TAMIL NADU AGRICULTURAL UNIVERSITY

Proceedings of the 7th Scientists Meet on Non Crop Specific Projects - 2019

Agricultural Meteorology
AICRP-IFS
Sustainable Organic Agriculture

Directorate of Research
Tamil Nadu Agricultural University
Coimbatore 641 003

2019

Proceedings of 7th Scientist Meet on Non crop specific projects – 2019 6th & 7th May2019

Seventh Scientist Meet on Non crop specific projects – 2019 was held on 7th, May 2019 at Seminar Hall-I, TNAU, Coimbatore. The Programme was chaired by the honourable Vice Chancellor Dr. N. Kumar and Co-chaired by Dr. K.S. Subramanian, Director of Research.

On 06.05.2019, 10.00 AM, a pre review meet was conducted by Dr. V. Geethalakshmi, Director, Directorate Crop Management (DCM) along with Dr. S. Panneerselvam, the Director, Water Technology Centre (WTC). Before the start of individual scientist presentation, the Director, Crop Management had narrated the expectation of University and points to be considered during the presentation. Action taken on the recommendations of 6th Meet, 2018 was presented by Dr. SP. Ramanathan, Professor and Head, Agro Climate Research Centre (ACRC), Directorate of Crop Management, Tamil Nadu Agricultural University, Coimbatore. This was followed by project wise presentation of individual scientist and action plan for 2019-22. Suggestions made by the Director, DCM and the Director, WTC were incorporated, accordingly.

On 07.05.2019, 2.00 pm, the Director of Research elaborated the research highlights of the non crop research projects. The Professor and Head, ACRC made the consolidated presentation of pre reviewed action taken on recommendations of 6th scientist meet, salient findings for information and adoption from the agro meteorological research during 2018 -19 and action plan 2019 – 22 at the 7th Scientist Meet on Non crop specific project at Seminar Hall-I, TNAU, Coimbatore.

i. Vice Chancellor's Remarks

- In the "TNAU – Web cum Mobile App", concentrate on important pests and diseases of major crops.

ii. **Director of Research's remarks**

- Design robust Agrotechnology advisory services using intellectual and indigenous knowledge

A. AGRL. METEOROLOGY

iii. Salient findings for adoption and information

a. For Adoption

Theme 1: Weather forecast and agro advisory

Weather during the cropping season contributes more than 50 per cent of crop yield. Response farming with timely weather based agro advisories helps the resource poor farmers to plan in advance on crop selection, intercultural, harvest and post harvest operations will increase the yield in addition to reduce the weather based risks on input loss. In this context, Weather based Automated Agro Advisory Web cum Mobile App has been successfully developed under Government of Tamil Nadu sponsored NADP scheme titled "Development of Agro Advisory Services using Automatic Weather Station data at block level in Tamil Nadu" at Agro Climate Research Centre, Directorate of Crop Management, TNAU, Coimbatore. "**TNAU-AAS web cum Mobile App**" automatically generates block level weather forecast for next 6 days, develops weather scenario for the every block of Tamil Nadu using past weather data observed from AWS installed in 385 blocks of Tamil Nadu under Tamil Nadu Agricultural Weather Network (TAWN) and for the block level forecasted weather data.

- **TNAU-AAS web cum Mobile App** picks up weather scenario based agro advisory from the data base containing advisory for six crop stages of 108 major agricultural and horticultural crops and sends to the registered farmer mobile as SMS. The weather specific, crop specific, stage specific agro advisories includes both management and plant protection.
- Web portal: aas.tnau.ac.in. Mobile App could be downloaded from Google Play store by typing "TNAUAAS" and install "Automate Agro Advisory Service"

Usefulness of "TNAU - AAS web cum Mobile App"

- Fully automated, reduce the work load of extension functionaries
- Lab to land transfer of technologies become direct and easy.
- No holidays, no need of technocrats except simple monitoring
- Surely reduce the crop failure risk of climate dependent farming
- AAS is viable option to do weather based precision farming

- Expected about 45 lakhs beneficiaries may get SMS every year.
- Total number of SMS required is very less as it is specific to farmer
- Can send special advisory / extreme events warning SMS

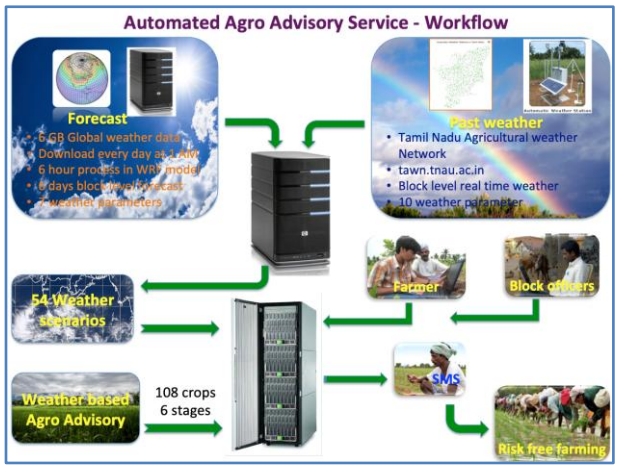

Figure 3.1 Work flow of TNAU - AAS App

Figure 3.2 TNAU - AAS web portal

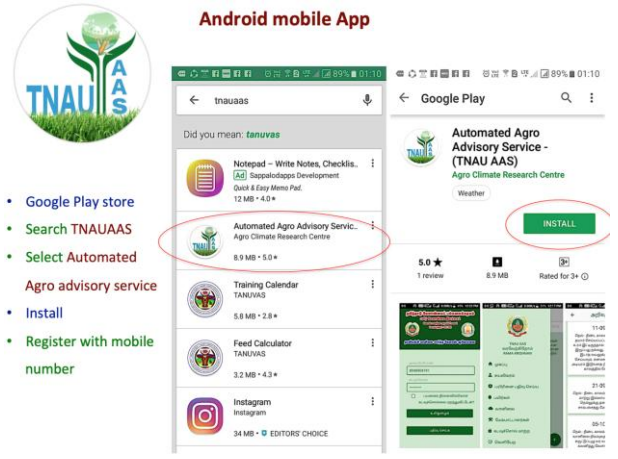

Figure 3.3 Weather based AAS Mobile App

Figure 3.4 TNAU – AAS Mobile App

Theme 2: Basic and applied meteorological studies

TNAU – MAI calculator

- Simple, user friendly, web based "TNAU Moisture Adequacy Index software" is developed for agricultural drought assessment. This product will be highly useful for Department of Agriculture officials and State Disaster management to calculate weekly drought scenarios using weekly rainfall data for any length of period during a year.

b. For Information

Theme 1: Weather forecast and agro advisory

- In GKMS scheme, analysis of IMD's district level rainfall forecast indicated that, inclusion of Western Ghats in Coimbatore gives more false alarms to other plains of Coimbatore district. The correctness of 2018-19 rainfall forecast was <50% in all districts. Need separate forecast from IMD for Coimbatore plains and Valparai. Whereas verification and error structure analysis of IMD's rainfall forecast indicated higher usability of forecast Kovilpatti (55 – 75%) and Pechiparai (45 – 60%). The forecast of other parameters viz., minimum temperature, maximum temperature, wind speed, relative humidity and cloud cover were perfectly (>80%) matched with actual.
- Weather based agro advisories issued by GKMS-AMFU scheme has increased the income of Agro Advisory Service adoptive farmers to the tune of Rs. 9500/- per acre maize (Coimbatore-AMFU), Rs. 2400/- acre maize and Rs. 7000 – 8000/- per acre Chillies (Kovilpatti- AMFU)
- In Astrometeorological rainfall forecast studies, the planet activeness cart developed at Agro Climate Research Centre increased the hourly astromet rainfall forecast accuracy and verified successfully. Moist planets viz., Neptune, Saturn and Venus at their active azimuth and hot planets viz., Sun, Mars and Uranus at their negative range to a particular location had good influence on the rainfall of that location. The planet activeness concept developed by our TNAU scientist is under process for "PATENT".
- In Astro-meteorological wind speed forecast studies inferred that, among the planets, Neptune and Mercury had higher number of wind speed influencing capability. Irrespective of planet, the azimuth range of 61 – 120 degree and 240 – 300 degree azimuth had good

influence on the wind speeds in the study locations. Active state of Mercury, Venus, Moon, Mars, Jupiter and Uranus and ruling state of Saturn have increased the wind speed of a location. Irrespective of 36 two-planet combinations, the 0-30 degrees aspects had more wind speed events than other aspects.

- In Weather Research Forecast (WRF) Model, the Kessler scheme produced highly usable forecast in the both input data resolution (0.25 and 0.5) than other schemes with same resolutions input data. The usability of forecast (correct + usable) obtained from WRF model with 0.25 degree resolution cum Kessler scheme microphysics options were between 76 to 89 per cent, whereas it was 64 to 77 in WSM3 class scheme and 60 to 80 in WSM6 class schemes.

Theme 2: Basic and applied meteorology

- According to Moisture Adequacy Index (MAI) analysis, there was moderate drought in Dharmapuri, Karur and Krishnagiri, in both SWM and NEM of 2018. The Namakkal, Perambalur, Pudhukkottai, Salem, Vellore, Trippur and Virudhunagar had moderate drought during SWM and mild drought during NEM. Whereas other districts had mild to moderate drought during SWM and then recovered during NEM 2018.
- Microclimate modification with variety, spacing and method of planting influences the growth and yield of organic rice varieties. Among the varieties, Co52 with SRI planting perform better.
- Climate variability and Chillies productivity studies inferred that Sivaganga, Ramanathapuram, Thoothukudi, Tiruppur, Karur and Ariyalur were low productivity regions for Chillies. Whereas, Vellore, Kancheepuram Tiruvannamalai, Viluppuram, Cuddalore, Namakkal, Thanjavur, Thiruvarur, Nagapattinam, Pudukkottai, Theni, Madurai were fallen under moderate productive region. Districts such as Erode, Krishnagiri, Coimbatore, Thiruchirappalli, Dharmapuri, Dindigul, Tirunelveli, Virudhunagar districts managed to be in high productive regions for Chillies. In comparing the average productivity index of Tamil Nadu with rainfall deviation, it could be conclude that the excess and normal years gave moderate to high productivity, but deficit rainfall years resulted in low to moderate productivity. The positive nature of correlation also proved that rainfall deviation and productivity index was linearly correlated with a positive relationship. Further, the regression model indicated that there was a considerable amount of variation in productivity due to rainfall deviation.

Theme 3: Climate change and crop weather model

- The crop yield forecast developed under FASAL scheme with crop simulation model perform better (- 6 to 10.8) than Statistical model (-24 to 24). Between flowering (F2) and pre harvest (F3) forecast, the F3 forecast gave more accurate estimation of rice, maize and groundnut yield. Hence, the CSM models could be used for yield estimation.
- Climate change and pulse productivity study inferred that the major pulse crops such as blackgram and redgram are expected to be highly vulnerable for the future temperature rise in Tamil Nadu. However, this effect would be counteracted to certain extent by the simultaneous increase in the carbon dioxide. Even though the yield is expected to sustain, the climate variability would adversely affect the yield of blackgram and redgram.Selection of suitable cultivar and a perfect sowing time would sustain the productivity and make the crop more profitable.

iv. Projects reviewed

Theme Wise Research Projects

Theme	URP	External funded Projects				Studnets Research	Total
		AICRP	GOI	GoTN	Private		
1. Weather forecast, Agro Advisory			6	1		3	**10**
2. Basic and applied meteorology	2					4	**6**
3. Climate change & Crop models	1		2		1	8	**12**
4. RS & GIS						1	**1**
Total	**3**	**0**	**8**	**1**	**1**	**16**	**29**

Crop Wise

Type of project	URP	AICRP	GOI	GoTN	External funded Projects	Studnets Research	Total
Rice			2*			2	**4**
Millets			1*			1	**2**
Minor millets	1					1	**2**
Pulses						1	**1**
Oil seeds			1*			1	**2**
Sugarcane						1	**1**

Cotton						1	**1**
Horticulture						2	**2**
Non crop	2		6	1	1	6	**16**
Total	**3**		**10***	**1**	**1**	**16**	**31**

* - Multi crop projects

Staff Pattern

Faculty	**Prof. & Head**	**Professor**	**Assoc. Prof.**	**Asst. Prof**
Agronomy	**1**	**1**	**1**	**1**
Agrl. Meteorology	**1**	**-**	**-**	**-**

v. Remarks on the ongoing research projects

A. University Research Projects

SN	**Project Title**	**Project Leader(s)**	**Period & remarks**
I	**Theme 2: Basic and applied meteorology**		
1.	**DCM/CBE/AMT/2016/001** Revalidation of efficient cropping zonation for major food crops in Tamil Nadu	Dr. S. Kokilavani, Asst. Prof. (Agrl. Met.) Dr. Ga. Dheebakaran, Asst. Prof. (Agronomy), ACRC, TNAU,	July 2016- Mar. 2019. Project Completed. **Recommended for closure of the project and submit completion report**
2.	DCM/CBE/AMT/2015/001 Computation of Water Budgeting for blocks/ Taluks of Western agro climatic zone of Tamil Nadu	Dr. S. Kokilavani, Asst. Prof. (Agrl. Met.)	Jun. 2015-Dec. 2018 Project Completed. **Recommended for closure of the project and submit completion report**
II	**Theme 3: Climate change and crop weather model**		
3.	**DCM/CBE/AGR/SMM/2016/001** Effect of elevated temperature on nutri millets tenai, samai, kuthraivali and pulses	Dr. S. Panneerselvam, Director, WTC, TNAU Dr. N. Chandrasekaran, Professor (SS&AC) Dr. N. Sritharan, Asst. Prof. (Crop Phy.)	Sep. 2016- Mar. 2019 Project Completed. **Recommended for closure of the project and submit completion report**

