

Directorate of Research
Tamil Nadu Agricultural University
Coimbatore 641 003

85th Scientific Workers' Conference 2020

(2nd Interim Meeting of the 84th SWC 2019 held on 11.03.2020)

(Webinar)

Venue : Anna Auditorium, TNAU, Coimbatore

Date : 25.09.2020

No	Remarks	Action Taken
I GENERAL		
1	The next meeting will be of regular 85 th SWC and has to be scheduled during July 2020 (Action : Director of Research)	• The 85 th Scientific Workers Conference 2020 is scheduled on September 25 th , 2020 at Anna Auditorium, TNAU, Coimbatore through Zoom online mode.
2	A publication from the Hindu Business Line carrying compilation of various important articles on agriculture needs to be made available in Library of TNAU for reference purpose. (Action : Director of Research)	• A publication from the Business Line HINDU was made on " A Handbook on Indian Agriculture 2020 " with a 20% discounted price of Rs.1200/-. The Dean (Students' Welfare ordered and distributed 25 copies to all the TNAU College libraries of TNAU. The Director of Research communicated all TNAU Deans / Directors / Heads of Departments to purchase the book for their respective libraries as a reference book utilizing the funds available in externally / private funded projects. More than 100 books have been ordered by various units in TNAU.

3	<p>Refresher training for the officers in Agriculture, Horticulture, Marketing, Seed Certification and Agricultural Engineering is to be conducted for duration of 3 days 40 per batch. Such Training can be organized at Coimbatore and Madurai Campuses. Four batches of Trainees 2 each in Coimbatore and Madurai (2 Batches x 2 Locations x 40 per batch = 160) has to be scheduled for every quarter of the year. Both DEE & DR TNAU should ensure updated course contents and comfortable stay and other logistics. DOA to explore the necessary required funds from ATMA.</p> <p>(Action : DoA, DHPC, AED, CAM & AB, DEE, Dir. Res. Dean Agrl.Eng..)</p>	<ul style="list-style-type: none"> The Refresher Training for Middle Level Extension Functionaries of State Department as detailed below <table border="1" data-bbox="1196 320 2085 1394"> <thead> <tr> <th>Department</th> <th>Officials</th> <th>Numbers</th> <th>Date</th> </tr> </thead> <tbody> <tr> <td rowspan="2">Agriculture</td> <td rowspan="2">ADAs</td> <td>294</td> <td></td> </tr> <tr> <td>I Batch (149)</td> <td>Aug. 24-28, 2020</td> </tr> <tr> <td></td> <td></td> <td>II Batch (145)</td> <td>Sept. 14-18, 2020</td> </tr> <tr> <td rowspan="2">Horticulture</td> <td rowspan="2">ADHs / HOs</td> <td>385</td> <td></td> </tr> <tr> <td>I Batch (193)</td> <td>Aug. 31-Sept. 4 2020</td> </tr> <tr> <td></td> <td></td> <td>II Batch (192)</td> <td>Sept. 14-18, 2020</td> </tr> <tr> <td>Ag. Marketing</td> <td>DDs / ADAs</td> <td>35</td> <td></td> </tr> <tr> <td>Ag. Engineering</td> <td>AEs / JEs</td> <td>150</td> <td></td> </tr> <tr> <td>Seed Certification & Organic Certification</td> <td>SCO & Seed Insp.</td> <td>25 25</td> <td></td> </tr> </tbody> </table>	Department	Officials	Numbers	Date	Agriculture	ADAs	294		I Batch (149)	Aug. 24-28, 2020			II Batch (145)	Sept. 14-18, 2020	Horticulture	ADHs / HOs	385		I Batch (193)	Aug. 31-Sept. 4 2020			II Batch (192)	Sept. 14-18, 2020	Ag. Marketing	DDs / ADAs	35		Ag. Engineering	AEs / JEs	150		Seed Certification & Organic Certification	SCO & Seed Insp.	25 25	
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The training is scheduled to be conducted during the period Aug. 24 to Oct. 23, 2020, through virtual mode, by the Directorate of Extension Education, TNAU, Coimbatore. The Refresher Training for Batch-I of Dept. of Agriculture was held during Aug. 24-28, 2020; and for Batch-I of Dept. of Horticulture & Plantation Crops during Sep. 1-5, 2020.

Annexure – I

DoA - ATMA

TNAU vide E mail dt 12.8.2020 has communicated the training schedule and participants list for the **Online Refresher Trainings** through Zoom for Middle Level Extension Officers for a period of five days (afternoon sessions) in two batches as per the following schedule with budget requirement of **Rs.1.6475 lakh**.

No.	Batch No	No of officers to be participated	Training Dates
1.	Batch-I	149	Aug. 24-28, 2020
2.	Batch-II	145	Sep. 14 - 18, 2020
	Total	294	

		<p>Accordingly, the Online refresher training for the 1st batch has been completed covering subjects like new and emerging technologies viz., nanotechnology, organic farming, e-Extension, empowering youth for self- employment and income generation in post Covid period, emerging trends in weather-based agro advisories, integrated management of invasive pests, remote sensing applications in agriculture, marketing reforms, and advances in farm mechanization etc.,</p> <p>The training for 2nd batch will commence for 145 no of ADAs during Sep14-18th, 2020.</p> <p>DHPC</p> <ul style="list-style-type: none"> • TNAU conducted a refresher training course through online for 193 HO/ADH on 31.08.2020 to 04.09.2020. • The Second Batch training is proposed during 21.09.2020 to 25.09.2020 for 192 ADH/HO
4	<p>For strengthening the research on the management of Fall Armyworm, a sum of Rs.5 Cr has been sanctioned by the State Government. In next meeting, amount spent and research undertaken using this sanctioned fund to be informed. Such efforts should continue for other pests & diseases. The research components and its time frame have to be validated.</p> <p>The TNAU Plant protection wing should intimate the pest and disease incidence to APC, DoA and DHPC regularly through WhatsApp or Messages. The action taken in this to be reported during next meeting.</p>	<p>The FAW Project entitled Developing Integrated Pest Management Module for Maize Fall Armyworm and Validation under Areawide Integrated Pest Management (AWIPM) through Farmer Participatory Approach in Tamil Nadu funded by GoTN became operational during June 2020.</p> <p>Shri. Gagandeep Singh Bedi I.A.S., Agricultural Production Commissioner and Principal Secretary to GoTN inaugurated this R&D Project and Methodology Workshop on 28.07.2020 in the Webinar. The Vice-Chancellor of Tamil Nadu Agricultural University Dr. N. Kumar, presided over the function</p>

	<p>(Action : CPPS, TNAU)</p>	<p>accompanied by Th. V. Dakshinamoorthy, I.A.S., Director of Agriculture and galaxy of scientists from TNAU. Dr. K. Prabakar, Director (CPPS) welcomed the gathering and set the stage. Dr. K.S. Subramanian, Director of Research, highlighted the innovative ideas infused in the project. Dr. R.J. Rabindra, Former Director (NBAIR) and Dean (PGS), CAU, Imphal and International Authority on Biological Control of Invasive Pests joined as Project Consultant on 13.07.2020. Dr. N. Muthukrishnan, Professor and Head (i/c), Department of Agricultural Entomology, TNAU, Coimbatore, proposed a formal vote of thanks. Dr. N. Sathiah, Prof. & Head, Dept. of Agrl. Entomology has been nominated as Nodal Scientist (FAW Scheme) with effect from 01.09.2020. Research Scholars on contractual basis as per Project approval were selected with concurrence of the University and have been inducted in FAW project activities.</p> <p>Annexure - II</p>
5	<p>Crop Production Manual 2020 for Agriculture & Horticulture – Efforts should be taken to print these books in Government Press for circulation to all field officials. Status to be updated in the next meeting</p> <p>(Action : DoA & DHPC)</p>	<p>IAMWARM</p> <ul style="list-style-type: none"> Action for printing 3,000 copies in Government Central Press is in progress vide G. O. (Rt.) No. 153, Agriculture (AP1) Department, dt., 25.08.2020 <p>DHPC</p> <ul style="list-style-type: none"> Soft copy of the manual sent to Government Printing press on 18.03.2020 requested to produce 3,000 copies of the Crop Production Manual.

II VARIETIES & SEEDS

1	Rice	
	A. Paddy	
	<p>i. CO-52 (MGR 100)</p> <p>The process of purification of CO 52 is to be presented in the next meeting</p> <p>(Action : CPBG, TNAU)</p>	<ul style="list-style-type: none"> • The nucleus seed was reconstituted in 2019 - 2020 from the carefully selected single plants for true to type as well as for the presence of Pi54 gene for blast resistance and much care has been taken for maintaining the genetic purity. • The breeder seed production has been taken up during September 2020 for the supply during June 2021
	<p>ii. TPS – 5: (Rice for southern districts)</p> <p>The performance was appreciated by the Department. The DoA is to intend Breeder Seeds of TPS – 5 to TNAU for multiplication, besides giving wide publicity on the use of TPS 5.</p> <p>(Action : DoA & CPBG, TNAU)</p>	<p>CPBG</p> <ul style="list-style-type: none"> • Breeder Seed Supplied during 2020 <p>480 kgs of TPS 5 Rice Breeder seed has been supplied</p> <p>DOA</p> <ul style="list-style-type: none"> • 400 kg of Breeder Seeds of Paddy variety TPS – 5 was indented and received in Kanyakumari and Thirunelveli districts for the year 2020-21. • About 5 acres were raised in SSF, Karaiyiruppu, 12.50 acres in SSF, Thirupathisaram and about 5 acres in farmers field, at Cheranmahadevi block.

iii. TRY-3: (Salt tolerant Rice Variety)

FLDs in saline patches of Nagapattinam involving KVK, Needamangalam and JDA, Thiruvarur to produce seeds to farmers and inform the fact in the next meeting.

(Action : CPBG, Seeds & DoA)

- Totally 200 demonstrations on TRY 3 saline tolerant rice variety are being laid under NFSM scheme at Nagapattinam district by the State Dept. of Agriculture.
- TRY 3 rice variety was cultivated in 3,990 ha in Nagapattinam district during 2019-20, and it is expected that this variety will be cultivated in 4,500 ha during 2020-21. Further, 61.16 tonnes of seed is available at the Block Extension Centres for distribution to farmers.
- 6,000 kg of TFL seeds of TRY 3 variety is available at ADAC & RI, Trichy, which has been intimated to JDA, Nagapattinam.

TANSEDA/PoS

TRY 3

- Since this variety is already under cultivation in the salt affected areas and there is stock of 237 MT of certified seeds of paddy for distribution during 2020-21, the FLD with this variety may not be needed.
- However, It is programmed to organize demonstration with TRY3 to an extent of 200 ha under NFSM-Rice in the blocks of Thirumurgal, Sirkali, Kollidam, Sembanarkoil, Kilvelur, Nagapattinam, Keelaiyur, Vedaranyam and Thalainayur of Nagapattinam district. The cultivation of the variety will be taken up during October 2020.

	<p>iv. VGD-1: (as alternate for Jeeraga samba rice)</p> <p>A meeting has to be organized for rice exports and traders to promote this variety at a large extent in the month of April 2020 involving CAM & AB</p> <p>(Action : CAM & AB, CPBG & Dir. Res.)</p>	<p>TANSEDA</p> <ul style="list-style-type: none"> This variety was released and notified during 2019 and 500 Kg of breeder seeds have been received for taking cultivation during Rabi 2020-21. The performance of the crop will be furnished during ensuing Rabi season in the SSFs of Thiruvallur, Villupuram, Salem, Erode, Trichy, Thanjavur, Nagapattinam, Thiruvarur, Madurai, Theni and Virudhunagar districts. 															
2	PULSES																
Indent of various pulses and quantities to be made																	
<table border="1"> <thead> <tr> <th data-bbox="286 917 405 1145">Sl. No</th> <th data-bbox="405 917 600 1145">Crop</th> <th data-bbox="600 917 741 1145">Varieties</th> <th data-bbox="741 917 943 1145">Qty. Of Breeder Seeds to be intended (Kg)</th> <th data-bbox="943 917 1451 1145">Remarks</th> <th data-bbox="1451 917 2056 1145">Action Taken</th> </tr> </thead> <tbody> <tr> <td data-bbox="286 1145 405 1412">1.</td> <td data-bbox="405 1145 600 1412">Black gram</td> <td data-bbox="600 1145 741 1412">ADT 6</td> <td data-bbox="741 1145 943 1412">400</td> <td data-bbox="943 1145 1451 1412">Rice fallow pulses. To replace ADT 3, action taken to multiply ADT 6 for distribution during 2021 has to be reported in the next meeting. (Action : DoA)</td> <td data-bbox="1451 1145 2056 1412">TANSEDA/PoS 400 kg of breeder seeds of ADT 6 have been indented for Rabi 2020-21 and the seed production will be taken up in SSF, Cuddalore after the receipt of Seeds.</td> </tr> </tbody> </table>	Sl. No	Crop	Varieties	Qty. Of Breeder Seeds to be intended (Kg)	Remarks	Action Taken	1.	Black gram	ADT 6	400	Rice fallow pulses. To replace ADT 3, action taken to multiply ADT 6 for distribution during 2021 has to be reported in the next meeting. (Action : DoA)	TANSEDA/PoS 400 kg of breeder seeds of ADT 6 have been indented for Rabi 2020-21 and the seed production will be taken up in SSF, Cuddalore after the receipt of Seeds.					
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1.	Black gram	ADT 6	400	Rice fallow pulses. To replace ADT 3, action taken to multiply ADT 6 for distribution during 2021 has to be reported in the next meeting. (Action : DoA)	TANSEDA/PoS 400 kg of breeder seeds of ADT 6 have been indented for Rabi 2020-21 and the seed production will be taken up in SSF, Cuddalore after the receipt of Seeds.												

		VBN 9 (2019)	200	Rice fallow pulses. It has to be tested for Rice Fallow condition in June 2020 and certified seeds to be supplied to farmers in 2021. The plan of action and timeframe to be presented. (Action : DoA)	TANSEDA/PoS 200 Kg of breeder seed indented and the seeds were received late due to COVID-19 lockdown. It will be raised during September-October 2020.
		KKM 1	220	Suitable for southern districts. A feedback has to be given on the performance on this variety in Southern District during next meeting. (Action : DoA)	TANSEDA/PoS Feedback received from districts: Thirunelveli - Spreading type, Moderately resistant to Yellow Mosaic Virus (YMV). Does not withstand water logging. 600 kg/ha yield is observed. The variety is less preferred by the farmers. Nagapattinam – Poor yielder and moderately resistant to Powdery Mildew and YMV. 600 kg/ha yield is observed. Trichy : 600 kg/ha yield is observed.
		Co 6	58	Suitable for Western districts. A feedback has to be given about the variety performance in Western zone during next meeting. (Action : DoA)	TANSEDA/PoS CO 6 : Since the advance indent for the year 2020-21 has not been made, it is not included in the 2020-21 seed supply.

		VBN 6 (2011)	848	Kharif season. DoA to give status and feedback in July 2020 meeting.	TANSEDA/PoS VBN6: About 208 kg have been indented and received. So far 15 acres seed farm has been raised at SPMF, Vamban, Vellore, Dharmapuri and Krishnagiri districts.
		VBN 8 (2016)	1026	All seasons. DoA to give status and feedback in July 2020 meeting.	TANSEDA/PoS About, 500 kg have been indented and 300 kgs seeds were received for Kharif 2020. So far, 30.5 acres seed farm has been raised at SSFs Sathyamangalam, Bhavanisagar, Vellalaviduthi and SPMF-Vamban at Pudukottai.
		VBN 10		Rabi Crop. CPBG, TNAU to send quantities to DoA, as per the indent during the last week of March, 2020 and the status to be updated	TANSEDA/PoS 400 kg breeder seeds of VBN 10 have been indented for <i>Rabi</i> 2020 and will be received and multiplied as foundation seeds at Cuddalore, Kancheepuram, Villupuram, Vellore, Salem and Namakkal districts. The seeds will be supplied by TNAU before September 2020.
2.	Red gram	Co 8	120	Performance in farmers' fields may be informed. Possibilities to be explored to extend subsidy under	TANSEDA/PoS About, 100 kg have been indented and received. So far, 15 acres of seed farm is

				<p>NFSM. Additionally, 100 kg Breeder Seeds has to be placed by DoA before August, 2020. Status to be updated during next meeting. (Action : DoA)</p>	<p>raised at SSFs of Vazhavachallur, Annapannai ,vamban, Thirupathur,Erode and Dharmapuri districts. Since the redgram variety CO8 comes under less than 10 years category, it is eligible for subsidy.</p> <p>Performance of CO 8 Redgram: Duration 145-180 days, Erect and bushy, 6-7 bunches in a plant, 4 numbers of seeds in a pod. Yield is 400 kg/ acre in rainfed and 750 – 800 kg/ acre in irrigated condition</p>
		BSR 1		<p>Explore the possibility of notification of BSR 1 to bring back in the seed chain (Action : Dir, CPBG)</p>	<p>CPBG</p> <ul style="list-style-type: none"> • The Redgram variety, BSR1 was released in 1986 and not got notified. Hence, it is not entered the seed chain. However, the TFL seeds of this variety is distributed to the required farmers. • As Redgram is an often cross pollinated crop it requires rigorous purification. • However, efforts are taken for pure line selections of this variety and after scheduled breeding programme and after confirming the performance of

						<p>thus developed pure lines. An improved version of BSR1 Redgram variety would be proposed for release which would take a minimum of five years.</p> <ul style="list-style-type: none"> • As of now, it would not be possible to propose for notification of the Redgram variety BSR1. • Purification of BSR 1 Redgram variety is in Progress at ARS, Bhavanisagar • Selfing of true to type plants in BSR 1 red gram variety was initiated during 2019-20 based on plant and seed characters • Twenty eight true to type single plants were selfed and the progenies were raised in progeny rows on 21.08.2020 The crop is at seedling stage • The seeds collected from true to type plants in the progeny rows will be constituted as nucleus seeds for breeder seed production. 	
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						<p>TANSEDA/PoS</p> <p>The Director CPBG has been addressed to furnish the status report. In this regard, it was informed by TNAU that Redgram being often cross pollinated crop, confirming the performance of the developed pureline will take minimum of 5 years. so, as of now it is not possible to propose the variety for notification.</p>
3	Castor & Sunflower					
	<p>i. Castor YTP-1 & YRCH-1 :</p> <p>a. 2000 kgs of YRCH-1 Hybrid Castor and 500 kgs of YTP 1 have to be supplied to DoA during April 2020 and June 2020, respectively.</p> <p>b. Hybrid seed production has to be organized in SSF, Danishpet, by getting seeds of male and female parents from TNAU.</p>					<p>CPBG</p> <p>Based on the indent or supply order from Department of Agriculture during the year 2020-21 total of 975 kg of hybrid castor seed is supplied to Dharmapuri, Salem, Namakkal and Trichy Districts. For remaining quantity, seed material is kept ready for supply. Based on the indent from DoA, supply will be effected.</p> <ul style="list-style-type: none"> Seeds of 2000 kg castor hybrid YRCH-1 and 500 kg castor variety YTP-1 have been reserved for the Department of Agriculture. Of which, 975 kg of YRCH-1 hybrid seeds have been supplied to Dharmapuri, Salem, Namakkal and Trichy Districts based on the indents.

