training, four workshops were organized at TNAU, to enhance the consortium center's capacity to deliver market advisories. Similarly to improve the capacity of consortium partners SRF's in planning, use of different forecasting models and conducting trader's survey, Two trainings for consortium partners SRF's were organized one at lead centre and other at Akola centre to equip themselves to assist Co-PIs in commodity price forecast in a shorter period.

For improving network efficiency of the agricultural market intelligence centers and continuous update on commodity perspectives NAIP-DEMIC INFO SERIES- an email new letter was developed. So far thirteen info series were developed and Communicated to the consortium partners in addition to sharing of traders survey reports. We have 440 regular users of NAIP-DEMIC INFO SERIES including policy makers and group email has been created.

Three commodity reports were prepared and shared among consortium centers and other stakeholders.

Department of Agricultural Economics

Eight research schemes are functioning in the Department of Agricultural Economics, T.N.A.U Coimbatore. Out of these eight schemes, one important scheme is the Comprehensive Scheme for Studying the Cost of Cultivation of Principal Crops in Tamil Nadu funded by Government of Tamil Nadu. The data collected from the scheme is used to fix the Minimum Support Prices (MSP) by the Commission on Agricultural Prices and Costs (CACP). The important crops covered under the scheme are paddy, millets, cotton, sugarcane, groundnut, gingerly and coconut.

Agriculture Sector in Tamil Nadu has undergone transformations in terms of new agricultural policies relating to trade, input subsidies, and public investments. With the changing scenario in social, economic and environmental conditions, the agriculture in Tamil Nadu is facing lot of challenges. The labour scarcity in peak seasons of operations, water scarcity coupled with groundwater resource depletion/degradation are reported to be the major constraints in agricultural production. Keeping these issues in view, an analysis of trend in input use, including labour use pattern over years was performed using CCS data from years 1993-94 to 2005-06.

Changes in labour use

Technology generation including evolving of new varieties have two important objectives of (i) increasing yields and (ii) economizing input use and increasing input-use efficiency, thereby reducing unit cost of production. In Tamil Nadu agriculture, particularly in recent years, labour scarcity is becoming a chronic problem. The present analysis specifically focuses on tracing the trends in labour use in terms of use of human labour, bullock power and machine power and possible substitutions taking place, more specifically machine power replacing animal power and human labour either marginally or substantially. The data collected under the Cost of Cultivation Scheme is used for this purpose.

The use of human labour and animal power for various crops declined dramatically over the years. For instance, in paddy, the human labour use declined from 1041 hours per hectare in 1993-94 to 825 hours per hectare in 2005-06. Similarly, the use of animal power also registered a downtrend and declined from 75 hours per hectare to 20 hours per hectare during the above period. This is mainly because of the use of machinery for different operations particularly operations like ploughing and puddling the paddy fields by tractors, harvesting and threshing by combined harvester. This is evidenced by the use of machinery which registered an increasing trend over the years. On an average, the machinery use increased from 7.6 hours per hectare in 1993-94 to 14.7 hours per hectare in 2005-06. The reduction in human labour and animal power use is found to be common in almost all the crops.

Use of animal power declined over a 12 years period of time in all crops. In the case of groundnut weeding, earthing up and harvesting and in cotton the harvesting remain as human labour intensive operations. Whereas in other crops use of animal power declined significantly, ranging between 32 to 85 per cent and use of human labour declined considerably ranging between 13 to 43 per cent. Machine power was obviously the reason for this kind of substitution, the increase of which ranged between 21 per cent in sugarcane and 102 per cent in groundnut. This trend indicates the fast mechanizing agriculture, the need to innovate and introduce machines even for operations which are

currently done using human labour. Agriculture is bound to suffer in near future as a result of labour moving out of agriculture.

Changes in Machinery use

Farmers use mostly tractors, power tillers, power sprayers, thresher cum winnowers and combined harvesters for their farming operations. The use of machine power is mainly for preparatory cultivation, plant protection operations, harvesting and threshing operations, as revealed by the sample data. If this could be taken as an indicator of trend in farm mechanization, most of the farms cultivating crops like paddy, maize, sugarcane and cotton could well be termed as mechanized farms or farms having predominantly mechanized operations.

In cultivating the Maize crop, 95.95 per cent of the farms have used tractors for land preparation activities. This was followed by the farms cultivating paddy, where 77.99 per cent of the farms have used tractors for their preparatory cultivation. The percentage of farms that used tractors for preparatory cultivation was 70.83, 62.82, 59.88, and 59.09 for pulses, coconut, sugarcane and cotton, respectively in that order. Overall, 80.00 percent of the farms have utilized tractors and nearly 13 percent used power tillers for preparatory cultivation. It could be inferred that the farms in the state have started widely using machines in preparing their fields due to the paucity of draught animals, labour shortage and to ensure timeliness in carrying out the operations which are season bound.

As far the harvesting operations are concerned, nearly 52 per cent of the farms cultivating paddy have used combined harvesters. About 38 per cent of the paddy farms have used power threshers in threshing and winnowing the harvested paddy crop while 89.19 percent of the maize farms have used power threshers for threshing and winnowing of maize crop. The plant protection operations have been carried out using power sprayers and hand sprayers. About 48.47 and 45.45 per cent of paddy and cotton farms have utilized power sprayers for plant protection operations followed by 41.89 per cent of the maize farms. In general, the paddy farms were the most mechanized farms followed by maize, sugarcane and cotton farms. The results only indicate the need to be proactive in designing machinery on priority basis to suit the existing crop geometry or to alter crop geometry to suit use of machines depending upon the necessity.

Temporal Variation of Operation wise Wage Structure

An analysis on variations in the wage structure in Tamil Nadu was analysed using the CCS data bank. It could be seen that the average wage for the male labourer was Rs. 0.46 per hour and female labourer was Rs. 0.30 per hour during 1971-72 while it was Rs.20.56 (45 times) and Rs. 12.43 (41 times) per hour during 2008-09 for male and female labourer respectively. It could be inferred that among the various operations, harvesting and threshing operations attracted the highest wages. To conclude, Agriculture is bound to suffer from labour scarcity and high wage rates in the near future as a result of labour moving out of agriculture. This needs for the fast mechanization in all operations of agriculture,

Marketing of Vegetables Under Different Supply Chains in Tamil Nadu

Post harvest facilities from production linking to the market and consumption points help in the reduction of losses due to wastage. Recent efforts in the horticultural sector revolve around maximizing farmer's returns by ensuring a greater share of consumer's rupee and by avoiding post harvest losses. Public private partnerships are being encouraged to invest in marketing infrastructure. Similarly corporate houses are entering horticultural produce marketing in a significant manner. Their success in penetrating the retail horticultural marketing is as yet uncertain as is the case with other market attempts like farmers shandies. There is need for examining the changes that are happening in the market place for horticultural products in the light of emerging alternative supply channels. To understand the effectiveness of these newer supply channels the present study was undertaken. Various functionaries active in the market and their linkages in forming vegetable supply chains/market channels were assessed. Market intermediaries and their functions.

Delivery options available to farmer producers include Direct selling to consumers, Selling to retailers, Selling to wholesalers and Contract supply to corporate.

Delivery sources to the final consumers

In Urban areas (with concentrated housing localities) these include Wholesale cum retail markets, Farmers markets, Special vegetable and fruit retail stores, Corporate retail stores, General purpose retail stores, Push cart vendors and Head load/cycle vendors.

In Rural areas the options are Weekly shanties, Local general purpose retail stores and Neighborhood purchases (cash/barter).

General conclusions based on the study

- Traditional channels still dominant/expected to continue so
- Channels have preset actors, but links dynamic.
- Channels and margins dynamic depending on geographical demand and supply changes
- Absolute price levels more relevant from farmers point of view
- Margins fluctuate within ranges.
- Consumer and producer price fluctuations wider.
- Corporates started with agri product marketing veering round to general retailing
- Corporates have not made desired inroads
- Corporates so far have not helped to reduce middlemen and price spread
- Corporates source from commission mandies/wholesalers
- Direct procurement by corporates from farmers through contract farming yet
- to materialize
- Some improvements in grading, storage and quality of delivery in corporate stores
- Not much improvements in creation of temporal utility facilities like processing and cold storage

Four major Production constraints in vegetable Cultivation:

- High Cost of Agro inputs
- Availability of Labor
- Fluctuation in market price
- Pest and Disease incidence

Department of Agricultural & Rural Management

e-velanmai

e-velanmai - an ICT based Agricultural extension approach has been pilot tested in three sub-basins of Tamil Nadu. It is found to be an effective ICT based, demand driven and participatory technology transfer model in agriculture to provide timely agro advisory services by a multidisciplinary team of agricultural scientists to the farmers using ICT tools on need basis. About 1230 farmers had enrolled as members in the scheme to avail advisory services of TNAU Scientists. Based on the pilot test results, e-velanmai model of extension is planned to upscale in 23 sub-basins of Tamil Nadu state during 2010-11.

Sustainable Management of Tank Water Resource

The following policies are recommended for the sustainable management of tanks in Tamil Nadu.

- Strengthen the existing WUA by empowering them to fix water charges for irrigation and collect it from the farmers to meet out the O & M activities of the tanks. Later based on the performance of the empowered WUA, turning over the responsibility of managing the tank irrigation system, its maintenance, right to control other benefits of tank to the WUA would promote the sustainable use of irrigation water and management of tanks. The village Panchayat working along with the WUA in regulating and enforcing the property rights is recommended.
- Women should be given representation among the office-bearers of the WUA and encouraged to participate actively to meet the needs of women folk connected with tanks.
- The rainfed tanks may be subjected to rehabilitation on a watershed basis considering the tank system as a whole comprising the catchment area, tank bed, physical structures and the command area. Soil conservation measures and afforestation programs may be planned in the tank catchment area to conserve soil and prevent silt deposition in supply channel and in the tank bed.