B. Externally Funded Projects

S. N	Project Title	Project Leader(s)	Period & remarks
I	**Theme 1: Weather forecasting and agro advisory services**		
1.	**NCMRWF/DCM/ADT/AGR/2013/ R003** GOI – IMD – Agromet –Gramin Krishi Mausam Sewa (GKMS) - Experimental Agro-Met Advisory Services (AAS), Aduthurai.	Dr. K. Sathiya Bama Assoc. Prof. (SS&AC) Dr. M. Raju, Assoc. Prof. (Agronomy) TRRI, Aduthurai	Apr. 2014 Mar. 2020 **Forecast verification should be done at district level.** **Recommended to continue.**
2.	**IMD/DCM/CBE/ACR/2014/R006** GOI – IMD – Agmet – Gramin Krishi Mausam Sewa (GKMS) - Weather based agro advisory services for farm decision making for western zone of TN.	Dr. Ga. Dheebakaran Asst. Prof. (Agronomy), Dr. SP. Ramanathan, Prof. and Head, ACRC, TNAU, Cbe -3	Apr. 2014 Mar. 2020 **Forecast verification should be done at district level.** **Recommended to continue.**
3.	**IMD/ DCM/ KPT/ AGR/ 1995/ R001** GOI – IMD - Agromet – Gramin Krishi Mausam Sewa (GKMS) – Rural Agro meteorological Advisory Service for Southern zone	Dr. B. Arthirani Asst. Prof. (Agrl. Met) ARS, Kovilpatti	Apr. 2014 Mar. 2020 **Forecast verification should be done at district level.** **Recommended to continue.**
4.	**GOI/DCM/OTY/ACRC/2016/R00 3** Agrometeorology Field Unit (AMFU) for Agrometeorological Advisory Services (GKMS – GraminKrishiMausamSewa) under IMD, GOI at HRS, Ooty	Dr. S. Karthikeyan Asst. Prof. (Horti), HRS, Ooty	Mar. 2014 Mar. 2020 **Forecast verification should be done at district level.** **Recommended to continue.**
5.	**GOI/DCM/PPI/ACRC/2016/R001** Agro meteorology Field Unit (AMFU) for Agro meteorological Advisory Services (GKMS – Gramin Krishi Mausam Sewa) under IMD, GOI at HRS, Pechiparai.	Dr. P. Rajarathinam, Ph.D., Assistant Prof. (Agronomy)	Mar. 2014 Mar. 2020 **Forecast verification should be done at district level.** **Add more beneficiaries.** **Recommended to continue.**

6.	**NADP/DCM/CBE/ACR/2016/D006** Development of Agro Advisory Services using Automatic Weather Station data at block level in Tamil Nadu under NADP 2013-14	**PI:** Dr. SP. Ramanathan Prof. & Head, ACRC **Co-PI:** Dr. Ga. Dheebakaran Asst. Prof. (Agronomy) Dr. S. Kokilavani, Asst. Prof. (Agrl. Met.),	Apr. 2014 Mar. 2019 **Extension requested to the sponsor. Recommended to continue.**
II	**Theme 2: Climate change & crop modeling**		
7.	**IMD/DCM/ADT/AGR/2011/R001** Forecasting Agricultural output using Space, Agrometerology and Land based observations (FASAL) to Agro Advisory Services for Cauvery Delta Zone – a linked project of AMFU for AAS (GKMS) at TRRI, Aduthurai	PI: Dr. M. Raju, Assoc. Prof. (Agronomy) Dr. K. SathiyaBama, Assoc. Prof. (SS&AC) TRRI, Aduthurai	Apr. 2013 Mar. 2018 extended up to 2020 **New methodologies and crops may be included. Recommended to continue.**
8.	**IMD/DCM/CBE/ACR/2010/R001** Yield forecasting for rice, maize and Groundnut in Western zone of Tamil Nadu using space, Agrometeorology and land based observation (FASAL)	PI: Dr. V. Geethalakshmi Director, DCM Co-PI: Dr. Ga. Dheebakaran Asst. Prof. (Agronomy), ACRC, TNAU, Coimbatore	Jan. 2011 Mar. 2020 **New methodologies and crops may be included. Recommended to continue.**
9.	**DST/DCM/CBE/AGR/2018/R003** DST - CCP- SPLICE (BRIFS) - Building Resilience to Climate Change and Improving Food Security through Climate Smart Solutions (E28ADP)	PI: Dr. V. Geethalakshmi Director, DCM Co-PI: Dr. Ga. Dheebakaran Asst. Prof. (Agronomy), Co-PI: Dr. S. Kokilavani, Asst. Prof. (Agrl. Met), ACRC, TNAU	Nov. 2018 -Mar. 2021 **Recommended to continue.**

vi. Action plan for year 2018-2019

a.	Tailor made agro advisory services for farm level planning	Dr. SP. Ramanathan, P&H, ACRC Dr. V. Geethalakshmi, Director, DCM, TNAU Dr. NK Sathyamoorthy, Assoc. Prof, ACRC – NWZ Dr. Ga. Dheebakaran, Asst. Prof. (Agron), ACRC – WZ Dr. S. Kokilavani, Asst. Prof. (Agromet.) – NEZ Dr. Sathyabama, Assoc. Professor (SS & AC) – CDZ Dr. B. Arthirani, Asst. Prof. (Agromet), ARS, KVPT – SZ Dr. P. Rajarathinam, Asst. Prof (Agron), HRS, PPI – HRZ Dr. S. Karthikeyan, Asst. Prof (Horti), HRS, Ooty – HAZ

b.	Improving the accuracy of TNAU's Season weather forecast	Dr. V. Geethalakshmi, Director, DCM, TNAU Dr. S. Kokilavani, Asst. Prof. (Agromet.), ACRC Dr. NK Sathyamoorthy, Assoc. Prof, ACRC
c.	Developing TNAU's village level medium range forecast with higher accuracy.	Dr. Ga. Dheebakaran, Asst. Prof. (Agron), ACRC Dr. KP. Ragunath, Asst. Prof. (SS&AC), RS&GIS
d.	Developing hybrid weather forecast by integrating the numerical and astrometeorological forecast	Dr. Ga. Dheebakaran, Asst. Prof. (Agron), ACRC Dr. SP. Ramanathan, P&H, ACRC Dr. S. Kokilavani, Asst. Prof. (Agromet.), ACRC
e.	Delineation of efficient cropping zone major commercial crops for Tamil Nadu	Dr. S. Kokilavani, Asst. Prof. (Agromet.), ACRC Dr. Ga. Dheebakaran, Asst. Prof, (Agronomy), ACRC
f.	Studying the microclimate modification options for improving the milk yield	Dr. N. Maragatham, Prof. (Agronomy), ACRC Dr. Thirunavukkarasu, Asst, Professor (AH)
g.	Crop Simulation Model studies on the impact of climate variability on Cereals.	Dr. NK Sathyamoorthy, Assoc. Prof. (Agronomy), ACRC Dr. S. Kokilavani, P&H, ACRC Dr. SP. Ramanathan, P&H, ACRC (Rice and Maize)
h.	Crop Simulation Model studies on the impact of climate variability on millets.	Dr. NK. Sathyamoorthy, Assoc. Prof. (Agronomy), ACRC Dr. Ga. Dheebakaran, Asst. Prof, (Agronomy), ACRC Dr. N. Maragatham, Prof. (Agronomy), ACRC (Sorghum, Cumbu and Ragi)

List of scientist participated in the 7th Non Crop Scientist Meet – Agrometeorology

SN	Department / Station	Name of Scientist
1.	Agro Climate Research Centre TNAU, Coimbatore	Dr. SP. Ramanathan, Prof. &Head, ACRC
2.		Dr. N. Maragatham, Prof. (Agronomy)
3.		Dr. N.K. Sathyamoorthy, Assoc. Prof. (Agronomy)
4.		Dr. Ga. Dheebakran, Asst. Prof. (Agronomy)
5.		Dr. S. Kokilavani, Asst. Prof (Agrl. Met.)
6.	Agricultural Research Station Kovilpatti	Dr.B. Arthirani, Asst Prof. (Agrl. Met.)

7.	Tamil Nadu Rice Research Institute, Aduthurai	Dr. M. Raju, Assoc. Prof. (Agronomy)
8.		Dr. K. SathiyaBama, Assoc. Prof. (SS& AC)
9.	Horticultural Res. Station, Ooty	Dr. S. Karthikeyan, Asst. Prof.(Horti),
10.	Horticultural Res. Station, Pechiparai	Dr. M. Rajarathinam, Asst. Prof (Agronomy)
11.	Water Technology Centre, TNAU	Dr. A. Raviraj, Professor (SWE)

B. DEPARTMENT OF SUSTAINABLE ORGANIC AGRICULTURE

i. Action Taken on the Previous Crop Scientist Meet

The Department of Sustainable Organic Agriculture was instructed to present the research activities in the crop-wise scientist meet during 2018 and hence, the action taken on the previous CSM 2017 on Non-crops is presented below;

Recommendation	Action taken
Coordinate with ICAR-IIFSR, Modipuram for finalization of the results of the organic experiments conducted at TNAU and after thorough scrutiny and confirmation the same communicated in future SWC	Coordinate with ICAR-IIFSR, Modipuram for finalization of the results of the organic experiments conducted at TNAU and after thorough scrutiny and confirmation the same communicated in future SWC
Organic seed treatment package need to be developed in consultation with the Department of Seed Science and Technology, TNAU, Coimbatore.	At Dept of Seed Science & Technology already validated organic seed treatment techniques are available Eg. Bio-priming for foxtail millet: Nutrigold, Pulse sprout for various crops
Organic seed production programme have to be taken up in vegetables in collaboration with TNOCD, Coimbatore	Four certified organic vegetable growers have been identified through TNOCD and the seed production is on going
To compare the quality of Beejamruth produced by the Regional Organic Research Station, Bengaluru/ Dharwad and organic farmers of Tamil Nadu. An official visit to Karnataka Centre may be made to discuss about the organic inputs preparation done at Karnataka.	IOF, Dharwad has validated the dosage of application of Beejamruth. The ingredients added in the preparation differs from Tamil Nadu preparation. RCOF, Bengaluru concentrates on the quality analyses of organic inputs from various research centres, farmers, other stakeholders etc.
Demonstration of organic medicinal rice may be initiated at TNAU	Demonstration of organic medicinal rice are being done at Wetlands of TNAU. Farmers visiting SOA, TNAU were exposed to the demonstration plots
A visit to organic vegetable field at Meenakshipuram, Palakkad may be made to	Visited the Sattakkal Pudur and Meenakshipuram areas. Due to shortage of

study the organic agricultural practices followed.	organic inputs and techniques of Pest and Disease management, many farmers are now practicing INM and IPDM practices in vegetable cultivation.

ii. Crop Wise Recommendations

Crop: Rice

A. Specific recommendation

- Complete package of practices for growing rice under organic cultivation may be developed and validated (through the visit to organic rice cultivation cluster at Singampatti, Thirunelveli district)

B. General recommendation

For Information:

- Rice varieties suited for organic farming are Bhavani, Improved white Ponni, Mapillai samba, Kitchadi samba, IR 20, CO 43 and CO (R) 48.
- Medicinal and aromatic category varieties such as Red kavuni, Jeeraga samba, KDML 105 and culture CB 05022 are also suitable for organic rice cultivation.

Crop : Vegetable crops

A. Specific recommendation

Nil

B. General recommendation

For Information:

- The brinjal yield was more (25.7t/ha) in 100% organic manure applied plots
- The yield of chilli was the highest (13.7t/ha) under 75% organic + 25% inorganic manure applied plots
- The tomato yield was more (17.6t/ha) in 75% organic manure + innovative practices applied treatment
- The quality parameters are better in 100% organic manures applied plots when compared to 100% inorganic and integrated nutrient management practices
- SOC content is increasing trend in the organic experimental fields from 0.57% (2013) to 0.82% (2019)

Crop: Millets

A. Specific recommendation

Nil

B. General recommendation

For Information:

- In a study on the impact of organic, conventional and integrated management practices on the productivity of finger millet, the plots treated with 75% organic (organic manures equivalent to 75% N requirement) followed by innovative organic practice (3% Panchagavya + Azophos @ 2kg/ha) registered the higher grain yield (2906 Kg/ha) and BCR (1.77).

- For organic finger millet, in places where the availability of FYM is a problem, the application of enriched vermicompost @ 1t/ha in two equal splits on 25 and 40 DAS followed by Foliar application of *Panchagavya* @ 3% on 30 and 45 DAS recorded the higher grain yield of 2563 kg/ha.

ICAR/DCM/CBE/SOA/2015/R001: Network Project on Organic Farming: Evaluation of organic, inorganic and integrated production systems in Finger millet (August, 2013 to August 2018) : **To be closed/continued as per the proceeding of the NPOF, ICAR.**

ICAR/DCM/CBE/SOA/2015/R001: Network Project on Organic Farming: Evaluation of organic, inorganic and integrated production systems in Barnyard millet (August, 2013 to August 2018) : **To be closed/continued as per the proceeding of the NPOF, ICAR.**

DCM / CBE / AGR / SMM / 2018 / CP011: Developing organic package of practices for finger millet (August, 2018 to July, 2020): **To be continued**

DCM/CBE/ENS/SOA/2018/CP062: On-farm resource quantification and utilization under Zero Budget Natural Farming System (Low external input organic farming) : **The project may be continued.**

Crop: Cotton

CPPS/CBE/ENT/COT/2018/001: Studies on the impact of ginger, garlic and green chilli extract for the management of insect pests in organic cotton: **The project may be continued**

Social Science

CARDS/CBE/EXT/2019/001: Assessment of the Cost and Returns and Marketing of Organic Vegetables in Tamil Nadu: **The project may be continued**

Non-Crops

A. Specific recommendation

- Complete package of practices for finger millet, pearl millet, banyard millet and fox tail millet under organic cultivation may be developed and validated

B. General recommendation
For Information:

- **From** Integrated organic farming system model **following informations were generated;**

  - Employment generated was 463 man-days
  - Crop component shared 68 % of the total income (Rs.85,864/-)
  - Dairy component contributes 32% of the total income of Rs. 41,119/-
  - About 5.48 tones of fresh cow dung was obtained from 2 heifer cows
  - The income from composting from crop residues with cow dung slurry was Rs. 8496/-per annum
  - Green fodder yield of 95.4 t/ha and 42.5 t/ha / year was recorded for CO (CN) 5 and *Desmanthus*, respectively
  - The green leaf manure yield of 148t/ha was observed through *Gliricidia* as border crop

- **From Organic inputs and bio inputs characterization for sustainable organic agriculture following information's were generated;**