	<p>c. TNAU should provide technical support whenever required</p> <p>(Action : DoA, CPBG & Dir. Res., TNAU)</p>	<ul style="list-style-type: none"> • The remaining seeds are ready for supply at TCRS, Yethapur. The seed availability was also communicated to the Director of Agriculture, Chepauk, Chennai. Despatch instruction from the Department of Agriculture is awaited. • To undertake hybrid castor seed production in SSF, Danishpet, male and female parent seeds of castor hybrid YRCH-1 was supplied by TCRS, Yethapur to JDA, Salem and hybrid seed production has been taken up in 7.0 acres. About 600 kg of hybrid seeds were produced and all these seeds were distributed to farmers. • Female and Male seed of Castor hybrid YRCH – 1 has been supplied to State seed farm, Danishpet and hybrid seed production is taken up in an area of 7.0 acres with the technical support from Scientists of TCRS, Yethapur and seed is procured by TCRS, Yethapur for Seed Hub programme and being supplied to farmers. <p>CPBG</p> <p>Female and Male parental seeds of Castor hybrid YRCH – 1 has been supplied to State seed farm, Danishpet and hybrid seed production is taken up in an area of 7.0 acres with the technical support from Scientists of TCRS, Yethapur and seed is procured by TCRS, Yethapur for Seed Hub programme and being supplied to farmers.</p>
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		<p>TANSEDA/PoS</p> <p>YTP 1: As per the Breeder Seed Finalisation meeting, 100 kg have been indented for Rabi 2020-21.</p> <p>YRCH-1: As per the Breeder Seed Finalisation meeting, 50 kg have been indented for Rabi 2020-21 and seed multiplication will be taken up during <i>Rabi</i> 2020 in Salem and Namakkal districts in September 2020.</p> <p>b) Supply of parent materials for YRCH 1 Hybrid seed production in SSF, Danishpet, is awaited from TCRS, Yethapur.</p> <p>c) The Director, CPBG is requested for technical support</p>
	<p>ii. Sunflower COH3: The hybrid is to be promoted in Karur, Thoothukudi, Virudhunagar and other potential districts. The crop is in flowering stage. The performance is to be informed by DoA in July meeting.</p> <p>(Action : DoA & CPBG TNAU)</p>	<p>CPBG</p> <ul style="list-style-type: none"> • 100 kg of Sunflower hybrid COH3 (TFL Seeds) seeds were supplied to ADA- Thoothukudi (25kg), ADA- Karur (25kg), ADA- Trichy (25kg), and ADA- Virudhunagar (25kg) on 19.11.2019. <p>TANSEDA/PoS</p> <p>Performance of Sunflower CoH3</p> <p>Duration – 90 days, 5 to 5.5 feet height; Tolerant to pest and disease; Compact head with good seed yield (600 – 800 Kg/ac)</p>

4	Sugarcane	
	<p>i. Relative performance of CO 11015 (Atulya) which is yet to be harvested has to be reported during July 2020.</p> <p>(Action : CPBG, TNAU)</p>	<p>CPBG Annexure - IV</p> <ul style="list-style-type: none"> • Chip budded seedlings and setts of the newly released sugarcane variety CO 11015 (Atulya) was planted in an area of 1.00 acre along with TNAU (SC) Si 8 to compare the relative performance at Sugarcane Research Station, Sirugamani, Trichy on 06.11.2019. <ol style="list-style-type: none"> a) The age of the crop is 11 months. b) The establishment percentage is 70 % to 75 % c) No pest and disease incidence is noticed d) No flowering is noticed till date e) The variety CO 11015 has medium thick cane and the number of millable cane ranges from 6 to 12/clump when compared to TNAU (SC) Si ranged from 5 to 10/clump f) Cane Weight of CO 11015 ranges from 1.00 tp 1.5 kg /cane while TNAU (SC) Si ranged from 1.50 to 2.00 kg/cane g) Brix % ranges from 14 to 15 % in CO 11015 when compared to TNAU (SC) Si 8 (11 % to 12 %) h) The expected yield is 90-100 tonnes/hectare for CO 11015 whereas to TNAU (SC) Si 8 recorded 110-120tonnes/hectare

	<p>ii. TNAU supplied 86.8 tons of seed cane of the variety COG 6 to three sugar mills (Ambur Cooperative Sugar Mill, Perambalur Cooperative Sugar Mill and others) and its performance to be reported with technical analysis</p> <p>(Action : CPBG, TNAU)</p>	<p>The new sugarcane variety COG 6 was supplied (86.8 tons) under NADP scheme to two sugar mills viz., Ambur and Perambalur Cooperative Sugar Mills Limited during November 2019 and February 2020. The feedback of two sugar mills are as follows,</p> <p><u>1. Ambur Cooperative Sugar Mills Limited</u></p> <p>The variety was raised in the fields of 18 growers of Vellore and Tirupattur districts. The crop age at present is 7-8 months. A satisfactory crop growth is experienced. The variety is found to be pest, disease, and drought tolerant</p> <p><u>2. Perambalur Cooperative Sugar Mills Limited</u></p> <p>a. The variety is planted in the fields of 11 farmers in the Permbalur District. The age of the crop is 7 months old. A good crop growth and stand are noticed</p> <p>b. The variety has medium thick cane.</p> <p>c. No pest and diseases are noticed.</p>
5	Cotton	
	<p>i. The CO 17, a synchronized maturity cotton, has been released in January, 2020 and the results of large demonstration need to be presented in July 2020. The status of notification of this variety may be informed in the next meeting. The DoA is to indent 50 kg of breeder seeds from TNAU.</p> <p>(Action : CPBG, Dir. Seeds, TNAU and DoA)</p>	<p>CPBG</p> <ul style="list-style-type: none"> Cotton variety CO 17 has been principally approved for notification vide ref. No. 3-76/2019-SDIVdt. 29.06.2020 (Minutes of 84th meeting on central sub-committee on crop standards notification and release of variety for agricultural crops held through video conferencing on 10.06.2020) DoA indented 10 kg of CO 17 breeder seed.

		<ul style="list-style-type: none"> • Large scale demonstration of CO 17 (one acre) at farmer's field was conducted by AEC, Namakkal. 4 kg seed was supplied by Dept of Cotton for large scale demonstration. The crops was raised at Puduchathiram block and are at vegetative stage (30 days old) • Large scale demonstration was also raised under rice fallow condition during 2020 at farmer's field (11.5 ac) and also research stations and KVKs (13.0 acre). • Large scale demonstration of new cotton variety CO 17 is being carried out in an area of 1.0 acre at this station. Sowing was taken up on 03.09.2020 and the crop is in vegetative stage. <p>TANSEDA</p> <ul style="list-style-type: none"> • Cotton CO 17 variety is yet to be notified and 5 kg has been received for Demonstration and it is planned to lay at Thirumalaipatti village in Puduchathiram Block of Namakkal district in September. • Regarding notification of new varieties, the Central Seed Sub Committee recommended for early notification of newly released varieties and will be notified in the ensuing days .Follow up action is being taken along with Director, CPBG, TNAU for early notification of newly released varieties.
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6	Groundnut	
	<p>i. The relative performance of other groundnut varieties, K6, K9 and GG7 as check varieties in the regular MLT (11+3) and special MLT (Early) (3+2) organized across six locations in Tamil Nadu during rabi/summer 2019-2020 season has to be reported during next meeting</p> <p>(Action : CPBG, TNAU)</p>	<p>CPBG</p> <ul style="list-style-type: none"> • The Groundnut varieties K6 and K9 are from Kathiri, Andhra Pradesh in the variety GG7 is from Gujarat. As desired during 84th SWC (2019) the seeds of these varieties (10kg each) were obtained for the respective research stations during the month of December 2019 and was multiplied during Rabi/Summer for seed enhancement and the same varieties have been included for MLTs of Kharif 2020. • However, the variety GG7 was used a check in one of the trials aimed for identifying 90-95 days maturing groundnut genotypes. • While examining the performance of GG7 in the above mentioned trial it has recorded an yield of 2075 kg/ha while the test entry VR17008 has recorded 12% increase yield over GG7 at RRS, Virudhachalam. • However, the performance would be confirmed in subsequent trials. In the forthcoming MLTs and ARTs of 2020-2021, the check varieties K6, K9 and GG7 have been included.

		<p>TANSEDA/PoS</p> <p>Groundnut:</p> <ul style="list-style-type: none"> The Director, CPBG has been addressed to furnish the status report on regular and special MLTs. In this regard, it has been informed by TNAU that VR17008 has recorded 12% increased yield over GG7. Varietal checking for K6 and K9 will be included in the forthcoming MLTs and ARTs of 2020-21.
ii.	VRI-8 is reported to have the issue of in-situ germination of seeds before harvesting. Hence, this variety need to be popularized. No further to be place.	<p>TANSEDA/PoS</p> <ul style="list-style-type: none"> Based on the advance indent made in 2019-20 Groundnut VRI 8 Breeder Seeds have been produced by TNAU to a tune of 12,000 kg. The Director CPBG regarding VRI 8 indent, it was informed that in previous year, due to unexpected rain in the critical periods, in-situ germinations occurred.
iii.	Groundnut – BSR 2 – Feedback on the performance should be furnished in the next meeting (Action : DoA)	<p>TANSEDA/PoS</p> <ul style="list-style-type: none"> BSR-2: 1560 kg breeder seeds has been received for Kharif 2020 and 12 acres seed farm has been raised at Erode and Pudukkottai districts. Performance of BSR 2: Duration of the crop is 110 days. There are 20 matured pods per plant. Yield: 600 kg/ac. No major pest and diseases is observed in this crop.

7.	<p>Poor Viability of Co 51 paddy variety</p>	
	<p>i. To overcome the poor viability of Co 51 paddy seeds, the seed treatment technique developed by TNAU involving Carbendazim @ 2 g + Malathion @ 10 g / kg and stores in cloth bag. This can be tested in freshly harvested CO 51 paddy seeds from JDAs of eight districts of Tamil Nadu viz., Tiruvarur, Trichy, Thanjavur, Nagapattinam, Kancheepuram, Vellore, Thiruvannamalai and Theni during January, 2020 and the results should be presented in the next SWC in July.</p> <p>Possibility of replacing CO 51 with ADT 53 can also be Explored. TANSEDA to give feedback on the performance of ADT 53.</p> <p>(Action : DoA & Director Seeds, TNAU;)</p>	<ul style="list-style-type: none"> Seed viability study conducted in rice variety CO 51 revealed that all the 11 seed lots received from JDA's of 8 districts lost viability below Indian Minimum Seed Certification Standard (80%) at 6 month of storage (i.e. before the validity period of 9 months). The seeds given with prophylactic treatment of Carbendazim 2g/kg + Malathion 10g/kg maintained the germination of 80% upto 8 months of storage. <p>TANSEDA</p> <ul style="list-style-type: none"> The Director Seed centre has been addressed to furnish the action taken report to overcoming poor viability of CO 51 Paddy variety seeds. 400 kg of breeder seeds of ADT 53 paddy variety has been received in 2020 and has been Planned to multiply as foundation seeds in SSFs Iruvelpattu, Inungur, Karaiyairuppu, Sakkotai and Kanchikudikadu. As on date, 3 acres of seed farm has been raised at SSF Kanchikudikadu, Thiruvarur district. About 50 acres have been covered by ADT 53 in Walajabad block, Kancheepuram district- 15 days old crop was visited by DOA on 03.07.2020. The performance of

		<p>ADT 53 will be compared with popular variety CO 51.</p> <p>Performance of ADT 53</p> <table border="1"> <thead> <tr> <th>Characters</th> <th>ADT 53</th> </tr> </thead> <tbody> <tr> <td>Duration</td> <td>105 days</td> </tr> <tr> <td>Average yield</td> <td>6-6.5 tonnes/ha</td> </tr> <tr> <td>Special feature</td> <td>Non lodging, medium slender, high milling out turn</td> </tr> <tr> <td>Resistance</td> <td>Moderately resistant to blast, sheath rot, stem borer and leaf folder</td> </tr> </tbody> </table>	Characters	ADT 53	Duration	105 days	Average yield	6-6.5 tonnes/ha	Special feature	Non lodging, medium slender, high milling out turn	Resistance	Moderately resistant to blast, sheath rot, stem borer and leaf folder
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8	Evolving extra early duration Rice variety:											
	<p>i. Extra early short duration rice germplasm has to be explored and evolved in a contingent condition and may be informed to the forum for information.</p> <p>(Action : CPBG)</p>	<ul style="list-style-type: none"> • An early culture CB 14920 (ADT 43/ CB 10550) has been developed at Department of Rice with the duration of 100 days and it recorded mean grain yield of 5695 kg/ha which is 13.6% increase over ADT 48. • Seed multiplication of the culture CB 14920 has been taken up during Kharif 2020 and the crop is in maturity stage. The culture will be assessed for its cooking quality and will be nominated for MLT during 2021. 										


		<ul style="list-style-type: none"> • The 30 rice germplasm accessions available in Ramiah Gene Bank which matures in 90-95 days may be utilized as donor lines for evolving extra early short duration rice varieties • An early culture AD 16019 (TurantDhan/ IET 22075 has been developed at TRRI, Aduthurai with the duration of 95 days and it recorded mean grain yield of 5798 Kg/ha with long slender grain type. This culture is forwarded for MLT during 2019
9	Introduction of Kadam, MTP 1 & Melia dubia, MTP 1 in SSFs & SHFs:	
	<p>i. These tree seedlings should be indented for supply to farmers in MSDA clusters.</p> <p>(Action : DoA/Dean Forestry)</p>	<p>The Dean, FC&RI, Mettupalayam has sent a letter to 26 Deputy Director of Horticulture regarding the readiness of the clones for lifting. Out of which, 31 SHFs have lifted 1625 Nos. of Melia MTP 1 clone and 270 Nos. of Kadam MTP 1 and the details of distribution in Annexure - V</p> <p>RFS-MSDA</p> <ul style="list-style-type: none"> • Under MSDA Phase-III Programme 20.30 Lakh No. of Timber value Tree Seedlings were distributed to 3.7 lakh beneficiary farmers @ 5 seedlings per hectare at free of cost.Rs.4 crore fund was spent for this component in this scheme during 2019-20.

		<ul style="list-style-type: none"> • During 2020-21, the MSDA is going to be relaunched as Tamil Nadu Mission On Sustainable Dryland Development (TNMSDD) covering 10 lakh ha of Dryland in 3years.In this Scheme, farmers will be given assistance for ploughing, Seeds & other inputs, value Addition and Farm machineries. However, Tree seedling distribution is not proposed during 2020-21 due to paucity of funds.
III. CROP MANAGEMENT		
1	Automatic Weather Stations (AWS)	
	<p>On receipt of the approval, 2020 AWSs should be made functional within three months. The status report will be presented in July 2020. Further, relocation for 100 AWS should be explored in Govt. premises and fixed. Once 285 made functional, the data will be shared to DoA for inclusion in the Uzhavan App and provide agro-advisories.</p> <p>(Action : DoA & DCM, TNAU)</p>	<ul style="list-style-type: none"> • The preparatory works for rectifying the AWS have been undertaken. The details of AWS in 285 blocks and the sites wherein the AWS need to be relocated have been communicated to the Director of Agriculture for arranging the alternate Government sites for relocation. • The proposal for utilizing the unspent money under NADP was permitted in the SLSC and the Government orders are awaited for initiating the rectification of AWS. • In the meantime, the weather data recorded from functional AWS around 50 nos. are being shared to the Director of Agriculture, Commissioner of Administration and O/o APC on daily basis.

		<ul style="list-style-type: none"> • The forecasts uploaded in the TNAU's TAWN (Tamil Nadu Agriculture Weather Network) daily have been linked to the Uzhavan app for wider adaptability by the farmers. The TNAU's Weather based Automated Agro Advisory Services (TNAU AAS) has also been linked to the Uzhavan app and the number of farmers registering in the app are receiving the crop based agro advisories at different stages of crop growth. <p>General</p> <p>1. The proposal submitted by Registrar, Tamil Nadu Agricultural University to utilise Rs.1.94 crore for revival of 285 AWS to Government is under consideration by Finance Department.</p> <p>Further, The TNSDRRA, intends to develop a comprehensive real time hydro/meteorological data collection system in various locations in the state in order acquire data on a real time basis by establishing Telemetric Automatic Rain Gauges (TARGs), Automatic Weather Stations (AWSs), Automatic water level recorders (AWLRs) and Automatic Lightning Risk Warning System (ALRWS) to serve as a common platform to the various response players in the field of natural disaster management by providing timely proactive science and technology inputs to the farming community, Agriculture and Horticulture-based sector, fisherman, State and District level Disaster Management Authorities. In this regard, TNSDRRA has engaged M/s Price Water House Cooper Pvt. Ltd., as consultant to study various models and submit the feasibility report. Accordingly the firm has submitted draft feasibility report with</p>
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		various suggestions. In this the TNAU is one of the key stakeholder. The integration of the AWS available with TNAU into TNSDRRA is yet to be decided by CRA
2	Satellite based Smart sampling to assess the crop out turn:	
	<p>i. The data developed by TNAU on smart sampling methodology for organizing and optimizing crop cutting experiments in Rice using homogeneity created by Start of the Season (SoS). (Leaf Area Index (LAI) and Normalized Different vegetation Index (NDVI) has to be presented in next meeting July, 2020. Possibility on similar studies can be explored for cotton, pulses and vegetables.</p> <p>(Action : DoA & DNRM, RS&GIS, TNAU)</p>	<p>The department of Remote Sensing and GIS, TNAU has developed the remote sensing based smart sampling methodology for organizing and optimizing crop cutting experiments in Rice using homogeneity created by Start of the Season (SoS), Leaf Area Index (LAI) and Normalized Difference Vegetation Index (NDVI).The technology was approved by the Scientific Workers Conference (SWC) 2019 for adoption. As per the remarks of the SWC, the proposal for getting approval from Government of India was submitted by the Director of Agriculture for approval and utilization in the PMFBY crop insurance scheme vide Lr.No.CIS.1/33489/2020 dt. 04.06.2020.</p> <p>The methodology was validated with the actual CCE's conducted by Department of Economics and Statistics. Among the different indices <i>viz.</i>, SoS, LAI and NDVI used to develop stratum, LAI based approach registered the highest mean R² value of 0.857 followed by SoS based derivatives with the values of 0.855. NDVI based methodology recorded the lowest value of 0.809. Similarly, the agreement per cent was the highest with the SoS based sampling plan with the value of 89.95 followed by an agreement per cent 89.64 from NDVI based sampling plan. The RMSE a measure of error was found to be the least with SoS based sampling plan recording a value of 314.2 kg ha⁻¹ followed by NDVI with a value of 320 kg ha⁻¹ however the R² value of</p>

		<p>>0.85, Agreement per cent of >89.0 from these products indicated that all the three products of SoS, LAI and NDVI could be utilized for smart sampling Crop Cutting experiments.</p> <p>DoA</p> <p>Proposal sent by the Director of Research, TNAU has been forwarded to Joint Secretary (credit) Government of India vide letter No CIS 1/33489/2020 dated 04.06.2020</p>
3	Scientific validation of Zero Budget Natural Farming:	
	<p>i. Zero budget Natural Farming needs scientific validation and new invention found has to be presented in the next meeting</p> <p>(Action : DCM, TNAU)</p>	<ul style="list-style-type: none"> • Evaluation of in-situ composting experiments were carried out. Among the different treatments, compost maturity and nutrient status was found. Application of waste decomposer followed by TNAU bio-mineralizer are effectively composted the crop residues than the other inputs application. • ZBNF scientific validation was carried out during 2019-20 at Eastern block, TNAU, Coimbatore along with sorghum + cowpea as intercrop • Cowpea crop was performed poor due to high EC content of soil and irrigation water and yield was not obtained. • Compare to other treatments the ZBNF treatment gave 60 % of the grain yield in sorghum crop due to application of organic sources • ZBNF scientific validation work is in under progress as confirmation trial in the same field along with cotton + green gram

		<p>Field evaluation on Zero Budget Natural Farming</p> 
4	<p>Technology for Red gram transplantation:</p>	
	<p>The details of scientific validation and its success rating with analysis have to be presented in the next meeting</p> <p>(Action : DCM)</p>	<p>Annexure VI</p> <ul style="list-style-type: none"> • In pro-trays each cone was filled with coco-pith and single seed was dibbled and kept under open conditions. • In sheet nursery, HDPE woven fabric sheet was laid down on the ground on which used fertilizer gunny bag was placed, on which red soil and vermi-compost mix was heaped to form a raised bed of 5 cm. • The seeds were sown at a spacing of 5 × 5 cm sufficient to avoid seedling competition at initial stage. • HDPE woven fabric sheet was provided below to prevent the penetration of roots. • Watering to the trays and HDPE woven fabric sheet (seedlings) were done using a rose can periodically. • From the observations it is concluded that, HDPE woven fabric sheet nursery may be considered ideal in eliminating root coiling and also economical for raising redgram seedlings over pro-trays.

5	Supply of TNAU Groundnut Rich Booster:	
	<p>i. The DoA should give the performance of Groundnut Rich developed by TNAU for the crop raised in State Oilseeds Farms in July 2020.</p> <p>(Action : DoA)</p>	<p>TANSEDA</p> <ul style="list-style-type: none"> • It is programmed to test the performance of Groundnut Rich Booster at SSF-Musaravakkam (Kanchipuram), Vellalarviduthi (Pudukottai), Neyveli (Cuddalore) and Vinayagapuram (Madurai) on pilot basis in an area of one ha each during kharif 2020-21 and in Bhavanisagar (Erode) during Rabi 2020-21. • Indent was placed with TNAU for 50 kgs. 40 kg Groundnut Rich Booster is supplied to four SSFs. Groundnut Rich Booster has been used during flowering phase. The result will be furnished after the harvest of the crop
6	Eco-friendly method of driving away wild boar menace:	
	<p>i. The results of the trials in multi location with the “Herbolive-Wild Animal Repellent” conducted in four locations are to be presented in next SWC. Elephant – FC&RI, Mettupalayam; Parrot & wild Boar – ARS, Bhavanisagar; Peacock - AC&RI, Madurai</p> <p>(Action : ABD, DR, FC&RI,MTP)</p>	<p>Based on the early and continuous monitoring of the On Farm Trials (OFT) for entry of wild animals like Wild boar, Monkey, Indian Gaur, Deer and Elephant, the following observations were recorded in the OFT.</p> <ul style="list-style-type: none"> • Herbolive spray was effective against Wild boar only when the whole cropping area was drenched with 100 percent foliar spray. • Herbolive was not effective against the entry of Elephants in banana plantation

		<ul style="list-style-type: none"> • The application of herbolive acts as an anti feeding agent due to pungent smell and the crop was not damaged • Regarding the efficacy of Herbolive, foliar spraying is required once in fortnight to prevent the entry of Wild boar. • Herbolive is not effective during rainy season • The yield of the crops was not reduced due to spray of Herbolive <p>Annexure - VII</p> <p>TNAU</p> <p>The TNAU has set a task force comprising Director of Research, Director (CPPS), Dean (Forestry) and other scientists to develop strategies to contain vertebrate pests. The brainstorming session brought down the following strategies</p> <ol style="list-style-type: none"> 1. Use of of Agri Cannon to scare parrots, sparrows and peafowls 2. TNAU Gas enabled bird scarer in the testing stage 3. TNAU Bomber to repel animals 4. TNAU Chime to scare rodents and nocturnal animals 5. Kethi Rakshak to deter vertebrate pests (ICAR - PJS AU) 6. Herboliv spray against wild boards
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7	Production & Supply of Pink Pigmented Facultative Methylobacterium (PPFM) by TNAU	
	<p>i.</p> <p>a) PPFM spray has to be included as demo component under NADP and ATMA schemes.</p>	<ul style="list-style-type: none"> • Department of Agricultural Microbiology, TNAU, Coimbatore will produce PPFM and supply to NADP and ATMA scheme demonstrations <p>P&M</p> <p>a) PPFM spray has been included in one among the components in demonstration to an area of 400 ha under NFSM Rice 2020-21.</p> <p>b) There is no demonstration under NADP.</p> <p>c) Further, it is also programmed to organize the demonstrations on PPFM spray in an area of 1000 ha @ Rs 3000/ha with financial outlay of Rs 30 lakh under ATMA during 2020-21. Release of funds is awaited under ATMA.</p>
	<p>b) Shelf life of PPFM may be reported in the next meeting. (Action : DoA, DNRM, Agrl. Microbiology)</p>	<ul style="list-style-type: none"> • Shelf life of liquid formulation of PPFM is one year
8	Development of Zinc solubilizing liquid biofertilizer:	
	<p>i. TNAU to discuss with DoA to supply the mother culture of Zinc solubilizing liquid Bio-fertilizer and technical guidance to the Dept. officials for further multiplication to supply to the farmers.</p>	<ul style="list-style-type: none"> • A proposal to include Zinc-Solubilizing bacteria as bio-fertilizer in bio-fertilizer production and quality control unit of Department of Agricultural Microbiology, TNAU, Coimbatore has been submitted for approval. However, the University has recommended for On Farm Trial (OFT) for one more Year (2020-21). After completion of the OFT, the mother cultures will be supplied to state Department of Agriculture.