Empowering the WUA could be an innovation in the institutional arrangement to facilitate collective action of the tank users, intensify the property rights over the tank resources, reduce the competition and conflicts among users, evict the encroachments in the tank effectively, coordinate with various other institutions managing the tanks thereby promoting effective conservation of tank resources and sustainable management of tank irrigation system in South India.

Department of Agricultural Extension and Rural Sociology

The Department of Agricultural Extension and Rural Sociology, CARDS has implemented two research programmes during the period under report.

The NADP sponsored programme entitled “Technology Assessment and Designing Extension Module for Precision Farming through Farmers Participatory Research and Extension” was organised in North Western Zone of Tamil Nadu which includes Salem and Namakkal districts where precision farming project had been implemented. The KVK located in the study area and State Department of Agriculture have been involved in the programme. A total of 6 blocks viz., Gangavalli, Vazhapadi, Ayodhiyapattinam, Edapadi and Kolathur blocks of Salem district and Namagiripettai block of Namakkal district were selected.

Salient findings of the project are furnished below

- The technology awareness and adoption of Precision Farming technologies indicated more adoption with respect to fertigation (100%) and installation of drip irrigation structures (95%) by the beneficiaries only after the introduction of the scheme.
- The adoption of shade net, nursery and use of protrays in the nursery management was also found to the significant level
- Cent per cent adoption was observed for the recommended practices such as iron fertigation tank, tank size (60 lit), pressure management gauge and use of inline drippers.
- The highest awareness level of various components of shadenet was evident for the practices such as color of shadenet (95.00%), site selection (93.75%), net house orientation (78.75%) and selection of net screen type (66.25%).
- Cent per cent adoption of recommended practices viz., raised bed preparation and proper spacing was observed in Maize crop cultivated under precision farming
- Similarly cent percent adoption was found in basal application and raised bed preparation in Turmeric and proper spacing, removal of laterals, staking in Banana, proper spacing in Brinjal and Chillies.
- The travel path of innovations viz., “KVK-Exposure visit-Cluster group-Drip company-Respondents” was conceived as the best one by majority of respondents.
- Increased water saving (95.00%) and decreased cost of labour (60.00%) were the prime “facilitating factors” while less marketing facility (90.00%) and high investment (86.25%) were the “major inhibiting factors” as expressed by the beneficiaries.

Another project entitled “F38-DQ- Survey on Tsunami Affected Households” was implemented in Tsunami affected areas of Nagapattinam district of Tamil Nadu.

Salient findings of the project are furnished below

- Regarding the cost of cultivation, 44 percent of the paddy cultivating farmers had the expenditure upto Rs.7500/ha before traumatic. The cost of cultivation of paddy has increased slowly from 2004 to 2007.
- The technical efficiency estimates of the stochastic frontier production function and the frequency distribution of the technical efficiency among the farmers in different years showed no significant difference in the overall mean. The overall mean technical efficiency is 83 % indicating the scope for increasing the technical efficiency further by 17 % through adoption of improved crop management practices.
- The Gini coefficient showed that the income inequality was high during 2004 to 2005 and much more high during 2005, the year just after tsunami. After one year of tsunami, that is in 2006 and 2007, the Gini coefficient level was found reduced implying that the farmers were able to cope-up with the after-effects of tsunami.
- The results of the paired 't' test indicated that PTSD symptoms like sleep problems, nightmares, depression, jumpiness, the need to withdraw from others, irritability, frequent mood swings, a bad conscience, a fear of places and situations and muscular tension were high immediately after tsunami and it was significantly reduced after five years

Department of trade and intellectual property

1. *Evaluation of Rockefeller Foundation Research and Technology: Transfer Projects on Drought Tolerant Rice*

In Tamil Nadu there are more than 10 land races which are occupied one-third of total rice area in the rainfed rice regions. These were not producing any significant yield gains for the farmers. Therefore, spreading the newly developed DT varieties is crucial for second 'green revolution' in agriculture, which has to come from rainfed ecosystem. In this context, Tamil Nadu Agricultural University developed and released DT rice varieties namely PMK1, PMK2, PMK3, AnnaR4 (PMK 4) and RMD1 which are capable of boosting the yield in rainfed areas. Several drought tolerant rice lines were developed and they are in the different stages of OFT (On Farm Trails), MLT (Multi Location Trials) and ART (Adopting Research Trials). Drought tolerant rice lines developed through concerted efforts include PM00 022, PM02 015, PM03 002, Ashoka 200F, Ashoka228, RM96019, IR64 near isogenic line #17, CPMB ACM 04003 and CPMB ACM 04004. Though, public sector forms one of the major sources of seed supply in Tamil Nadu State, these newly developed drought tolerant rice varieties are not being produced in the State Seed Farms. Tamil Nadu Agricultural University has taken the task of production and distribution of drought tolerant rice varieties and supplied 50047 kg of seeds of DT varieties to the farmers since 2003 covering an area of 667 ha.

Impact of drought tolerant rice varieties due to yield and price advantages over the existing check varieties cultivated by farmers in the rainfed rice region under similar conditions was estimated. The outcome of the research study show that adoption of drought tolerant rice varieties would bring substantial gain to the farmers who grow DT varieties over the existing varieties. Additional benefits due to cultivation of drought

tolerant rice varieties compared to land races in an area of 667 ha is estimated at Rs.8.48 million without drought and Rs.2.12 million with drought. DT varieties are cross bred of land races and high yielding varieties with drought tolerant trait and white slender grain quality suitable for rainfed cultivation and household consumption. Hence, DT varieties are preferred over land races and also have high marketability. Though high yielding varieties are qualitatively superior over DT varieties in terms of grain and marketability, they are susceptible to drought.

In Ramnad district alone rice is cultivated in 0.13 million ha and it is clear that spread of drought tolerant rice varieties would bring substantial gain if the rate of adoption of drought tolerant varieties would be higher among farmers. Currently, in the absence of any formalized systems of seed supply, most of the adoption occurs through farmer to farmer seed exchanges and other informal means in these marginal environments. With more often occurrence of drought in these rainfed environments, it is necessary to enhance the adoption of these drought tolerant varieties to sustain both household food and income security. This could be possible only by improving the existing seed supply and other market mechanisms to realize the full benefits of these technologies for farmers living in marginal environments.

2. Market Survey for Agricultural Products in Abroad and Promotion of Agricultural

Exports from Tamil Nadu

Export of non-bastmati rice from Tamil Nadu is negligible. In terms of Net Protection Coefficient (less than one), export of rice from Tamil Nadu will be competitive. Domestic Resource Cost (DRC) estimates indicate that it is cheaper to produce locally and export rice to world market. The Indian rice export market expanded after 1995 and is in increasing trend. The reason for the increasing trend is due to liberalization policies and the demand of Indian rice in the world market. However, at present the rates of applied and bound tariffs are equal. Hence, imports of rice will affect rice productivity and livelihood of million of farmers as such there is no leverage to increase the custom duty. Aromatic short grain like Jeeraga samba and non-aromatic quality rice like White ponni released by TNAU have good potential for export. However, it is necessary to improve their yield potential for competitive price in the international market. Improvement of these varieties or development of high yielding varieties possessing same quality characteristics is needed for export purpose. Similarly export potential of horticultural products is unlimited. However, use of Hazard Analysis Critical Control Point (HACCP) system needs to be promoted as a basis for regulatory food control and a standard for international food trade. To ensure safety of the commodities like fruits, vegetables and processed products exported, the HACCP system will be helpful to minimize the problem of contaminants thereby increasing the competitiveness of the products in the major importing countries like Australia, Canada, New Zealand, USA and European Union. Specification of quality/codex standard for export of indigenous fruits and vegetables need to be developed. Phytosanitary regulations for importing vegetatively propagated materials need a relook/revision and rigorous enforcement. There is a need for development of bulk handling system of tropical fruits, including pre-cooling and CA/MA storage and post harvest protocols for sea transport of major fruits like banana, mango, litchi, sapota, and pomegranate. Disinfestation technology including vapour heat treatment (VHT) for export of fresh fruits and extension of shelf life by preventing desiccation of vegetables should help in further export promotion. The major factor for

the revival of floriculture is the growth in the domestic market and the appearance of smaller units. The reason for latter is economic smaller units have lower overheads. The domestic market has reduced sole dependence on the vagaries of export market, with its too short season, providing a longer season within in the country. While the overseas season lasts from December to mid-February, the domestic market begins in August and goes on to mid-February. Training and extension work play a crucial role in the development of this sector.

CENTRE FOR PLANT MOLECULAR BIOLOGY

Dept. of Plant Molecular Biology and Biotechnology

At this Department of Plant Molecular Biology and Biotechnology efforts are made to improve major crop varieties for biotic and abiotic stress tolerance and nutritional quality through genetic transformation and marker assisted breeding.

Drought Tolerant Rice Variety released during 2009

A promising drought tolerant rice variety namely Anna (R) – 4 (derivative between Pantdhan 10 x IET 9911) was developed through farmers participatory plant breeding approach in collaboration with Dept. of Plant Breeding and Genetics, AC&RI, Madurai, ARS, Paramakudi and CSRC, Ramnad. This variety belongs to short duration group (100-105 days) and has a maximum yield potential of 3.7 t/ha under rainfed conditions.