1. Jeevamruth - Compounds and their activity

Common name (fatty Acid)	Activity of compound
Diffractaic acid	Antifungal, secondary metabolites
Retinoic acid	herbicide
Isoenanthic acid	capsules for seed
D-Glucoheptose	antimicrobial
Benzoic acid, methyl ester	Herbicide
Carboxybenzene	Fungistatic compound
Daphnin (daphnetin-7-O-glucoside)	strongest antibacterial activity
Columbianetin, lomatin	Increase seed longevity
Retinoic acid, methyl ester	Herbicide and solvent
Fumaric acid	Pesticides manufacturing.
1,6-Hexanediol	Coatings, Adhesives
1,4-Cyclohexanediol	Insect repellent
Benzoic acid	Preservatives & inhibit bacteria

Linoleic acid	Activates Peroxisome
2-hydroxygarvin B	fungicides
Common name (Alkains)	**uses**
Trimethylbenzene	Component of herbicides
á-Selinene	Insecticidal and Antifungal
Pseudolimonene	insecticide
9 - propyl - anthracene	insecticides
Common name (Alconols and alcohols)	**Uses**
ar-turmerone	Insecticide and antimicrobial
Stigmasterol	Growth promotor & Salt stress tolerence
Common name (Ester)	**Uses**
Benzoic acid, 2-ethyl hexanediol diester	defense response

2.Vermiwash

- pH – 7.80,EC – 3.86 dsm^{-1} ,Organic Carbon – 2.32 %,Total N – 1.51 %,Total P – 0.92 %,Total K – 0.12 %,Total Zn – 0.18 ppm,Total Mn – 0.72 ppm,Total Fe – 0.1 ppm,Total Ca - 0.06 ppm,Total Mg – 6.2 ppm,Total Na – 11.0 ppm,Bacteria – 83 x 10^6 ,Fungi – 8 x 10^3 and Actinomycetes – 3 x 10^2

3. Crop residue compost

Parameters	**Total value**
P^H	6.86
EC	0.29 dsm^{-1}
Organic Carbon	9.25 %
Total N	0.62 %
Total P	0.39 %
Total K	0.52 %
Total Mn	23.7 ppm
Total Zn	17.3 ppm
Total Fe	7.4 ppm
Total Cu	9.6 ppm
Bacteria	92 x 10^6
Fungi	17 x 10^3
Actinomycetes	12x 10^2

4.BEEJAMRUTH-Compounds observed and their activity

Compound name (Fatty Acid)	Uses /Activity
Pinocembrin	Antimicrobial,antifungal
4-tert-butylcalix[4]axene	Herbicide
Mevastatin, Gitoxigenin	Bioconversion, repellents
Columbianetin, lomatin	**Increase seed longevity**
Dibutoxyanthracine	Pesticide
Enterolactone	Antimicrobials
Prednacinolone	Insecticides
Ubiquinol, dupical	Antioxidant, reduces reductase activity
4-methoxychalcone, Cicloprofen	Antibacterial coating
Macrocyclon	Antimicrobial, cryopreservation
Macrocyclon, 8-heptadecene dioic acid	Antimicrobial
Erioflorin, Nagilactone a	Plant growth regulators and herbicide
Trimegestone	Antibiotic
Rofe coxib	Antibiotic
Isobornyl acetate	Solvent
Clupanodonic acid	Plant defense
Cyclohexyl dodecyl euceinate	Plant pesticide
Eldecalcifol	Insecticide
Petrosaspongiolide m, Hyatolide a	Lipid signaling pathway
Catalpol	Plant defense
Garcinone-d	Prevention and treatment of diseases
(Propoxyethoxy) ethylbenzene	Solvent
Subglutinol a	Immunosuppressive agent
Benzoic acid, 2-ethyl hexanediol diester	Defense response
Kuraidin, oxogedunin	Insecticide
Compound name (alkanes)	
Decylnaphthalene	Plant growth regulating compound
P-quinquephenyl	Fungicide
Tetrahydrosqualene	Fungicides
Compound name (alconol & alcohols)	
Farnesal, Isoacolamone	Assist in the pollination
Curlone, Germacrone	Antiviral activity
Eucalyptol, Gexanid	Insecticide,assist in the pollination
Camphor	Biopesticide
Taraxerone, Arborinone	Antimicrobial
Farnesal	Natural antifungal

5. Arappu Buttermilk karaisal

- pH – 5.20,EC – 4.52 dsm^{-1} ,Total N – 0.80 %,Total P – 0. 20 %, Total K – 0.80 %, Bacteria – 1020 x 10^6 ,Fungi – 33 x 10^3 and Actinomycetes - 93 x 10^2

6. 3G extract (ginger, garlic and green chilli)

Compound name	**Uses**
Tetracosane	Antifungal
Hexatriacontane	Antimicrobial
Beta sesquiphellandrene	Antimicrobial
2,6-octadienal 3 7-dimethyl- (z)-	Antimicrobial
3-vinyl-1 ,2-dithiacyclohex-4-ene	Antibacterial
Diallyl disulfide	Antimicrobial
1,2-dithin, 3-ethenyl-3, 4-dihydro-	Antimicrobial
2-vinyl-4h-1 3-dithiin	Antioxidant
Tetradecane	Cytotoxic & Antifeedant

7. Egg Amino acid (EAA)

- Among the four isolates identified (E1 to E4) identified from EAA, E_4 recorded an inhibition zone of more than 2 cm, and hence its antimicrobial activity against *Fusarium* sp. is confirmed

8.Fish amino acid (FAA)

- Four isolates (F1 to F4) were identified from FAA
- F_1, & F_2 isolates from FAA exhibited antifungal activity against *Macrophomina phaseolina*
- F_3 & F_4 isolates had antifungal activity against *Macrophomina phaseolina* and *Fusarium sp.*

General:

- The cow urine based five leaf extracts (neem, notchi, *Adathoda*, *Ailanthus* and *Jatropha*) and 3G extracts (ginger, garlic and green chilli) showed comparable nympal mortality and adult emergence in white backed plant hoppers in rice.

- Benzene-1-ethoxy-4-methyl, Tetracosane, Diallyl disulphide were identified as the major bio-active compounds indentified in cow urine based 3G extract analyzed through GCMS.

- The highest Bhendi yield of 13.5t/ha was recorded in plots treated with 5 leaf herbal repellent @10% concentration as foliar spray followed by foliar spraying of 3G extract @10% with the yield potential of 12.9t/ha.

iii. Action Plans (2019-2022)

Action plan 1. Climate smart organic farming in rice

Period: Three years (2019-20 to 2021-22)

- **Rationale**
  - Widespread changes in rainfall and temperature
  - Climate induced water scarcity
  - Elevated soil temperature and emission of Methane
  - Growing interest on organic rice cultivation

- **Objectives**
  - To develop a climate resilient protocol for sustainable organic rice farming
  - To study the impact of organic packages on rice quality growth and productivity
  - To analyze the economic feasibility of the protocol developed

Treatments

T_1	Modified SRI with RDF
T_2	Modified SRI with EFYM @ 750 kg/ha+neem cake @250 kg/ha+vermicompost@1t/ha in two equal splits at AT and PI stages + 3% Panchagavya as foliar spray twice (15 days before and after flowering)
T_3	Green manure/Green leaf manure application @6.25t/ha+vermicompost @ 1t/ha+neem cake @250 kg/ha+3% Panchagavya as foliar spray twice (15 days before and after flowering)

T_4	T2 +AWD using FWT
T_5	T3 + AWD using FWT
T_6	FYM @12.5 t/ha + RDF (check)
T_7	Green manure grown *in situ* and incorporated at 50% flowering + 3% Panchagavya spray (farmer's practice)

Design	**:**	RBD
Replications	**:**	3
Variety	:	CO (R) 48
Season	:	Rabi
Duration	:	Three Years (2019-20 to 2021-22)

Observations

Weather parameters (air temperature, soil temperature, rainfall, windspeed etc), Greenhouse gas emission (Methane, CO2, etc.,), Growth and yield attributes of rice and Economic analysis

Centre	Department / Station	Scientists
Co-ordinating centre	Agro Climatic Research Centre & Sustainable Organic Agriculture, TNAU, Coimbatore	Dr. SP. Ramanathan, Prof & Head, ACRC Dr. E. Somasundaram,Prof& Head, SOA Dr. K .Ganesan, Asst. Prof (Ag. Ento.),SOA
Centres for conducting experiment	RRS, Tirur	Dr. V. M. Sankaran, Prof & Head Dr. S. Malathi, Asst. Prof (Pl. Patho.)
	AC & RI, Madurai	Dr. E. Subramanian, Asst. Prof (Agron.) Dr. P. Kannan, Asst. Prof (SS & AC)
	RRS, Ambasamudram	Dr. S.R. Shri Rangasami, Asst. Prof (Agron.) Dr. K. G. Sabarinathan, Asst. Prof (Ag.Micro.)
	TRRI, Aduthurai	Dr. M. Raju, Assoc. Prof. (Agron.) Dr. C. Umamageswari, Assoc. Prof. (Agron.)

Participants

1. Dr. E. Somasundaram, Professor and Head
2. Dr. K. Ganesan, Assistant Professor (Agrl. Entomology)
3. Dr. R. Sunitha, Assistant Professor (Environ. Sciences)

Action plan 2. Developing package of practices for organic production of curry leaf

Period: Three years (2019-20 to 2021-22)

Objective / Theme : Standardization of improved agro techniques for increasing the productivity of spices

2019-20 : Standardization of cost effective sustainable organic cultivation practices in curry leaf for yield and quality
2020-21 : Standardization of agro techniques
2021-22 : Confirmation trial

Deliverables : Developing package of practices for organic production of curry leaf

Centres& Scientist In-charge for conducting experiment	1. HC&RI, Coimbatore 2. HC&RI,Periyakulam, 3. Dept. of Sustainable Organic Agriculture 4. CPPS, TNAU, Coimbatore

Participants

1. Dr. E. Somasundaram, Professor and Head
2. Dr. K. Ganesan, Assistant Professor (Agrl. Entomology)

Action Plan : 3. Comparative evaluation of desi and cross bred cow dung, cow urine and milk for sustainable agriculture

Period: Three years (2019-22)

Rationale: Desi cow products (dung, urine and milk) are superior in quality and safer to the environment

Objectives:

- To study the quantitative and qualitative characters of desi and cross bred cow products
- To analyze the bio-active compounds in cow dung and urine of desi and cross breds

Deliverables: Qualitatively superior and safe source of cow dung, cow urine and milk can be identified.

Centre	Department	Scientists	Activity
Co-ordinating centre and Centres conducting experiment	Sustainable Organic Agriculture, TNAU, Coimbatore	1. Dr. E. Somasundaram Prof & Head, SOA 2. Dr. K .Ganesan Asst. Prof (Ag. Ento.),SOA 3. Dr. R. Sunitha Asst. Prof (ENS)	Soil health Plant protection aspects Qualitative analysis
	Agronomy	1. Dr. K. R. Latha Chief Scientist (Agronomy), AICRP-IFS 2. Dr. S.P. Sangeetha Asst. Prof (Agronomy), AICRP-IFS	Quantitative evaluation

C. **Ongoing project details**

Project details	URP	Core Project	ICAR-NPOF	Externally Funded	VCS
Rice	-	-	1	-	-
Cotton	1	-	-	-	-
Finger Millet	-	1	-	-	-
Green Manure -Brinjal - Bajra Cropping System	-	-	1	-	-
GM - Chilli - Barnyard Millet Cropping System	-	-	1	-	-
GM - Tomato - Finger Millet Cropping System	-	-	1	-	-
IOFS - Integrated Organic Farming System Model	-	-	1	-	-
ZBNF- Zero Budget Natural Farming	-	1	-	-	-
Cost and Return assessment	-	1	-	-	-
Bio-characterization of Organic Inputs	-	-	-	1	-
Organic inputs and training on organic farming	-	-	-	-	1
Total	**1**	**3**	**5**	**1**	**1**

G.Total :11

E. List of scientists working in SOA

1. **Dr. E. Somasundaram**
   Professor and Head
2. **Dr. R. Jansirani**
   Professor (Agrl. Extn.)
3. **Dr. K. Ganesan**
   Asst. Professor (Agrl. Ento)
4. **Dr. R. Sunitha**
   Asst. Professor (ENS)

C. AGRONOMY - AICRP-IFS

i. Decisions made on Adoption / OFT : Nil

ii. For Information

- IFS model developed for 1.0 ha area under irrigated dryland condition involving crop (8500 m^2), horticulture (1000 m^2), dairy (50 m^2), goat (50 m^2), kitchen garden (200 m^2) and vermicompost (50 m^2) recorded net return of Rs. 3,54,271/- with B:C ratio of 1.82 during 2017-18.

- The cropping system contributed 36.1 % of total Gross returns and 42.4 % of total net returns followed by dairy unit with 32.8 % gross return and 14.5 % of net return. Among cropping systems, Prosomillet – Chillies – Green manure (Daincha) recorded the highest net return of Rs. 44, 873/-

- The system generated an employment of 558 mandays and with an additional nutrient generation of 108.7 kg N, 47.6 kg P_2O_5 and 65.6 kg K_2 O by recycling livestock wastes and crop residues.