		<p>ALS</p> <ul style="list-style-type: none"> • Zinc Solubilizing Bacteria (ZSB), production technology to be released in ensuing SWC,2020.
	<p>ii. The compatibility study for Consortium should be studied.</p> <p>(Action : DoA, DNRM, TNAU)</p>	<ul style="list-style-type: none"> • Bio-fertilizer consortium development work has been initiated at Department of Agricultural Microbiology, TNAU, Coimbatore.
9	<p>Multi-micronutrient liquid formulation for drip fertigation</p>	
	<p>i. The TNAU Multi-micronutrient liquid from comprising of Zn, Fe, Cu, B, Mn and Mo with suitable stabilizing agent for tomato, chillies and cotton has to get approval from FCO for large scale production and supply.</p> <p>(Action : DNRM, SS&AC)</p>	<ul style="list-style-type: none"> • Proposal for FCO approval was submitted to the Director of Agriculture (Ref: Lr. No. DNRM-84th SWC 2019-2nd Interim Review Meeting /FCO approval/2020 dt.08.07.2020). • As per the State Fertilizer Committee constituted vide G.O. (MS) No. 890, Agriculture Department dt.30.11.90, TNAU was requested to send the proposal with results, report of its field trials, ingredients and quality parameters (Ref: Letter No.ALS 4/42304/2019 dt.24.07.2020 of the Director of Agriculture, Go.TN, Chennai). <p>Annexure - VIII</p>

IV. HORTICULTURE

1	<p>Multiplication of hybrid vegetable seeds in Farmers' fields</p>	
	<p>i.</p> <p>a) The indent placed by DHPC for Co-2 Banana suckers 500 Nos, Co-1 Manathakalai Breeder seeds -2 kg, Co-6 Aggregattum Onion – 4 kg should be supplied by TNAU which is to be reported in the next meeting.</p>	<ul style="list-style-type: none"> • CO2 Banana suckers 250 Nos of CO 2 banana suckers (sword suckers) have already been supplied to State Horticulture Farm, Mudhalaipatti, Karur (12.09.2020) and remaining 250 Nos is ready for supply. • CO 6 Aggregatum Onion 2 kg seeds of CO 6 Aggregatum Onion has been supplied to Centre of Excellence, Thali and Reddiyarchathiram. Besides 200kg of CO 6 Onion seeds were supply to the Department of Horticulture for distribution to the farmers • CO 1 Manathakali breeder seeds Seeds of CO 1 Manathakkaali were supplied to Deputy Director of Horticulture, Salem (Karumandurai farm), Deputy Director of Horticulture, Chengalpattu (Attur farm), Deputy Director of Horticulture, Pudukottai (Nattumangalam farm) and Deputy Director of Horticulture Virudhunagar (Srivilliputhur farm). <p>Seed production of CO 1 Manathakkali is being taken up in three locations. Around 300kg of seeds will be ready for supply during December, 2020</p>

		<p>DHPC</p> <ul style="list-style-type: none"> • Indent placed for Co-2 Banana Suckers (500 Nos), Co-1 Manathakkali (1 Kg) and Co-6 Aggregatum onion (4 Kg) to TNAU, vide ref.Lr.No.FPM3/1363/2017 dt.26.02.2020. • So far, 2 kgs of Onion seeds (COE Thally and COE Reddiarchathiram each 1 kg) received and sowed in Portrays and 250 Banana Suckers have been received (SHF Mudalaipatti) on 11.09.2020.
	<p>b) Seed Production of vegetables in SHFs should be monitored by TNAU and the person in-charge to be identified by the Dean (Hort.) in the nearby research stations for technical guidance.</p> <p>(Action : Dean (Hort.), DHPC)</p>	<p>Dean (Horticulture)</p> <ul style="list-style-type: none"> • Scientists from nearby stations and colleges are identified for monitoring the seed production activities of SHFs. The names of the identified Scientist and the Research Station were sent to DHPC for further action. <p>DHPC</p> <ul style="list-style-type: none"> • Letter addressed to Dean (Hort.) with farm wise seed production details for further action.
2	<p>Production & Supply of vegetable grafts to DHPC</p> <p>(Action : Dean (Hort.), DHPC)</p>	
	<p>i. TNAU has to supply required quantities of brinjal grafts as per the indent of DHPC and its status shall be reported in the next meeting</p>	<p>Dean (Horti)</p> <ul style="list-style-type: none"> • The entire quantity of brinjal grafts as per the indent were supplied to DPHC, Chennai. The recently received indent for grafts are ready for supply

		<p>DHPC</p> <ul style="list-style-type: none"> • During 2019-20, 4,500 Brinjal grafts have been received from TNAU and planted in SHF's. From that, 2,252 Kgs of Brinjal has been harvested and the harvesting is progress. During 2020-21, indent placed to TNAU to supply 5,000 numbers of Brinjal grafts.
	ii. TNAU should give training on technologies involved in Vegetable grafting to official of Horticulture Department.	<ul style="list-style-type: none"> • On 01.09.2020, 150 number of Department officials including HO's and ADH's were trained on Vegetable grafting technology through online mode
3	Intensification of research on hydroponics by TNAU	
	<p>i. The hydroponics system available at TNAU is high cost model. TNAU should develop low cost working model for commercialization involved private entrepreneurs. The success stories may be shared in July 2020. SOPs may be developed for hydroponic culture of few horticultural crops. Five viable units shall be erected at the Nilgiris by Dean (Horticulture) Coimbatore and Kodaikanal by Dean (Horticulture) Periyakulam</p> <p>(Action : Dean (Hort.), CBE/PKM, ABD)</p>	<ul style="list-style-type: none"> • The short duration vegetables <i>viz.</i>, Amaranthus, Coriander, Fenugreek and Mint are under evaluation under hydroponics system • The preliminary observation indicated that Amaranthus and Fenugreek are ready for consumption in 15-18 days after sowing • Coriander and Fenugreek needs a month to attain harvestable stage for consumption • Arrangements are being made to install the above units in both the stations.

4	Purification of Mundu type Chillies for Ramanathapuram	
	<p>i. The status of the identified Mundu chillies for Ramnad to be reported in the next SWC 2020.</p> <p>(Action : Dean (Hort.), CBE/PKM)</p>	<ul style="list-style-type: none"> 41 accessions collected from Ramnad were selfed during first season. From each accession single plants were identified based on morphological characters of fruits. The selfed progenies were transplanted for further purification.
5	Notification of Horticultural Crop varieties	
	<p>i. Notification proposal sent to DHPC and in turn to CVRC, which has to be followed up.</p> <p>(Action : DHPC, Dean (Hort.))</p>	<p>Dean (Hort.) Notification proposal have been sent to DHPC, Chennai, for forwarding to Ministry of Agriculture for approval and follow up in progress</p> <p>DHPC</p> <ul style="list-style-type: none"> Notification proposal sent to the Government of India vide Lr.No.MISC 3290/2015 dated 12.03.2020 for Banana, Tomato, Onion, Tapioca and Manathakkali.
6	Popularization of Guava variety Arka Kiran (Red Pulp):	
	<p>i. The DHPC has to make necessary arrangements to multiply this Guava variety in SHFs to enable supply to the farmers. The nematode management protocol suggested by TNAU needs scrupulously adopted.</p> <p>(Action : Dean (Hort.), DHPC)</p>	<p>Dean (Horti) The protocol for nematode and wilt complex management were provided to the DHPC for adoption.</p> <p>DHPC</p> <ul style="list-style-type: none"> Arka kiran guava mother plants have been planted in the following State Horticulture Farms (SHF)

		<table border="1" data-bbox="1193 268 2080 906"> <thead> <tr> <th>Sl.No</th> <th>District</th> <th>Name of the SHF</th> <th>Mother Plant</th> </tr> </thead> <tbody> <tr> <td>1.</td> <td>Cuddalore</td> <td>Neyveli</td> <td>1100</td> </tr> <tr> <td>2.</td> <td>Erode</td> <td>Baguthampalayam</td> <td>150</td> </tr> <tr> <td>3.</td> <td>Kallakurichi</td> <td>A. Sathur</td> <td>800</td> </tr> <tr> <td>4.</td> <td>Kancheepuram</td> <td>Melottivakkam</td> <td>100</td> </tr> <tr> <td>5.</td> <td>Kanniyakumari</td> <td>Kanniyakumari</td> <td>500</td> </tr> <tr> <td>6.</td> <td>Madurai</td> <td>Poonjuthi</td> <td>300</td> </tr> <tr> <td>7.</td> <td>Pudukottai</td> <td>Vallathirakottai</td> <td>550</td> </tr> <tr> <td>8.</td> <td>Thirupathur</td> <td>Kudapattu</td> <td>100</td> </tr> <tr> <td>9.</td> <td>Thiruvarur</td> <td>Moovanallur</td> <td>100</td> </tr> <tr> <td>10.</td> <td>Virudhunagar</td> <td>Srivilliputtur</td> <td>100</td> </tr> <tr> <td>11.</td> <td>Virudhunagar</td> <td>Poovani</td> <td>200</td> </tr> <tr> <td colspan="3" style="text-align: right;">Total</td> <td>4000</td> </tr> </tbody> </table> <ul style="list-style-type: none"> • So far, 980 guava layers produced and out of which 890 guava layers has been distributed to farmers. Another, 4,900 Guava layers will be ready within two months. • Nematode management protocol received from TNAU is being followed in State Horticulture Farms. 	Sl.No	District	Name of the SHF	Mother Plant	1.	Cuddalore	Neyveli	1100	2.	Erode	Baguthampalayam	150	3.	Kallakurichi	A. Sathur	800	4.	Kancheepuram	Melottivakkam	100	5.	Kanniyakumari	Kanniyakumari	500	6.	Madurai	Poonjuthi	300	7.	Pudukottai	Vallathirakottai	550	8.	Thirupathur	Kudapattu	100	9.	Thiruvarur	Moovanallur	100	10.	Virudhunagar	Srivilliputtur	100	11.	Virudhunagar	Poovani	200	Total			4000
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Total			4000																																																			
7	Introduction of new varieties and wilt tolerant rootstock in Avocado:																																																					
	<p>i. The DHPC should place indent for required quantities of different varieties of avocado in TNAU and multiply in SHFs for distribution to farmers.</p> <p>(Action : Dean (Hort.), PKM, DHPC)</p>	<p>Dean (Hort)</p> <ul style="list-style-type: none"> • Required quantities of different varieties of avocado Indent was received form DHPC for supply to different SHF'S on 10.09.2020. TKD 1 plants are in the multiplication stage at HRS, Thadiyankudisai. 																																																				

		<p>DHPC</p> <ul style="list-style-type: none"> The indent placed to TNAU, for supply of Avocado (Available varieties/Grafts) for further multiplication at State Horticulture Farms. Vide ref.Lr.No.FPM3 / 7372 /2017 dt.10.09.2020
8	Supply of Star Jasmine (Co 1) planting material DHPC	
	<p>i. The DHPC should place indent the required quantities of CO 1 Star Jasmine planting materials (rooted cuttings) to TNAU and the status to be updated.</p> <p>(Action : Dean (Hort.), PKM, DHPC)</p>	<ul style="list-style-type: none"> Indent received from Managing Director, TANHODA vide Lr. No. FPM3 /7372 /2017, dt. 09.09.2020 CO.1 Star Jasmine plants (rooted cuttings) have been supplied to the following farms @ 25 plants/farm: <ol style="list-style-type: none"> Anaikatti (Coimbatore Dt.) Kannampalayam (Coimbatore Dt.) Baguthampalayam (Erode Dt.) Mudalaipatti (Karur Dt.) Periyakulam (Theni Dt.) Sankaramanallur (Thiruppur Dt.) Poovani (Vridhunagar Dt.) Srivilliputhur (Vridhunagar Dt.) <p>DHPC</p> <ul style="list-style-type: none"> The Indent placed to TNAU, to supply 1,000 rooted cuttings of Co-1 Star Jasmine vide ref. Lr.No. FPM3 /7372 /2017, dt. 09.09.2020

9	Engaging Protray filling pneumatic seed picking and sowing machine developed by TNAU in SHFs:	
	<p>i. The fabrication of portray seeder is in progress Revolving fund scheme. The DHPC should test its performance and report in the next meeting.</p> <p>(Action : Dean (Ag.Engg.), CBE, DHPC)</p>	<ul style="list-style-type: none"> • In TNAU model automatic protray seeder, vegetable seeds having spherical shape like cabbage, cauliflower can be directly sown in protrays, whereas for sowing seeds of tomato, chilli and brinjal, coated or pelleted seeds alone can be sown. • The operation of automated protray unit was demonstrated to the Horticultural Officer, Thimmapuram farm and the unit has been handed to the Horticultural Officer on 16.09.2020. <p>DHPC</p> <ul style="list-style-type: none"> • The indent placed to TNAU, The Machinery yet to be supplied.
V. CROP PROTECTION		
1.	<p>Monitoring of invasive pests like Fall ArmyWorm and Spiralling Rugose Whitefly by Scientists and department officials to keep the incidence under control and status report may be presented in the next SWC 2020. The success story of Fall Armyworm management shall be reported to Secretary, GoI, New Delhi.</p> <p>(Action : CPPS, DoA, DHPC)</p>	<p>CPPS</p> <p>The state encountered three invasive pests <i>viz.</i>, Coconut Rugose Spiralling Whitefly (RSW), <i>Aleurodicus rugioperculatus</i>, Fall Armyworm, <i>Spodoptera frugiperda</i> and Cassava mealybug, <i>Phenacoccus manihoti</i> during the period under report. The efforts undertaken to contain the invasive alien species were enlisted below.</p> <p>Annexure – IX</p>

		<p>DOA</p> <p>Plant Protection</p> <ul style="list-style-type: none"> • During 2019-20, a special scheme called Mass ground spray has been implemented in an area of 1,19,486 ha with a financial sanction of Rs.47.66 Crore. As a result, the infestation was controlled and the average yield of Maize crop has increased up to 8 tonnes per ha. • 2020-2021- Awareness is being created to the farmers to follow the precautionary activities and dealers were trained to distribute only the chemicals recommended by GOI. It is ensured that activities such as Summer ploughing, Neem cake application, Intercropping, Bund/ Border cropping, installation of Pheromone traps etc., are being adopted by the maize cultivating farmers. • It is programmed to extend an assistance of Rs.2000/ ha for 1 lakh ha under NADP scheme to control Fall Armyworm in Maize during 2020-2021. Received financial sanction and scheme is under implementation • The infestation of RSW in Coconut is controlled through Water spray in an area of 25,000 ha. Further laying out of yellow sticky trap and release of parasitoid <i>Encarsia</i> have been completed to prevent further infestation. Release of predator called <i>Chrysoperla</i> sp is under progress. The intermittent rain throughout the State also helped to save the crop from infestation of RSW.
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		<p>The required particulars regarding management of FAW in Tamil Nadu has already been communicated to GOI. The success stories will be sent shortly in coordination with TNAU</p> <p>DHPC</p> <ul style="list-style-type: none"> • Fall Army worm attack was not noticed in Horticultural Crops so far. • Rugose Spiralling Whitefly attack in Arecanut and other Horticulture Crops is under control by erecting yellow sticky traps in affected fields in the districts of Coimbatore, Erode, Namakkal, Salem and Kanyakumari districts. • Cassava Mealy Bug attack was noticed in Namakkal Salem, Erode, Kanyakumari & Thanjavur Districts. Spraying of plant protection chemicals (Azadirachtin followed by profenophos in 15 days interval) followed by rain has kept the cassava mealy bug attack under control.
<p>VI POST HARVEST MANAGEMENT</p>		
1	<p>Use of Agri-Nano products (Dip in EFF and Nano-Stickers) for the preservation of fruits (Banana & Mango)</p>	
	<p>i. The TNAU should take necessary steps to sign an MoU for commercialization of nano-products.</p>	<ul style="list-style-type: none"> • One day capacity building programme to 22 Horticultural and Agricultural Officers from 7 districts of Tamil Nadu on the usage of Enhanced Freshness liquid Formulation (EFF) and Nano stickers to increase the shelf life of fruits (mango and banana) was organized by Department of Nano Science and Technology, DNRM, TNAU, Coimbatore on 06-022020.

- **Dr.K.S.Subramanian**, Director of Research and Dr. A. Lakshmanan, Professor and Head, Department of Nano Science and Technology acted as resource persons and trained the participants on the usage of Enhanced Freshness liquid formulation and Nano stickers.
- In continuation of the training programme, the participants were given with nano stickers and EFF to test the efficacy on banana. As instructed, efficacy trials were conducted by the participants in banana in their places and the test results confirmed that the shelf life of banana was enhanced to 4-6 days.



The details of participation of officers from DHPC & CAM-AM for the Nano-Sticker training and the outcome of the project is given in **Annexure X**

The EFF technology has been jointly developed by TNAU and University of Guelph, Canada and the patent rights were given to M/S Smart Harvest, Canada for commercialization. M/S Smart Harvest, Canada planned to install EFF production facility by March 2020 in Coimbatore. Unfortunately, due to COVID pandemic, the proposed plan could not be executed in time. But

	<p>The launch of nano-products should be done during SWC 2020. Officials of DHPC & CAM & AB should be trained on use of agro-nano products.</p> <p>(Action : Dir. Res., ABD, DNRM, TNAU)</p>	<p>M/S Smart Harvest, Canada is actively looking for an Indian partner to initiate the production shortly.</p> <p>On the other hand, TNAU has the patent right for Nano-Stickers that going to be launched during 85th SWC on 25.9.2020</p>
2	<p>Technology to extend the shelf life of Neera:</p>	
	<p>i. The developed technology for processing of Coconut Neera to enhance the shelf life using thermal methods along with chemical additives by Centre for Post Harvest Technology, AEC&RI, TNAU, Coimbatore should be demonstrated at the large scale prior to commercialization</p> <p>(Action : Dean, (Agrl.Engg.), PHTC, ABD, TNAU)</p>	<p>The neera obtained from the farm were subjected to thermal processing within one hour as detailed below. Before processing, the total acidity should be checked and the acidity content should not exceed 0.02% to obtain a good quality Neera. Two samples of each freshly Processed Neera and refrigerated Neera (15 Days after Storage) were sent to two FSSAI approved Laboratories in Chennai as per the recommendations of SWC review meeting for testing the presence of any antifermenting agents. The results clearly indicated there was presence of Benzoic acid as Sodium benzoate up to 150ppm. The addition of sodium benzoate @150ppm preservative is added during processing which can be admissible as per Codex and FSSAI standards upto 1000mg/kg (1000ppm).Based on the above results, it was observed that Neera preservation Technology developed at CPHT may be recommended that the limit of antifermenting agents or food additives used are safe to consume as per Codex and FSSAI standards and there will not be any impact on human health. Action has been initiated to file patent and commercialization of the same through Director, Agri Business Development, TNAU, Coimbatore during September 2020. The details are enclosed</p> <p>Annexure XI</p>

VII. MECHANIZATION & POST HARVEST ENGINEERING

1	Groundnut Harvester and Stripper	
	<p>i. TNAU to finetune the existing version of Groundnut Harvester and Stripper to promote area expansion of groundnut in Tamil Nadu</p> <p>(Action : Dean (Agrl.Engg.); AED)</p>	<ul style="list-style-type: none"> • TNAU model groundnut harvester is well suited for harvesting bunch type rainfed groundnut crop with a field capacity of 2.0 ha per day. The stripping efficiency of the TNAU groundnut stripper for bunch type groundnut is about 98 per cent with a capacity of 600 kg per day. However, both the operations need additional man power for collection of uprooted plants from the field and also to hold the plants in hand against the stripping drum for stripping off the groundnut pods. • In view of the above facts, incorporating both the operations, a new research project for the development of mini tractor operated combine harvester for groundnut, to harvest the plants in a single row from the field and strip the pods from the plants is initiated. • A mini tractor operated digger, which can dig the plants and windrow it on the field in a single row was purchased. Incorporation of plants lifting arrangement, stripping mechanism and pod collection box is in progress to modify it as a combine harvester.