Bunchy top virus (BBTV) resistant Banana

Hill bananas, known for their special flavour and long shelf life, are unique to the state of Tamil Nadu, India. Like other bananas, hill bananas are also susceptible to banana bunchy top virus (BBTV). None of the strategies now available are able to completely protect hill bananas against the virus. Efforts have been made at the Centre for Plant Molecular Biology, TNAU with a view to engineering resistance in hill banana cultivar, Virupakshi through RNAi technology. A suitable regeneration and transformation protocol has been standardized for the hill banana using immature male flower bud as explant. Replicase gene has been cloned from BBTV genome and used for constructing RNAi vector. This RNAi vector was used for genetic engineering of BBTV resistance in hill banana. About 75 putative transgenic hill banana plants are now under evaluation under green house conditions.

Cloning and characterization of agronomically important genes

Indigenous *Bacillus thuringiensis* strains of about 500 numbers were isolated in TNAU from samples of diverse regions of Tamil Nadu. A new holotype of *cry2A* gene has been cloned from the indigenous isolate of Bt and designated as *cry2Ai*. Arrangements are being made for collaborative research to use the new Bt gene for development of transgenic crop plants.

With a view of improving bioavailability of nutrients in maize kernels, transgenic maize lines showing over-expression of *phytase* enzyme are being developed. In this regard, a *phytase* encoding gene has been cloned from *Aspergillus niger* and characterized. Genetic transformation studies are in progress.

Drought and salinity are the major abiotic stresses affecting rice production in major rice growing areas of Tamil Nadu. With a view of improving drought tolerance in rice through genetic engineering, putative candidate genes namely, OsDREB1A, OsDREB1B, Osmotin and DREB2 have been cloned from a drought tolerant upland rice variety namely "Apo". Experiments for further characterization of these genes are in progress.

WATER TECHNOLOGY CENTRE

Physiological comparison of surface and sub-surface drip fertigation in rice

Preliminary research conducted at Water Technology Centre, Coimbatore during Kuruvai (2009) season indicated that higher grain yields of 6342 and 5907 kg ha⁻¹ were recorded with the sub-surface and surface drip biofertigation system respectively at 125 % PE + 100 % RDF + *Azophosmet*. This was 23.8 and 15.3 per cent more yield than the control treatment receiving surface irrigation at IW / CPE ratio of 1.0 + soil application of 100 % RDF.

Results of IAMWARM Project

SRI

During 2008-09, SRI demonstrations were extended to an additional 16 numbers of Phase II sub basins resulting in physical area achievement of 2581 ha (1801 and 780 ha for Phase I and II, respectively) and an impact area of 10782 ha (8629 and 2153 ha for Phase I and Phase II, respectively). In I phase the percent increase was 31.3 where it was 35 percent in II phase sub-basins. The overall average yield recorded under SRI was 7432 kg ha⁻¹ and conventional practice was 5482 kg ha⁻¹. Intervention of SRI practices increased the rice yield up to 38.4 per cent over conventional method of planting.

CROP: MAIZE

IPT (Improved Production Technologies) for maize

The physical area achieved in I Phase sub basins was 272 ha and 180 ha in Phase II sub basins. Thus the overall physical area achieved for 2008-09 was 452 ha. In case of impact area, the total impact area was 2531 ha (1631 and 900 ha for Phase I and II, respectively). Overall average yield of IPT was 7183 kg ha⁻¹ and conventional was 5420 kg ha⁻¹. The yield increase of 38.7 per cent was found in IPT maize compared to conventional.

CROP: PULSES

IPT for pulses

The total physical area covered was 3494 ha (2556 and 938 ha for Phase I and II, respectively). The achievement in impact area was 9959 ha (7147 and 2812 ha for Phase I and II, respectively). The physical area achievement for 2009-10 for Phase I sub basins was 448 ha and for Phase II sub basins 78 ha with an overall achievement in physical area of 526 ha. The impact area attained was 750 ha.

IPT for gardenland pulses

Intervention of IPT on garden land pulses increased the pulse yield to the tune of 34.0 per cent over conventional practice in II phase sub-basins. The overall average yield recorded under IPT was 827 kg ha⁻¹ and conventional practice was 616 kg ha⁻¹.

IPT for rice-fallow pulses

Implementation of IPT on rice fallow pulses increased the yield up to 34.5 per cent over conventional farmer practices. The over all average yields realized in improved production technology demonstrations and conventional practice were 686 and 505 kg ha⁻¹, respectively.

CROP: OILSEEDS

IPT for Groundnut

The overall average yields realized in IPT demonstrations and conventional practices were 1912 and 1536 kg ha⁻¹, respectively. The percentage increase over conventional was 29.3.

IPT for Sunflower

Intervention of IPT on sunflower increased the seed yield to the tune of 30.9 per cent over conventional practice. The overall average yield recorded under IPT was 1631 kg ha⁻¹ and conventional practice was 1261 kg ha⁻¹.

CROP: COTTON

IPT for Cotton

Demonstrations of IPT on cotton in 6 sub basins increased the cotton yield up to 33.4 per cent over conventional practice. 1883 and 1411 kg ha⁻¹ seed cotton yields were recorded under IPT and conventional, respectively.

IPT for other field crops

Other field crops includes Cotton, sunflower and groundnut In 2008-09, the physical area demonstrated was 1083 ha (662 and 421 ha for Phase I and II, respectively). The impact area achieved was 7100 ha (5150 and 1950 ha in Phase I and II, respectively). During 2009-10, the physical area achievement was 489 ha (209 and

280 ha for Phase I and II, respectively). The total impact area attained was 1475 (475+1000) ha.

Others

Study on groundwater balance

- Parambikulam-Aliyar basin is located in the south western part of the Peninsular India which covers an area of 2388.72 km² and one third of the basin is under hilly tract with dense forest and tea plantations.
- The circulatory ratio (Re) values for the Aliyar, Valayar, Solaiyar and Palar sub basins are 0.5347, 0.543, 0.254 and 0.471 respectively
- The relief ratio (Rn) value for the four sub basins ranges from 0.0052 to 0.0676.
- Sholayar sub basin has form factor (Rf) value of 0.974 which is greater than 0.7854 indicating that the basin is not a perfectly circular basin. Palar basin has lowest Rf values of 0.195. Sub basins of Sholayar and Valayar exhibit higher values, an indicator of having higher peak flow for shorter duration.
- Palar and Aliyar basins exhibit elongation ratio of 0.498 and 0.429 indicating that the basin is elongated. Valayar basin exhibits elongation ratio of 0.795 – 0.8, thus showing that the basin is oval. Sholayar basin possesses elongation ratio of 1.114, proving that the basin is circular.
- The drainage density values for all the four sub basins viz., Aliyar, Valayar, Solaiyar and Palar lie in the range of 0.543 to 0.759.
- The annual and seasonal rainfall of the 27 stations located in the study area for the years 1988-2008 are collected and analyzed.
- In terms of percentage, the post monsoon and pre monsoon rains contribute 20 to 25 % (plains) and 9 to 17 % (hills) of the annual rainfall.
- In terms of percentage, the southwest monsoon rains contribute 15 to 17 % (plains) and 42 to 77 % (hills) of the annual rainfall.
- In terms of percentage, the northeast monsoon rains contribute 60 to 63 % (plains) and 14 to 41 % (hills) of the annual rainfall.
- It has been noticed that in the case of plains about 60 % of the rain is received during the northeast monsoon and in the case of hills about 60 % of the rain is received during the southwest monsoon.
- Water level data indicated that rise in water level takes place coinciding with pre-monsoon, south-west monsoon and north-east monsoon respectively.
- In all the wells, the shallowest water table occurs during the month of December and afterwards the water level declines gradually depending upon the rainfall and groundwater abstraction.

Conjunctive use of surface and groundwater sources in the Parambikulam Aliyar Project (PAP) Command

- Parambikulam Aliyar basin spreads 3462 square kilometers out of which Hillock is 1480 square kilometers. The total command area worked out to 1,74,553 ha.
- Aliyar basin has an old Ayacut to an extent 2591 ha and new Ayacut to an extent 1796 ha. Five from old Ayacut and four canals from new Ayacut irrigate 20,558 ha.

- Palar sub basin has old Ayacut to an extent 1302 ha. It has two components one being system tanks and other being direct Ayacut. New Ayacut is 15263 ha. In total the irrigation area under Palar sub basin is 174553 ha.
- Pollachi main canal (new ayacut) of Aliyar sub-basin has been selected for in depth water management study where the entire command has been divided into A zone and B zone with equal area and each zone gets canal supply once in alternate years.
- The hydraulic particulars of Pollachi main canal and distributary no.4 of Pollachi main canal were collected for water balance study.

Management of groundwater quality in the Parambikulam-Aliyar basin

- Most of the samples come under medium salinity class (C_2) (56.7%)
- Chloride concentration in most of the samples (56.7%) come under excellent category
- Total hardness of the samples coming under safe category (83.3%)
- All the samples come under low sodium category ($S_1 < 10$ SAR).
- In the present study Permeability Index ranged from 26 to 87. There is no permeability hazard in the study area.