2. Research Projects on Pulses Crop

	Centre	URP	AICRP	EFP	TNAU Core project (Phase II)	Total
Agronomy						
AICRP-IFS	Department of Agronomy, Coimbatore	-	3	-	1	4
	SWMRI, Thanjavur	-	1	-		1
	ARS, Bhavanisagar	-	3	-		3
	TCRS, Yethapur	-	3	-		3

3. Ongoing URPs /AICRPs / Externally Funded Projects

Agronomy		
AICRP-IFS		
No.	**Project No. and Title**	**Remarks**
1.	**AICRP/DCM - CBE – AGR/001** Sustainable resource management for climate smart IFS (June 2017- May 2022) Dr.K.R.Latha Professor (Agronomy) & Chief Agronomist (AICRP – IFS), TNAU, Coimbatore	• The project may be continued • Salient findings to be given for information

2.	**AICRP/DCM - CBE – AGR/001** Expt. 1 a. -- Identification of cropping system module for different farming system modules (June 2017- May 2022) Dr.S.P.**S**angeetha, Assistant Professor (Agronomy), TNAU, Coimbatore	• The project may be continued
3.	**AICRP/DCM - CBE – AGR/001** Carbon crediting and GHG emission in IFS model (June 2017- May 2022) Dr.A.Renukadevi, Assistant Professor (SS & AC), TNAU, Coimbatore	• The project may be continued
4.	**AICRP/DCM - CBE – AGR/001** Integrated farming system for marginal farmers of Cauvery New Delta Zone (August 2016 – August 2019) Dr. S. Porpavai, Professor (Agronomy) and Head, SWMRI, Thanjavur	• Salient findings to be given for information
5.	**AICRP/DCM - CBE – AGR/001** OFR Experiment I- On-Farm crop response to plant nutrients in pre-dominant cropping systems and their impact on crop-livestock-human continuum (April 2017 to March 2020) Dr.N.Satheeskumar**,** Asst. Professor (Agronomy), ARS, Bhavanisagar	• Important constraints for each block may be taken for intervention. • The project may be continued
6.	**AICRP/DCM - CBE – AGR/001** OFR Experiment II- Diversification of Existing Farming Systems under Marginal household conditions (April 2017 to March 2020) Dr.N.Satheeskumar**,** Asst. Professor (Agronomy), ARS, Bhavanisagar	• The project may be continued
7.	**AICRP/DCM - CBE – AGR/001** OFR Experiment III- On-farm evaluation of farming system modules for improving profitability and livelihood of small and marginal farmers (April 2017 to March 2020) Dr.N.Satheeskumar**,** Asst. Professor (Agronomy), ARS, Bhavanisagar	• The project may be continued
8.	**AICRP/DCM - CBE – AGR/001** OFR 1: On Farm crop response to plant nutrients in pre-dominant cropping systems and their impact on crop – livestock – human continuum (April 2017 to March 2020) Dr.D. Raja, Professor (Agronomy), TCRS, Yethapur	• The project may be continued
9.	**AICRP/DCM - CBE – AGR/001** OFR 2: Diversification of existing farming systems under marginal household conditions. (April 2017 to March 2020) Dr.D. Raja, Professor (Agronomy), TCRS, Yethapur	• The project may be continued

10.	**AICRP/DCM - CBE – AGR/001** OFR 3: On-farm evaluation of farming system modules for improving profitability and livelihood of small and marginal farmers (April 2017 to March 2020) Dr.D. Raja, Professor (Agronomy), TCRS, Yethapur	• The project may be continued
(TNAU Core project – Phase II)		
1.	**DCM/CBE/AGR/IFS/2018/CP060** GOTAG/GEN/2018/R001 Integration of Rice + duck farming system in irrigated transplanted rice under organic farming June 2018 to May 2019 Dr. N. Thavaprakaash, Assoc. Prof. (Agronomy), Department of Agronomy (CFU), TNAU, Coimbatore.	• The project to be continued for one more years

4. Action plan

Action plan 1: Agricultural and horticultural crops based integrated organic farming system model for small and marginal farmers of Tamil Nadu

Theme Leader: Dr K.R.Latha, Professor, Dept. of Agronomy, TNAU , Coimbatore				
Activity	**Name of the scientist and centre**	**2019-2020**	**2020-2021**	**Deliverables / expected out come**
To identify the best integrated organic farming system model for Tamil Nadu Treatments T1: Control T2: Field Crops (Green manure-Rice-Blackgram) + fish +	**Department of Agronomy, TNAU, Coimbatore** Dr.K.R.Latha Professor (Agronomy) & Chief Agronomist (AICRP – IFS), TNAU, Coimbatore Dr. N. Thavaprakaash, Assoc. Prof. (Agronomy),	• Project proposal and approval • Experiment layout and sowing • Crop management , monitoring and observation • Monitoring and maintenance of fish, duck, desi chicken and Japanese	• Confirmative trial • data processing • Report preparation	The suitable integrated organic farming system model will be identified for small and marginal farmers of Tamil Nadu

Japanese quail T3: Vegetable crops (Tomato-Green manure-Pumpkin) + fish + duck T4: Leaf Banana + fish + Desi chicken Kitchen garden: Amaranthus, Coriander, Fenugreek, Mint, Gourds, Radish, Palak Border Planting: Papaya, Moringa	Department of Agronomy (CFU), TNAU, Coimbatore Dr.S.P.**S**angeetha, Assistant Professor (Agronomy), TNAU, Coimbatore Dr.T.Saraswathi Professor (Horticulture) TNAU, Coimbatore	quail and observation • Soil fertility analysis		

Action Plan 2. Validation of GHG emission in IFS model for Crop Component from real time field data

Theme Leader: Dr K.R.Latha, Professor & Chief Agronomist (AICRP – IFS), Dept. of Agronomy, TNAU , Coimbatore					
Activity	**Name of the scientist and centre**	**2019-2020**	**2020-2021**	**2021-2022**	**Deliverables/ expected out come**
To study the GHG emission from crop component in IFS model	**Centre** : Dept. of Agronomy Scientists Involved **Dr.K.R.Latha** Professor	• Project proposal and approval • Sowing of crops at different seasons	• Sowing of crops at different seasons • Collection of gases and estimation	• Sowing of crops at different seasons • Collection of gases and estimation	Quantification of green house gases from different cropping systems in IFS model

Treatments **A. Cropping Systems** 1. Cowpea (G) – Ragi – G.Manure 2. Maize – Sunflower – G.Manure 3. Prosomillet – Chillies – G.Manure 4. Pearlmillet – Cotton – G.Manure 5. Perennial fodder grass and *Desmanthus* **B. Sample Collection** Seasons-(kharif, rabi and summer), Stages of crop and at Regular intervals	(Agron.) **Dr.A.Renukadevi** Asst. Prof.(SS&AC) **Dr.S. Kokilavani** Asst. Prof. (Agrl. Meterology) **Dr.S.P.Sangeetha** Asst. Prof. (Agron) TNAU, Coimbatore	• Collection of gases and estimation in Gas Chromatography	in Gas Chromatography	in Gas Chromatography	

Closing remarks and way forward

Vice Chancellor

- In the use of water hyacinth as bioremedial measure for heavy metals like chromium, the fate of removed metals from the environment perspective needs to be explained

- In micronutrient studies, as Copper injury to crop is reported, the status of copper in Tamil Nadu soils may be assessed

- In the use of Chitosan nanoemulsion as antitransparent drought mitigation strategy efforts may be taken to extend its effect behind 5 days. Adoptability of this antitransparent in field level also to be considered.

- While assessing the raw, boiled and cooked rice for the presence of heavy metals, samples may be drawn from the hot spot areas instead of market samples.

- Use of low cost banana peel based biochar as biosorbent of heavy metal may be encouraged.

- While assessing the mercury contamination in Kodaikanal, the exact location of mercury dumping has to be identified with the local people and the contamination level may be assessed on the water bodies/rivers of Periyakulam area originating from the dumping site.

- Demonstration on the management of water contamination as a result of coffee pulp disposal at lower Palani hills may be considered. Water decontamination measures for *E.coli* in water bodies of pilgrimage important places like Thamirabharani may be considered.

- Environmental issues faced in Industry rich areas like Tuticorin may taken up as researchable issues

- As an Agricultural Scientist priority may be on to save the soil and water bodies from the existing environmental issues

- Emerging areas like millipede compost may be tried.

- Through RSGIS, the major water bodies serving as irrigation sources of Tamil Nadu may be assessed.

- Possibility of using biofertilizers to mitigate the soil 'Zn' deficiency may be explored

- While developing products for organic agriculture, care may be taken to use inputs from organic areas.

- Possibilities for bioherbicide may be explored

- In mushroom production arecanut and cassava based biowastes may be considred as containers.

- Technology to develop *Ganoderma* based antiviral compound may be strengthened.

- Dammer bee colonies may be supplied to farmers to assess its impact on productivity of mango, amla, tamarind etc.

- Due care may be taken to avoid the overlapping nature of work observed between ACRC and RSGIS.

Director of Research

Way Forward

- Enable nano-products reaching the farm gate by fulfilling the requirements of commercialization and regulatory frameworks
- Augment eco-friendly environmental remediation processes and products
- Document of success stories on GIS & RS based Risk Assessment and Monitoring Systems
- Design robust Agro-Meteorology Advisory Services using intellectual & indigenous knowledge
- Map TNAU farm soils to rationalize fertilizers and enable smart farming

IV) CONTACT DETAILS OF SCIENTISTS PARTICIPATED IN THE CSM ON PULSES, 2019

S.No.	**Name & Designation with full address**	**Email ID**	**Mobile Number**
1.	Dr.K.R.Latha Professor (Agronomy) & Chief Agronomist (AICRP – IFS), Dept. of Agronomy TNAU, Coimbatore	palaiappan_latha@yahoo.co.in	8825912770
2.	Dr.S.P.**S**angeetha, Assistant Professor (Agronomy), Dept. of Agronomy TNAU, Coimbatore	sangeetha.agr@gmail.com	9976961660
3.	Dr.A.Renukadevi Assistant Professor (SS&AC), Dept. of Agronomy TNAU, Coimbatore	renu_remsen@yahoo.co.in	9994084375
4.	Dr. S. Porpavai, Professor (Agronomy) and Head, SWMRI, Thanjavur	porpavaiswmri@yahoo.co.in	9442987904
5.	Dr.D. Raja, Professor (Agronomy), Tapioca and Castor Research Station Yethapur	arsyethapur@tnau.ac.in	8903769689
6.	Dr.N.Satheeskumar**,** Asst. Professor (Agronomy), Agricultural Research Station Bhavanisagar	nsatheeshe2000@gmail.com	9894563397
7	Dr. N. Thavaprakaash, Assoc. Prof. (Agronomy), Department of Agronomy (CFU), TNAU, Coimbatore.	thavaprakaash.n@tnau.ac.in	9443622977

TAMIL NADU AGRICULTURAL UNIVERSITY

PROCEEDINGS OF THE 7th SCIENTISTS MEET ON NON CROP SPECIFIC PROJECTS - 2019

Directorate of Natural Resource Management
Tamil Nadu Agricultural University
Coimbatore – 641 003

Proceedings of the
7th Scientists meet on Non Crop Specific Projects - 2019

7th Scientists' Meet on Non Crop Specific Projects was held on 06.05.2019 & 07.05.2019 at TNAU, Coimbatore under the chairmanship of **Dr. N. Kumar**, Vice Chancellor, TNAU, Coimbatore. **Dr. K. S. Subramanian**, Director of Research welcomed the gathering and presented the research highlights of the year 2018-19 encompassing technologies and products developed by the Directorate of Natural Resource Management. Based on the discussions and review of 62 research projects by **Dr. R. Santhi,** Director (DNRM) in the concurrent session held on 06.05.2019, the recommendations and action plans that emanated were presented for the approval of the Chairman. Action taken on the 6th Scientists' Meet on Non-Crop Specific Projects and salient outcome from the research projects for information, OFT and adoption were presented by **Dr.A. Lakshmanan**, Professor and Head (NS&T), **Dr.K.Valliappan**, Professor and Head (ENS), **Dr.S.Palanivezhan**, Professor and Head (RS&GIS), **Dr. P.Malavizhi**, Professor and Head (SS&AC) and **Dr. V. Gomathi**, Professor and Head (AGM). The meet ended with the closing remarks by the Vice-Chancellor and vote of thanks by the Director of Research, TNAU, Coimbatore.

The proceedings of the meet is furnished as below pertaining to the Departments of Nano Science and Technology, Environmental Sciences, Remote Sensing and Geographic Information System, Soil Science and Agricultural Chemistry and Agricultural Microbiology under the following headings.

A. Decisions made on Adoption / OFT / Information
B. Research Projects reviewed
C. Remarks on the ongoing University Research projects/AICRP/Externally funded projects
D. Action Plan 2019-2022
E. General remarks
F. Participants

1. **Department of Nano Science and Technology**

A. Decisions made on Adoption / OFT / Information:

A1. For Adoption

1.Enhanced Preservation of Fruits using Nanotechnology (GAC-IDRC, Canada)

(a) Enhanced Freshness formulation for Pre-harvest spray and Post-harvest dip.

(b) Hexanal loaded Nano stickers.

(c) Hexanal loaded Nano pellets.

(i) Pre-harvest spray for mango and other fruits

- Dilute 20 ml of fruity fresh formulation in one litre of water or 200 ml of fruity fresh in 10 litre of water.
- Spray over fruits and leaves when the fruits are at 60 - 70% maturity stage. For better results give one more spray after 10 days.
- The spray solution should be used on the same day and ensure entire tree foliage and fruits are soaked.

(ii) Post - harvest dip for mango and other fruits

- Dilute 20 ml of fruity fresh formulation in one litre of water or 200 ml of fruity fresh in 10 litre of water.
- Dip fruits for five minutes in the diluted solution and dry the fruits before packing.

(iii)Benefits of the fruity fresh

- TNAU fruity fresh spray can delay the harvest for two weeks in case of pre - harvest spray
- Post - harvest dip in 2% TNAU fruity fresh extends the shelf life of fruits by two weeks in ambient storage condition and upto 4 weeks under cold storage.

A2. For Information

1. **Developing nano packaging to extend shelf–life of perishables**

Fruit pulp of *Cucurbita moschata* was identified to have good film forming property without adding plasticizers. Edible coat nanoformulation with *Cucurbita moschata* and *Tribulus terrestris* enhanced the shelf life of fresh cut carrots to 24 hours and dehydrated carrots to 24 months at room temperature. The edible coat nanoformulation is suitable to enhance shelf life of carotenoid rich fruits and vegetables.

2.Computational design of nano materials and their interaction with natural product plant protective agents as inhibitors for Cauliflower mosaic virus (CaMV) transmission

Designed the mesoporous Nano-Silica as smart delivery system for encapsulating biomolecules. Predicted the molecular interaction between Mysus persicae stylet's cuticle protein and cauliflower mosaic virus aphid transmission helper component protein. Screened the diterpenoid Annosquamosin-A as ligand for aphid stylet virus transmission proteins.

3.Developing a novel biocompatible coating to enhance the shelf life of fruits (Tomato)

Sericin protein has been isolated and purified from the discharge water from sericulture Industry which made sericin as a value added product. The molecular weight of purified sericin protein ranges from 70 to 75 kda. The thermal property of sericin protein could able to withstand higher temperatures.