2	Small machines for harvesting and de-trashing in sugarcane	
	<p>i. A machine for cane harvesting for small scale farmers should be demonstrated in the ensuing SWC July, 2020</p> <p>(Action : AED, Dean, (Agrl.Engg.), CoS)</p>	<ul style="list-style-type: none"> • Initial model of mini tractor operated sugarcane harvester has been developed at ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore. The developed unit consists of main frame, base cutting unit, crop windrowing system and power transmission system. The base cutting unit consists of four numbers of blade and the provisions were provided to change the approach angle of cutting blades and number of blades from two to four. • The harvester is suitable for attaching with mini tractors ranging from 18-24 hp. The power from Tractor PTO is transmitted through gear box and belt pulley drive to base cutting unit. • The developed unit was field test initially at ICAR-Sugarcane Breeding Institute, Coimbatore (variety: Co 86032, age of cane:14 months) recently and the performance of the harvesting system is satisfactory and still further study on influence of cutting blade thickness on cutting of sugarcane in terms of smooth cut/partial cut/broken cut has to be conducted. Intensive field trials have to be conducted in future <p>Annexure XII</p>

VIII. Synergy between TNAU and Departments

1	<p>Close association between CoEs of TNAU and Departments of Agriculture & Horticulture: (Action : DR)</p>	
	<p>i. Activities and achievement may be reported in SWC 2020.</p>	<ul style="list-style-type: none"> • During the year 2019-20 290 Extension official from 21 district and 105 Extension officials in the year 2020 were benefited on dryland technologies at DARS, Chenttinad • In the CoE in Sustainable Soil Health at ADAC&RI, Trichy, analytical services were rendered to farmers and Entrepreneurs guided by the officials of Dept. of Agriculture and Horticulture • In the Farm Women Knowledge Centre HC&RI (W), Trichy five training were conducted to the farmers guided by Dept. of Officials and All India Radio on processing of cakes and cookies, Bee keeping, processing of millet based food production, nutrient production and processing of fruits. • All the centre of Excellence in Innovation in AC&RI, Madurai, Dept. Officials of Agriculture during their training at KVK, Madurai were explained to facilities available for analysis. • In the CoE in Molecular Breeding two trainings were given to TNAU scientists particularly Breeder, since it is scientific oriented. <p style="text-align: right;">All COE details are in Annexure XIII</p>

2	Conduct of MLTs in SHFs/SSFs to observe the actual performance:	
	<p>i. The MLTs may be conducted in selected SSFs and SHFs for major crops</p> <p>(Action : DOA; DHPC, CPBG, TNAU)</p>	<p>CPBG</p> <ul style="list-style-type: none"> • It is informed that conduct of MLT involves about a dozen of genotypes (entries) of various crops. • It is advisable that conduct of MLT could be avoided in State Seed Production Farms as there are chances of occurrence of admixtures with the scheduled Foundation Seed Production produce in the State Seed Farms. • Moreover, MLTs are the preliminary level of testing the adaptability of genotypes and at this stage only limited quantity of seeds would be available for each of the genotypes as the seeds are evolved from a breeding programme from a single plant (recombinant) which is gradually multiplied over seasons/years after assessing their performance. • The available seeds of the stage of MLT will be very much limited in quantity and would be sufficient only for the proposed and relevant MLT centres of TNAU across Tamil Nadu. • Further, all the entries including the check varieties would be coded and they are in initial stage of evaluation by scientist.

		<ul style="list-style-type: none"> Considering the above mentioned points, it is suggested that MLTs need not be conducted in SSFs and instead it would be appropriate to conduct ARTs in SSFs. <p>TANSEDA</p> <ul style="list-style-type: none"> The Director, CPBG, TNAU has been addressed to share the programme of MLTs in 2020-21 and list of SSF selected. In this regard, it was suggested by TNAU that instead of MLT's , ART's may be conducted in SSF's to avoid occurrence of admixtures of genotypes to serve the purpose.
3	<p>Training by TNAU on Seed pelleting to department officials.</p> <p>(Action : Dir. Seeds, TNAU)</p>	
	<p>i. The refresher training will include seed pelleting techniques for horticultural crops and small millets</p>	<ul style="list-style-type: none"> A topic on "Seed pelleting and coating techniques" was included in training module of 'Refresher Training for Middle Level Extension Officers' and the lecture was delivered on 24.08.2020 by the Director, Seed Centre, TNAU, Coimbatore. About 120 Extension Officials attended the training programme.
IX. Others		
1	<p>Indent finalization meeting with TANSEDA Officials for foundation and certified seeds should be organized in the month of April, 2020</p> <p>(Action : Director Seeds; TANSEDA)</p>	<ul style="list-style-type: none"> It was programmed to conduct joint meeting with TNAU and TANSEDA during April 2020. But, due to COVID 19, the meeting was not conducted. However, discussion was made with TANSEDA officials regarding indenting of foundation and certified seeds. It was decided to place

		<p>indent for foundation and certified seeds of pulses and oilseeds as and when required based on the availability of seeds at TNAU.</p> <p>TANSEDA</p> <ul style="list-style-type: none"> • Due to COVID-19, meeting could not be conducted. However, whenever F & C seeds are required, indent will be placed for foundation and certified seeds based on the availability at Seed centre, TNAU.
2	<p>Trend Analysis in Area, Production & Productivity of horticultural crops in selected districts and recommendation for bridging the gap may be reported to APC & DHPC before next meeting:</p> <p>(Action : DHPC, Dir. DCARDS, TNAU)</p>	<p>Tomato</p> <ul style="list-style-type: none"> • High price fluctuation-Promotion of processing and value addition / High yielding and disease resistant hybrids /Management of Leaf Curling virus/ Pinworm (fruit borer), leaf miner & Bacterial wilt / tolerance to Salt stress • PPFM (Pink Pigmented Facultative Menthylotrops) to improve dry land horticulture. <p>Brinjal</p> <ul style="list-style-type: none"> • Promotion of grafted brinjal / Resistant varieties to Bacterial wilt and borers • Management of Mealy bug, fruit borers and coccinilled beetles / Bacterial wilt, Little leaf / input subsidy <p>Bhendi</p> <ul style="list-style-type: none"> • Varieties with short internode for easy harvesting / YVMV resistant • Promotion of use of Azospirillum , Phosphobacterium and VAM /light traps, yellow sticky and pheromone traps /

		<p>PPFM (Pink Pigmented Metro Bacterium) to improve dryland horticulture.</p> <ul style="list-style-type: none"> • Based on the suggestions from the Director of Horticulture and Plantation Crops, a research proposal on Farm level productivity assessment of major horticultural crops namely Tomato, Brinjal Bhendi and Banana was taken up • The study will be conducted in Dharmapuri, Villupuram, Salem, Kancheepuram and Vellore districts for Bhendi. Dharmapuri, Kancheepuram, Villupuram, Salem and Thiruvannamalai districts were selected for Brinjal. Krishnagiri, Dharmapuri, Salem, Theni and Coimbatore were selected for Tomato and Erode, Thoothukkudi, Coimbatore, Kanniyakumari and Trichy were selected for Banana. • Totally 400 samples will be collected from these districts for the study. The study has been resumed and will be completed by December 2020.
3	<p>Testing the Universal Solar Pump controller' efficiency and its performance may be reported in SWC 2020</p> <p>(Action : AED, Dean (Agrl.Engg.), Dir, Res. TNAU)</p>	<ul style="list-style-type: none"> • The Dryland Agriculture Research Station (DARS), Chettinad has installed capacity of 7.5 hp solar water pumping system. M/s. Shakthi Pumps India Limited, Pithampur, Madhya Pradesh, is the approved channel partner of Ministry of New and Renewable Energy (MNRE) for the design and supply of Universal Solar Pump Controllers (USPC). • Supply of 7.5 hp USPC to DARS, Chettinad is awaiting from M/s. Shakthi Pumps India Limited. Due to Covid'19 pandemic lockdown, the firm is not able to supply the USPC in time. After the supply of the USPC, the effective utilization of solar power system will be tested for the operation of available machineries

		such as groundnut stripper (1 hp) and chaff cutter (3hp) at DARS, Chettinad.
4	<p>Activities & Accomplishments of ABD may be reported for the past one year</p> <p>(Action : CAM-AB, ABD, TNAU)</p>	<p>Annexure XIV</p> <p>In brief:</p> <ul style="list-style-type: none"> • Licensing of Hybrids - 2 • Licensing of technologies - 4 • Consultancy Services - 2 • Training offered - 8 Participants - 119 • Number of VCS - 150 • Revenue generated - 129.68 Lakhs • Exporters - 11 • Number of ideas received - 400
5	<p>Documentation may be done on Market preference for TNAU released varieties for large scale adoption</p> <p>(Action : Dir. CARDS, TNAU)</p>	<p>Annexure XV</p>

Annexure I
Refresher Training

- As per the Interim Meeting held on 11-3-2020, action was initiated to organize the Refresher Trainings for the 5 Departments of Agriculture Department, Govt. of Tamil Nadu, at TNAU, Coimbatore.
- However, during the Review Meeting conducted by APC & PS to Govt., Agriculture Dept. on 25-6-2020, due to COVID-19 lockdown it was decided to conduct the Refresher Trainings in virtual mode. Accordingly, steps were taken to organize the Refresher Trainings through video-conferencing.
- The Training dates and number of participants for the Refresher Training for Middle Level Extension Officers of Agriculture Department are as follows:

S.No.	Departments	Dates	No. of Participants
1.	Dept. of Agriculture	Aug. 24-28, 2020 & Sep. 14-18, 2020	294 (ADAs)
2.	Dept. of Horticulture & Plantations Crops	Aug. 31-Sep. 4, 2020 & Sep. 21-25, 2020	385 (ADHs& HOs)
3.	Agri. Engineering Department	Oct. 5-9, 2020	150 (AEs&& JEs)
4.	Dept. of Agri. Marketing & Agri Business	Oct. 12-16, 2020	35 (DDAs, ADAs, AOs)
5.	Dept. of Seed Certification & Organic Certification	Oct 19-23, 2020	50 (SCOs & Seed Inspectors)

- The Inaugural Function of the Refresher Training was held on Aug. 24, 2020. Th. Gagandeep Singh Bedi, IAS., APC & PS to Government, Agriculture Department, Chennai inaugurated the training in the presence of Dr.N.Kumar, Vice-Chancellor, TNAU,Th.S.J. Chiru, IAS., Commissioner of Agrl. Marketing &Agri Business, Chennai, Th.V.Dakshinamoorthy, IAS., Director of Agriculture, Chennai, Dr. N. Subbaiyan, IAS, Director of Horticulture & Plantation Crops, Dr. R. Murugesan, Chief Engineer (Agrl. Engineering), Chennai, Th. M. Subbiah, Director of Seed Certification & Organic Certification, Coimbatore, Dr. M. Jawaharlal, Director of Extension Education, TNAU, University Officers, Scientists of TNAU, and all the participants of the training programmes.
- Refresher Training for Middle Level Extension Officers of State Dept. of Agriculture (Batch–I and Dept. of Horticulture & Plantation Crops (Batch–I) have been conducted. The remaining trainings will be conducted as scheduled.
- The Training programmes are conducted through virtual mode due to government regulations during COVID-19 lockdown / unlockdown period.
- Training manuals for the five Departments are under preparation.

Annexure II

For Strengthening the research on the management of Fall Army Worm

The programmes identified for 2020-2021 *Kharif* season have been initiated in all the 27 identified maize growing districts of the State. Scientists from the four zones viz., Coimbatore, Madurai, Trichy and Tirunelveli participated in the Programme Development Workshop. Since launching of the Project, laboratory and field research programmes have been implemented in eight thematic areas as of 15th September, 2020.

Season wise and region wise population dynamics have indicated occurrence of FAW at varying intensities in the State. Along with FAW, natural enemy population is also noticed in higher number compared to previous years. Strain identity of FAW indicates the presence of Maize (M) and Rice (R) strains which has been confirmed through molecular studies. Considering the higher productivity of maize in the State, determination of Economic Threshold Level (ETL) and Yield Loss Assessment studies have been taken up in the Kharif season 2020. As part of developing ecofriendly FAW management programme studies on identification of botanicals have been taken up in Madurai centre. In the Delta region, demonstration studies on nanopheromone formulation of FAW are in progress. In Tirunelveli Zone, Fixed Plot surveys have been initiated for understanding the population dynamics.

In collaboration with district administration, training programmes and other outreach activities were carried out.

Trainings and meetings organized

Date	Venue	Details of training/ meeting
28.07.2020	Anna Auditorium, TNAU, CBE	Methodology workshop on GoTN Sponsored FAW R&D Project organized by DCPPS, TNAU, Coimbatore
28.08.2020	Dept. of Agrl. Entomology	Discussion meeting on Project Management and Work plan allotment

Extension Activities

Date	Venue	Sponsor	Details of activity	No. of participants
Coimbatore District				
18.08.2020	Vadavalli, Sultanpet block, CBE Dt.	ATMA programme by Dept. of Agriculture	Management of Fall armyworm followed by field visit	45
Ranipet and Tirupattur District				
	Gururajapalyam Madhanur block	District Level webinar on NFSM Nutricereals to Vellore, Ranipet and Tirupattur district farmers organized by Department of Agriculture	Management of maize fall armyworm	60
ARS, Vagarai				
21.08.2020.	Keeranur village of Thoppampatti block, Dindigul district		Farmer's training programme on maize FAW	ADA, AO and 25 farmers
Tiruchirappalli Zone - Tiruchirappalli District				
30.6.20	JDA office, Trichy		Awareness Programme on FAW	80 (Two batches) Extension workers
18.8.20	ADA office, Pullambadi, Trichy		Awareness Programme on FAW	50 (Input dealers) + 5 (Extension workers)

Villupuram District				
17.06.2020	Karunakaranallur		FAW-IPM Demonstration to maize farmers	TN-IAMP for lower Cooleron in Cuddalore District
Tirunelveli Zone - Tirunelveli district				
9.7.2020	Alangulam, Vasudevanallur, Kadayanallur, Sankarankoil, Kuruvikulam blocks	Organized through online using Google Meet App	FAW awareness training programme	52 (input dealers and extension functionaries)
31.7.2020	Alangulam, Vasudevanallur, Kadayanallur, Sankarankoil, Kuruvikulam blocks		FAW awareness training programme	55 (input dealers and extension functionaries)
Tenkasi Disrict				
10.07.2020	Srivilliputtur and Rajapalayam	ADA Srivilliputtur and Rajapalayam	FAW in Maize – Awareness training programme	Input dealers
17.07.2020	Watrap and Sivakasi	ADA Watrap and Sivakasi	FAW in Maize – Awareness training programme	Input dealers

Thoothukudi District				
02.07.2020	Thoothukudi district	Online training	TNAU Technology Capsule for the management of Maize Fall armyworm	32 input dealers
10.07.2020	Thoothukudi district	Online training	Training on Management of Maize fall armyworm with TNAU Technology capsule	26 (AO, AAO, ATM and BTM)
27.07.2020	Thoothukudi district	Online training	Training on Management of Maize fall armyworm with TNAU Technology capsule	280 farmers
Virudhunagar District				
10.07.2020	Virudhunagar & Kariapatti	Organized by DoA	FAW and its management in the awareness programme	
17.07.2020	Narikudi	Organized by DoA	FAW and its management in the awareness programme	
23.07.2020	Sattur and Vembakottai	Organized by DoA	FAW and its management in the awareness programme	

Purchases

1. Purchase orders were placed for the purchase of following items

No.	Item	No. of units	Value (Rs.)
1.	Aerated walk in Cages with 120 micron mesh	8 Nos.	648480
2.	Gel Documentation System	1 No.	997500
3.	Lab Incubator	1 No.	
4.	High speed refrigerated centrifuge (Imported)	1 No.	973823
5.	Homogenizer (Imported)	1 No.	
6.	Insect cages	35 Nos.	951000
7.	Olfactometers (8-arm)	1 No.	
8.	Olfactometers (6-arm)	1 No.	
9.	Volatile collection chamber	1 No.	
10.	Gel electrophoresis with power pack	1 No.	
11.	Instrument Platform Support with Granite Top and Cabinets	20 Nos.	494000
		Total	4064803

2. Tenders were called for the purchase of following items

No.	Item	No. of units	Value (Rs.)
1.	Preparative Column Apparatus (Silica gel)	1 No.	150000
2.	Solvent – Solvent partition system	1 No.	300000
3.	Automatic Soxhlet Extractor	1 No.	300000
		Total	750000

Besides, tender processing is also initiated for the purchase of Incubator cum Shaker, Phase contrast Microscope, Plant Sample grinder, Volatile Analyst, Volatile Collection Apparatus, Wind tunnel, SDS PAGE, Fermenter

The TNAU Plant protection wing should intimate the pest and disease incidence to APC, DoA and DHPC regularly through WhatsApp or Messages

The incidence of pest and diseases in Tamil Nadu is being monitored by the TNAU Plant Protection Scientists across different districts and is being compiled and intimated every month to APC, DoA and DHPC regularly through pest forecast report.

Incidence of non-locust grasshoppers in Nilgris, Nagapattinam and Krishnagiri were also monitored by our TNAU scientists and were informed through pest forecast reports to extension officials. Besides, the occurrence of grasshoppers were surveyed and monitored in the state jointly by Entomologists and State Department Officials. On 31.5.2020, Honorable Chief Minister reviewed the action taken with reference to Desert locust in which Vice-Chancellor and Professor and Head, Department of Agricultural Entomology participated and appraised the situation in the state. Followed by it three webinars were organized at national (9.6.2020), regional (7.7.2020) and state level (30.5.2020) in which the Department Scientists participated and analyzed the situation. Cassava plants in all the major cassava growing districts have been regularly monitored for the presence of new invasive cassava mealybug, *Phenacoccus manihoti*. Quick survey by TNAU teams revealed 30 to 40% infestation in Namakkal District, 10 to 15% infestation in Erode Districts and 10 to 15% infestation in Salem District which was also informed to the extension officials concerned. Suitable management measures were also suggested to farmers to circumvent the problem.

Annexure III

Sugarcane

Location: Sugarcane Research Station, Cuddalore

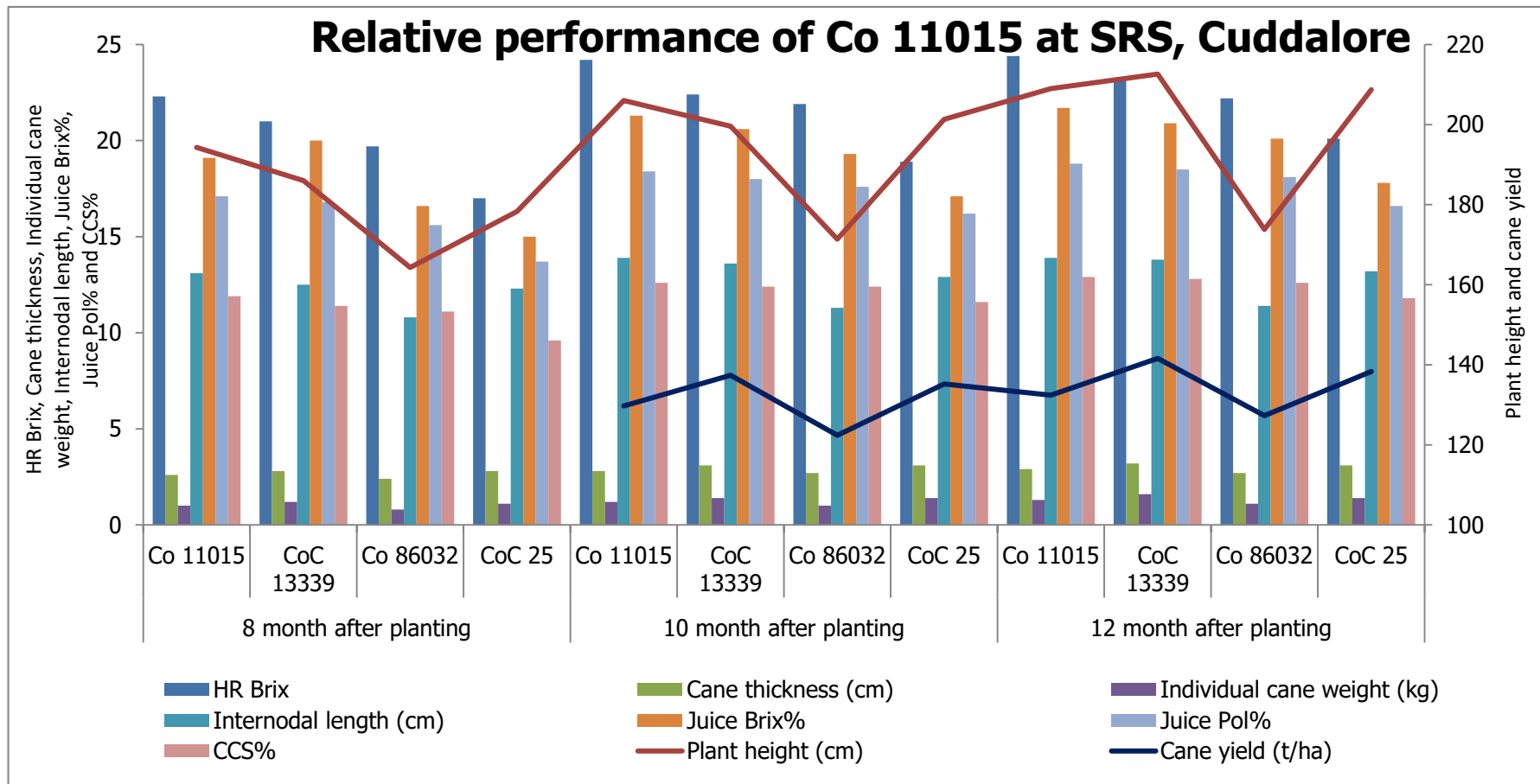
Particulars	8 th month after planting				10 th month after planting				12 th month after planting			
	Co 11015	CoC 13339	Co 86032	CoC 25	Co 11015	CoC 13339	Co 86032	CoC 25	Co 11015	CoC 13339	Co 86032	CoC 25
HR Brix	22.3	21	19.7	17	24.2	22.4	21.9	18.9	24.4	23.2	22.2	20.1
Plant height (cm)	194.3	186	164.3	178.3	206	199.6	171.4	201.3	209	212.6	173.8	208.7
Cane thickness(cm)	2.6	2.8	2.4	2.8	2.8	3.1	2.7	3.1	2.9	3.2	2.7	3.1
Individual cane weight (kg)	1.0	1.2	0.8	1.1	1.2	1.4	1.0	1.4	1.3	1.6	1.1	1.4
Internodal length (cm)	13.1	12.5	10.8	12.3	13.9	13.6	11.3	12.9	13.9	13.8	11.4	13.2
Juice Brix%	19.1	20	16.6	15	21.3	20.6	19.3	17.1	21.7	20.9	20.1	17.8
Juice Pol%	17.1	16.8	15.6	13.7	18.4	18.5	17.6	16.2	18.8	18.5	18.1	16.6
CCS%	11.9	11.4	11.1	9.6	12.6	12.4	12.4	11.6	12.9	12.8	12.6	11.8
Cane yield (t/ha)	-	-	-	-	129.7	137.4	122.4	135.2	132.4	141.6	127.3	138.3

At 8 month after planting, the variety Co 11015 recorded higher HR Brix (22.3), plant height (194.3 cm), inter nodal length (13.1 cm), juice Pol% (17.1) and CCS% (11.9) compared to other check varieties (CoC 13339, Co 86032 and CoC 25).