Impact of artificial recharge structure in percolation pond

- There was no recharge during summer for the years 2008 and 2009 in both study areas of Vellore and Coimbatore districts.
- Artificial recharge in the Elavambadi village is 9% to 17% during 2008 and 8 to 18% during 2009. In Kalapatti study area, recharge occurred is 5 -9% and in Vellanipatti area it is 7-11% during the year 2009.
- The influence of recharge **was higher in the closer wells**, followed by medium distanced wells and lower in distanced wells. Closer wells benefiting more than the distanced wells in all the study areas.
- There was significant amount of recharge occurred only during North east monsoon in both the years 2008 and 2009 which is found to be 17 and 18.1% respectively in Elavambadi village. During 2009, 9% recharge occurred in Kalapatti and 11.1% occurred at Vellanipatti study areas.
- During Southwest monsoon, 8-9% of recharge occurred in the study area for both the years 2008 and 2009 in Elavambadi village. 5.32% recharge occurred in Kalapatti and 7.47% at Vellanipatti during 2009.
- Water level fluctuation is found to vary between 1.1m to 2.14m in Elavambadi village, 1.2 to 4.5m in Kalapatti and 1.1m to 5.8 m in Vellanipatti during the year 2009.
- Medium level ($0.25 - 0.75$ dS m^{-1}) of salinity was observed in majority of the ground water samples collected from Elavambadi village. All the SAR values (<10) fall with in the safe limit and RSC value (<1.25 me L^{-1}) fall with in the safe limit and chloride concentration of the groundwater samples were also in the safe limit (<5 me L^{-1}). Hence groundwater in Elavambadi village is suitable for irrigation purpose in both the seasons.
- High salinity (>2.25 dS m^{-1}) was observed in majority of the ground water samples collected from Kalapatti village. There were no drastic variations in pH. All the SAR values (<10) and RSC value (<1.25 me L^{-1}) fall with in the safer limit which indicated

that the sodium concentration of groundwater is better utilized for irrigation purpose. The chloride concentration of the groundwater samples in most of the wells is found to be on the higher side. Therefore, the groundwater of this study area can be irrigated for crop production; nevertheless, chloride sensitive crops will face severe chloride toxicity.

- High salinity (0.75 – 2.25 dS m⁻¹) was observed in majority of the ground water samples collected from Vellanipatti village. pH was observed as neutral. All the SAR values (<10) fall with in the safe limit and RSC value (<1.25 me L⁻¹) fall with in the safe limit. Hence, the groundwater of this study area can be irrigated for crop production, but salinity has to be managed.

Volume of tank and economics for roof top rain water harvesting

Simulation of Rain Water Harvesting was done for Coimbatore City through tanks on daily basis for different collection tank volumes and also for two different types of end uses namely full potable use and only toilet flushing use. Seven years of daily rainfall data was used for study. The annual harvestable volume of water as a function of volume of collection tank was found out for both the types of uses.

The annual harvestable is shown in Table when water is used for all domestic uses and the cost of collection. Similarly, the annual harvestable is given in Table when water is used for only toilet use and the cost of collection.

Harvestable Water for All Domestic Uses and Cost of Harvesting

Sl. No	Tank Volume (litres)	Annual Harvestable Water from 100 m ² area (litres)	Cost of RWH Water per 1000 litres (Rs.)		
			FRP Tank	Ferrocement tank	Pond with plastic sheet
1	500	18805	28	17	11
2	1000	28612	31	17	8
3	1500	35063	35	18	7
4	2500	43320	45	21	7
5	5000	52484	70	32	8
6	7500	56467	97	43	9
7	10000	59223	122	53	10
8	12500	61009	147	64	12
9	15000	62795	171	74	13

Harvestable Water for only Toilet Use and Cost of Harvesting

Sl. No	Tank Volume (litres)	Annual Harvestable Water from 100 m ² area (litres)	Cost of RWH Water (Rs per 1000 litres)		
			FRP Tank	Ferrocement tank	Pond with plastic sheet
1	500	13764	38	24	14
2	1000	19364	45	25	11
3	1500	23111	53	27	10
4	2500	28010	69	33	10

5	5000	34779	106	48	11
6	7500	39425	138	61	13
7	10000	42739	169	74	14
8	12500	45405	198	86	16
9	15000	47877	224	97	17
10	20000	51571	276	119	20
11	25000	53179	334	144	24

The existing tariff slabs at present adopted is shown in Table. The Corporation announced an annual increase of tariff at 5 % per year. The service life of the rain water harvesting project is taken as 10 years. By standard economical procedures, the tariff slabs have been converted into equivalent slab for 10 years and shown in Table.

Tariff Slabs

Tariff Number	Bi-monthly Water Used (litres)	Type of Water Use	Present Payment Slab (2007) (Rs/1000 litres)	Equivalent Slab for 10 years (Rs/1000 litres)
1	Upto 50,000 litres	Domestic	4.50	5.40
2	50000 to 1,00,000	Domestic	6.00	7.20
3	1,00,000 to 1,50,000	Domestic	8.00	9.60
4	Upto 50,000	Non-Domestic	10.50	12.60
5	Above1,50,000	Domestic	11.00	13.20
6	50000 to 1,00,000	Non-Domestic	13.50	16.20
7	1,00,000 to 1,50,000	Non-Domestic	18.00	21.60
8	Above1,50,000	Non-Domestic	22.50	27.00

Economic analysis for using three different types of storage tanks namely Fibre Reinforced Plastic tanks, Ferro cement tanks and Pond with Plastic sheet lining was done. The cost of the tank is found to be a crucial factor in the economic analysis. With the existing tariff slabs, it is only for some tariff slabs, rain water collection through tanks is economical. If the Coimbatore Corporation aims to increase the RWH, either it should increase the Tariff rates of its supply still higher, at least above Rs.17 per 1000 litres. Or else, the rain water collection tanks should be provided at a subsidized rate.

HOME SCIENCE

1. Using green lentil in Traditional Indian foods

Value added lentil products such as sweets (*laddu, mysore pak*), savories (*karaboondhi, omapodi*), convenience foods like *appalam, idli* powder, spice powder and ready-to-cook *kheer* mix, *bisibelabhath* mix, *pongal* mix, *sambar* mix, *idli* mix and *dhokla* mix were standardized and distributed to the consumers through super markets in three districts namely Madurai, Trichy and Tirunelveli to assess the consumer preference.

2. Standardization of selected ethnic fermented foods and beverages by rationalization of indigenous knowledge

Based on the physical parameters, Kadasamba, IR 20, CO36 and Sona Ponni were found to produce good quality idli.

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

- On-farm evapo-cooling system was developed at Home Science College and Research Institute, Madurai could help to extend the shelf life of fruits and vegetables for reasonable period of time. The evapo cooling chamber was fabricated with locally available materials like metal plates, nylon net, gunny bags and thermocoal to prevent the entry of insects and flies.
- Our Honourable Vice-Chancellor appreciated the chamber as a useful device for the village people and uzhar sandhai and is very economical device.

4. Application of nanotechnology to enhance the bioavailability of phytochemicals in health foods

The optimization for preparation of nanodispersion was standardized. The antioxidant (α -tocopherol) was added to prevent degradation of carotene.

5. Development of hybrid in coconut with high copra and oil for chocolate making

The coconut hybrids containing less oil content from coconut Research Station, Veppankulam and Coconut Research Station, Aliyarnagar were evaluated for its suitability in chocolate making. Out of 48 varieties screened for making quality chocolate, it was observed that East Coast Tall and West Coast Tall variety were suitable for making chocolates. Consumer preference test proved its quality.

6. Development of technological packages for quality evaluation of healthy herbal tea

Among forty medicinal herbs screened, nine were found to be organoleptically acceptable for herbal tea preparation in the ratio of 1:4 (Tea dust : herbal powder)

7. Utilisation of rice bran in the development of rice bran beverages.

The standardized rice bran beverages has been found to be highly palatable for 21 days at 7° C storage. This beverage was found to contain antioxidant properties and good amount of dietary fibre due to the addition of bran.

TRANSFER OF TECHNOLOGY

Research findings of this college are disseminated to the public through skill oriented trainings. The following two projects are involved in women empowerment and capacity building through training in food processing.

1. Empowerment and capacity building of self help women through establishment of Agro Processing Centre (APC)

Seven off campus training and 20 on campus trainings were completed.

2. Economic Empowerment of rural women through promoting micro-enterprises – A pragmatic approach

Millet based products and ready-to-use mixes were standardized. These technologies were transferred through Seventeen training programmes and few of them have started their enterprises.

New externally funded schemes

The following projects were obtained during 2009 – 10

Sl. No.	Title of the project	External Funding Agency	Budget
1.	Occupational health hazards of women workers employed in call centres	Department of Science and Technology, New Delhi	9,13,800
2.	Developing Community based approach for prevention of Anemia among young rural women in Virudhunagar District	Department of Science and Technology, New Delhi	6,55,000
3.	Formulation and Development of Nutraceutical Products from <i>Solanum nigrum</i>	National Medicinal Plants Board, New Delhi	15,00,000

DIRECTORATE OF AGRI BUSINESS DEVELOPMENT

The days of traditional agriculture are gone. Today's agriculture is viewed with a business outlook. During the process of commercialization, it becomes absolutely essential to supply quality inputs, timely advice, creation of value chain and beyond all stretching a helping hand to the needy. Established in the year 2007, Directorate of Agribusiness Development, TNAU has made concerted efforts to promote agribusinesses through single window system and several outreach programs. The prime objective of this Directorate is to deliver quality inputs of TNAU, and expert scientific services to the farmers and industry on Public Private Partnership basis.

Commercialization of Technologies / Products

During 2009-10, five technologies / products viz., TNAU-Herbal insect repellent, TNAU-Multi row power weeder for SRI, TNAU-Insect egg removal device, TNAU-Liquid biofertilizers inoculants and TNAU-Solar crop drier (Tunnel type) have been commercialized through six different private entrepreneurs by way of signing MOU with the University. In addition, one MOU has been signed with M/S Bioseed Research India (P) Ltd., Hydrabad for collaborative research on the use of Cry gene of Bt from TNAU. As a high end activity to nurture entrepreneurship, Agribusiness Business Incubator

(ABI-TNAU) in collaboration with ICRISAT has been established during 2009-10 at this Directorate. Through National Research Development Corporation (NRDC), Ministry of Science and Technology, GOI, New Delhi, fifteen technologies have been short listed for commercialization.