B. Research projects reviewed

Departments	Centre	URP	Core Project	EFP	Private	AICRP	Total
Department of Nano Science and Technology							
Nano Science and Technology	Dept. of Nano Science and Technology, TNAU, Coimbatore	7	-	5	-	-	**12**

C. Remarks on the ongoing University Research projects/AICRP/Externally funded projects				
(i)UNIVERSITY RESEARCH PROJECTS				
S.No.	**Project No. & Title**	**Name of the Scientist(s)**	**Duration**	**Remarks**
1.	**NRM/CBE/NST/HOR/2013/004** Developing nano packaging to extend shelf–life of perishables.	Dr. S.Haripriya	July 2013 to August, 2014; Extended to September,2018	Rehydration test for the edible coated carrots may be carried out and the result can be included in the project completion report. The project completion report should be submitted by June, 2019.
2.	**NRM/CBE/NST/PHY/2015/004** Computational design of nanomaterials and their interaction with natural product plant protective agents as inhibitors for Cauliflower mosaic virus (CaMV) transmission.	Dr. D. JeyaSundaraSharmila	January, 2015 to December 2018	New research grant proposal may be submitted in collaboration with virologist. The project completion report should be submitted by June, 2019.
3.	**NRM/CBE/NST/PHY/2015/005** Developing a novel biocompatible coating to enhance the shelf life of fruits (Tomato).	Dr. Pon. SathyaMoorthy	September, 2015 to August, 2018	The project completion report should be submitted by June, 2019.
4.	**NRM/CBE/NST/2015/001** Nano encapsulation of hormones to promote seed germination and seedling vigour of groundnut and greengram.	Dr. K.Raja	August, 2015 to July, 2018 extended to June, 2019	IAA Nano formulation is recommended for OFT at ORS, Tindivanam, TNAU, Coimbatore and NPRC, Vamban. Industrial partner may be identified for fine tuning and up-scaling the IAA infused nanofibre seed coating technology.
5.	**NRM/CBE/NST/13/02** Chitosan nanoformulation in Plant-Water relations: Testing for an antitranspirant activity in Maize (*Zea Mays* L.).	Dr. S.Marimuthu	August, 2014 to August, 2018	Recommended for OFT in collaboration with Crop physiologist at RRS, Kovilpatti, DARS, Chettinad and ARS, Bhavanisagar.

6.	**NRM/CBE/NST/13/03** Synthesis and characterization of Organic wastes based superabsorbent polymers for improving moisture retention in soil.	Dr. S.Marimuthu	August, 2014 to August, 2018	The project completion report may be submitted by July, 2019.
7.	**NRM/CBE/NST/14/002** Reactive oxygen species quenching in pollen grains using nano cerium to increase seed-set in sorghum under drought stress.	Dr. M. Djanaguiraman	November 2014 to February 2020.	The project may be closed. New Research proposal may be submitted for inviting external funding.
(ii)EXTERNALLY FUNDED PROJECTS				
8	Multi-layered encapsulation of 1 MCP and hexanal as a smart delivery system to enhance the shelf-life of banana. **(DST – SERB)**	**PI:** Dr. S. Srivignesh, National PDF. **Mentor :** Dr. K.S. Subramanian	2018 - 2020	The project may be continued.
9	Flexible and adhesive surface enhanced Raman spectroscopy based nanostructures device for efficient detection of multicomponent pesticide residues in fruits and vegetables. **(DST – Ramalingasamy Faculty Re-entry)**	**PI :** Dr. S.Thirumalairajan	2018 - 2023	The project may be continued.
10	Nano-encapsulation of plant growth promoting bacteria to improve shelf-life. **(DST – SERB)**	**PI :** Dr. Pon. SathyaMoorthy	2017-2020	The project may be continued.
11	Nano-based Smart Delivery of Agri-Inputs to Promote Pulses Productivity. **(DST Nano Mission)**	**PI:** Dr. K.S. Subramanian. **Co-PI:** Dr. S. Marimuthu Dr. K. Raja	2017-2020	The project may be continued.

		Dr. M. Kannan Dr. S. Haripriya Dr. PonSathyaMoorthy Dr. D. JeyaSundaraSharmila		
12	**NABARD/NRM/CBE/NST/2017/R015** Development of Nano-fibre based nutrient delivery to achieve balanced nutrient for groundnut nunder NABARD chair Professor scheme of TNAU (NABARD Scheme)	**PI:** Dr.K.S.Subramanian	2017-2020	The project may be continued.

D. Action Plan 2019-2022

Action plan 1	**Design and fabrication of nano-agri inputs** Chelated nanometals for enhancing mineral nutrition in soil, crop and human continuum			
Project Leader(s)	Dr.C.Sharmila Rahale, AP (SS&AC), Dept. of NST , Dr.A.Lakshmanan, Prof.& Head, Dept. of NST			
Name Scientists and Centre	**2019-20**	**2020-21**	**2021-22**	**Deliverables / Expected outcomes**
Dr.C.Sharmila Rahale, AP (SS&AC), Dept. of NST, Dr.A.Lakshmanan, Prof.& Head, Dept. of NST	Synthesis of metal nano particles and standardization of protocol. Stabilizing the metal nano particles using natural chelating agents such as Rhamnolipd, humic and fulvic acids.	Assessing the stability after capping with chelating agents along with the mapping of sorption and desorption pattern.	Eco-friendly, cost effective micronutrient metal chelates will be available for farmers that would enhance the use efficiency of Zinc and Iron.	Synthesis of metal nano particles and standardization of protocol. Stabilizing the metal nano particles using natural chelating agents such as Rhamnolipd, humic and fulvic acids.

Action plan 2	**Design and fabrication of nano-agri inputs** Nanofibre encapsulation of *Methylobacterium* for Groundnut seed invigouration to improve productivity under rainfed ecosystem
Project Leader(s)	Dr. K. S. Subramanian, NABARD Chair Professor , DNST, TNAU, Coimbatore Dr. K. Raja ,Assist. Prof. (SST) Dr. A. Lakshmanan, Professor & Head, Dept. of Nano Sci., & Technology Dr. M. Senthilkumar, Assoc. Professor (AGM), AC & RI, Echankottai

Name Scientists and Centre	2019-20	2020-21	Deliverables / Expected outcomes
Dr. K. S. Subramanian, NABARD Chair Professor , DNST, TNAU, Coimbatore Dr. K. Raja ,Assist. Prof. (SST) Dr. A.Lakshmanan, Professor & Head, Dept. of Nano Sci., & Technology Dr. M. Senthilkumar, Assoc. Professor (AGM), AC & RI, Echankottai	Development and characterization of E-Spun nano-fibre / spray particles (nanosphere) using biopolymers for entrapping microbial cells Assessing the viability of nanofibre entrapped microbial cells under ambient conditions	Testing the bio-efficacy of microbial cells entrapped nanofibre seed invigouration for improved germination, seedling vigour and yield of groundnut The product of the project would be evaluated under *in vivo* condition at different locations (Research stations) of University and farmers' fields for large scale adoption	Single solution product "encapsulation of seeds with nano-fibre carrying microbial cells" with an intention to tide over abiotic stresses These processes ensure germination, plant population, productivity and production of groundnut under rainfed conditions.

Action plan 3	**Design and fabrication of nano-agri inputs** Developing advanced formulation for botanical insecticide (Azadirachtin) using nano-porous biogenic silica from sugarcane baggase for high bio-efficacy. [New Project Proposal submitted to SERB-CRG & an initial Mini Project Proposal submitted for NABARD funds]		
Project Leader(s)	Dr. Jeya Sundara Sharmila, Assist. Prof. (Physics), DNST, CBE -3 Dr. A. Lakshmanan Professor & Head, Department of NST, TNAU, Cbe – 3. Dr. D. Rajabaskar, Assist. Prof. (Agrl. Ento.), Department of Pulses, TNAU, Cbe – 3.		
Name Scientists and Centre	**2019-20**	**2020-21**	**Deliverables / Expected outcomes**

Dr. Jeya Sundara Sharmila, Assist. Prof. (Physics), DNST, CBE -3 Dr. A. Lakshmanan Professor & Head, Department of NST, TNAU, Cbe – 3. Dr. D. Rajabaskar, Assist. Prof. (Agrl. Ento.), Department of Pulses, TNAU, Cbe-3	• Development of nanoporous biogenic silica from agricultural waste such as sugar cane baggase and characterization. • Inclusion of bio-molecule (Azadirachtin) in nano-porous biogenic Silica formulation and release profile.	• Efficacy studies of Azadirachtin loaded bio-silica formulation in laboratory (UV-irradiation) and field condition. • Scale-up technology	• A new eco-friendly bio-formulation (Aza-Sil) would be available to control insect pests organically with UV-safe extended bio-efficacy. • Interested agro-industries can commercialize the [Aza-Sil] technology so as to benefit large farming community.

Action plan 4	**Nano-Food Systems** Nanoformulation of Annonaceous Acetogenins from *Annona muricata* for better delivery			
Project Leader(s)	Dr.S.Haripriya, Asst. Professor (Hort.), Dept. of Nano Science & Technology, TNAU, Coimbatore – 03			
Name Scientists and Centre	**2019-20**	**2020-21**	**2021-22**	**Deliverables / Expected outcomes**
Dr.S.Haripriya, Asst. Professor (Hort.), Dept. of Nano Science & Technology, TNAU, Coimbatore – 03	Extraction and characterization of Annonaceous acetogenins from *Annona muricata.*	Nanoformulation and characterization of Annonaceous acetogenins. Assess the bioactivity and cytotoxicity of Nanoformulated acetogenins.	-	Nanoformulated Acetogenins for Cancer patients.

Action plan 5	**Development of Biosensor:** Development of Foliar Diagnostic Kit for on Site Detection of Nitrogen and Moisture Status in Crops		
Project Leader(s)	1. Dr. K.S. Subramanian NABARD Chair Prof. DNST, CBE 2. Dr. S. Marimuthu AP (Agron.), DNST, CBE 3. Dr. Pon. Sathya Moorthy , AP (Physics), DNST, CBE 4. Dr.K.M. Sellamuthu, Assoc. Pro. (SS & AC), HC &RI, Periyakulam		
Name Scientists and Centre	**2019-20**	**2020-21**	**Deliverables / Expected outcomes**
Dr. K.S. Subramanian NABARD Chair Prof. DNST, CBE Dr. S. Marimuthu AP (Agron.), DNST, CBE Dr. Pon. Sathya Moorthy AP (Physics), DNST, CBE Dr.K.M. Sellamuthu, Assoc. Pro. (SS & AC), HC &RI, Periyakulam	Development of on-site detection devices for the measurement of leaf moisture and macro-nutrient status in major crops (rice, maize, greengram, cotton, tomato) Calibration of devices for on-site decision making on irrigation scheduling and fertilizer prescription for various systems	Validation of these sensors with standard operational protocols for scaling up of the technology	Prototype for monitoring leaf moisture, nitrogen, phosphorus will be made available

Action plan 6	**Nano systems for pollution management and Eco system health** Developing Metal Oxide Frameworks (MOFs) based heterogeneous Nano catalysts for the management of heavy metals and Green house gases		
Project Leader(s)	1.Dr. A. Lakshmanan Professor & Head, Dept. of Nano Sci., & Technology 2.Dr.K.S.Subramanian,NABARD Chair Professor & Director of Research, TNAU, Coimbatore 3. Dr.V.Geethalakshmi, Director, Crop Management, TNAU, Coimbatore.		
Name Scientists and Centre	**2019-20**	**2020-21**	**Deliverables / Expected outcomes**

Dr. A. Lakshmanan Professor & Head, Dept. of Nano Sci., & Technology Dr.K.S.Subramanian,NABARD Chair Professor & Director of Research, TNAU, Coimbatore Dr.V.Geethalakshmi, Director, Crop Management,TNAU, Coimbatore	Screening and development of MOFs based heterogeneous nano devices Enhancing the efficiency by the introduction of catalytically active sites into the framework.	Assessing stability of the engineered nano systems Confirming the efficacy on heavy metals reduction and methane adsorption Assessing the bio safety of the MOF systems	Metal Oxide Frame work nano devices will be available for the eco friendly and cost effective management of heavy metal pollution besides trapping green house gases from various eco systems

Action plan 7	**Bio safety of nano particles** Antimicrobial activity of metal-oxide nano particles on Plant Growth Promoting Rhizobacteria (PGPR)			
Project Leader(s)	Dr. Pon. Sathya Moorthy, Assistant Professor [Physics], Dept. of Nano Sci., & Technology, TNAU, Coimbatore			
Name Scientists and Centre	**2019-20**	**2020-21**	**2021-22**	**Deliverables / Expected outcomes**
Dr. Pon. Sathya Moorthy, Assistant Professor [Physics], Dept. of Nano Sci., & Technology, TNAU, Coimbatore	Synthesis of metal oxide nano particles (CuO & TiO2) can be done using available facile techniques in our department.	Characterization of synthesized nano particles using (i) PSA, (ii) PXRD, (iii) FTIR, (iv)SEM, (v) TEM, (iv) BET etc	Antimicrobial activity of metal oxide nano particles against (*Psuedomonas fluorescence* & *Bacillus subtilis*) using well diffusion method and broth dilution method	Minimum inhibitory concentration and minimum bactericidal concentration of individual nano particles can be determined. Above information may provide basic working concentration for any nano inputs formulations such nano pesticide, nano herbicide, nano fertilizer etc without perturbing the existing microbial ecology

2. Department of Environmental Sciences

A. Decisions made on Adoption / OFT / Information:

A1. For Information:

1. Water hyacinth biochar has the greatest potential of Cr (VI) removal than Cr (III). The optimum pH, biosorbent size, biosorbent dosage and contact time for achieving the highest Cr VI adsorption by water hyacinth biochar were 2.0, 0.2mm, 2.5g/100ml and 36 hrs respectively, while for Cr IIII these were 4.0, 0.2mm, 2.5g/100ml and 12 hrs respectively. Desorption of Cr was higher in biochar (83 %) than fresh biomass of water hyacinth (62 %). The efficiency of the desorbing agents to recover Cr were in the order of 0.1 M HCl > 0.5 M HCl > 0.1M H_2SO_4 > 0.5 M H_2SO_4.

2.In the evaluation of long term impact of treated paper mill effluent application on soil and yield of Maize under different amendments, the maize yield was found to be increased to 29 % in the treatment with 100% Gypsum and Composted Poultry Manure@ 6 t ha^{-1} (6.4 t ha^{-1}) as compared to Control.

3.Treated paper and paper board mill effluent irrigation with 50% pressmud compost and 50% RDF recorded the highest yield of 11.5 tonnes/ha in Marigold and 36 t h^{-1} in turmeric, which were 57.1% and 20% higher than 100% RDF with well water respectively

4.Absorption properties of aerosols recorded highest value (1.02±0.04) in summer and lowest value (0.84±0.03) in monsoon. This indicates the dominance of fossil fuel aerosols in modifying the aerosol absorption properties at Ooty.