At 10 month after planting, the variety Co 11015 recorded higher HR Brix (24.2), plant height (206.0 cm), inter nodal length (13.9 cm), juice Brix% (21.3), juice Pol% (18.4) and CCS% (12.6) compared to other check varieties (CoC 13339, Co 86032 and CoC 25).

At 12 month after planting, the variety Co 11015 recorded higher HR Brix (24.4), inter nodal length (13.9 cm), juice Brix% (21.7), juice Pol% (18.8) and CCS% (12.9) compared to other check varieties (CoC 13339, Co 86032 and CoC 25).

Inter node borer incidence was recorded upto 40% and infestation intensity was 2.84%.



Relative performance of Co 11015 at SRS, Cuddalore

Annexure IV

Introduction of Kadan, MTP 1 & Melia dubia, MTP 1 in SSFs & SHFs

FC&RI, Mettupalayam has sent a letter to 26 Deputy Director of Horticulture regarding the readiness of the clones for lifting. Out of which, the following 31 State Horticulture farms have lifted 1625 Nos. of Melia MTP 1 clone and 270 Nos. of Kadam MTP 1 as given below.

Sl. No.	Name of the District	State Horticulture Farm	Melia MTP1	Kadam MTP 1	Sl. No.	Name of the District	State Horticulture Farm	Melia MTP1	Kadam MTP 1
1	Ariyalur	Keelapalavur	5	5	17	Pudukottai	Kudumiyamalai	100	-
2	Chennai	Madhavaram	25	5	18	Pudukottai	Vallthirakottai	200	-
3	Coimbatore	Anaikatty	50	50	19	Pudukottai	Nattumangalam	100	-
4	Coimbatore	Kannampalayam	10	10	20	Ranipet	Navlock	100	20
5	Dharmapuri	Polayampalli	25	5	21	Salem	Mulluvadi	50	15
6	Erode	Baguthampalayan	50	15	22	Salem	G.O. Karumandurai	200	15
7	Kancheepuram	Attur	25	5	23	Salem	SHF Karumandurai	50	15
8	Kancheepuram	Vichanthangal	25	5	24	Salem	Maniyarkundram	50	15
9	Kancheepuram	Melkadirpur	25	5	25	Salem	Sirumalai	10	10
10	Kancheepuram	Melottivakkam	25	5	26	Thanjavur	Aduthurai	25	5
11	Kancheepuram	Pitchivakkam	25	5	27	Thanjavur	Marungulam	25	5
12	Karur	Mudalaipatti	25	-	28	Thirupathur	Kudapattu	25	5
13	Krishnagiri	Thimmapuram	25	5	29	Thiruvarur	Moovanallur	50	5
14		Jeenur	100	10	30	Tiruppur	Sangaramanallur	50	15
15	Nagapattinam	Vanduvancherry	50	5	31	Trichy	Thorakudi	50	5
16	Perambalur	Vengalam	50	5			Total	1625	270

Annexure - V

Transplanting technologies:

- Long duration redgram varieties are preferable
- Transplant 18 to 25 days old seedling
- Transplant during the second fortnight of August under irrigated conditions (or) under rainfed conditions after receiving soaking rains
- Raising seedlings on raised bed over HDPE Woven fabric sheet
- Fill the seed bed with native soil: Sand: FYM @1:1:1
- Harden the seeds with 0.2% Calcium chloride for one hour and dry it under shade for 7 hours
- Treat the hardened seeds with *T. viride* @ 4g/kg and 100 g Rhizobium and 100 g phosphobacteria and PPFM. Sow the seeds spacing of 5 × 5 cm at 1 cm depth
- Plough the field deeply to get fine tilth followed by 2-3 harrowing at 3 weeks prior to transplanting
- In medium to deep soils for raising long duration varieties, dig 15 cm² pits at 5' × 3' for pure crops and 6' × 3' for intercropping under irrigated condition. In rainfed condition dig the pits at a spacing of 5' × 3'. For short duration varieties dig 15 cm² pits at 3' × 2' spacing.
- Under water logging condition, form furrows before digging pits
- Apply inorganic fertilizers @ 25:50:25 kg NPK/ha at 20-30 days after planting as urea, DAP and potash around the seedlings
- Apply ZnSO₄ @ 25 kg/ha as basal along with FYM or sand
- Nipping (removal of top 5 cm) the plants on 25th day after planting to induce profuse branching and flowering
- Spray planofix @ 0.5 mL/L to control flower dropping

Evaluation study

Redgram seedlings are normally raised in pro trays which leads to root coiling and is not economical. In order to overcome the problem, the present investigation was carried out during June, 2020 at Agricultural College and Research Institute, Madurai using pro-tray (50 cones/tray and 98 cones/tray) and High-Density Polyethylene (HDPE) Woven Fabric sheet.

In this study seedlings were raised in 50 cones pro-tray, 98 cones pro-tray and HDPE Woven Fabric Sheet (**Fig. 1; 2**).

- In pro-trays each cone was filled with coco-pith and single seed was dibbled and kept under open conditions.
- In sheet nursery, HDPE woven fabric sheet was laid down on the ground on which used fertilizer gunny bag was placed, on which red soil and vermi-compost mix was heaped to form a raised bed of 5 cm.
- The seeds were sown at a spacing of 5 × 5 cm sufficient to avoid seedling competition at initial stage.
- HDPE woven fabric sheet was provided below to prevent the penetration of roots.
- Watering to the trays and HDPE woven fabric sheet (seedlings) were done using a rose can periodically.



Fig. 1: Raising seedlings in 98 cones, 50 cones pro-trays, and HDPE Woven Fabric Sheet



Fig. 1a: Used fertilizer gunny bag spread over HDPE Woven fabric sheet

Fig. 2: General view of the experiment



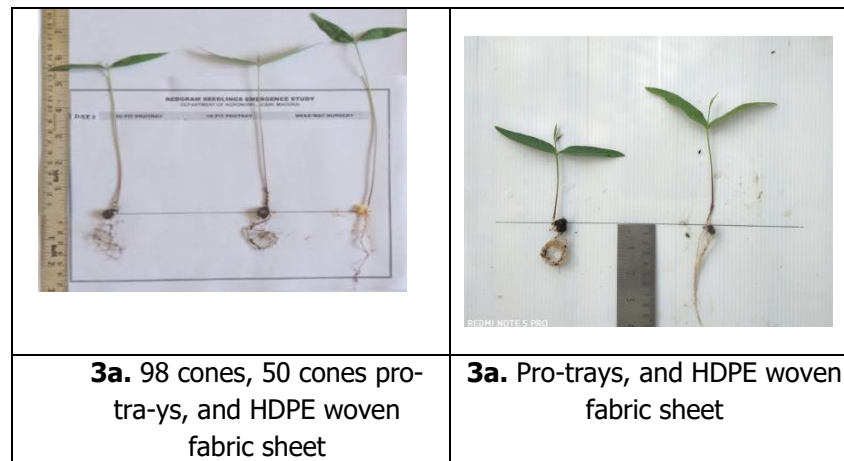


Fig. 3: Comparison of redgram seedlings in Pro-trays and HDPE fabric sheet

The results of the study showed that, there was not much difference among the different nursery methods in terms of seedling height, number of leaves per seedling and dry matter production. With regard to root growth, the higher root length was recorded in 50 and 98 cones pro-tray compared to HDPE woven fabric sheet nursery but, coiling of root was more pronounced in 98 cones pro-tray followed by 50 cones pro-tray which may affect the seedling establishment in the main field. On the other side, root coiling was not observed in the HDPE woven fabric sheet nursery (**Fig. 3**).

From the observations it is concluded that, HDPE woven fabric sheet nursery may be considered ideal in eliminating root coiling and also economical for raising redgram seedlings over pro-trays.

Annexure – VI

Eco-friendly method of driving away wild boar menace

The following multi location trials were conducted for testing the effect of Herbolive as animal repellent

Name of the Farmer	Crops	Wild animal Problem	Total Area
Vishu.P Arepalayam Hasanur, Erode District 9944969939	Beans Chilli	Wild boar Elephant Deer	1 acre
PalaniSwamy Arepalayam Hasanur, Erode District 9487684909	Banana	Wild boar Elephant Deer	1 acre
Saravanan Hasanur Near Govt School Erode District 6383282562	Chrysanthemum	Wild boar Elephant	2 acres
Shivaraj Mavanatham Thalamalai, Erode Distruct 9385629861	Beans	Wild boar Monkey	2 acres
Veeraswamy Naripallam Mettupalayam 9842222501	Banana	Elephant Wild boar	2 acre
Veluswamy Kutharipalayam Sirumugai 9894052147	Arecanut Banana	Wild boar	2 acre

Based on the early and continuous monitoring of the On Farm Trials (OFT) for entry of wild animals like Wild boar, Monkey, Indian Gaur, Deer and Elephant, the following observations were recorded in the OFT.

- Herbolive spray was effective against Wild boar only when the whole cropping area was drenched with 100 percent foliar spray.
- Herbolive was not effective for banana against the entry of Elephants
- The application of herbolive acts as an anti feeding agent due to pungent smell and the crop was not damaged
- Regarding the efficacy of Herbolive, foliar spraying is required once in fortnight to prevent the entry of Wild boar.
- During the rainy time, Herbolive was not effective
- The yield of the crops was not reduced due to spray of Herbolive

Annexure – VII

Multi-micronutrient liquid formulation for drip fertigation

Field evaluation trials were carried with the following crops.

(i). Fertigation trials

No.	Name of the crop	Location	Method of application	Per cent increase over NPK fertigation schedule
1.	Hybrid tomato	Kinathukadavu	Fertigation (2%)	19.7
2.	Hybrid Chillies	Narasipuram	Fertigation (2%)	17.0
3.	Cotton	Thondamuthur	Fertigation (2%)	14.0

(ii). Foliar Nutrition

No.	Name of the crop	Location	Method of application	Per cent increase over RDF+ 19:19:19 spray
1.	Rice	TNAU farm	Foliar spray (1%)	11.0
2.	Green gram	Devarayapuram	Foliar spray (1%)	9.5
3.	Hybrid Bhendi	Vellanaipatti	Foliar spray (1%)	14.0

Annexure VIII

Monitoring of invasive pests like Fall Army Worm and Spiralling Rugose Whitefly

Rugose spiralling whitefly (RSW)

- To contain this pest, awareness/ training programmes were organized for the benefit of the farmers and extension functionaries in a war footing manner in Coimbatore, Tiruppur, Erode, Salem, Dharmapuri, Krishnagiri, Dindigul, Thanjavur, Tiruvarur, Kanyakumari, Tirunelveli, Cuddalore, Thirvannamalai, Thiruvallur, Nammakkal, Karur, Ramanathapuram and Theni districts.
- TNAU is continuously supplying *Encarsia* parasitoids (35,00,000 lakh to cover 35,000 ha and to 20,000 farmers) and *Chrysoperla* predators (38,00,000 lakh eggs to cover 3,800 ha and to 18,000 farmers) directly to the farmers and through the Department of Agriculture, Government of Tamil Nadu since 2016. Adoption of TNAU RSW management capsule in Tamil Nadu resulted in the reduction of whiteflies to a tune of 40 to 50% in well maintained coconut gardens. Moreover, conservation of biocontrol agents, environmental sustainability and insecticide residue free nuts and tender coconut are ensured by using the TNAU developed RSW management capsule
- A CDB sponsored mission mode programme on the management of coconut rugose spiralling whitefly, *Aleurodicus rugioperculatus* with nymphal parasitoid, *Encarsia guadeloupae* is operational at TNAU from April, 2020 with a mandate of mass production of parasitoid, *Encarsia guadeloupae* and the scheme has been initiated
- Besides, on farm trial is being carried out by TNAU in 10 different locations on the evaluation of management modules of rugose spiralling whitefly

Maize Fall armyworm (FAW)

- TNAU Core Team for the entire State and Task Force Scientists for each maize growing District is coordinating with the extension officials to mitigate FAW on maize. The TNAU Core Team and Task Force Scientists travelled across the State and organized 435 diagnostic field visits in 27 major maize growing districts, 120 Front Line Demonstrations in six districts on FAW management capsule; participated in 410 awareness campaigns and 25 Kisan Melas; and sensitized 42500 farmers, 2650 input dealers and 3550 extension officials.
- Further, the research and extension activities related to FAW management is being carried out under a project entitled Developing Integrated Pest Management Module for Maize Fall Armyworm and Validation under Areawide Integrated Pest Management (AWIPM) through Farmer Participatory Approach in Tamil Nadu funded by GoTN since June 2020.

Cassava Mealybug, *Phenacoccus manihoti*

- Cassava is being grown in an area of 75,000 ha in Tamil Nadu. Major districts growing cassava are Salem, Namakkal, Erode, Cuddalore, Villuppuram, Dharmapuri and Kanyakumari.
- Cassava mealybugs, *Phenacoccus manihoti* is indigenous to South America. It was accidentally introduced from South America to the Congo Republic in 1973. It has spread in Africa in a period of 16 years. Its accidental introduction damaged a staple crop during a time of drought, leading to famine. From Africa to practically all countries where cassava is grown, in a broad belt from West through East Africa and down to the eastern edge of South Africa. During March, 2020 cassava mealybugs have been noticed in cassava at Trissur, Kerala
- Since then, cassava plants in all the major cassava growing districts have been regularly monitored for the presence of *Phenacoccus manihoti*. Quick survey by TNAU teams revealed 30 to 40% infestation in Namakkal District, 10 to 15% infestation in Erode Districts and 10 to 15% infestation in Salem District.

Management of cassava mealybugs

The following contingent management practices are in practice to completely avoid further spread.

1. Collection and complete destruction of mealybug infested plants from the infested area.
2. Continuous and extensive monitoring for *P. manihoti* and natural enemies on cassava, alternate host plants and weed plants in major cassava growing Districts by the farmers, extension officers and TNAU scientists
3. Avoid selecting planting materials from the infested fields for further planting.
4. Wherever irrigation facilities are available, frequent irrigation of fields to minimize mealy bug population and to improve the vigour and growth of plants.
5. Proper sett treatment with chlorpyrifos 20 EC @ 2 ml per litre of water for 10 minutes before planting.
6. In case of severe infestation, use azadirachtin 1500 ppm 1.0 lit/ac or thiamethoxam 25 WG 100 g/ac.
7. Avoid spraying of same chemicals and combination products

Research initiatives by TNAU

- In all the cassava mealybugs infested Districts, plant samples were collected along with mealybug colonies for the identification of the cassava mealybug species and its natural enemies. The mealybugs were identified as *Phenacoccus manihoti* Matile-Ferrero
- The following predators and parasitoids were observed in the mealybug colonies.

Predators:

1. *Hyperaspis maindroni* Sicard (Coleoptera: Coccinellidae) (Identified by Dr. N. Chitra of TNAU: and confirmed by Dr. Poorani, ICAR-NRCB, Trichy)
2. *Cheilomenes sexmaculata* (Coleoptera: Coccinellidae)
3. *Cryptolaemus montrouzieri* (Coleoptera: Coccinellidae)
4. *Mallada* sp. (Neuroptera: Chrysopidae)

Parasitoids:

1. *Homalotylus turkmenicus* Myartseva (Hymenoptera: Encyrtidae) – Parasitoid of *Hyperaspis maindroni* which is a predator of cassava mealybug. (Identified by Dr. Poorani, ICAR-NRCB, Trichy: Identity confirmed by Dr. Ankita Gupta, ICAR-NBAIR, Bengaluru)
2. *Prochiloneurus aegyptiacus* Mercet- (Hymenoptera: Encyrtidae) (Identified by Dr. Ankita Gupta, ICAR-NBAIR, Bengaluru)
3. Bethylidae – (Identified by Dr. Ankita Gupta, ICAR-NBAIR, Bengaluru)
4. *Tetrastichus* sp. (Hymenoptera: Eulophidae) (Identified by Dr. Ankita Gupta, ICAR-NBAIR, Bengaluru)



Cassava mealybugs
Phenacoccus manihoti



Hyperaspis maindroni - grub
of mealybug predator



Hyperaspis maindroni - Adult
predator of mealybug



Homalotylus turkmenicus-
Parasitoid of *coccinellid* predator

- *Anagyrus lopezi* is an invasive effective parasitoid of cassava mealybugs available in other countries.
- Steps are being taken by ICAR- NBAIR, Bengaluru to import a potent exotic parasitoids *Anagyrus lopezi* from Thailand for the classical biological control of the cassava mealybug.
- Once the parasitoids specificity and safety are established in quarantine by the ICAR- NBAIR, TNAU can obtain *A. lopezi* culture for further mass production and field release in farmer's fields as we did for *Acerophagous papayae* for the management of papaya mealybugs



- Also, a new University Research Project on, 'Characterization of mealybug complex and their natural enemies in cassava is being operated at TCRS, Yethapur, Salem. Besides, an action plan entitled, 'Management of mealybugs in cassava' is being carried out in four different locations *viz.*, Erode, Coimbatore, Salem and Namakkal to evaluate the potential of novel molecules of insecticides.
- Tamil Nadu Agricultural University in collaboration with the Entomological Society of India, New Delhi (ESI) organized the International seminar on Transboundary Pest Management (ISTPM) at TNAU, Coimbatore on 4th March 2020. The seminar was organized on major theme areas including biodiversity and biosystematics, biological control, storage and quarantine pests, IPM, Biotechnological/Nanotechnological approaches and vector mediated diseases transmission. Scientists of International standing, Researchers across the country numbering around 400 participated in the Seminar. The impact of the transboundary pests on the crop sector, economics, rational use of inputs, ecological backlash etc. were discussed. A compendium on Invasive pests comprising souvenir and abstracts was released.

Annexure - IX

Nano stickers and nano emulsion for dipping (Training)

S. No	Name	Designation	Place	Mobile no
1.	Mr. A.Velayudham	Asst. Director of Horticulture	Trichy	9840232381
2.	Mr. N. Pandiarana	Asst. Director of Horticulture	Theni	9003704076
3.	Mr. T. Ramesh	Asst. Agri. Officer (Agri. Marketing)	Theni	9750091801
4.	Mr. T. Thomson	Agricultural Officer (SAGL)	Dharmapuri	9443563977
5.	Mr. R. S. Shameem	Agricultural Officer (SAGL)	Dharmapuri	9443563977
6.	Mrs. M. Vanadhi	Agricultural Officer	Krishnagiri	9003720549
7.	Mrs. V. Priya	Asst. Director of Horticulture	Erode	9095950500
8.	Mr. Shanmuga Sundaram	Asst. Director of Horticulture	Theni	8072056553
9.	Mr. K. V.Kumaravelu	Asst. Director of Horticulture	Salem	9790669171
10.	Mr. V. Arumuham	Asst. Director of Horticulture	Kanyakumari	9789293474
11.	Mr. M. Anand	Asst. Director of Horticulture	Dharmapuri	8015345067



Based on the interaction with the officials, an action plan was formulated to test the efficacy of EFF (Post harvest dip) and nano sticker on mango and banana. The details are summarized below

S.No.	Name	Designation	fruit
1.	Mr. Shanmuga Sundaram	Asst. Director of Horticulture, Theni	Banana (Grand naine)
2.	Mr. T. Ramesh	Asst. Agrl. Officer (Agri-marketing & Business), Theni	Banana (Grand naine)
3.	Mr. N. Pandiarana	Asst. Director of Horticulture, Theni	Banana (Grand naine)
4.	Mr. A. Velayudham	Asst. Director of Horticulture, Trichy	Banana (Ney Poovan or Rasthali)
5.	Mr. R. S. Shameem	AO (SAGL), Dharmapuri	Banana (Ney Poovan or Rasthali)
6.	Mr. T. Thomson	AO (SAGL), Dharmapuri	Banana (Grand naine)
7.	Mr. M. Anand	Asst. Director of Horticulture, Dharmapuri	Banana (Grand naine)

8.	Mrs. M. Vanadhi	AO, Krishnagiri	Mango (Alphonsa)
9.	Mr. V. Arumuham	Asst. Director of Horticulture, Kanyakumari	Banana (Nendran); Mango (variety depending on availability)
10.	Mrs. V. Priya	Asst. Director of Horticulture, Erode	Banana (Grand naine)
11.	Mr. K. V. Kumaravelu	Asst. Director of Horticulture, Salem	Banana (Var: Yelakki)

The materials (EFF liquid formulation, nano stickers, carton boxes) required to carry out the experiment have been given to the concerned officials. The experiment has already been initiated and would be concluded by the first/second week of March, 2020, followed by report preparation and result compilation.

A WhatsApp group has been created to coordinate the experiment at different locations and to establish constant communication between TNAU scientists and Department officials who are carrying out the experiment.

The following key points were highlighted during the training programme that have to be followed with out any deviation while carrying out the EFF dip and Nanosticker experiments.