Consultancy Services

Experts of TNAU undertook seven National and one International consultancy projects during the year 2009-10, and generated an income of Rs.1.99 lakh to the University. The consultancy services were undertaken in the fields of Precision farming, Rain water harvesting, Production of liquid biofertilizers and Landscaping. The international consultancy project was undertaken in the capacity to strengthen seed and plant health inspection at FAO country office, Afghanistan..

Venture Capital Scheme

Launched in the year 2003, Venture Capital Scheme is an innovative approach of TNAU with twin objectives of helping farmers and stock holders by providing quality agricultural inputs like seeds, seedlings, grafts, organic compost, biofertilizers, biocontrol agents, coconut tonic and services through custom hiring of agricultural implements at a nominal cost. The revenue generated through these schemes are used for laboratory and infra structural development of various departments and research stations in the University. During 2009-10 twelve new schemes with a budget estimate of 28.10 lakh have been sanctioned. From all the 143 venture capital schemes operated in the University, an amount of Rs.24.09 lakh has been received as institutional charges (25% of total revenue generated) during 2009-10.

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 bio-data 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 five years (2006-10), about 4101 fresh graduates (2006: 609; 2007: 724; 2008: 804; 2009: 840; 2010: 1124) had registered in the roll. Recently, Radio Frequency Identity Card (RFID) 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.	Diploma in Agri	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
5	2010	768	248	1	107	1124
	Total	2694	1204	96	107	4101

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 five years 2006-10, 73 campus interviews had been conducted which helped about 2151 graduates to get employed in various organizations involving 276 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 five job fairs had been conducted which benefited fresh graduates to acquire employment well before getting 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
5	2010	15	1	44
	Total	72	5	276

Sector-wise Students Placement

No	Sectors	UG					PG & Ph.D				
		2006	2007	2008	2009	2010	2006	2007	2008	2009	2010
1	Agro-industries	281	111	221	226	315	92	3	76	115	49
2	Seed Industry	8	12	12	16	4	2	19	3	10	0
3	Food Industry	15	2	6	8	23	13	10	3	4	5
4	Fertilizer industry	-	2	-	5	0	0	4	-	2	0
5	NGOs	4	15	-	5	28	3	0	-	4	0
6	Plantations	2	-	-	5	42	-	-	-	2	0
7	Banking	7	13	6	15	25	23	92	84	55	44
	Total	317	155	245	280	437	133	128	166	192	98

Industrial visits

The Director (Students' Welfare) and Professor (Students' Welfare) visit agro-based industries and interact with HRD personnel in order to gain feed back about the performance of TNAU graduates and besides inviting them for Campus Interviews for recruitment. During the visit, about university, courses offered, capacity building of students, special features in the curriculum which makes an edge over other degree programs and performance of students already working in various organizations will be briefed.

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 disadvantageous 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 were recruited in 2008-09 and 69 graduates were recruited in 2009-10 in five banks. 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 five years, 73 students (2006, 16; 2007, 17; 2008, 24; 2009, 10; 2010, 6) have cleared civil service. Coaching is given to students with a fee of Rs. 2000 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.

Number of graduates cleared Civil services, IFS and other sectors during the last five years

Year	Civil services	IFS	Other sectors
2006	16	6	450
2007	17	5	283
2008	24	3	411
2009	10	14	472
2010	6	6	95
Total	73	34	1711

Career Development Courses

Besides civil service coaching, Career Development Courses like Computer C & C+, Tally, TOEFL, Business English Certificate, IELTS and Hindi were offered and totally 154 students were benefited from the course during 2009-10

Career Development Course details 2009-2010

S.No.	Activity	No. of students benefitted
1	Civil Service	35
2	Computer C & C+	23
3	Tally	20
4	TOEFL	21
5	Business English Certificate	28
6	IELTS	15
7	Hindi	12
	Total	154

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 2009-10, the Directorate of Students' Welfare conducted a two day Workshop on "***Career Guidance*** " during March 10, 2010 at the Agricultural College & research Institute, Coimbatore, in order to facilitate the out-going undergraduate students to get themselves prepared for immediate placement. About 450 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 benefited and employed.

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, GRE and IELTS. In the past four years, 114 students (2006, 23; 2007, 23; 2008, 36; 2009, 32; 2010) 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).

Dual Degree Program

Under Dual Degree Program for Under Graduates, two students have gone to Nova Scotia Agricultural College, Canada to study B.Tech (Environmental Horticulture) for three semesters during 2009-10.

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.

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

Distance Learning Programmes

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.

(i). Candidate Enrollment & Completion (2009 – 2010)

Sl. No.	Course	No. of candidates enrolled (2009 – 2010)	No. of candidates completed (2007 – 2009)
	PG Degree		
1.	MBA	50	11
2.	M.Sc. (Environmental Management)	24	5
3.	M.Sc. (Sugarcane Technology)	19	24
	PG Diploma		
1.	Food Biotechnology	-	-
2.	Production and Quality Control in Medicinal Plants	-	4
3.	Bioinformatics	-	-
	Total	93	44
	Certificate Courses (Tamil)	339	339
	Certificate Courses (English)	76	76

(ii). External Fund Mobilization

- A proposal was sent to the Distance Education Council, New Delhi for receiving the development grant and an amount of Rs. 15 lakhs was sanctioned. The expenditure is planned as follows:
 - 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 2010 – 2011 has also been sent for sanction.

- A Project on NAIP component I “Innovations in Technology Mediated Learning : An Institutional Capacity Building in using re-usable learning objects in Agro-Horticulture” is principally sanctioned for an amount of Rs. 41.45 lakhs and is to be operated from 2009 – 2012 (3 years).

(iii). Curriculum Development

- A bachelor degree programme (Bachelor of Farm Technology) for farmers is to be organized through distance learning by Tamil Nadu Agricultural University. In this regard, all faculty Deans were called for a meeting and the technologies available in each faculty were invited for consolidation to propose a curriculum and syllabus.
- Efforts are being taken for editing the course material for all the ODL PG programmes.

(iv). Promotional Activities

- Intensive publicity were given in Indian Express, Dailythanthi, Mathurubhoomi, Vanigavelanmai, Ulavarin Valarum Velanmai and many leading newspapers about the ODL programmes of TNAU.
- A press meet was held on 06.09.2009 with the Vice-Chancellor to sensitize the ODL courses among the civics at Chennai
- Advertisement on ODL programme in Vaniga Velanmai (August 2009)
- Contacted number of sugar industries (21) and their special officers towards sensitization about ODL programme on M.Sc. (Sugarcane Technology).
- A live telecast programme about ODL of TNAU on 13.09.2009 in Sun TV between 11.00 am – 12.00 noon was given by the Director (ODL).
- Participated and exhibited the ODL course details for enrollment on advertisement through magic shows for Agri Intex 2009 held at CODISSIA Complex from 02.10.2009 to 05.10.2009. A news bulletin for spot admission during this Agri Intex fair was also arranged.
- Necessary arrangements were made for Farmers Day exhibition to promote ODL activities on 27.10.2009.
- Organized a meeting at the Office of the District Chief Education Officer, Town Hall to create an awareness on ODL programmes

- The Director, ODL participated in a live telecast programme of Sun TV the Varthaga Ulagam and delivered a talk on job opportunities in agriculture sector on 29.11.2009 at Chennai.

(v). Other Activities

- Organized an inaugural function of ODL Programmes for the academic year 2009 – 2010 and launching of the portal specially developed for ODL activities on 19.09.2009.
- Foreign universities were contacted to explore the possibilities of conducting ODL courses *viz.*, Uganda, Singapore and Mauritius
- Discussions were held for mutual exchange programmes between ODL and University of Cologne, Germany in offering the certificate programmes of ODL to the vocational trainees of University of Cologne, Germany during February 2010.
- A workshop with the scientists from the University of Guelph, Canada and other NGO groups regarding a collaborative projects with CIDA was arranged during March 2010.
- ODL zonal meetings were arranged by identifying ODL coordinators from each research stations / academic campuses at the following places.
 - ✍ East Zone : 05.03.2010 at Trichy
 - ✍ South Zone : 23.03.2010 at Madurai
 - ✍ West Zone : 09.04.2010 at Coimbatore
 - ✍ North Zone : 19.04.2010 at Tindivanam
- The Steering Committee meeting of ODL were conducted on 26.08.2009 and 19.01.2010 under the Chairmanship of Director (ODL) to discuss on the efficient conduct of the ODL programmes and launching of new programmes *viz.*,
 - ✍ Eco-friendly pest management
 - ✍ Plant quarantine
 - ✍ Energy Management
 - ✍ Multimedia Techniques in Agriculture and
 - ✍ Bachelor of Farm Technology for Farmers and the proceedings were sent to approval of the Vice-Chancellor.
- The vehicle TDU 1186 Ambassador Car was condemnation and auctioned.
- The Directorate of ODL served as a Coordinator for Video Committee to arrange CCTV, Video and photography in connection with Centenary Building opening ceremony on 27.10.2009 and consolidated the report on the 4th National Conference on KVKs during November 2009.
- Distance Education institutes *viz.*, Bharathiar University, MKU, AU and MU were addressed and visited by the staff for collecting information on the norms followed for ODL admissions.