5.Atmospheric heating rate at Ooty ranged from 0.25 to 0.31$Kday^{-1}$ with the annual mean of 0.28 $Kday^{-1}$.

6.The leaf bronzing symptom was observed earlier in rice varieties namely ADT 43, ADT 45, ASD 16, ASD18, MDU 5, MDU 6 and TRY 2 due to exposure of Ozone at 50ppb

7.The rice exposed to 50 ppb ozone recorded the photosynthetic rate from 19.10 to 24.74 µmol CO_2 m^{-2} s^{-1} and stomatal conductance from 0.27 to 0.54 mol H_2O m^{-2} s^{-1}. The lowest reduction of photosynthetic rate was observed in rice Anna 4 (3%) followed by CO 51(5%), Rice PMK(R) 3, CO 47, ADT4 and ADT37 (5.7%).

B.Research projects reviewed

Department	Centre	URP	Core Project	EFP	Private	AICRP	Total
Environmental Sciences	ENS, TNAU, Coimbatore	5	-	9	-	-	**14**
	SOA, TNAU, Coimbatore	1	-	-	-	-	**1**
	AC&RI, Killikulam	1	-	-	-	-	**1**
	Dean (SPGS), TNAU, Coimbatore	1	-	-	-	-	**1**
	ADAC&RI, Trichy	1	-	1	-	-	**2**
	CRS, Aliyarnagar	1	-	1	-	-	**2**
	ORS, Tindivanam	1	-	-	-	-	**1**
	FC&RI, Mettupalayam	1	-	-	-		**1**

	Dean i/c,TRIARD	1	-	-	-	-	**1**
	COE, TNAU, Coimbatore	-	-	1	-	-	**1**
	Total	**13**		**12**			**25**

C.Remarks on the ongoing University Research projects/AICRP/Externally funded projects

Theme Area -1 Bioremediation of Polluted Environment

S.No	Project Number and Title	Duration	Scientist in Charge	Remarks
1.	**DST/HCRI/PKM/ENS/2016/R004:** Assessment on the utility of water hyacinth (*Eichhornia crassipes*) biomass as potential bio-sorbent for sequestration of heavy metals from tannery effluent and desorption of chromium from bio-sorbent for effective reuse	August 2016- July 2019 (DST-SERB)	Dr. E. Parameswari, Asst.Prof (ENS) Dr. S. Avudainayagam Professor (ENS), Deani/c, TRIARD Dr. V. Davamani	Surface charges of biochar obtained from water hyacinth may be assessed. Desorbed Cr may be tested with hide. The project may be closed and the completion report may be submitted
2.	**NRM/ALR/ENCNT/2016/001 :** Evaluating the impact of Organic amendments on Coconut growth, nut yield and soil nutrients in Coir Industry wastewater affected areas	July 2016-June 2020 (URP)	Dr.R.M.Jayabalakrishnan Asst.Prof (ENS)	The project may be continued
3.	**NRM/CBE/ENS/2017/001:** Assessing the bioavailability, bioaccumulation and bioremediation	January 2017-	Dr. S. Avudainayagam,	Water samples may also be collected in

	of mercury in the contaminated soils and plants at Kodaikanal	December 2020(URP)	Professor (ENS) Deani/c, TRIARD Dr. V. Davamani, AP(ENS)	the selected sites and tested for mercury contamination. The project may be continued
4.	**NRM/CBE/ENS/REM/2017/002 :** Sustainable management of textile and tannery effluent contaminated soils using castor priming with AM fungi	April 2017-March 2019 Extended upto September 2019(URP)	Dr. P. Kalaiselvi Asst.Prof (ENS) Dr. M. K. Kalarani, Professor(CRP)	B:C ratio may be worked out. Instead of applying GLM, alternate organic amendments suitable for garden land may be tried.
5.	**NRM/CBE/ENS/BHM/2017/001 :** Studies on Bio accessible Heavy Metal From Raw and Cooked Rice	March 2018 – June 2019 (URP)	Dr.P.Dhevagi Asso. Prof.(ENS),	Rice samples from contaminated fields may be collected for testing the bio-accessible heavy metals and the project may be closed
6.	**NRM/CBE/ENS/2018/001 :** Developing a low cost biosorbent for heavy metal removal from polluted water.	January 2018 to December 2019 (URP)	Dr.P.Dhevagi Asso. Professor (ENS),	Surface charges of biochar obtained from banana peel may be assessed and the project may be closed.
7.	**NRM/CBE/ENS/2018/002** : Fate and transport of pesticide residues in soil and water of predominant vegetable growing village of Ottanchathiram	June 2018 – May 2020(URP)	Dr.R.Jayasree Asst.Prof(ENS)	The presence of other pesticides residues also should be tested. Product should also be included
8.	**NRM/CBE/ENS/2018/003 :** Natural Adsorbents to remove mercury from waste water in Coimbatore	June 2018 – May	Dr.R.Sunitha Asst.Prof(ENS)	Number of bench mark sites for

	District.	2020(URP)		sampling should be increased as per the statistical requirements. Mercury contaminated sites may be included. Midterm corrections should be done in this project

Theme Area -2 Wastewater Treatment and Recycling

S.No	Project Number & Title	Duration	Scientist in Charge	Remarks
1.	**ACSM/NRM/CBE/ENS/2014/R004** : Evaluation of distillery wastewater for Agriculture and its impact on environment	April 2014-March 2017 (Private)	Dr. M. P. Sugumaran Asso. Professor (ENS), Dr.K.Suganya, Asst.Prof (ENS)	The project may be closed and the completion report may be submitted
2.	**BASM/NRM/CBE/ENS/2014/R006** : Studies on eco-monitoring of the land application of biomethanated distillery spent-wash on quality of water, soil health, yield ,quality of crop produce and sustainable environment	October 2014 – September 2018 (Private)	Dr. R. Jayashree Asst.Prof(ENS) Dr. P. Kalaiselvi Asst.Prof(ENS)	The Project may be closed and the completion report may be submitted
3.	**SD/NRM/CBE/ENS/2014/R007** : Assessing the long term impact of distillery effluent application on soil and crop and evaluation of alternative use of distillery effluent for crop production	September2014- August 2018 (Private)	Dr. P. Dhevagi Asso. Professor (ENS), Dr.K.Suganya Asst.Prof(ENS)	The project may be closed and the completion report may be submitted

4.	**TNPL/NRM/CBE/ENS/2015/R008** : Evaluation of long term effect of utilization of TNPL effluent water for irrigation and remediation of effluent irrigated soil habitat	April 2018 - March 2021 (Private)	Prof. & Head, Dept. of Environmental Sciences Dr.S.Paul Sebastian Asst.Prof(ENS)	The uptake of salt per unit area by *Sesuvium Portulacastrum* may be worked out. The disposal option of *S. Portulacastrum* may be explored. Some other salt loving halophytes may be tried. The project may be continued
5.	**SPBL/NRM/CBE/ENS/2018/R005 :** Ecofriendly utilization of Seshasayee paper mill effluent and solid wastes and monitoring its impact on soil and groundwater	April 2018- March 2019 (Private)	Prof. & Head, Dept. of Environmental Sciences Dr. V. Davamani Asst.Prof(ENS)	The project may be continued
6.	**ITC/NRM/CBE/ENS/2014/R003 :** Effective utilization of treated effluent water and sludge generated from ITC factory	April 2017- March 2020 (Private)	Dr.S.Paul Sebastian Asst.Prof(ENS) & Dr.S. Avudainayagam Professor (ENS) Deani/c , TRIARD	The project may be continued
7.	**DST/NRM/ALR/ENS/2017/R005 :** Preparation and development of adsorbent carbon and nano cellulose fibrils from *Cocos nucifera* and its potential application in wastewater treatment system	May 2017 - April 2021 SERC-DST	Dr. R.M.Jayabalakrishnan, Asst. Professor (ENS), CRS, Aliyar.	The project may be continued

8.	**TNPL/NRM/TRY/SAC/2015/ R002 :** Environmental quality assessment in the use of Paper Board Industry (TNPL Unit II) waste water for agro-forestry system	November 2015 – March 2019 (Private)	Dr. P.Balasubramaniam, Professor and Head (SS&AC), ADAC&RI, Trichy.	The project may be continued
9.	**NRM/TMV/ENS/2014/001 :** Assessment of Soil and Water Pollution in Polluted Ecosystem of Shrimp cultivation	October 2014 to September 2016 (URP)	Dr. P.C .Prabu Asst.Prof. (ENS)	The project may be closed and the completion report may be submitted
10.	**NRM/MTP/ENS/2016/001:** Development of biofloating technology for the odour management in sewage water	December2016 – November 2019 (URP)	Dr.M. Prasanthrajan Asst.Prof. (ENS)	In odour removal studies include ammonia and also other parameters. The project may be continued

Theme Area -3 Air Pollution Monitoring and Mitigation

S.N	Project Number and Title	Duration	Scientist in Charge	Remarks
1.	**ISRO/NRM/KKM/ENS/2012/D001** : GOI-ISRO-GBP-ARFI project on "Assessing the Aerosol Radiative Forcing over India" (ARFI)	April 2018 - March 2021 (ISRO - ARFI)	Professor and Head(ENS) Dr. R.M.Jayabalakrishnan Asst. Prof. (ENS) Dr. K. Boomiraj, Asst. Prof. (ENS), AC&RI, Kudumiyanmalai, Professor and Head, HRS, TNAU, Ooty	The project may be continued

2.	**ISRO/NRM/KKM/ENS/2014/D002** : Establishment and Maintenance of Environmental Observatory at Wood House, HRS, Ooty for Atmospheric Trace gases Chemistry Transport Modeling (ATCTM)	April 2018 - March 2019 ISRO-ATCTM	Professor and Head, Dept. of Env.Sciences Dr.P.Dhevagi, Asso. Professor (ENS), Professor and Head, HRS, TNAU, Ooty	The project may be continued
3.	**DST/NRM/CBE/ENS/2018/R011 :** Assessment on the potential of oil palm (*Elaeis guineensis*) plantations for carbon sequestration in different regions of Tamil Nadu	April 2018-March 2021 DST-SERB	Dr. V. Davamani Asst. Prof. (ENS) Dr. E. Parameswari Asst. Prof. (ENS) Dr. M. Velmurugan, Asst. Prof. (Hort.)	The project may be continued
4.	**NRM / KDM /ENS / 2016 / 001 :** Identifying high phytolith yielding cultivars among millets to promote carbon sequestration in rainfed ecosystem	July 2016-June 2018 (URP)	Dr.S.K. Rajkishore Asst. Professor (ENS).	The project may be closed and the completion report may be submitted

Theme Area - 4 Integrated Solid Waste Management

S.No	Project No and Title of the Project	Duration	Scientist in Charge	Remarks
1.	**NRM/TPS/ENS/2015/001 (URP)** : Development of integrated solid waste management (ISWM) strategy for APPTA (Agricultural Product Producers and Traders Association) market of Kanyakumari district	September 2015 - August 2017	Dr. C. Prabakaran, Assistant Professor (ENS)	The data may be checked statistically and the completion report may be submitted
2.	**NRM/KKM/ENS/2017/001 (URP) :** Development and standardization of enriched fish waste compost and its evaluation on soil and crop	June 2017-May 2020	Dr. S. Shenbagavalli Assistant Professor (ENS)	Nitrate forms may be analysed

Theme Area - 5 Agro-ecology and Ecosystem Services

S.No	Project Number and Title	Duration	Scientist in Charge	Remarks
1.	**NRM/CBE/ENS/2015/004 :** Establishing green corridor along the coastline of Cuddalore district for ecological preservation	June 2015-May 2018	Dr.M.P. Sugumaran Asso. Professor (ENS),	The project may be closed

D. Action Plan 2019 - 2022

Action plan 1	**Low Cost Constructed Wetland System for the Treatment of Polluted Noyyal River Water at Downstream of Tiruppur City for the sustainable reuse in Agriculture**			
Project Leader(s)	Dr. S. Paul Sebastian, Dr. M. Maheswari, Dr. K. Sivasubramanian and Dr. K. Boomiraj			
Name Scientists and Centre	**2019-20**	**2020-21**	**2021-22**	**Deliverables / Expected outcomes**
Dr. S. Paul Sebastian, Dr. M. Maheswari, Dr. K. Sivasubramanian and Dr. K. Boomiraj, Department of Environmental Science, TNAU, Coimbatore	• Formation of water user groups, Clearing channel, Formation of lining with HDPE in the channel and Formation of settling tank, Portioning of channel as floating and emergent tanks, Filling up of tanks with Gravel • Obtaining clearance from PWD, Collector and other Govt bodies	• Planting of floating and emergent wetland plants, • Maintenance and monitoring of established floating & emergent wetlands, • Field trial by using treated water	• Analysis of water & plant samples from the constructed wetland, Field trial by using treated water • Studies on the impact of treated water irrigation • Documentation and report preparation	1. Treated water will be utilized for irrigation 2. This project will address soil and groundwater pollution issues 3. Groundwater table will increase 4. It restores the agriculture land by bringing it into cultivation 5. Farmers socio-economic status will be improved 6. It can be replicated in other locations

* **Proposal is submitted to TANII with a total budget of 200Lakh. Project will be implemented after getting the financial support**

Action plan 2	***Development of elite microbial consortium for degradation of Woody Biomass***		
Project leader (s)	Dr. P. Kalaiselvi, Dr. V. Davamani, Assistant Professors (ENS) and Dr. M. Maheswari, Professor (ENS), Dept. of ENS, TNAU, CBE-3 Dr. S. Prasanthrajan, ENS, FC & RI, Mettuplayam		
Name Scientists and Centre	**2019-2020**	**2020-2021**	**Deliverables / Expected outcome**
Dr. P. Kalaiselvi, Dr. V. Davamani, Assistant Professors (ENS) and Dr. M. Maheswari, Professor (ENS), Dept. of ENS, TNAU, CBE-3 Dr. S. Prasanthrajan, ENS, FC & RI, Mettuplayam	• Isolation of woody biomass degrading microflora from degraded wood, termite gut and elephant dung and *In vitro* screening. • Evaluating the degradation potential of microbial isolates. • Phylogenetic characterization of microbial cultures by 16S rRNA and18S rRNA or ITS sequencing. • Testing the compatibility of the microbial cultures to formulate the microbial consortium	Evaluation of developed microbial consortium on the decomposition of woody biomass	Effective and sustainable way of promoting woody biomass degradation for the production of quality compost.