Banana:

- The EFF technology works best for the fruits harvested at 80% maturity
- The fruits should be free from spots / latent infection / phenol residues and bruises.
- For the sake of maintaining uniformity in experiments, fruits of similar size and maturity should be taken for experiment
- Banana fruits should be preferably be harvested by "Rope Method of Harvesting"
- Number of fruits : Two hands per box (To be followed for both dip and sticker experiments)

Mango:

- The fruits should be harvested at 80 % maturity
- Fruits should be harvested with hooks and nets method
- The fruits should be subjected to de-sapping (fruits should be placed upside down/or to be dipped in water/hot water)

Nano-Stickers

- Fruits (Mango / Banana) should be procured, arranged in boxes, labeled appropriately.
- Just prior to sticking only, the Nano sticker should be removed from sachet.
- Each agricultural/horticultural officer will be given 30 sheets for the experiment
- Boxes for conduct of experiments will be procured by Department of Nano Science & Technology, TNAU and will be dispatched to concerned experiment site for the sake of maintaining uniformity in experiments.
- It is advised to maintain 50 % control and 50 % treated fruits. Under circumstances of limited availability of fruits, minimum 10 boxes of control should be maintained.
- Apart from the various data recording (observation in colour, ripening, weight loss, disease incidence), it is highly important to record the visual changes by means of pictures / photographs.
- The 10th day of the experiment period is very crucial which will match with the ethylene burst from fruits. The technology (sticker) will be effective only when the methodology is adopted in terms of time of application.
- All parameters should be entered in the data sheet given to all on daily basis

Annexure X

Technology to extend the shelf life of Neera

Neera is the sweet, translucent white coloured sap tapped from immature inflorescence ('spathe') of coconut. It is a delicious health drink, a rich source of sugars, minerals and vitamins. The most significant characteristic of the coconut neera is its low Glycemic Index (GI is 35), an indicator of the extent of sugar absorbed into the blood. Foods with GI less than 55 are classified as low GI foods. Though neera is a delicious drink, the sap is highly susceptible to natural fermentation at ambient temperature within a few hours of extraction from the coconut. Once fermented, it transforms into toddy with 4% alcohol. But Neera, is an unfermented drink which does not contain alcohol. Since Neera is a highly fermentable sap, processing and preservation of Neera in its natural form to retain the vitamins, sugar, and other nutrients beneficial for health is a challenge. To extend the shelf life of neera, a technology was developed at Center for Post Harvest Technology, Agricultural Engineering College and Research Institute, Tamil Nadu Agricultural University Coimbatore using chemical preservatives with thermal preservation techniques.

Processing of Neera

The neera obtained from the farm were subjected to thermal processing within one hour as detailed below. Before processing, the total acidity should be checked and the acidity content should not exceed 0.02% to obtain a good quality Neera.

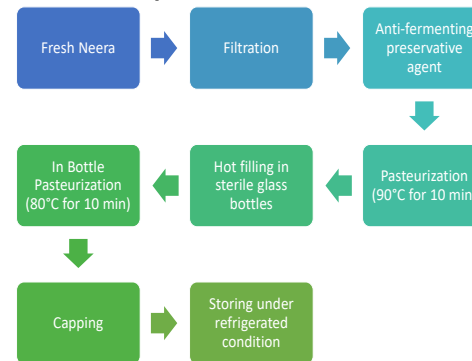


Fig 1. Thermal Processing of Neera

Two samples of each freshly Processed Neera and refrigerated Neera (15 Days after Storage) were sent to two FSSAI approved Laboratories in Chennai as per the recommendations of SWC review meeting for testing the presence of any

antifermenting agents. The results clearly indicated there was presence of Benzoic acid as Sodium benzoate up to 150ppm. The addition of sodium benzoate @150ppm preservative is added during processing which can be admissible as per Codex and FSSAI standards upto 1000mg/kg (1000ppm).Based on the above results, it was observed that Neera preservation Technology developed at CPHT may be recommended that the limit of antifermenting agents or food additives used are safe to consume as per Codex and FSSAI standards and there will not be any impact on human health.

Action has been initiated to file patent and commercialization of the same through Director, Agri Business Development, TNAU, Coimbatore during September 2020

Annexure XI

Small machines for harvesting and de-trashing in sugarcane

Initial model of mini tractor operated sugarcane harvester has been developed at ICAR-Central Institute of Agricultural Engineering, Regional Centre, Coimbatore. The developed unit consists of main frame, base cutting unit, crop windrowing system and power transmission system. The base cutting unit consists of four numbers of blade and the provisions were provided to change the approach angle of cutting blades and number of blades from two to four. The harvester is suitable for attaching with mini tractors ranging from 18-24 hp. The power from Tractor PTO is transmitted through gear box and belt pulley drive to base cutting unit. The developed unit was field test initially at ICAR-Sugarcane Breeding Institute, Coimbatore (variety: Co 86032, age of cane:14 months) recently and the performance of the harvesting system is satisfactory and still further study on influence of cutting blade thickness on cutting of sugarcane in terms of smooth cut/partial cut/broken cut has to be conducted. Intensive field trails have to be conducted in future.

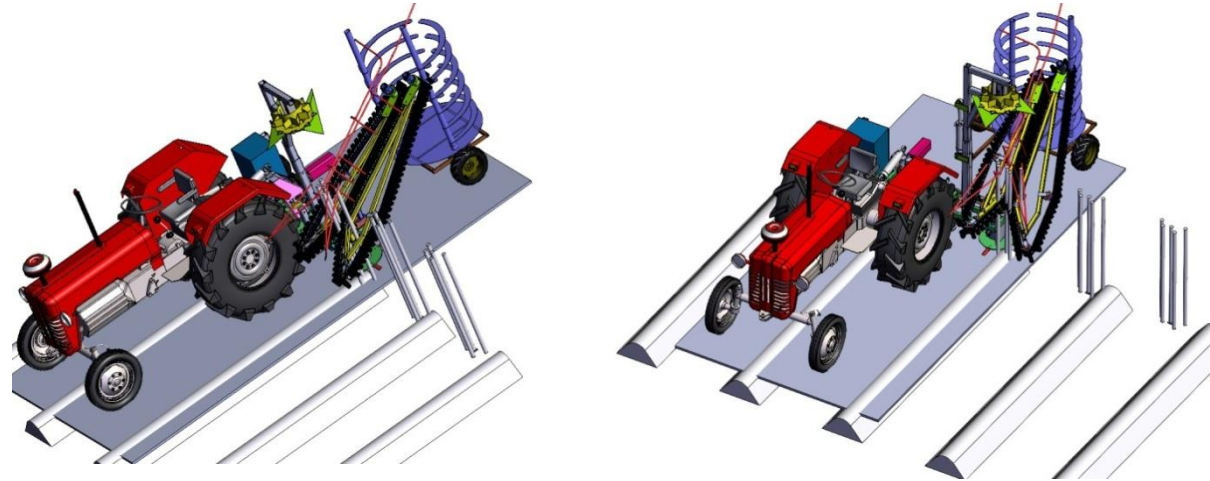


Mini tractor operated sugarcane harvester



Operational view of mini tractor operated sugarcane harvester

The CAD drawing for development of whole cane harvester has been prepared with individual components. The Conceptual tractor operated whole cane harvester consists of Main frame, Power transmission system, Base cutting unit, cane conveying system, Detopping system, cane collection box. The fabrication of individual components is in progress.



Detrasher:

Arrangements have been made to conduct the field trial of commercially available mini tractor operated detriashing unit in the mechanized sugarcane field established at Eastern Block, TNAU on 24.09.2020.

ANNEXURE XII

CENTRE OF EXCELLENCE

1. Farm Women Knowledge, Tiruchirappalli

The Farm Women Knowledge Centre of Tiruchirappalli in association with Dept. of Agriculture and Dept. of Horticulture, imparted Trainings to Farm Women for improving their Skills for Employability Enhancement and Women Empowerment. The following Trainings were given in the year 2019-20.

S.No.	Date	Technology Transfer Training	Number of Participants
1.	26-09-2019	Processing of Cake and Cookies	30
2.	27-09-2019	Bee Keeping	29
3.	30-09-2019	Processing of Millet based Food Production	33
4.	01-10-2019	Mushroom Production	32
5.	03-10-2019	Processing of Fruits and Value Addition	32

2. Innovation at AC&RI, Madurai

1.	Name of the Project	:	NADP (RKVY) - Centre of Excellence in Innovation at AC&RI, Madurai, TNAU
2.	Year of Sanction & SLSC	:	2016
3.	G.O No. & Date	:	G.O.MS No. 06 dated 04.01.2016 of Agricultural Production Commissioner and Secretary to Government, Agriculture Department, Government of Tamil Nadu, Chennai -2

4.	Amount Sanctioned (Rs. in lakh)	:	Year I – Rs. 530.60 lakhs + Year II – III – Rs. 62.00 lakhs Total : Rs.594.85 Lakhs
5.	Amount Released (Rs. in lakh)	:	Year I – Rs. 530.60 lakhs + Year II – III – Rs. 62.00 lakhs Total : Rs.594.85 lakhs
6.	Expenditure (Rs. in lakh)	:	Rs. 594.84585/- lakhs
7.	Implementing Department	:	Department of Biotechnology, Agricultural College and Research Institute, Tamil Nadu Agricultural University Madurai – 625 104

8. Objectives

- Focusing on high end research to understand the molecular basis for the accumulation of micronutrients in small millets and exploiting the process of value addition for better human nutrition and healthcare.
- Combing the classical and molecular tools of plant breeding to understand the genetic diversity of small millets and major horticultural crops to speed-up the process of evolving superior genotypes for framers' cultivation.
- Understanding the physiological and phenological basis associated with abiotic stress tolerance to evolve suitable crop management technologies.
- Conducting soil quality research to identify major constraints associated with the cultivation of small millets and major horticultural crops to give suitable nutrient management practices to the farmers
- Understanding the role of integrated pest and disease management in major agricultural and horticultural crops and formulating novel bio-control agents and bio-inoculants.
- Surveying the socio-economic factors associated with sustainable and successful crop production in Southern Districts of Tamil Nadu by having inter-institutional collaborations at TNAU level.

9. Instruments Available for research work

SI No	NADP Name of the Equipment	Application
1	Amino acid analyzer with power backup	Analysis of Amino Acid content from Plant and food materials
2	Anaerobic Glove Chamber	Used in preparing Inoculums under anaerobic condition
3	Anaerobic Incubator	Used for Incubation studies under anaerobic condition
4	Autoclave (50 litres) = 1 No and 80 litre = 1 No	Used for preparing tissue culture media and for sterilizing buffers and solutions for Nucleic acid and protein isolation
5	Ball mill	Sample grinding
6	Benchtop Centrifuge refrigerated- 1 no. & Refrigerated Microfuge- 1 no. + Minispin - 2nos.	To Centrifuge plant DNA/RNA/protein samples
7	Deep freezer (-20°C), (-40°C), (-80°C) - 1 No. each	Storage of DNA/RNA/protein samples, enzymes, stock solutions etc
8	Dehuller with grader polisher destoner for small millets	Removing hull and polishing seed
9	Electrophoresis - Power pack (High voltage) - 2 Nos.	To check and quantify DNA and RNA
10	Electrophoresis Vertical units (Protein) - 2 nos	To check and quantify proteins
11	ELISA multimode microplate reader	Quantification of Protein
12	Environmental Digital shaker	Secondary metabolite production and culture incubation
13	Freeze Drier -Lyophilizer	To prepare powder

14	GCMS with power backup facility	To analyze volatile chemicals
15	Gel Documentation Unit	To document gel images
16	Gradient PCR	To amplify DNA
17	Grain huller and miller for grain polishing	To mill cereal grains
18	Growth chamber (Multi-stack)	To grow plants under lab controlled conditions
19	Hi-tech greenhouse facility	To grow plants under controlled conditions
20	Laminar air-flow chamber (4 ft) = 1 No and (6 ft) = 1 No	Tissue culture work and inoculation of cultures
21	Microscope - Inverted - Phase contrast and fluorescence	To visualize microscopic image
22	Microscope - Stereozoom with camera	To visualize the magnified image
23	Microscope - Upright with high resolution digital image processor with local accessories	To visualize microscopic image and document the size
24	Microvolume spectrophotometer	DNA/RNA/Protein quantification
25	Net house	Raising plant under semi-controlled condition
26	PCR - Real time (RT) (96 well) with power backup	DNA amplification
27	Plant Sample Grinder	Large scale grinding plant samples for DNA extraction
28	Refrigerated Incubator cum shaker	For performing incubation with mixing
29	Retort packaging machine	Packaging food products
30	Rotary Evaporator with accessories vacuum pump and chiller	To concentrate crude plant extracts

31	Spectrophotometer- UV	Quantification of DNA
32	Spectrophotometer- UV - VIS - NIR	Quantification of biomolecules
33	Texturometer	To analyze texture of food products
34	Tissue grinder for DNA extraction	Plant Tissue grinding for DNA extraction
35	Vacuum Concentrator	To remove moisture
36	Water purification systems (Elix and Milli Q)	To prepare ultrapure water for molecular biology experiments
37	X-Ray Fluorescence Analyzer	To estimate micronutrients in plant samples
38	PCR	To amplify DNA

3. Dryland Agricultural Research Station, Chettinad

CENTRE OF EXCELLENCE IN DRY FARMING (COEDF)

Centre of Excellence in Dry Farming was established in the year 2015 with the following objectives

- To diversify dry land cropping system with less water intensive, high value short life drought tolerant crops
- To develop suitable soil and crop management technological strategies for sustainable dry farming systems in the dryland areas
- To promote mechanized cultivation under dry farming conditions
- To develop alternative land uses like arid zone fruit gardens, silvopasture, agro-horticulture and tree farming
- To evaluate the eco-friendly IPDM modules for dryland crops
- To fine tune processing and value addition techniques of dryland crops and to develop entrepreneur skill among the rural youths
- To impart skill oriented trainings and capacity building to farmers, officials and rural youths in specialized areas to support high tech dry farming

Research Focus

- Evolving drought tolerant varieties in groundnut and small millets
- *In-situ* and *ex-situ* rainwater harvesting
- Reuse of harvested water for life saving supplemental irrigation through micro irrigation
- Integrated soil and crop management; pest and disease management for groundnut, small millets and pulses
- Agro forestry models and tree farming for dryland ecosystem
- Seed to seed mechanization in dryland crops

Salient Activities

Demonstration

- Drought mitigation technologies developed at DARS are maintained as demonstration plots for show casing the technology to the farmers visiting DARS and also for training purpose.
- Land configuration of Broad bed furrow, Tie ridging, Farm pond and Rain water harvesting are also developed and sustained for the benefit of the farmers.

COEDF Laboratory

COEDF is equipped with the scientific instruments viz., Portable Photo Synthesis System, Leaf Water Potential Meter, Infrared Thermometer, LAB Leaf Area Meter along with Conveyor Attachment, Chlorophyll Content Meter/SPAD, Soil Moisture sensor, Multichannel Soil Temperature Sensor, Soil Penetrometer, Total organic carbon analyser, Atomic absorption Spectrophotometer, Chlorophyll fluorescence meter, Rhizo scanner and Accessories, Growth Chamber and Pressure chamber and accessories.

Students are benefited by the laboratory facilities created.

Year	Districts covered	No. of students
2017	4	291
2018	6	647
2019	5	670
2020	1	35

Technologies developed (Soil and Moisture conservation, Dryland crop Management)

- Adoption of compartmental bunding with crop residue mulch @ 5.0 t ha⁻¹ is recommended for groundnut in *alfisols*
- Adoption of minimum tillage with crop residues @ 5 t ha⁻¹ and supplementary irrigation (2 or 3 times) through raingun / sprinklers from **farm pond** increased soil moisture retention and pod yield of groundnut in *alfisols*.

- Adoption of laser leveling with crop residue mulch @ 5 t ha⁻¹ enhanced the growth, yield, economics and rain water use efficiency of rainfed groundnut.
- Balanced use of NPK (10:10:45 kg ha⁻¹) as basal and split application of gypsum 200 kg at basal and remaining 200 kg ha⁻¹ at as and when rain received between 30 to 45 days has been found to be most suitable fertilization technique for rainfed groundnut
- Application of biochar @ 5 t ha⁻¹ enhanced the soil moisture status, total carbon stock, soil physical, chemical and biological properties and crop yield in Alfisol
- The integrated application of organic (FYM 12.5 t ha⁻¹ and inorganic (10:10:45 kg ha⁻¹ NPK) with *rhizobium* and *phosphobacteria* 2 kg ha⁻¹ has been found to be most suitable nutrient application under rainfed condition for sustainable soil health and groundnut yield.
- Application of TNAU micronutrient mixture @ 5kg ha⁻¹ as Enriched farm yard manure is recommended for rainfed blackgram
- Application of phospho poultry manure compost @ 9.37 t ha⁻¹ was found to be economically viable to the farmers in terms of improvement in soil properties and blackgram yield
- Seed to seed mechanized groundnut production technologies: Decordication, sowing, harvesting and stripping process was standardized and demonstrated 100 acres groundnut in farmers' holdings through participatory technology development mode
- Two promising drought tolerant groundnut lines have been evolved and are in pipe line for release.
- Promising barnyard millet genotypes were identified for rainfed *Alfisol*
- Biodegradation of coirpith by *Pleurotus* and its application to blackgram for managing root rot caused by *Macrophomina phaseolina*

Research Outcome

Two drought tolerant cultures of Groundnut and Barnyard millet are developed and entries are kept ready for varietal proposal.

Dissemination of Technologies

- Large scale cluster demonstrations of PPFM spray in 2500 acres of rainfed rice in six blocks of Sivagangai district to mitigate intermittent and terminal drought.
- Farmers participatory demonstration of mechanized cultivation of direct seeded rice in an area of 100 acres to increase the income of the rainfed famers
- Water harvesting structure and recycling of harvested water through micro irrigation viz., mobile sprinkler and rain gun facilities are available for showcasing the water management technologies to the farmers
- DARS is equipped with seed to seed mechanization implements and equipments facilities for dryland crops.

Trainings

The above dryland technologies are upscaled and showcased through different outreach programmes organized at this institute to the various stakeholders of agriculture and allied sectors. Trainings and demonstrations are given regularly to the famers and extension officials. The details of trainings are given below.

Year	Districts covered	No. of beneficiaries
2017	14	Farmers – 838 Extension officials – 120
2018	19	Farmers – 942 Extension officials – 311
2019	21	Farmers – 2350 Extension officials – 290
2020	16	Farmers – 940 Extension officials – 105

Training to the farmers under Mission on Sustainable Dryland Agriculture

S.No	Name of the Block	District	Date	No. of beneficiary farmers
1.	Aruppukottai	Virudhunagar	22.06.2017	50
2.	Singampunery	Sivaganga	29.06.2017	50
3.	S.Pudur	Sivaganga	05.07.2017	50
4.	Thogaimalai	Karur	11.07.2017	50
5.	Kallikudi	Madurai	12.07.2017	50
6.	Kariyapatti	Virthunagar	14.07.2017	50
7.	K. Paramathi	Karur	25.07.2017	50
8.	Paramathi	Nammakkal	26.07.2017	50
9.	Gujiliamparai	Dindigul	01.08.2017	50
10.	Mallasamudram	Nammakkal	02.08.2017	50
11.	Mallanur	Vellore	17.08.2017	50
12.	Thottiyam	Trichy	22.08.2017	50
13.	Sanarpatti	Dindigul	22.08.2017	50
14.	Kayathar	Tuticorin	23.08.2017	50
15.	Thuraiyur	Trichy	29.08.2017	50
16.	Thanjavur	Thanjavur	01.09.2017	50
17.	Ariyalur	Ariyalur	05.09.2017	50
18.	Pennagaram	Dharmapuri	11.09.2017	50
19.	Morappam	Dharmapuri	11.09.2017	50
20.	Dharmapuri	Dharmapuri	11.09.2017	50
21.	Budalur	Thanjavur	18.09.2017	50
	Total			1050

Trainings to ATMA Farmers

S.No	Name of the Block	District	Date	No of beneficiary farmers
1.	Singampunery	Sivaganga	29.06.2017	50
2.	Sakottai block	Sivaganaga	11.08.2017	100
3.	Singampunery	Sivaganga	30.08.2017	50
	Total			200

Special training to the officials of the Department of Agriculture, Tamil Nadu

S.No	Name of the College	Officials	Date	No of officials
1.	STAMIN-Kudimiyamalai	ADA, AO, Deputy AAO	20.06.2017	40
2.	STAMIN-Kudimiyamalai	ADA, AO, Deputy AAO	04.07.2017	40
3.	STAMIN-Kudimiyamalai	AAO	18.07.2017	40
4.	STAMIN-Kudimiyamalai	AAO	25.07.2017	40
5.	STAMIN-Kudimiyamalai	BTM	09.08.2017	30
6.	STAMIN-Kudimiyamalai	BTM	17.08.2017	30
7.	STAMIN-Kudimiyamalai	BTM	22.08.2017	30
		Total		250

Trainings to B.Sc.(Ag.) Students

S.No	Name of the College	District	Date	No of students
1.	AC&RI,Kudimiyamalai-Study tour	DARS,Chettinad	26.02.2017	55
2.	AC&RI-Thiruannamalia-Study tour	DARS,chettinad	05.03.2017	62
3.	ADAC&RI,Trichy –Study tour	DARS,chettinad	20.03.2017	112
4.	College of Agricultural Technology (CAT)	Theni	05.07.2017	90
5.	College of Agricultural Technology (CAT)	Theni	06.07.2017	50
6.	J.K.K Munirajah college of Agriculture	Erode	06.07.2017	69
	Total			209

Special lectures delivered to the Agriculture Officers in the trainings organized by Department of Agriculture

S. No	Training/Seminar/Conference/Field visit	Organized by	No of farmers	Date
1.	Varieties, season and general cultivation practices for Groundnut	ADA, Kannangudi	25	03.03.2016
2.	PMJY-Meeting	ADA, Illyangudi	45	11.08.2016
3.	Pre-campaign for Direct seeded rice	ADA, Kallal	48	17.08.2016
4.	Direct sown rice	ADA kallal	45	05.09.2016
5.	IPDM in small millet	ADA, Sakkottai	23	23.08.2016
6.	Integrated crop management in Small millet			
7.	Processing and value addition of millet			
8.	Awarness Programme on rural energy utilization.	Seethalakshmi college for women, pallathur	150	07.10.2016
9.	Rice nursery pest and disease	ADA, Manamadurai	45	19.10.2016
10.	Seed village training	ADA, kannankudi	55	19.10.2016
11.	Value addition of minor millet	Rural training centre Amaravathipudur	30	20.10.16 and 21.10.2016
12.	Small millet pest and disease problems	ADA,Sakkottai	44	20.10.2016
13.	ICM-Paddy	ADA, Kannangudi	60	16.11.2016
14.	Seed treatment and IDM for rice	ADA, Illayangudi	42	16.11.2016
15.	ICM-Groudnut	ADA,Kannankudi	65	17.11.2016
16.	Disease management in groundnut	Ammeyanthal	20	22.11.2016
17.	"Active additive application of bio-inoculants through seed pelletisation for enhancing and profit of dryland crops"to the farmers			
18.	ATMA farmers training on improved pulse production technologies at Chokkanpatti village of Sakkottai block	ADA, Sakkotai	50	22.11.2016
19.	ICM in Groundnut	ADA, Thirupathur	46	23.11.2016