(vi). Conferences / Seminars attended

- The workshop on “Open Educational Resources in Agriculture” organized by ICRISAT, Hyderabad on 13.07.2009 was attended by the Director (ODL).
- 15th Annual Conference at Kashmir University, Srinagar and paper presentation on Distance Education Programmes of TNAU from 05.11.2009 to 07.11.2009.
- An International Seminar on “Digital Libraries” entitled “Knowledge sharing through distance education” held at New Delhi during February 23 – 25, 2010 was attended and paper presented.

- A National Seminar on “Coordination and Quality Control in Distance Education” entitled “Premium Education in Distance Learning programmes of TNAU” was attended at Sardarshahr, Rajasthan during February 20 – 21, 2010

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) :8,200
- Brochures :28,800
- TNAU Newsletter :2,675
- All the course materials pertaining to Distance learning programmes viz., PG Degrees, PG Diploma programmes and Certificate courses are being printed at this unit.
- Income generated :Rs. 17,59,179

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 coverages : 31
- Video lessons sold : 225
- Video editing : 31
- DVD Conversions : 27
- Audio commentary : 12
- Video film produced : 9
- Video script prepared : 15
- Plummy assignment
 - i. Produced a magic show depicting the significance of ODL programmes
 - ii. Produced a consolidated Thumb-nail-sketch of IAMWARM programme for Water Technology Centre
- Income generated : Rs. 3,03,777/-

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.

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 2010, thirteen new crop varieties TNAU Rice CO 50, TNAU Rice TRY 3, TNAU Wheat COW 2, TNAU Sorghum CO 30, TNAU Blackgram CO 6, TNAU Groundnut CO 6, TNAU Sunflower Hybrid CO 2, TNAU Sugarcane SI 7, TNAU Coconut ALR 2, TNAU Brinjal VRM 1, TNAU Tomato Hybrid CO 3, TNAU Chilli Hybrid CO 1 and TNAU Celery OTY 1 were released for cultivation by farmers. During this period, two new farm implements and one technology were also released for use by the farming community.

Rice

- Works on root phenomics
- Characterization of induced materials for drought resistance.
- MAS to introgress BLB & Blast resistance into parental lines of released and pre release hybrids.
- Research on hybrids for aerobic and drought prone environment.
- Development of rice varieties tolerant to coastal and inland salinity

Maize

- Artificial screening of maize germplasm against downy mildew and turicum leaf blight has been initiated in the field condition. Maize cultivars were collected from the Directorate of Maize, New Delhi and evaluated in the field conditions and those promising line were selfed and the seeds were collected for confirmation studies.

Forage crops

By poly cross breeding work, an elite Lucerne culture ACP 1-2 has been identified and sponsored to All India Coordinated Varietal trial under AICRP on Forage Crops during Rabi 2010-11.

Castor

- Effect of land configuration and nutrient management on physiological characters and productivity of castor hybrid in rainfed condition
- Effect of spatial management and plant ideotype for yield maximization
- Physiological, anatomical and biochemical characterization of *Fusarium* wilt resistant castor genotypes
- Determination of fertilizer use efficiency under drip fertigation schedule for Hybrid castor
- Developing composting technology for eco-friendly utilization of castor and tapioca wastes. Study on integrated management of castor wilt under in-situ field condition during June'2010.

Microbiology

1. Open Tower Chamber (OTC) installed for methane emission and carbon flux studies at a cost of 10.00 lakh under NAIP scheme in the Wetlands, TNAU, Coimbatore
2. Three proposals were filed for patenting
 - a. Pigment production from *Thermomyces* sp.
 - b. Chitin extraction from Silk worm waste and
 - c. Protocols for wine production from fruits

Biotechnology

The major focus of research programs at Centre for Plant Molecular Biology is towards manipulating biotic and abiotic stress tolerance and nutritional quality of major crop plants through genetic transformation and marker assisted breeding. During 2010-11, eleven new research programs have been initiated to improve major crops viz., rice, wheat, cotton, sesame and vegetables for tolerance against drought, salinity, diseases, insect pests and to improve nutritional quality. The new research programs undertaken at this centre are being funded by Department of Biotechnology, New Delhi and various private agencies.

Three new research programs have been initiated to improve resistance against pests and diseases in rice, wheat and vegetables through genetic engineering. This centre has also established linkages with leading Private Biotech firms' viz., BASF India Ltd., Bioseed Research India (P) Ltd., etc., in developing and evaluating transgenic crop plants exhibiting enhanced level of resistance against pests and diseases. A challenging research program has been initiated with the support of DBT, New Delhi to develop sesame varieties with improved oil quality through genetic engineering. Two new research programs have also been initiated to identify and isolate novel gene(s) conferring resistance against wheat rust and salinity tolerance in rice using recent tools in molecular biology. New research programs have also been initiated to develop drought tolerant cotton varieties and flooding tolerant rice varieties through Marker

Assisted Selection. Basic research activities have also been initiated to understand the biodiversity of insects, testing bioefficacy of transgenic lines by utilizing the expertise available at this centre.

Nano Science and Technology

The Tamil Nadu Agricultural University is the first State Agricultural University in India to establish an exclusive Department of Nano Science & Technology with a view to initiate research in the cross-cutting areas. Nanotechnology is a sunrise technology being exploited in a wide array of fields such as electronics, energy, environment and biological sciences including agriculture. The advent of scientific inventions to evolve nanoformulations that is capable of improving the use efficiency of agricultural inputs while preserving the natural resources. The Nanotechnology Center was established with an initial investment of Rs. 12.0 crores on state-of-the-art infrastructure facility, sophisticated equipments and trained human resource. The Center is currently working on nano-inputs (nano-fertilizers, nano-herbicides, nano-pesticides), biosensors (seed sensor and early detection of diseases), food systems (nano-films and nano encapsulation of functional foods) besides nano-remediation of pollutants in soil and aquatic systems. Our institute is fostering multi-faceted research collaborations with national and international organizations. We intend to provide advanced education and research opportunities to young graduates for taking the inventions from the laboratory to the farming community.

Facilities available

The TNAU Nanotechnology Center has a state-of-the-art Instrument Hub equipped for synthesis, characterization and applications of nano-particles in agriculture. The Centre encompasses Transmission Electron Microscope (TEM), Scanning Electron Microscope (SEM), Atomic Force Microscope (AFM), Raman Spectrophotometer, Ultra Probe Sonicator, GC-MS, Ultra Centrifuge, Ultra Microtome, Confocal Microscope, X Ray Diffraction (XRD), Spray Drier, Gas permeability Tester (GPT), Carbon and metal evaporator and Ion Sputter

On-going research projects

- Nano-fertilizer for balanced crop nutrition
- Controlled release of Nanoherbicides for rainfed agriculture
- Neem based nanopesticide for insect pest management
- Customizing nanoparticle for improving the seed quality
- Biosensor for early detection of plant diseases
- Developing high barrier nanocomposite films for food packing
- Nanoencapsulation of functional foods
- Nano-films for improving self-life of preserved foods
- Nano-remediation of pollutants in soil and aquatic systems using nano-scale zero valent iron (Fe⁰) particles

Accomplishments

- Synthesized laboratory scale nano-fertilizer and being tested for its use efficiency by crops

- Fabricated controlled release nanoencapsulated herbicide for weed management in rainfed agriculture
- Refresher Training programme organized for period of five days (12.7.2010 to 16.7.2010) to faculty of TNAU constituent and affiliated colleges

Proposed research programs

- Soil health maintenance
- Slow-release nano-fertilizers and nano-composites
- Nanoherbicides for effective weed control
- Carbon nanotubes to promote seed germination
- Nanosensors
- Smart delivery system for early detection of diseases
- Nanodevices for Identity Preservation (IP) and Tracking
- Nanobiotechnology
- Nano-Food Industry
- Nanotechnology for environmental safety

Plant protection

Utilization of organic wastes for the production and formulation of entomopathogenic fungi for Eco-friendly pest management of white grub

- Two promising entomopathogenic fungi isolates, *Metarrhizium anisopliae* isolate *M. a. 3* and *M. a. 2* and one *Beauveria bassiana* isolate *B. b. 2* were found promising to white grub
- Application of 20 ml of fungal suspension mixed with 1 Kg of manure at the concentration of 2.4×10^7 /ml was found effective
- Two white grub species *Holotrichia serrata* and *Schizonycha ruficollis* were got identified through specialist

Bacterial melanin as UV protectant for biocontrol agents

- Isolated native isolate of entomopathogenic nematode from Madurai
- Isolated melanin producing bacteria for UV protection of biocontrol agents

Testing new insecticide formulation, Thiamethoxam 75% SG for its crop vigour effect in cotton, sugarcane and groundnut

- Groundnut plants, drenched with Thiamethoxam 75% SG @ 280, 240 and 200 gm/ha during 20 days after sowing enhanced the growth of plants (plant height, number of leaflets, number of branches) besides managing the population of leaf miner and aphids
- TSS in sugarcane, treated with various doses of Thiamethoxam 75% SG was recorded

Biological testing of spinetoram 12 SC and Sulfoxaflor 24 SC against major cotton pests and their natural enemies

- Second season experiment on the bioefficacy of spinetoram 12 SC against major cotton pests and their natural enemies has been initiated

Evaluation of bio-efficacy of Alika 247 ZC and Thiamethoxam 30% FS against insect pests of groundnut, maize and Bengal gram

- Maize seeds treated with Thiamethoxam 30% FS @ 5.0 ml/kg seeds was found to be effective in managing early crop stage insects, shoot fly, stem borer, aphids and termite
- A field trial on Bengal gram has been initiated on 10.12.2010 to test the efficacy of Thiamethoxam 30% FS, as seed treatment
- Drip fertigation studies in Redgram APK 1 revealed that application of NPK as combined with Salicylic acid improved seed set by 20 %.
- Use of cashew nut shell liquid to that Blackgram seeds against chemicals was effective at 4 ml/kg.