Action plan 3	**Screening trees for Biosilencing of Noise**	
Project Leader(s)	Dr. M.P.Sugumaran and Dr. G.Balasubramanian, TNAU, CBE-3 Dr. S. Prasanthrajan, ENS, FC & RI, Mettupalayam	
Name Scientists and Centre	**2019-20**	**Deliverables / Expected outcomes**

Dr. M.P.Sugumaran and Dr.G.Balasubramanian, TNAU, CBE-3 Dr. S. Prasanthrajan, ENS, FC & RI, Mettupalayam	• Screening of dominant tree species for higher noise reduction • Quantifying the reduction level of noise in industries by dominant trees	The information on the dominant trees for absorbing high energy sound waves will be useful to the conservation officials

Action plan 4	**Monitoring and utilization of Municipal treated sewage water for Agriculture at Udumalpet and Thanjavur area**	
Project Leader(s)	Dr. P. Thangavel, Professor (ENS), TNAU, CBE-3 Dr. M. Selvamurugan, Asst. Professor (ENS), TNAU, CBE-3	
Name Scientists and Centre	**2019-20**	**Deliverables / Expected outcomes**
Dr. P. Thangavel, Professor (ENS), TNAU, CBE-3 Dr. M. Selvamurugan, Asst. Professor (ENS), TNAU, CBE-3	• Characterization of the treated sewage water periodically (once in three months interval) for assessing its environmental quality parameters • Monitoring and assessing the environmental quality of water, soil and plant in the farmers' field irrigated with treated sewage water at Udumalpet and Thanjavur area	The extent of pollution of soil and water due to irrigation of treated sewage water can be assessed. The possibility of utilizing the sewage water as irrigation source can be assessed.

The research work at Udumalpet area has been taken up as per the request of the commissioner of Pollachi Municipality .

Action Plan 5	**Influence of "N" inhibitors on nitrous oxide emission under intensive tomato cultivation**
Project Leader(s)	Dr. V. Davamani, Asst. Prof. (ENS) and Dr. M. Velmurugan, Asst. Prof. (Horti.), TNAU, Coimbatore Dr. J. Kannan, Professor (ENS), HC & RI., Periyakulam

Name Scientists and Centre	2019-20	Deliverables / Expected outcomes
Dr. V. Davamani, Asst. Prof. (ENS) and Dr. M. Velmurugan, Asst. Prof. (Horti.), TNAU, Coimbatore Dr. J. Kannan, Professor (ENS), HC & RI., Periyakulam	• Initial & post harvest soil fertility status • Nitrous oxide emission, Nitrate reductase analysis and Ammonical & Nitrate nitrogen estimation on 0, 1st, 2nd , 3rd , 4th & 5th day after "N" based fertilizer application • Yield parameters to be recorded	Reduction of N_2O emission through effective "N" utilization and sustained soil health and productivity

Action plan 6	Impact of Elevated Troposphere Ozone on Pulses at Ground level		
Project Leader(s)	Dr. P. Dhevagi, Associate Professor		
Name Scientists and Centre	**2019-20**	**2020-21**	**Deliverables / Expected outcomes**
Dr. P. Dhevagi, Associate Professor,Department of Environmental Sciences, TNAU, Coimbatore	• Identifying the response of major pulses to elevated levels of tropospheric ozone and identifying the sensitive crop	To deduce the role of ozone protectants in different sensitive crops	Outcome of the result will be helpful for plant breeders to develop ozone tolerant pulse crop.

Action plan 7	**Rhizofiltration of micro pollutants using vettiver: Floating bed Techniques**	
Project Leader(s)	Dr. K. Sara ParwinBanu, Professor (ENS)	
Name Scientists and Centre	**2019-20**	**Deliverables / Expected outcomes**
Dr. K. Sara ParwinBanu, Professor (ENS), Department of Environmental Sciences, TNAU, Coimbatore	• Establishment of Vetiver Floating system to treat the effluents • Standardisation of flow rates, Hydraulic retention time and plant density for maximum efficiency	Establishment of low cost plant based wastewater treatment system

3. Department of Remote Sensing and GIS

A.Decisions made on Adoption / OFT/Information:

A1. For Adoption

1. TNAU REMOTE SENSING TECHNOLOGY FOR MAIZE AREA AND YIELD ESTIMATION FOR CROP INSURANCES

Methodology for mapping maize was developed and test verified during 2017-18 and 2018-19. Maps and statistics at district, block and village level were generated with an accuracy of 91.0 per cent. Based on the accuracy levels the state government has approved the usage of this technology in crop insurances for the next three years.

2. MOBILE APPICATION FOR GEOTAGGING AND MONITORING TNIAMP INTERVENTIONS ON WATER RESOURCES AND TECHNOLOGY DEMONSTRATIONS

A Mobile App to geotag the Interventions / Components of the line departments has been developed with the following features and capabilities as below:

i. Features of the TNIAMP Mobile App:

Frontend Design : Android
Version compatibility : 5.0 and latest
Framework : Ionic

Icons and design : Custom design
Backend Database : SQL (Secured connection)

ii. Capabilities:

- Can operate in both online and Offline mode
- Data captured in Offline mode will automatically sink to server when App is accessed online.
- Registration of Users to collect root level officers info.
- User friendly, easy drop down options to maximum extent possible.
- Selection based drop drown filters for Phases, Sub-basin, District, Block and village.
- Automatic Hiding and Visibility of entries based on selected Component options.
- Embedding of Latitude and Longitude values in Photos and Location.
- Automatic notifications of changes if any in App version or the Database.
- Sync ability with the Server Database to keep the app up to date.
- About App Information to keep users updated on the App info.

A2. For Information:

1. The Length of the Growing Period (LGP) at block level was worked out from 2001 to 2017 and the temporal changes over the years for both Kharif and Rabi seasons of Tamil Nadu were generated, which could be utilized for developing newer crop plan.
2. Rice Crop area statistics at village level for 16 samba rice growing districts were generated using Sentinel -1A Synthetic Aperture Radar data.
3. Damage caused by Gaja cyclone was assessed using drones and satellite data and 38.72 lakh coconut trees were estimated to be uprooted or damaged in three districts namely, Thanjavur, Tiruvarur and Pudukottai. Block wise statistics were also generated.

B. Projects reviewed:

Department	Centre	URP	Core Project	EFP	Private	AICRP	Total
Remote Sensing & GIS	TNAU, Coimbatore	5	-	4	-	-	**9**

C.Remarks on the ongoing University Research projects / AICRP / Externally funded projects

S.No.	Project Number and Title	Project Leader	Period	Remarks
UNIVERSITY RESEARCH PROJECTS & CORE PROJECTS				
1.	**DCM/CBE/AGR/2016/001** Area mapping and yield estimation of Groundnut, Maize and Rice fallow pulses using SAR data and crop growth models	Dr. S.Pazhanivelan Prof. & Head (RS&GIS) Coimbatore	February 2016 to March 2019	• The project may be closed and the completion report may be submitted • The technology on Maize area and Yield estimation for crop insurances is recommended **for Adoption**
2.	**NRM/CBE/RSG/SAC/2016/002** Assessing impact of climate change on the growing period of rainfed crops in Tamil Nadu using Remote Sensing data	Dr. K.P. Ragunath, Asst. Professor (SS&AC) RS&GIS, Coimbatore	January 2016 to March 2019	• The project may be closed and the completion report may be submitted

3.	**NRM/CBE/SAC/RSG/2018/CP067** Mapping area and assessing suitability for mango cultivation in Salem, Dharmapuri and Krishnagiri districts of Tamil Nadu	Dr. K.P. Ragunath, Asst. Professor (SS&AC) RS&GIS, Coimbatore	July 2018 to March 2019	• The project may be closed and the completion report may be submitted • A new proposal may be given by including the other suitable areas of mango cultivation *viz.,*Theni, Vellore and Kanyakumari districts.
4.	**NRM/CBE/SAC/RSG/2018/CP068** Rainfed area mapping of Tamil Nadu	Dr. R. Kumaraperumal, Asst Prof (SS&AC) RS&GIS, Coimbatore	April 2018 to March 2019	• The project may be completed. • A new proposal on generating a high resolution rainfed and irrigated crop and area map may be proposed
5	**NRM/CBE/SAC/RSG/2018/CP135** Coconut area mapping and change detection in Coimbatore and Tiruppur districts of Tamil Nadu using Remote Sensing techniques	Dr. R. Jagadeeswaran, Assoc. Prof. (SS&AC)	February 2019 to December 2019	• The project may be continued and closed after project period completion
EXTERNALLY FUNDED PROJECTS				
6	**NADP/NRM/CBE/RSG/2017/001** Remote sensing based information for crop coverage, yield estimation and drought monitoring	**PI:** Dr. S.Pazhanivelan Professor and Head (RS&GIS) **Co-PIs:** Dr. K.P.Ragunath, Asst. Professor (SS&AC) Dr. R. Kumaraperumal, Asst Prof (SS&AC)	Sep 2017 to March 2020	• The project may be continued
7	**TNIAMP–Phase I** Tamil Nadu Irrigated Agriculture Modernization Project (TNIAMP) Phase I (F36NT)	**PI:** Dr. S.Pazhanivelan Professor and Head (RS&GIS) **Co-PIs:** Dr. K.P. Ragunath, Asst.Prof.(SS&AC),	Sep 2017 to March 2023	• The project may be continued • A new proposal may be given for crop planning with the existing water resources that are available in Tamil Nadu. • Mobile application for Monitoring

		RS&GIS Dr. R. Kumaraperumal, Asst.Prof.(SS&AC), RS&GIS Dr. G. Thiyagarajan, Asst.Prof.(SWCE), WTC		Interventions of TNIAMP line Departments is recommended **for Adoption**
8	**NRSC/NRM/CBE/RSG/2018/R005** Developing a methodology and interface for spatial maize crop production estimation using Crop simulation model	**PI:** Dr. S.Pazhanivelan Professor and Head (RS&GIS) **Co-PIs:** Dr. K.P. Ragunath, Asst.Prof.(SS&AC), RS&GIS Dr. R. Kumaraperumal, Asst.Prof.(SS&AC), RS&GIS	November 2018 to October 2020	• The project may be continued
9	**SAC/NRM/CBE/RSG/2019/R006** SUFALAM- Space technology for Groundnut area and Yield estimation for Insurances	**PI:**Dr. S.Pazhanivelan Professor and Head (RS&GIS)	April 2019 to October 2021	• The project may be continued

D. Action Plan 2019-2022

Action Plan. 1	**Crop Area Mapping and Yield Estimation**
Project Leader	Dr. S. Pazhanivelan, Prof.& Head (RS&GIS), Dr. K.P. Ragunath, Asst. Prof (SS&AC) –(3 hrs/week) Dr.R.Kumaraperumal, Asst.Prof (SS&AC)(3 hrs/week), Dr. A.P. Sivamurugan, Asst.Prof. (Agron.) –(3 hrs/week) Dr. N. Muthukrishnan, Prof. (Ento.) -(3 hrs/week), Dr.M.Jayachandran, Prof. & Head, SRS, Cuddalore – (3 hrs/week) Dr.A.Kamaraj, Asst. Prof. (Agri. Engg), AC&RI, Echankottai – (3 hrs/week) Dr.A. Raju, Assoc. Prof.(Agron.), TRRI, Aduthurai-(3 hrs/week) Dr. E. Subramanian, Asst. Prof (Agron.), AC&RI, Madurai – (3 hrs/week) Dr. C. Sivakumar Associate Professor (Agron), AC&RI, Tiruvannamalai – (3 hrs/week)

Name Scientists and Centre	2019-20	2020-21	Deliverables/ expected out come
Dr. S. Pazhanivelan, Prof.& Head (RS&GIS), Dr. K.P. Ragunath, Asst. Prof (SS&AC) Dr.R.Kumaraperumal, Asst.Prof (SS&AC), Dr. A.P. Sivamurugan, Asst.Prof. (Agron.) Dr. N. Muthukrishnan, Prof. (Ento.) Dr.M.Jayachandran, Prof. & Head, SRS, Cuddalore – Dr.A.Kamaraj, Asst. Prof. (Agri. Engg), AC&RI, Echankottai Dr.A. Raju, Assoc. Prof.(Agron.), TRRI, Aduthurai Dr. E. Subramanian, Asst. Prof (Agron.), AC&RI, Madurai – Dr. C. Sivakumar Associate Professor (Agron), AC&RI, Tiruvannamalai	▪ Sustaining rice and Maize area and yield monitoring ▪ Generating maps and area statistics in cotton, pulses, groundnut, sugarcane and minor millets at state level ▪ Developing interface to integrate remote sensing products with DSSAT models to estimate yields ▪ Developing Smart Sugarcane Management System ▪ Smart sampling of CCE's ▪ Developing customized software for crop mapping integrating open source tools with python coding ▪ Localized monitoring of nutrient deficiencies, pest and disease incidence and spraying of chemicals using UAV /drones ▪ Mapping Mango, Cashew nut and Banana. ▪ Change detection in Coconut plantations	• Sustaining crop monitoring by generating area maps and statistics for Rice, maize, Cotton • Developing methodology for monitoring minor millets and vegetable crops • Smart Sugarcane management System • Web portal for publishing real time crop information	• Real time area statistics and maps on crop area, yield and losses at District, Block and village level for rice, cotton, maize, pulses, groundnut, sugarcane, Minor millets • Maps of Mango, Cashewnut and Coconut plantations and statistics • Smart Sugarcane Management System

Action Plan. 2	Soil and Land Resource Mapping		
Project Leader	Dr.R. Kumaraperumal, Asst. Prof. (SS&AC), Dept of RS &GIS Dr. K.P. Ragunath, Asst. Prof (SS&AC) –(3 hrs/week) Dr.K. Sivakumar, Asst. Prof. (SS&AC),-(3 hrs/week) Dr. P. Kannan, Asst. Prof. (SS&AC), AC&RI, Madurai-(3 hrs/week)		
Name Scientists and Centre	**2019-20**	**2020-21**	**Deliverables/ expected out come**