20.	Nursery technology in rice	ADA, Kannangudi	25	25.11.2016
21.	Planting technology in rice	ADA, Kannangudi	25	28.11.2016
22.	ICT-Groundnut	ADA, Thirupathur	50	20.12.2016
23.	IPDM-Groundnut	ADA, Illayangudi	45	21.12.2016
24.	ICM-Pulses	ADA, Kannankudi	45	21.12.2016
25.	INM in rice	ADA, Kannangudi	25	27.12.2016
26.	Organic farming technology	ADA, Devakottai	49	27.12.2016
27.	ICM-Groundnut	ADA, Sakkottai	50	06.01.2017
28.	Farm school-Post harvest management and disease management in rice at Kannankudi	ADA Kannangudi	25	01.03.2017
29.	ATMA-Vegetables disease management at Pethachikudirrupu-Sakkottai	ADA Sakkottai	25	09.03.2017
			1157	

Training organized during the year 2019

S. No.	Block	District	Date	No. of Participants
1.	Vennandur	Namakkal	03.01.2019	40
2.	Erumapatti	Namakkal	29.01.2019	40
3.	Krishnarayapuram	Karur	19.02.2019	40
4.	Krishnarayapuram	Karur	20.02.2019	40
5.	Vilathikulam	Thoothukudi	26.02.2019	40
6.	Madaurai	Madurai (DWDA)	25.03.2019	120
7.	Kottur	Thiruvarur	30.05.2019	30
8.	Pavinjur	Kanchipuram	30.05.2019	50
9.	Kayathar	Tuticorin	31.05.2019	50

S. No.	Block	District	Date	No. of Participants
10.	Sulur	Coimbatore	06.06.2019	50
11.	Kallal	Sivagangai	10.06.2019	50
12.	Thirumangalam	Madurai	08.07.2019	50
13.	Puduchatram	Namakkal	09.07.2019	50
14.	Andipatti	Theni	19.07.2019	50
15.	Pulambadi	Trichy	24.07.2019	50
16.	Sedapatti	Madurai	26.07.2019	50
17.	Manachanallur	Trichirapalli	07.08.2019	50
18.	Elachipalayam	Namakkal	28.08.2019	50
19.	Kannankudi	Sivagangai	30.08.2019	50
20.	Pudukottai	Pudukottai	04.09.2019	100
21.	KV Kuppam	Vellore	12.09.2019	50
22.	Kalasapakkam	Tiruvanamalai	25.09.2019	50
23.	Namakkal	Namakkal	03.10.2019	50
24.	Vembakam	Tiruvanamalai	04.10.2019	50
25.	Kadavur	Karur	05.10.2019	50
26.	Kundadam	Tirupur	30.10.2019	50
27.	Elachipalayam	Namakkal	06.11.2019	50
28.	Kallal	Sivagangai	13.11.2019	50
29.	Mecheri	Salem	13.11.2019	50

S. No.	Block	District	Date	No. of Participants
30.	Mallasamudram	Namakkal	13.11.2019	50
31.	Kolinjaur	Villupuram	14.11.2019	50
32.	Kalrayan hills	Villupuram	15.11.2019	50
33.	Chinasalem	Villupuram	15.11.2019	50
34.	Illayangudi	Sivagangai	15.11.2019	50
35.	Uthukuli	Tirupur	19.11.2019	50
36.	Thiyagadurgam	Villupuram	22.11.2019	50
37.	Mechari	Namakkal	26.11.2019	50
38.	Kalayarkovil	Sivagangai	26.11.2019	50
39.	Mangalore	Cuddalore	03.12.2019	50
40.	Thiruvarangulam	Pudukottai	04.12.2019	50
41.	Mangalore	Cuddalore	04.12.2019	50
42.	Viralimalai	Pudukkottai	04.12.2019	50
44.	Viudhachalam	Cuddalore	05.12.2019	50
45.	Melmalayanur	Viluppuram	05.12.2019	50
47.	Thanthani	Karur	06.12.2019	50
48.	Arupukottai	Virthunagar	06.12.2019	50
				2350

Training to ATMA Farmers during 2019

S.No	Name of the Block	District	Date	No.of.Farmers
1.	Mugaiyur	Namakkal	07.01.2020	50
2.	Mailam	Vilupuram	07.01.2020	50
3.	Sankarapuram	Vilupuram Dist	07.01.2020	50
4.	Periyakulam	Theni	08.01.2020	50
5.	Thirumangalam	Madurai	10.01.2020	50
6.	Pollachi south	Thirupur	10.01.2020	50
7.	5 Sankarankovil	Tenkasi	13.01.2020	50
8.	Kuruvikulam	Tenkasi	13.01.2020	50
9.	Kallikudi	Madurai	22.01.2020	50
10.	Aranthangi	Pudukottai	23.01.2020	50
11.	Kayathar	Tuticorin	23.01.2020	50
12.	Perambalur	Perambalur	23.01.2020	50
13.	Natham	Dindigul	23.01.2020	50
14.	Veppanthattai	Perambalur	24.01.2020	50
			Total	700

Training to Agriculture Officers, Department of Agriculture

1.	AAOs/Dy.AO	STAMIN-Kudimiyamalai-Pudukottai	10.01.2019	50
2.	ADAs	STAMIN-Kudimiyamalai-Pudukottai	23.01.2019	50
3.	Deputy AO/AAOs	STAMIN-Kudimiyamalai-Pudukottai	31.01.2019	50
4.	AAOs	STAMIN-Kudimiyamalai-Pudukottai	25.07.2019	20
5.	AO&DyAO	STAMIN-Kudimiyamalai-Pudukottai	13.09.2019	30
6.	ADAs	STAMIN-Kudimiyamalai-Pudukottai	17.09.2019	30
7.	BTM	STAMIN-Kudimiyamalai-Pudukottai	17.12.2019	30
	BTM	STAMIN-Kudimiyamalai-Pudukottai	19.12.2019	30
				290

Trainings organized during the year 2020

1.	ATM	STAMIN-Kudimiyamalai-Pudukottai	21.01.2020	40
2.	ATM	STAMIN-Kudimiyamalai-Pudukottai	23.01.2020	40

4. Soil Health, ADAC&RI, Trichy

NADP Scheme Achievements from 2010-11 to 2020-21

S.No	Particulars	Details
1	Title of the NADP Project	: NADP - Centre of Excellence in sustaining Soil Health, ADAC&RI, Trichy
2	Primary Objectives	<ul style="list-style-type: none"> Quantification of organic molecules / pesticide residues/ hormones/ enzymes in soil, plant, water/ environment using LC-MS/MS and GC-MS/MS techniques Identification of diverse microbial communities by MALDI – TOF analyzer

		<ul style="list-style-type: none"> • Offering analytical services/ to farmers/ entrepreneurs/ researchers; and instrumentation training to scholars/ scientists • Technology dissemination in sustaining soil health in sodic soil
3	Name of Scientists involved Principal Investigator	: Dr. P. Santhy, Professor of Soil Science and Agrl. Chemistry Dr. P. Balasubramaniam, Professor and Head (SS&AC) Dr. K. Arulmozhiselvan, Professor of Soil Science and Agrl. Chemistry
4	Name of Scientists involved Co-PIs	: Dr. P. Janaki, Associate Professor (SS&AC) Dr. J. Ejilane, Assistant Professor (Microbiology) Dr. G. Gomadhi, Assistant Professor, (SS&AC)
5	Place	: Anbil Dharmalingam Agricultural College and Research Institute, Trichy 620027
6	Duration of the project	: 2015-2018
7	Budget Outlay	: Rs. 420 Lakhs
8	Brief description about Farmers Skill Development Trainings* and Type: Number: Budget :	: (Details enclosed) Skill development programme was conducted to Scholars and scientists on analytical and instrumentation techniques (Scholars – 15; Scientists -10)
9	Brief description about Assets / Infrastructure created* and Type: Number: Value: Geo-tag details:	: (Details enclosed) Sophisticated analytical instruments – (5) Lab/ support Instruments & Infrastructure –(12) Rs. 420 Lakhs
9	Brief description about Number of Beneficiaries* and Farmers: Rural Youth: Scientists (Lab): Students (Lab): Any other:	: By way of analytical advisory services farmers, scientists were benefitted. Farmers : 30 Scientists : 18 Students : 54

10	Salient Findings/Abstract (1 page)	:	One Page report enclosed
11	Success stories enclosed	:	No
12	Sustainability of the Project#	:	The NADP Infrastructure and Analytical Instruments are being used continuously by Scholars and Scientists under Venture capital Scheme on "Analytical and Training Services" at COE-SSH (V60IJ). Instruments are maintained with receipts received in VCS on sustainable basis benefitting Farmers, entrepreneurs and researchers
13	Scalability of the Project##	:	Adopting to Best Laboratory Practices, it is expected to scale up the Lab of this Centre to a reputed State Level Lab for soil Health within a Decade
14	Publication if any (including popular articles)	:	4 in NAAS rated Journals Book -1
15.	Others (if any)		

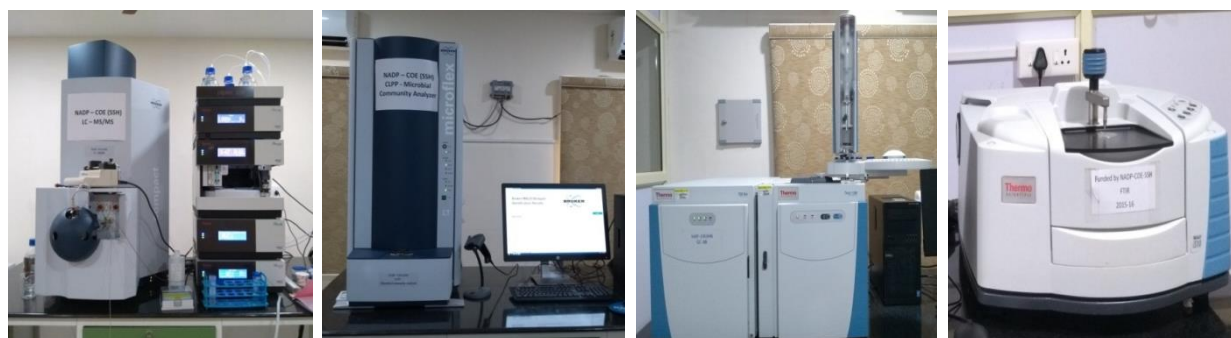
* Attach documentary evidence including photos and press clipping

Mention how the activities are continued for the benefit of farmers / scientists after the project period

Increased scale of operations after the project period by the Department / University

NADP - Centre of Excellence in sustaining Soil Health, ADAC&RI, Trichy
Infrastructural Facilities created

S. No.	Name of equipment	Cost in Lakhs Rs.	Year of Purchase
1	Open Top Chamber	18.69	2016
2	Refrigerated Centrifuge	6.00	2016
3	Photometer	1.44	2016
4	Deep Freezer	9.65	2016
5	Wet and Dry Sieve Analysis Set	1.98	2017
6	Soil Core Sampling Kit	0.50	2017
7	LC MS/MS	150.03	2017
8	CLPP Microbe Identification System	106.00	2017
9	Pressure Plate Apparatus	21.39	2017
10	FT- IR	23.04	2017
11	GC – MS	58.75	2017
12	UV Double Beam Spectrometer	9.65	2017
13	Water Purification System	4.99	2018
14	15 KVA Generator, Laptop for Conference Room, LED monitor for Conference Room, CCTV and other utility	15.74	2018
Grand Total = 420.0 Lakhs			





LC MS/MS

UV Vis Spectrometer



MALDI TOF

Pressure Plate Apparatus



GC MS/MS



Deep freezer

FT IR Spectrometer



Open Top Chamber

NADP - Centre of Excellence in sustaining Soil Health, ADAC&RI, Trichy

Activities and Beneficiaries

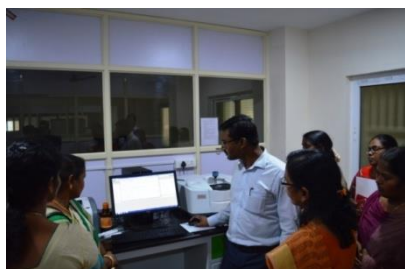
Offered facility to research investigators in the disciplines of Soil Science and Agricultural Chemistry, Agronomy, Microbiology, Crop Physiology, Biochemistry, and Environmental Science to take up analytical work involving the equipments installed in the COE - Soil Health - Laboratory for the purpose of solving issues related to Soil Health and improving soil productivity in terms of yield and profitable income realizable by farmers.

Research works are being taken up in the following aspects: Quantification of organic molecules / pesticide residues in samples by LC-MS/MS and GC-MS/MS techniques; Identification of diverse microbial communities by MALDI – TOF analyzer.

Workshops / Training on Soil Health during 2017-18, 2018-19 and 2019-20

S.No.	Title of the workshop / training	Date	Facilitator
1.	Food Safety and latest advancement in residue analysis and food authenticity	24.11.2017	M/S Thermo scientific
2.	Seminar cum Workshop on MALDI-Biotyper- MALDI-TOF based microbial identification system	11.5.2018	M/S Bruker
3.	Application training on LC-MS	21.6.18	M/S Bruker
4.	Application training on LC-MS	13-15 Nov. 18	M/S Bruker
5.	Application training on LC-MS	17.4.19	M/S Bruker
6.	Application training on GC-MS	24.6.19 to 27.6.2019	M/S Thermo Scientific

View of Trainings/ workshops



With FT IR Spectrometer



With GC MS/ MS analysis



With Atomic Absorption Spec



With GC MS/ MS analysis



Food safety workshop



Food safety workshop

Salient findings / Abstract

NADP - Centre of Excellence in sustaining Soil Health, ADAC&RI, Trichy has been established under NADP funds of Rs. 420 lakhs during the year 2015-18 with a aim to offer advance instrumental analytical laboratory facility for the benefit of farmers, scholars and scientists.

Sophisticated instruments viz., LC MS/MS, GC MS/MS, MALDI-TOF, FT-IR, Spectrometer, etc are available in this Centre. Soil, plant and environment samples are analysed in this Centre.

Research findings emanated from the Centre

- The dissipation of glyphosate in sodic soil and non target Arbuscular Mycorrhizal (AM) fungi interaction was explored with bhendi test crop using LC-MS and spectrophotometer. Glyphosate persistence decreased with the time and degraded with the mean half-life ranged from 5.09 to 10.35 days. Glyphosate and AMPA residues were found below detection limit (0.01 mg/kg) on 45th and 60th days respectively in soil.
- The application of glyphosate at higher doses is indeed detrimental to crop growth and microorganisms like AM fungi, which reside in soil and roots of the host plant. The AM fungi influence the uptake of glyphosate, both in plants and weeds, which resulted in more population of weeds.
- Terminal residues of the applied herbicides viz., pendimethalin, oxyfluorfen and bispyribac-sodium were analysed using the HPLC-DAD and LC-MS/MS and were found below detection limit in soil (0.01 mg/kg) and below the MRL (0.05 mg/kg) in finger millet grain.
- Pesticide residues in vegetables collected at weekly interval from different markets and farmer's field in Trichy district was analyzed using GC-MS and HPLC-DAD and found ethion was detected in all vegetables particularly in brinjal and tomato across different locations followed by quinalphos, profenophos and chlorpyriphos.
- For easy analysis and quality control, the assessment of active ingredients in the commercial pesticide formulations by the FTIR was done. Validation is in progress.

Publications

- Bhavadharani, M, P Janaki, R Sheeba Joyce Roseleen, K Arulmozhiselvan and J Ejilane. 2019. Evaluation of rapid enzyme inhibition test for pesticides detection and validation by spectrophotometer and GC/MS". The Pharma Innovation Journal. 8(6): 1069-1074.
- Brindhavani P.M., P. Janaki and J. Ejilane. 2018. Effect of Glyphosate on Arbuscular Mycorrhizal Fungi in Soil and Growth of *Abelmoschus esculentus* Madras Agric. J., doi:10.29321/MAJ 2018.000190.
- Brindhavani P.M., P. Janaki, G. Gomadhi, T. Ramesh and J. Ejilane. 2020. Influence of arbuscular mycorrhizal fungi on glyphosate dissipation rate in okra cultivated sodic soil of Tamil Nadu. Journal of Environmental Biology. Accepted for publishing.
- Asan Mohamed B and Janaki P. 2020. Determination of active principles in commercial pesticides using fourier transform infrared spectroscopy. **Abstract** presented in 3rd Agricultural Graduate Students Conference held at TNAU, Coimbatore through online during 28.5.2020-29.5.2020.

Operation of Venture Capital Scheme for Analytical and Training Services

A venture capital scheme has been started on "Analytical and Training Services at COE-SSH". The income generated from the scheme is being utilized for the maintenance of equipments. {Income generated Rs. 185700 (2018-19), Rs. 67,560 (2019-2020) and 6,78,110 (2019-2020)}

Period	User	Technique	No. of samples	Receipt (Rs.)
2018-19	Scientists	GCMS, LCMS, MALDI-TOF, FTIR, AAS – with advanced analytical methods	434	185700
2019-20	Scientists	Flame photometry, Spectrometry and routine analytical methods	104	48700
2019-20	Farmers	Flame photometry, Spectrometry and routine analytical methods	56	18860
2020-21	Scientists	Flame photometry, Spectrometry and routine analytical methods	1466	669645
2020-21	Farmers	Flame photometry, Spectrometry and routine analytical methods	47	8465

Period	User	Technique	No. of samples	Receipt (Rs.)
2018-19	Scientists	GCMS, LCMS, MALDI-TOF, FTIR, AAS – with advanced analytical methods	434	185700
Total			2107	931370

Brought out a Book Compilation (National level) on salt affected soils

A book was published in the context of salt affected soils prevalent in the region of Trichy district

- Masilamani, P., Arulmozhiselvan, K. and P. Balasubramaniam (Eds.) (2020). Technological advances in enhancing productivity of salt affected soils”. Today and Tomorrow’s Printers and Publishers, Daryaganj, New Delhi 110002 (ISBN: 9788170196686)

5. Oil Palm, Agricultural Research Station, Pattukkottai

I. TRANSFER OF TECHNOLOGY (2019 - 2020)

a) Training programmes / field days organized: 2019 - 2020:

S. No	Date	Topic	No. of participants	Sponsored by
1.	28.01.2019 to 29.01.2019	Recent trends in Oil Palm cultivation technology	40 farmers from Cuddalore District	ATMA Scheme- Department of Agriculture
2.	11.07.2019	Training on Improved production techniques on oil palm	40 farmers from Thirukovilur Block of Villupuram district	ATMA Scheme- Department of Agriculture
3.	14.11.2019		40 farmers from Viralimalai block of Pudukkottai district.	
4.	14.08.2019		50 farmers from Uthukuli block of Thiruppur District	
5.	04.10.2019	Training programme on Fertigation techniques and Harvesting Practices in Oil Palm	40 farmers at Vadakkur village of Thanjavur district	ICAR-IIOPR & Godrej Agrovet Pvt. Ltd.
6.	22.11.2019	Training on Improved production techniques on oil palm and field visit	40 farmers from Mathur block of Krishnagiri District	ATMA Scheme- Department of Agriculture
7.	25.11.2019		50 farmers from Thanjavur block of Thanjavur district	
8.	26.11.2019		40 farmers from Vadamadurai block of Dindigul district	

9.	26.11.2019		50 farmers from Ilayangudi block of Sivagangai district	
10.	27.11.2019		40 farmers from Viilupuram block of Villupuram district	
11.	28.11.2019		50 farmers from Kadamalaikundu block of Theni district	
12.	21.02.2020		26 farmers from Pattukkottai block of Thanjavur District	ICAR-AICRP on Palms
Total			506 Farmers	

b) Research – Extension – Farmer interface programme conducted:

Sl. No.	Date	Theme of interface programme	Agencies involved	No. of participants
1.	28.01.2019 to 29.01.2019	Recent trends in Oil Palm cultivation technology under ATMA –Cuddalore District	ATMA -Department of Agriculture	40 farmers
2.	14.08.2019	Training cum awareness programme on cultivation Practices in Oil Palm	ATMA - Department of Agriculture	50 farmers
3.	04.10.2019	Training cum awareness programme on Fertigation techniques and Harvesting Practices in Oil Palm	ICAR-IIOPR & Godrej Agrovet Pvt. Ltd	50 farmers
4.	26.11.2019	Training cum awareness programme on cultivation Practices in Oil Palm-ATMA –Sivagangai district	ATMA - Department of Agriculture	50 farmers
5.	21.02.2020	Training cum awareness programme on cultivation Practices in Oil Palm	ICAR-AICRP on Palms	26 farmers
Total				216 farmers

Oil Palm Training at ARS, Pattukkottai on 28.01.2019 & 29.01.2019



Field Visit to Naduvur Village during the Training Programme on 29.01.2019

Oil Palm Training at ARS, Pattukkottai on 14.11.2019 (Viralimalai block)



Oil Palm Training at ARS, Pattukkottai on 25.11.2019 (Thanjavur district)



Oil Palm Training at ARS, Pattukkottai on 26.11.2019 (Sivagangai district)



II. RESEARCH HIGHLIGHTS (2019 - 2020):

1. Studies on the comparative performances of different hybrid combination of oil palm (GEN 8): Varieties/Hybrids Released: "Godavari Gold"

- Among the 10 hybrids evaluated for growth and yield parameters, the highest FFB yield of 198.39 kg/palm and per ha yield of 28.37 t was recorded in hybrid NRCOP 17. Best performing oil palm hybrid NRCOP17 was identified and released as '**Godavari Gold**' by the Central Variety Release Committee.
- This oil Palm hybrid '**Godavari Gold**' can be best suited for the **Cauvery Delta regions of Tamil Nadu**.
- This oil Palm hybrid '**Godavari Gold**' is capable of producing oil content 21.28 % per bunch of FFB with the **oil yield of 5.79 tonnes per hectare** in twelve years of planting.