Release of papaya mealybug parasitoids

A field day was organized to release the Parasitoids for the biological control of papaya mealybug at Thimmarasanayakkanur village in Aundipatti block of the Theni District on 22.12.2010. Three parasitoids were released by the District Collector Dr. P. Muthuveeran, I.A.S. The Parasitoids in culture tubes (200 Nos of parasitoid/culture tube) were also distributed to six farmers and also to farmers at Tiruchi, Perambalur and Salem Districts at free of cost.

Horticulture

HC&RI, Periyakulam

Varietal evaluation

- To find alternate variety for PKM – 1 tamarind, sweet tamarind germplasm evaluation is under progress

Advanced culture - Vegetable Cowpea ACC. No. 6

Performance of the culture tested in different centres through ART and MLT

- MLT has been conducted at eight different research stations of TNAU and found that the culture performed well in all the locations tested.
- Similarly Adoptive Research Trial (ART) has been conducted at seven districts of Tamil Nadu at farmers fields which also performed well in these locations.
- One acre demonstration trial has been conducted at Upparpatti Village near Theni where in the performance was extremely well.
- Under AICRP (Vegetable Crops) it is proposed to conduct trials at All India level.

HRS, Kodaikkanal

- The grafts of apple varieties Mollies delicious, Gala mast, Vista bella, Mayan, Starkrimson, Red delicious, Lal ambri, KKL-1, Golden delicious and Golden spur, almond varieties Merced, Primorskij, Pranyaj, Non Pareil, Waris and I x L, apricot varieties CITH- Apricot No.1, CITH- Apricot No.2 and CITH- Apricot No.3, walnut varieties CITH walnut No.1, CITH walnut No.2, CITH walnut No.4, CITH walnut No.6, CITH walnut No.7 and CITH walnut No.12 were planted in field No.2 on 21.07.2010 under ICAR- Network Project on “Outreach of Technologies for Temperate Fruit Crops”.
- Sixteen peas varieties were collected from all over India and planted for evaluation.
- Sixteen beans varieties were collected and planted under polyhouse condition.
- For the introduction of grape, variety red glow was planted and maintained under polyhouse condition.
- Initiated production of garlic planting material programme under NHM sponsored by Directorate of Arecanut and Spices Development, Calicut.
- Planted five varieties of strawberry received from KF, Pune.
- Under Venture Capital Scheme (V60 BU) eucalyptus oil extraction and production of planting materials are done regularly.
- Under Venture Capital Scheme (V60 GK) production of mushroom spawn, honey and vermin compost work has been initiated and soil samples were analyzed whenever samples received.
- The following trainings were conducted during this period:

FRS,Thovalai

New crops introduction: Gladiolus

New species introduction: Heliconia

- Heliconia spiralfan*
- Heliconia sunrise*
- Heliconia excelsia*
- Heliconia chartacea*
- Heliconia caribaea*

Bird of Paradise

- Sterilitzia nicolai*

New variety introduction: Heliconia

- Heliconia chartacea* var. i. Sexy Scarlet, ii. Temptress
- Heliconia caribaea* var. i. Caribaea Red, ii. Caribaea Cream
- Heliconia wagenariana* var. i. Wagenaria Pumpkin, ii. Wagenaria Turbo
- Heliconia angusta* var. i. Orange Christmas

1. Scented rose

- Button rose
- Gladiator

- Standardization of mat based banana cultivation system under NE zone of Tamil Nadu
- Collection and evaluation of musk melon cultivars (*Cucumis melo*) suitable for north eastern zone of Tamil Nadu.

Cassava

- Integrated management of *Cyprus rotundus*
- Design and development of foliar concoction to improve yield and quality
- OFT with TCRS castor PGR consortia was initiated in three locations at Namakkal and three locations in Salem district for improving pistillate efficiency and improving yield
- Determination of water use efficiency under different fertigation schedule
- Assessment study on eco-friendly technologies adoption Study on evaluation of drip fertigation
- Standardization on low input technology
- Integrated weed management

Extension

- ICAR sponsored short course on “Gender Mainstreaming through Technology Empowerment” was organized during 15.9.2010 to 24.9.2010 for the benefit scientists of State Agricultural Universities.
- NABARD sponsored training on “Value addition of Non Wood Forest Products” was organized during 10.11.2010 to 12.11.2010 for the benefit of farmers from various districts of Tamil Nadu.
- One day farm school on maize was organized on 22.7.2010 at Thondamuthur block, Coimbatore district.
- Training on “Establishment of Farmers’ Interest Groups under Societies Registration Act (TN)-Procedures and modalities” was organized at Thondamuthur block, Coimbatore district on 03.01.2011.
- Training programme on “Clonal Propagation of Tree Seedlings in collaboration with State Forest Extension Centre, Dept. of Forestry, Tamil Nadu” was conducted on 07.01.2011 at Viraliyur, Thondamuthur block, Coimbatore district.
- IWDP/DPAP Evaluation studies for the following districts were conducted during the period under report
 - Mid-term evaluation of DPAP-XI watersheds in Tiruvannamalai District
 - Mid-term evaluation of DPAP-V watersheds in Namakkal District
 - Mid-term evaluation of DPAP-IV watersheds in Tiruvannamalai District
 - Impact evaluation of IWDP-I watersheds of Villupuram District
- Agri Intex 2010 – Regional Agricultural Fair for Southern Region was held from 30th September to 3rd October, 2010 at CODISSIA Trade Fair Complex, Coimbatore and the Department of Agricultural Extension and Rural Sociology, CARDS participated and exhibited the activities.

A field day was organized at AEC&RI, Kumulur, Trichy District to demonstrate “Grain Amaranth and Rice Bean Cultivation” on 24.12.2010. Sixty farmers of Trichy District participated in the programme. Being a seed production centre, the farmers were elaborated about the cultivation and marketing of grain amaranth and rice bean.

- Training on “Rice seed production technology” was organized at Tamil Nadu Rice Research Institute, Aduthurai for five days from 18.01.10 to 23.01.10, to 1000 farmers (200 per day) for the farm beneficiaries from selected seed villages in Kodavasal block of Tiruvarur district. Scientists of Tamil Nadu Rice Research Institute imparted the training on seed production technologies covering

cultivation, plant protection and economics of seed production to the seed producers.

- A Field Day on “Application of post emergence herbicide for pulses crop” was conducted and a Seminar on “Post emergence herbicides in pulses” on 09.03.2010 at TRRI, Aduthurai
- Awareness program on “Weather, climate and farmers” was conducted on 18.03.10 by the Agro-Met Advisory Unit, Aduthurai. 156 farmers from 6 Cauvery Delta districts viz., Thanjavur, Tiruvarur, Nagapattinam, Trichy, Pudukkottai and Perambalur were participated.
- The Clima Rice programme was launched in two villages viz., Thirubhuvanam in Thiruvaidaimaruthur taluk and Manalur in Thirupanandal taluk of Thanjavur district which represent the Cauvery Old Delta Zone. Preliminary meets were arranged in both the villages on 20.07.10 and 21.07.10 respectively.
- The BPD – Entrepreneurial hub was launched at TRRI, Aduthurai on 22.07.10. About 80 participants from various places in the district attended the program.
- Awareness programme on Warehousing (Development and Regulation) was jointly conducted by the Central Warehousing Corporation, Kumbakonam and TRRI, Aduthurai on 20 & 21.08.10
- A two days interactive workshop on Rice Knowledge Management Portal, (RKMP) an innovative farm knowledge dissemination network for the benefit of stake holders mainly the rice farmers in the Tamil Nadu was held at TRRI, Aduthurai on 2 and 3.12.10.
- A B.F. Tech three years degree programme for the farming community in Tamil was inaugurated on 04.12.10 at TRRI, Aduthurai.

List of MoUs signed between TNAU and other academic institutions and private companies from February 2010 to December 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.	Nokia India Private Limited ,Radisson complex, New Delhi-110037	NAIP-Domestic and Export Market Intelligence Cell	Dr.N.Ajjan Director (CARDS)	One year from 24.09.2010
2.	Department of Biotechnology, Ministry of Science and Technology, New Delhi	Molecular mapping of Mungbean Yellow Mosaic Virus (MYMV) resistance genes in blackgram (<i>Vigna mungo</i> (L.) Hepper)	Dr.P.Jayamani	Dec. 2010 to Dec. 2013
3.	Kancor Ingredients Ltd., Cochin	Evolution of Lucerne genotype possessing high biomass and chlorophyll content	Dr.C.Babu, Assoc. Professor PBG) Dr.K.Velayudham Professor (Agron.)	June, 2010 to May, 2015
4.	M/s. BASF, Hyderabad	Field evaluation of chlormequat chloride 50% SL in onion	Dr.C.N.Chandrasekhar Assoc. Professor	Aug 2010 – July 2011
5.	M/s. Sri Ramcides Chemical Pvt. Ltd., Chennai	Field evaluation of Allwin Top Drip special under Fertigation in bhendi	Dr. S. Vincent Assoc. Professor	Sep 2010 - Aug 2011