2. Evaluation of new cross combination of oil palm for Cauvery Delta Zone of Tamil Nadu (GEN 8C):

- Among the 10 hybrids evaluated for growth and yield parameters, the highest FFB yield of 138.60 kg/palm and per ha yield of 19.82 t/ha was recorded in the hybrid NRCOP 9.

3. Progeny evaluation trials in oil palm (Set I) – (GEN 8D):

- Among the replicated hybrids, the highest FFB yield of 120.40 kg/palm and per ha yield of yield of 17.21 t was recorded in the hybrid NRCOP 38.
- Among the non replicated hybrids, the highest FFB yield of 102.25 kg/palm and per ha yield of yield of 14.62 t was recorded in the hybrid NRCOP 35.

4. Evaluation of Dwarf Oil Palm Hybrids – (GEN 9):

- Secondary nursery has been raised in the seven dwarf tenera hybrids viz., IIOPR-53, 54, 55, 56, 57, 58 and 59 during the month of September 2019.
- The seedlings have established well and are maintained properly in the shade net condition.

6. CENTRE OF EXCELLENCE IN MOLECULAR BREEDING

PROGRESS OF WORK

Nutritional and therapeutic properties in rice

- Screening of 150 core rice germplasm accessions for different nutritional traits were taken up. The line RG1 (Mapillai samba) was found to possess high protein (14.70 g/100g) in brown rice. The line RG2 (CK 275) was found to possess high folate (29.28 µg /100g). In Genome wide association mapping, the markers RM6321, RM5511 and RM205 on chromosome 1, 4 and 9 exhibited association with protein content. Two candidate gene based markers viz., RM13737 and RM110 were found to be linked with the trait folate content.
- In these 150 lines, the amylose content ranged from 27.20% to 42.80%. The traditional rice landraces namely Kodai, Improved Chinsurah, Jeevan Samba, Seeta sail, Kalli madayan, Katta samba recorded high amylose content. The traditional landraces viz., Mikuruvai (28.22), Mappillai samba (18.09) Sorna kuruvai (16.32), Malathan samba, Earapalli samba and Edavan Kudi Pokkali recorded high phenolic content. Highest value of flavonoid content was observed for Vadakathi samba (84.73 mg /g) followed by Thooyamalli (42.35), Karungan (36.48), Kavuni and Sembala.

- High antioxidant activity was observed in the germplasm Edavankudipokkali (1.729 mg/g), followed by Mapillai samba (RG1) (1.566 mg/g), Kattuponni (RG39) (1.488 mg/g), Purple puttu (1.318 mg/g). High anthocyanin content was observed in the germplasm Kallimadayan – RG 126 (4.16 mg/g), followed by Mapillai samba (RG1) (3.68 mg/g), Arkadkichali (RG72) (3.45 mg/g) and Ponmani samba- RG 118 (3.37 mg/g). Low level of anthocyanin content was observed in ARB 65 – RG 74 (1.62 mg/g).
- Totally, 94 germplasm DNA samples were genotyped using 480 SNP markers (ID 8652-1 of 5, ID 8652-2 of 5, ID 8652- 3 of 5) using 5 Integrated Fluid chip (ID 1382-430-247, ID 1382-417-112, ID 1382-417-058, ID 1382-417-614 and ID 1382-417-611) and data analysis is in progress

Drought response and biomass in rice

- Nagina 22 (N22) is a deep-rooted, drought and heat tolerant upland rice cultivar extensively utilized in breeding programme. Mutants for different traits have been obtained in a DBT scheme. Among them, 30 mutants were identified for high and low biomass. These mutants were screened with 96 SNPs and 18 were found to be polymorphic between the two parents (N22 wild type and N22- CC-M4-HT-1333) for biomass trait. Five high biomass plants exhibited similar allelic patterns to that of high biomass parent N22- CC-M4-HT-1333 for the three SNP markers. Three SNP markers *viz.*, id10003686, id10000174 and id1025292 co-segregated with biomass trait. The high biomass EMS Mutant N22-CC-HBM-1333 recorded increased yield than wild type N22 through studies on crop growth rate.
- Twelve mutants with altered drought response were identified. Among them, N22-CC-DTM-810 is having increased root length and root number. N22-CC-DTM-595, 650,766, and 893 is having better drought tolerance than Nagina22.

Pyramiding of genes for multiple stress tolerance in rice

Using marker assisted molecular breeding (DBT project) it was aimed to improve the rice variety CO 43*Sub 1* for drought, salinity and brown plant hopper resistance and the variety CR 1009*Sub1* for drought, salinity and bacterial blight resistance.

Recurrent parent CO 43Sub1

Two lines possessing 6 QTL/genes(s) (for qDTY3.1 + qDTY12.1 + *Bph20* + *Bph22*+*Sub1*+*saltol*) were identified. They were found resistant to BPH in artificial screening and resistant to drought under Rain out shelter. Besides, 13 lines with 4 QTLs (qDTY3.1 + qDTY12.1 + *Sub1*+*saltol*) were also identified.

Recurrent parent CR1009Sub1

Totally 33 cultures possessing 5/6 QTL/genes (s) (*qDTY12.1-RM8094+RM 211*, *saltol (RM 8094 + RM 493)*, *Xa 5+ Xa 21*, *Sub1*) were identified.

Genetic analysis for phosphorus acquisition efficiency in rice [DST – Phos]

- In the study to identify genotypes that can effectively acquire “P” under low soil P condition, the genotypes RG 99 and RG 92 recorded an increase of 10.26g and 9.28g in total dry matter in –P condition on comparison with +P condition. At maturity stage, the genotypes RG174, RG133 and RG4 recorded an increase in the number of productive tillers as 10.00, 7.67 and 7.67 respectively in –P condition when compared with +P condition. The genotypes RG1, RG44 and RG20 recorded an increase of 17.12g, 14.13g and 12.44g in single plant yield in –P condition in contrast with +P condition.
- A total of nine *Pup1* related markers was surveyed in the 150 rice germplasm that constitute the association mapping panel. A total of 22 genotypes exhibited the genotyping pattern in correspondence with the Kasalath type allele.

Annexure XIII

Agri-Business Directorate

The Directorate of Agribusiness Development (DABD) was established in 2007 with the major mandate of supporting startup companies in agriculture and also commercializing the technologies developed by the University. The DABD strives to serve as a one stop solution to all the business needs of agribusiness firms and entrepreneurs who are interested in agriculture and allied activities. DABD encourages students, youth, farmers and women individually or in teams to make use of the services provided by this Directorate to realize their vision in life. People with inclination to innovate, start new agribusinesses, expand existing business could approach DABD for mentoring, support and business services. The journey of innovation and entrepreneurship requires persistence, networking, optimism and purpose. DABD facilitates clients to stay on target, offer handholding and grow with the clients.

I. Revenue Generation

1. Directorate of Agri Business Development

a). Licensing of Hybrids

Si.No.	Name of the Hybrid	Buyer	Amount (Rs. in Lakhs)
By Licensing Hybrids			
1.	Maize- COH(M) 9	M/S. Rasi Seeds Pvt Ltd., Attur, Salem.	5.00
2.	Maize- COH(M) 8	M/S. Proline Seeds Company (India) Pvt Ltd., New Delhi.	5.00
By Royalty			
1.	Rice Hybrid CORH4	M/s. Rasi Seeds, Attur	2.27

Si.No.	Name of the Hybrid	Buyer	Amount (Rs. in Lakhs)
By Licensing Hybrids			
1.	Maize- COH(M) 9	M/S. Rasi Seeds Pvt Ltd., Attur, Salem.	5.00
2.	Maize- COH(M) 8	M/S. Proline Seeds Company (India) Pvt Ltd., New Delhi.	5.00
By Royalty			
2.	Maize COH(M)8 and CORH 4	M/s.Trimurti Plant Sciences Pvt, Ltd., Telangana.	2.37
By Membership in TNAU- Private Seed Sector Research and Technology Consortium			
S.No.	Name of the company		Amount (Rs. in Lakhs)
1.	M/S. R.K. Nidhi Seeds		1.00
2.	M/S. Sri Subhalakshmi Hybrid Seeds		1.00
3.	Sri Mangal Murti Agri Research Technologies Pvt. Ltd.,		1.00
4.	Kalash Seeds Pvt. Ltd.,		1.00
	Sub-Total		18.64

b). Licensing of Technologies and Machines

Si.No.	Name of the Technology/ Hybrid	Buyer	Amount (Rs. in Lakhs)
1.	TNAU-Liquid Bio-Pesticide - <i>Trichoderma viride</i>	M/s. HIL (India) Limited, New Delhi	5.00
2.	TNAU-Liquid Bio –Pesticide- <i>Pseudomonas fluorescens</i>	M/s. HIL (India) Limited, New Delhi	5.00
5.	TNAU Sweetflag 6 % EC (Rs. 25 lakhs to be paid as Rs. 5 lakhs every year)	M/s. Bhuvi Care Pvt. Ltd., Tirunelveli	5.00
6.	Wetland laser leveler	M/s. Farm Implements (India) Pvt. Ltd., Chennai	2.00
	Sub-Total		17.00

c) Consultancy

Si.No.	Name of the Technology/ Hybrid	Buyer	Amount (Rs. in Lakhs)
1.	Sustainable agricultural development with emphasis on water demand management in bhavani river basin	M/s. ITC Limited, Kolkata	8.27
2.	e-commerce platform and partners for cold storage and logistics for delivery of vegetables & fruits to consumer	M/s. Farmgate India, Chennai	1.19
	Sub-Total		9.46

d) Training

S.No.	Training Name	Number of Training Conducted	Number of Participants	Amount (Rs. in Lakhs)
1.	Managing Agri Business Incubation Centre	1	8	0.23
2.	EDP on Agricultural Export & Import	6	91	7.96
3.	Coconut farmers on Entrepreneurship Development	1	20	1.00
4.	Membership in Agri Business Export Consortium (ABEC)		30	3.00
	Sub-Total			12.19
	Total (a+b+c+d)			57.29

2. Venture Capital Scheme

Si.No.	Number of schemes under operation	Number of Production, analytical services and training provided for quality inputs / products / services	Revenue as Institutional charges to TNAU (Rs. in Lakhs)
1.	150	222	129.68
		Grand Total (1+2)	186.97

II. Schemes operating under Directorate of Agri Business Development (2019-20)

Si.No	Scheme	Fund allotted (Rs. in Lakhs)			Fund Utilized (Rs. in Lakhs)			
		Recurring (Rs. in Lakhs)	Non-Recurring (Rs. in Lakhs)	Total (Rs. in Lakhs)	Recurring (Rs. in Lakhs)	Non-Recurring (Rs. in Lakhs)	Total (Rs. in Lakhs)	Percentage (%)
1.	Institutional Development Plan (IDP)#	154.34	586.50	740.84	62.49	412.73	475.23	64.14
2.	Unnat Bharat Abhiyan 2.0 (UBA 2.0)#	10.00	-	10.00	2.71	-	2.71	27.18
	Total	164.34	586.50	750.84	65.20	412.73	477.94	91.32

Permission granted to use 2019-20 funds in 2020-21.

III. Activities during 2019-20

a). Technology Commercialization

- Interactive meeting between TNAU breeders and representatives of private seed firms was organized on 30.07.2019 at TNAU, Coimbatore.
- A Field Day was organized on 01.10.2019 to demonstrate the performance of high yielding varieties and hybrids to the private seed companies. About 62 members from 28 seed companies, officials from Directorate of Seed Certification and Scientists from TNAU participated.
- Wide publicity has been given in Print media, TNAU website, Incubation Forum Website and social media.
- Detailed Project Reports (DPR) is being prepared. Technology Expo, Business Incubation Innovation Expo and Commercialization of Technologies of TNAU will be held in 2020.
- Commercialization of TNAU biomineralizer technology and enhanced freshness formulation are under progress.

- List of nine food processing technologies has been sent to the Commissioner, Department of Agriculture and Agri. Business and to the Deputy Director of Agriculture (Agri business), Krishnagiri.

b). Venture Capital Scheme

- Regular monitoring of VCS was undertaken.
- VCS database Software was designed for easy operations and management of the various schemes undergoing in various departments, colleges and research stations of TNAU.

c). Executive Development Programme

i). Export of Agri Products

- EDP was attended by 91 members, of which 11 members started export business.
- Four monthly handholding meetings were conducted regularly, for the participants who have completed the EDP and were given guidance and support in various areas of export like product and market selection, documentation process, logistics etc.,
- With the permission of the University, the Agri Business Export Consortium (ABEC) was initiated on 20.11.2019 with membership fee of Rs. 10,000/- and annual membership renewal fee of Rs. 3000/- from second year. Thirty members have joined ABEC.
- The Agri Business Export Consortium (ABEC) will support the export trainees in the process of exporting the agriculture commodities to various international markets and providing guidance on logistics, documentation & banking process.

ii). Achievements by Export of Agri Products

S.No	Firm	Exporter Name	Batch	Product	Country	Value
1.	Elite Veggies	Mr. K. Ganesh	V	Coconut	UAE	Rs.42,00,000
2.	Sri Prathyangira export and imports	Mr. Barani	II	Millet food items	UAE & US	\$7500 USD
3.	Thaai Exim	Mr. Mohan Raj	I	Vegetables and fruits		Rs.2,50,000
4.	Float Exim	B. Naveen Raj	V	Areca Plates	US	Rs.7,00,000
5.	Nutshoah Global	Mrs. Preethi	VI	Jaggery	To a Merchant Exporter	Rs.5,00,000
6.	Winall Exports	Mrs. Sudha	V	Jaggery		
7.	Star Oil and Rice	Mr. Siva kumar	V	Jaggery		
8.	360 Purvey	Mr. Rajavel	IV	Spices	To Merchant Exporter	Rs.50000
9.	Ratham Exports	Mr. Ramesh	VI	Spices		
10.	Sri Ambal Trading	Mr. Mohan Babu	III	Spices		
11.	VR in Healthy Harvest Export	Mrs. Banu Priya	II	Guava	To Merchant Exporter	Rs. 3,50,000

d). Capacity Building Programme to Farmers

This programme is sponsored by Coconut Development Board, Regional Office, Chennai. Main aim of the training was empowering the coconut farmers across the state and motivating them into commercial ventures on coconut. The programme schedule included the topics on coconut production, protection, organic coconut production, organic certification, value addition, bankable project preparation, export of coconut products, and interaction with successful coconut entrepreneurs. Farmers got field level exposure on advanced production technologies of coconut, nutrient management, special problems, pest and disease problems, coconut IFS models and processing of coconut and byproducts. Guided to prepare bankable projects for their prospective enterprises and arranged interaction with successful entrepreneurs.

e). AGPREUN

AGPREUN Ideathon Challenge 2019 and Bootcamp 2020 were jointly organized by the Directorate of Agri Business Development, TNAU and 'University Innovation Cluster' operating at the Department of Plant Biotechnology, CPMB&B.

Details on AGPREUN Ideathon Challenge 2019

Sl. No.	Venue	Number of Ideas received	Number of ideas invited for level 1 presentation	Number of teams selected for Final round
1	FC & RI, Mettupalayam	59	23	9 (18 students)
2	AC & RI, Killikulam	70	23	9 (18 students)
3	AC & RI, Kudumiyamalai	70	23	9 (18 students)
4.	AC&RI, TNAU, Coimbatore	199	27	3 (6 Students)

Details on Boot camp 2020

Sl. No.	Venue	Number of teams selected
1	AC&RI, TNAU, Coimbatore	22 (44 students)

f). Business Incubation Forum

S.No.	Particulars	Cumulative (April 2019 –March 2020)
1.	Innovative Incubatee	90
2.	Manufacturing Incubatee	88
3.	Trainings Conducted	143
4.	Workshop Conducted	43
5.	Technology / Hybrid Commercialization	12
6.	AGPREUN Idaethon Challenge	01
7.	Alumni	97
8.	EDII- IVP applied	05
9.	Revenue generated (Rs. in lakhs)	83.17

g). Unnat Bharat Abhiyan 2.0

Unnat Bharat Abhiyan, a flagship national program of Ministry of Human Resource Development (MHRD) Government of India and IIT Delhi. The Mission of Unnat Bharat Abhiyan is to enable participating higher educational institutions to work with the people of rural India in identifying development challenges and evolving appropriate solutions for accelerating sustainable growth. TNAU, Directorate of Agri Business Development (DABD) is one of **Regional Coordinating Institutes (RCIs) to facilitate, guide and monitor the activities of Participating Institutes** of ten districts i.e Coimbatore, Erode, Karur, Tiruppur, Tiruchirappalli, Nagapattinam, Namakkal, Thanjavur, The Niligiris and Tiruvarur.

Achievements of RCI, TNAU

1. Organized Orientation Meeting for 85 Participating Institutes (PI's) on 01.08.2019
2. Organized Second Orientation Meeting for 16 Constituent Colleges of TNAU on 11.10.2019
3. Enrolled 25 New Participating Institute (PI's) in UBA 2.0 from Erode, Tirchy, Thanjavur and Coimbatore.
4. Participated in various activities organized by Participating Institute (PI's) in and around Coimbatore.
5. Participated in National Conferences on Rural Immersion Management held at Mahatma Gandhi National Council of Rural Education (MGCRE) Hyderabad on 13 &14 July,2019.
6. RCI, TNAU helped to source funding of f Rs.2.75 lakhs for the newly enrolled PI's from UBA head quarters to a funding

h). Institutional Development Plan (IDP)

The Institutional Development Plan (IDP) is funded by ICAR under National Agricultural Higher Education Project (NAHEP) for the period of August 2019 to July 2022. The objectives of TNAU- IDP are

- a) to improve learner centric environment by adopting innovative pedagogy and academic reforms,
- b) to promote student faculty diversity, competence, entrepreneurship, skill development and international outlook, and
- c) to enhance education management by leveraging alumni network and partnership.

The project is for three years with an overall budget of Rs. 2986 lakhs, of which, Rs. 2486 lakhs is under NAHEP and Rs. 500 lakhs is from State Government.

S.No.	Facilities Created	Nos.	College Campuses
1.	Smart Class Rooms	12	All the accredited colleges
2.	Language Laboratory	6	AC&RI, Madurai (1); AC&RI, Killikulam (1),ADAC & RI, Trichy (1); HC & RI, Periyakulam (1), AEC&RI, Kumulur (1); FC & RI, Mettupalayam (1)
3.	Establishment of AR and VR facility centre	1	TNAU, Coimbatore
4.	Establishment of Big Data centre	1	TNAU, Coimbatore
5.	Establishment of Entrepreneurship centre	1	TNAU, Coimbatore
6.	Online exam evaluation cum training hall of the Controllerate of Exams	1	TNAU, Coimbatore
7.	Renovate IoT based extension skill centre	1	TNAU, Coimbatore
8.	Renovation of Managerial skill development centre	1	TNAU, Coimbatore
9.	Remedial Courses	20	All the accredited colleges, two course each.
10.	Vocational Courses	9	All the accredited colleges, one course each.
11.	Certificate Courses	1	AEC&RI, Kumulur (1)
12.	International Lecture Series	1	TNAU, Coimbatore
13.	Workshop on Educational Management and Quality Assurance	1	TNAU, Coimbatore

Annexure XIV

Documentation may be done on Market preference for the TNAU released varieties for large scale adoption

Market Preference of TNAU Rice Varieties		
Variety	Characteristics	Traits for Market Preference
CR-1009 Sub-1	Crop withstand higher water level & stagnation in the field due to more height; Non-lodging; Most suitable for Samba season	Preferred by traders, millers to sell in Kerala; Also sold to TNCSC as a common rice variety; Less breakage and High milling ratio; Short and Bold rice; White colour, Preferred for idli making
ASD16	Tolerant to salinity and water logging. Kuruvai and Summer (Navari) seasons	Short bold grains and suitable for Idly making; preferred by traders and millers Kerala state); Procured also by TNCSC; good keeping quality.
CO(R) 50	Medium duration (135 days); Resistance to blast and brown spot Suitable for Late samba and Thaladi	High yielding, High Milling Ratio Multi-purpose rice suitable for rice, idly and savories; high milling ratio
CO (R) 51	Moderately resistant to BPH, GLH & Blast white medium slender rice with high milling. preferred for late samba and Thaladi season	High yield, High rice recovery
ADT 39	High yield Short duration; Drought resistance; Less water required; Non-lodging; Resistance to GLH, BPH, Blast and Brown spot. Non-shedding of grains; Preference in Navarai and Kuruvai and late thaladi seasons; Better than CR1009 (Malligai Idly)	Medium slender white rice; Preferred by traders and millers; Suitable for Idly: High milling per cent, used for mixing with ponni

Variety	Characteristics	Traits for Market Preference
CR 1009	Duration 160 days (10 days more than sub 1); Short bold grain; Resistance to BPH; Drought resistance; Suitable for water stagnation; Less availability of seeds; Longer duration; suitable for samba	Suitable for preparing Idly; Cooking quality good; Farmers selling grains through millers, traders and TNCSC.
ADT 45	Blast resistant	Fine white grains; medium slender; Suitable for meals. But not preferred due to less keeping quality. Low milling per cent due to broken grains
ADT43	Higher yield; Short duration; More tillering; High price; Millers and traders preferred this variety. Non-Lodging and non-shedding of the Kuruvai and Summer; Short duration variety; Lodging is the main problem	Fine grains; Suitable for meals; Better keeping quality; Mixing with ponni