6.	M/s. Novozymes South Asia (P) Ltd., Bangalore	Studies on the effects of biostimulant (NovoBAC) on morpho- physiological characters and yield in maize, cowpea and chilli	Dr. P. Jeyakumar Assoc. Professor	Nov 2010 – Oct 2012
7.	Mahindra and Mahindra Limited	Mahindra Samriddhi stipend for Undergraduate students	Dean (Agriculture)	2011-2012
8.	Kancor Ingredients Ltd., Cochin	Evolution of Lucerne genotype possessing high biomass and chlorophyll content	Dr.C.Babu, Assoc. Professor (PBG) Dr.K.Velayudham Professor (Agron.)	June, 2010 to May, 2015
9.	GOI-DBT, New Delhi	Utilization of organic wastes for the production and formulation of entomopathogenic fungi for Eco-friendly pest management of white grub	Dr. S. Manisegaran Prof.& Head (Agrl. Entomology)	July 2009 to March 2012 (6.8.09)
10.	GOI-DBT, New Delhi	Development of new functional microbial consortium formulation suitable for Bio-fertigation and phyllosphere spray in precision farming	Dr. SP.Sundaram Prof.& Head (Agrl. Microbiology)	Nov 2009 to Oct 2012
11.	Institute of Applied Microbiology, Justus Liebig University, Giessen, Germany	DST – BMBF Indo German collaborative research project on Development of a pilot plant for rice based constructed wetland system and preevaluation of microbial diversities for purification of cassava sago factory waste water	Dr.K. Kumar, Prof. and Head	July, 2007 To Till date
12.	M/S. Poabs Biotech Pvt. Ltd., Palghat	Explanation of Biofertilizer Production (Transfer of liquid biofertilizer technology on consultancy mode)	Dr.K.Kumar, Prof. & Head and Dr.G.Gopaldaswamy, Prof.(Biotech)	April, 2010 to Mar.2011
13.	M/S. Novozymes, Canada	R&D project Development of newer inoculation for N and P nutrition and evaluation of their stability in nanoclay formulations”	Dr.K.Ilamurugu, Prof.(Ag.Micro)	Jan, 2011 to Dec.2013
14.	M/S. University of East Anglia, United Kingdom	Assessment of the potential for biochar as substrate for microorganisms used for the biofertilization of soils as transfer of technology	Dr.P.Santhanakrishnan, Prof. (Ag.Micro)	June, 2010 to Feb.2011
15.	World Noni Research Foundation (WNRF), Chennai.	Development of organic production techniques for noni (<i>Morinda citrifolia</i>) under varying water regimes through drip irrigation for higher yield and post harvest quality	Dr. V. Ponnuswami Dean (Horticulture) HC & RI, Periyakulam	Three years

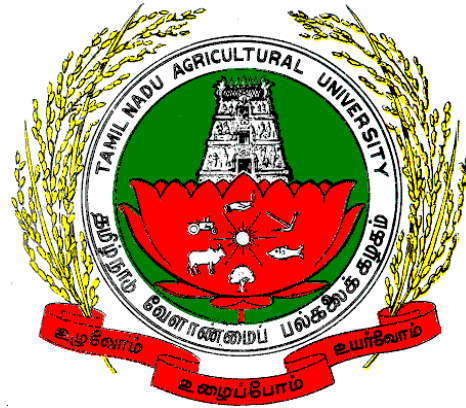
16.	Department of Biotechnology, Ministry of Science and Technology, New Delhi	Molecular mapping of Mungbean Yellow Mosaic Virus (MYMV) resistance genes in blackgram (<i>Vigna mungo</i> (L.) Hepper)	Dr.P.Jayamani	Dec. 2010 to Dec. 2013
17.	External funded scheme NABARD	Drum seeding and Mechanical weeding for Productivity Profitability and Prosperity of Rice Farmers	Prof. & Head RRS, Paiyur	2010-2011& 2011-2012
18.	External funded scheme NABARD	Sensitization of farmers on the recent and improved rice production technologies for higher productivity, profitability and prosperity	Prof. & Head	22-24.9.2010 (3 days)
19.	External funded scheme ATMA, Krishnagiri	Management of Anthracnose disease of Mango for higher productivity	RRS, Paiyur	Nov. 2010 Nov.2011
20.	FTTF - NABARD	Augmenting productivity of lead crops in Krishnagiri district	Prof. & Head	2010 to 2013
21.	ICAR fully financed schemes	Coordinated Trials in small millets.	RRS, Paiyur	2010-2011
22.	NABARD- CAT	Quality seed production for rainfed crops	Prof. & Head	28.01.2010 to 30.01.2010
23.	NABARD- CAT	Non monetary cost input techniques in dry land agriculture	RRS, Paiyur	21.01.2010 to 23.01.2010
24.	NABARD-CAT	Creating awareness on Precision Farming in Vegetable Cultivation Techniques under Pilot Project on Augmenting the productivity of Lead Crops.	Prof. & Head	24.05.2010 to 25.05.2010
25.	NABARD- CAT	Creating awareness on Pulses Cultivation Techniques under Pilot Project on Augmenting the productivity of Lead crops.	RRS, Paiyur	20.05.2010 to 27.05.2010
26.	NABARD- CAT	Empowerment of Farm Women on Beekeeping for Sustainable Livelihood	Prof. & Head	27.9.2010 to 29.9.2010
27.	M/G.Glo tech Private Limited, Trichy	Bio-efficacy study of Neem based organic fertilizer "Memato gro" for Brinjal crop	RRS, Paiyur	Nov.2010 to Oct.2011
28.	ATMA, Krishnagiri	Development of technology package on electronic form to be shared through IT Net Work	Prof. & Head	2010-2011
29.	ATMA, Krishnagiri	Studies on zinc nutrition to saline soil rice cultivation.	RRS, Paiyur	2010-2012
30.	NABARD FIPF	Technological Demonstration of Sustainable Sugarcane Initiative (SSI) for improving	Prof. & Head	2011-2013

		Sugarcane Productivity in cool dry zone of Tamil Nadu.		
31.	Mahindra & Mahindra Limited.	Making Tractor based solution for puddling rice field	Dr. D.Manohar Jesudas	One year 20.10.2010
32.	EID Parry India Ltd, Pugalur	Developing integrated remediation technology for improving salt affected soils at Orathai, Karur District.	ENS, CBE	April 2010 – March 2013
33.	DST	Bioremediation of contaminated soils in different agro-ecological zones of TamilNadu.	ENS, CBE	June 2010 – March 2013
34.	Sakthi Sugars Ltd	Study on long term impact of Distillery effluent on Soils and Crop.	ENS, CBE	August 2010 - March 2013
35.	Amaravathy Co-Operative Sugar mill Pvt. Ltd, Krishnapuram.	Effect of long term application of post methanated distillery spentwash on soil, water & crops.	ENS, CBE	Jan 2010 – Dec 2012
36.	Salem Co-Operative Sugar mills Ltd, Mohanur.	Assessing the long term impact of bio methanated distillery spentwash on crop, soil and ground water quality.	ENS, CBE	July 2009 – June 2012
37.	Monsanto Biotech (India) Ltd.	Studies on optimizing irrigation and fustigation schedule under drip fustigation system in Bt cotton	Dr.P.Muthukrishnan Prof. & Head (Agron.)	1.4.2010 to 31.3.2012
38.	M/s Talco-Dintec, Dindigul	Influence of treated tannery effluent along with domestic waste water on sustainable crop production	Dr.Mohamed Amanullah Prof. (Agron.)	1.4.2010 to 31.3.2013
39.	ITC Limited	Evaluation of wellgro soil, wellgro pellets (PHF) and wellgro grains on growth and yield of turmeric and banana	Dr.E.Somasundaram Assoc. Prof. (Agron.)	1.4.2010 to 31.3.2012
40.	FMC India Ltd.	Evaluation of sulfentrazone 4%F for the weed control efficiency in sugarcane and its residual effects on succeeding crops	Dr.C.Chinnusamy Prof. (Agronomy)	1.4.2010 to 31.3.2013
41.	Pioneer Overseas Corporation, Hyderabad	Bio-safety research trials level-1 for transgenic stacked corn hybrids (TC 1507 x NK 603) in India	Dr.C.Chinnusamy Prof. (Agronomy)	1.4.2010 to 31.3.2012
42.	Mansanto India Ltd. Mumbai	Bio-safety research trials level-1 for transgenic stacked corn hybrids (MON 89034 x NK 603)	Dr.C.Chinnusamy Prof. (Agronomy)	1.8.2010 to 31.7.2011

43.	United phosphorus Ltd., Mumbai	Bio-efficacy evaluation of UPH-309 and (PSE) 10% WP and their effect on soil physico-chemical properties and soil microflora and fauna and succeeding crops	Dr.P.Murali Arthanari Asst. Prof. (Agron.)	1.8.2010 to 31.7.2012
44.	Rallis India Ltd. Bangalore	Evaluation of post emergence herbicide, RIL-029-F1 (10% SC) for bio-efficacy and phytotoxicity in transplanted rice	Dr.P.Murali Arthanari Asst. Prof. (Agron.)	1.8.2010 to 31.3.2012
45.	RENY Marketing, Coimbatore	Manufacturing and establishment of solar crop dryer (tunnel type) for commercial production and marketing	Dr.P.Venkatachalam Prof. & Head, Bioenergy	Ten years from 4.5.2010
46.	IOT-Mabagas Ltd. Mumbai	Design engineering slurry management and enrichment based value addition for solid and liquid manure of the poultry litter based biogas plant	Dr.P.Venkatachalam Prof. & Head, Bioenergy	26.11.2010 to 26.11.2013

44th RESEARCH COUNCIL MEETING

17th February, 2011



AGENDA NOTES

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

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