Dr.R. Kumaraperumal, Asst. Prof. (SS&AC), Dept of RS &GIS Dr. K.P. Ragunath, Asst. Prof (SS&AC) Dr.K. Sivakumar, Asst. Prof. (SS&AC Dr. P. Kannan, Asst. Prof. (SS&AC), AC&RI, Madurai.	▪ Digitization and generation of cadastral Maps in eight districts ▪ To generate cadastral level soil nutrient mapping ▪ Digital soil mapping of Tamil Nadu	▪ Digitization and generation of cadastral Maps in Twenty one districts	• Cadastral level soil nutrient map • Block level soil available nutrient status • Digital Soil Maps

Action Plan. 3	**Assessing impact of Drought, Flood, Climate Change and environmental monitoring using geospatial technologies**		
Project Leader	Dr. S. Pazhanivelan, Prof.& Head (RS&GIS) Dr. K.P. Ragunath, Asst.Prof (SS&AC) (3 hrs/week) Dr.R.Kumaraperumal, AP (SS&AC) (3 hrs/week) Dr. S. P. Ramanathan, Prof.& Head (ACRC) (3 hrs/week) Dr. P.C. Prabu, Asst.Prof. (ENS) (3 hrs/week)		
Name Scientists and Centre	**2019-20**	**2020-21**	**Deliverables/ expected out come**
Dr. S. Pazhanivelan, Prof.& Head (RS&GIS) Dr. K.P. Ragunath, Asst.Prof (SS&AC) Dr.R.Kumaraperumal, AP (SS&AC) Dr. S. P. Ramanathan, Prof.& Head	▪ Agricultural drought vulnerability assessment ▪ Ensuring drought preparedness by assessing rainfall departure, SPI, NDVI, NDWI and MAI at 8 to 15 days interval during NEM ▪ Mapping flooded areas and assessing impact on yield loss in rice. ▪ Assessing impact of other disasters in Agriculture. ▪ High resolution rainfed area maps ▪ Spatial estimation of methane emission using remote sensing and GHGs using FAO EXACT model To generate digital soil map for Tamil Nadu	• Drought vulnerability assessment • Sustaining assessment of drought indices at block level • Generation of high resolution products for satellite based indices of drought • Flood risk zonation mapping with tools for assessing depth of water	• Spatial estimation and quantification of methane emission from rice ecosystem. • Drought vulnerability map • Rainfed area map • Flood risk zonation maps for Tamil Nadu

(ACRC) Dr. P.C. Prabu, Asst.Prof. (ENS)			

Action Plan. 4	**Water resources monitoring and irrigation water management**		
Project Leader	Dr. K.P. Ragunath, Asst. Prof. (SS&AC) - (5 hrs/week), Dr. S. Pazhanivelan - (5 hrs/week) Dr. R. Kumaraperumal , Asst. Prof. (SS&AC) -(3 hrs/week), Dr.Balajikannan, Asst. Prof (SWCE) –(5 hrs/week) Dr.K. Sivakumar, Asst. Prof. (SS&AC) -(10 hrs/week)Dr. A Velayutham, Prof.(Agron), WTC – (3 hrs/week) Dr. G. Thiyagarajan, Asst. Prof. (SWCE), WTC – (3 hrs/week), Dr. T. Ramesh, Asst. Prof. (Agron.) ADAC&RI, Tiruchirapalli – (3 hrs/week), Dr. A. Nagarajan, Asst. Prof. (SWCE), AEC&RI, Kumulur – (3 hrs/week) Dr. S. Manikandan, Asst. Prof (SS&AC), AC&RI, Killikulam – (3 hrs/week)		
Name Scientists and Centre	**2019-20**	**2020-21**	**Deliverables/ expected out come**
Dr. K.P. Ragunath, Asst. Prof. (SS&AC) Dr. S. Pazhanivelan Dr.R. Kumaraperumal , Asst. Prof. (SS&AC) Dr.Balajikannan, Asst. Prof (SWCE) Dr.K. Sivakumar, Asst. Prof. (SS&AC) -Dr. A Velayutham, Prof.(Agron), WTC Dr. G. Thiyagarajan, Asst. Prof. (SWCE), WTC, Dr. T. Ramesh, Asst. Prof. (Agron.)	▪ Estimation of Water spread area and duration in tanks using Satellite data ▪ Mobile and Web application for monitoring interventions and assessing impact ▪ Real time crop planning based on post monsoon water storage in LBP reservoir. ▪ Spatial estimation of soil moisture in cropped fields using SAR data. ▪ Digital mapping of Ayacuts in sub-basins	▪ Estimation of Water spread area in eighteen subbasins of Tamil nadu ▪ Developing surface elevation models and scatterometeric techniques for assessing water storage in tanks	▪ Crop area maps for Sub Basins and crop cover change ▪ Information on water storage in major tanks ▪ Water resource mapping – water spread & duration of water availability in tanks & its impact on crop yield and intensity of cropping ▪ Soil Moisture maps for irrigation management

ADAC&RI,Tiruchirapalli Dr. A. Nagarajan, Asst. Prof. (SWCE), AEC&RI, Kumulur Dr. S. Manikandan, Asst. Prof (SS&AC), AC&RI, Killikulam –			and drought monitoring

Action Plan. 5	**Monitoring market sensitive horticultural crops using remote sensing and mobile application**		
Project Leader	Dr. S. Pazhanivelan, Prof.& Head (5 hrs/week), Dr. K.P. Ragunath, Asst. Prof. (SS&AC) (5 hrs/week) Dr. R. Kumaraperumal , Asst. Prof. (SS&AC) (5 hrs/week), Dr. K. Sivakumar, Asst. Prof. (SS&AC)–(5 hrs/week) Dr. T. Ramesh, Asst. Prof. (Agron.), ADAC&RI, Trichy - (10 hrs/week) Dr.K.M.Sivakumar,Prof.(Agrl. Economics), TNAU (5 hrs/week) Dr.M.Mohanalakshmi,Asst.Prof(Horti.) (5 hrs/week		
Name Scientists and Centre	**2019-20**	**2020-21**	**Deliverables/ expected out come**
Dr. S. Pazhanivelan, Prof.& Head, Dr. K.P. Ragunath, Asst. Prof. (SS&AC) Dr. R. Kumaraperumal , Asst. Prof. (SS&AC) (5 hrs/week), Dr. K. Sivakumar, Asst. Prof. (SS&AC Dr. T. Ramesh, Asst. Prof. (Agron.), ADAC&RI, Trichy - Dr.K.M.Sivakumar,Prof.(Agrl. Economics), TNAU Dr.M.Mohanalakshmi,Asst.Prof(Horti.)	• Generation of real time data on progress of planting and acreage through • Mobile based registration of farmers • Satellite based monitoring (Pilot Districts Erode, Salem, Perambalur and Coimbatore district) • Monitoring the anticipated production. • Linking market intelligence for crop advisories to farmers.	• Validation of Mapping techniques • Developing web portal	• Progress of planting and area sown figures for turmeric, onion and tomato • Market intelligence and sustaining income of farmers.

4. Department of Soil Science and Agricultural Chemistry

A. Decisions made on Adoption / OFT/ Information:

A1 For OFT:

Field scale validation of sensor for Automated Drip Irrigation

T1 - Humidity sensor

Humidity sensor is the best soil moisture sensor for soils of all texture (measured up to 63 % in loamy/ clayey textures).

T2 – Automatic Signal Handling and Switching Device

For automated irrigation a new sensor method was devised and test verified. The method works based on sensor data comparing the Critical Point of ΔT.

Automated device set at Critical Point of ΔT of 3°C saved 23.7 per cent water in drip irrigation. The method uses non contact sensor and is useful in all soil types and all seasons.

Crops : Vegetables (Chillies)

Coordinating Scientist : Dr.K.Arulmozhiselvan, Professor (SS&AC)

Centres and Scientists: Dr.P. Manikandan, Asst. Professor AC&RI, Killikulam & Dr.K.M.Sellamuthu, HC&RI, Periyakulam

B. Projects reviewed:

Department	Centre	URP	Core Project	EFP	Private	AICRP	Total
Department of Soil Science and Agricultural Chemistry							
Soil Science and Agricultural	TNAU, Coimbatore	1	1	-	-	1	**3**
	CRS, Aliyarnagar	1	-	-	-	-	**1**

Chemistry	FC&RI, Mettupalayam	1	-	-	-	-	**1**
	AC&RI, Bhavanisagar	1	-	-	-	-	**1**
	AC&RI, Madurai	-	-	1	-	-	**1**
	WTC, TNAU, Coimbatore	-	-	-	-	1	**1**
	Total	**4**	**1**	**1**		**2**	**8**

C. Remarks on the ongoing University Research projects/AICRP/Externally funded projects

University Research Projects				
S. No.	**Project No. and Title**	**Project leader(s) / Co-Project Leader(s)**	**Duration**	**Remarks**
1.	**NRM/ALR/SAC/2016/001** Desalinization of irrigation water for sustainable agriculture	Dr.C.Sudhalakshmi Asst. Professor (SS&AC) Coconut Research Station, Aliyar Nagar	July 2016 - June 2019	As pot culture experiment is in progress, extension proposal may be submitted.
2.	**NRM/MTP/SAC/2019/001** Status and dynamics of soil and carbon sequestration potential with organic manures in mulberry growing soil	Dr.Rajeshwari Assitant Professor (SS&AC) Mettupalayam	Mar. 2019 to Feb. 2022	To be continued and the title may be changed
3.	**NRM/PKM/SAC/2016/001** Developing Spatial Variability maps of soil physico-chemical properties and available nutrient status of Western Farm of HC & RI, Periyakulam	Dr. D.Muthumanickam , Professor (SS&AC) ARS, Bhavanisagar	3 years (April 2016 to March 2019)	Completion report may be submitted. Thematic maps may be displayed in the Soil Science laboratory of HC & RI, Periyakulam for reference.
4.	**NRM /CBE/SAC / 2015 / 002** Soil Resource Inventory of TNAU, Coimbatore Farms	Dr. N. Chandra Sekaran Professor (SS&AC), TNAU, Coimbatore	Jan. 2015 to June 2017	Completion report may be submitted.

Core projects				
5.	**NRM/CBE/SAC/WQI/2018/CP132** Hydrochemical assessment of water quality for irrigation in Periyanaickenpalayam block, Coimbatore district, Tamil Nadu.	Dr.D.Jayanthi Associate Professor(SS&AC) Dept. of SS&AC, TNAU, Coimbatore-3. Dr. R.Jagadeeswaran Associate Professor (SS&AC), AC&RI, TNAU, Kudumianmalai.	One year (Initiated in February 2019)	Sample collection and analysis may be completed and completion report may be submitted.
Externally Funded Project				
6.	**DST/NRM/MDU/AGC/ 2018/R001** Development of Dry Formulation from Botanicals for Insect Pest Management	Dr K Senthil Assistant Professor (Agricultural Chemicals) Dept. of Soils and Envt. AC&RI, Madurai.	November 2017 To October 2020	The Director, Centre for Plant Protection Studies may be appraised. An Assistant Professor (Agricultural Entomology) may be included as one of the Co- Principal Investigator in the project.
AICRP Projects				
7	**ICAR/WTC/CBE/AGR/2016/R 009** Agri Consortia research platform on water - Groundwater contamination due to geogenic factors and industrial effluents and its impact on food chain.	Dr. M. Elayarajan Assistant Professor (SS & AC) Dr. A. Raviraj Professor(SWCE) WTC,TNAU, Coimbatore	01.04.2018 to 31.03.2019	The project may be continued
8	**AICRP/NRM/CBE/SAC/004** Delineation and reassessment of micro and secondary nutrients deficient areas and updating soil fertility maps of Tamil Nadu	Dr.T.Chitdeshwari Professor (SS&AC) Dr.D.Jegadeeswari Assoc.Professor (SS&AC) Dept. of SS&AC, TNAU, Coimbatore	2018-20	As copper deficiency in soils is alarming, awareness should be created among the farmers to apply copper sulphate fertilizers. Intensity of copper deficiency in the soils of Tami Nadu may be brought to the knowledge of the ADA (Research), State Department of Agriculture, Government of Tamil Nadu. The critical limit for DTPA copper may be redefined in due consultation with IISS, Bhopal.

D. Action plan 2019 -2022

Action plan 1	***Soil resource inventory and Fertility mapping of soils of AC&RI, Vazhavachanur using GIS***		
Project leader (s)	Dr.V.Arunkumar, Asst. Prof. (SS & AC), AC & RI, Vazhavachanur.		
Name Scientists and Centre	**2019-2020**	**2020-2021**	**Deliverables / Expected outcome**
Dr.V.Arunkumar, Asst. Prof. (SS & AC), AC & RI, Vazhavachanur	Soil Profiles will be dug based on the physiography of soils. Soil will be analysed for Morphological characteristics, moisture content, total and available status of macro and micronutrients	GPS aided surface (15 cm) and sub surface soil samples (30 cm) will be collected in all the fields of A, B, C, D, G,I.J, O,P,M and N blocks of AC&RI, Vazhavachanur by adopting the standardized soil sampling procedures.Soil samples will be abalysised for their physical properties The base map of AC&RI, Vazhavachanur will be generated from open source satellite data and thematic maps will bedeveloped on various soil attributes.	Soil resource information of AC&RI, Vazhavachanur will be developed. Database on Physical properties and chemical properties will be developed. GIS based soil fertility maps will be developed.

Action plan 2	***Mapping groundwater quality in Pollachi taluk***			
Project leader (s)	(i) Dr.C.Sudhalakshmi, Assistant Professor (SS & AC), CRS, Aliyar Nagar (ii) Dr.R.Kumarperumal, Assistant Professor (SS&AC), Department of Remote Sensing & GIS, TNAU, Coimbatore			
Name Scientists and Centre	**2019-2020**	**2020-2021**	**2020-2021**	**Deliverables / Expected outcome**
Dr.C.Sudhalakshmi Assistant Professor (SS & AC), CRS, Aliyar Nagar Dr.R.Kumarperumal, Assistant Professor (SS&AC), Department of Remote Sensing & GIS, TNAU, Coimbatore	• Collection of groundwater samples during pre and post monsoon periods in Anaimalai block. • Analyses of quality parameters	• Collection of groundwater samples during pre and post monsoon periods in Pollachi (North) block. • Analyses of quality parameters	• Collection of groundwater samples during pre and post monsoon periods in Pollachi (South) block. • Analyses of quality parameters	Ground water quality index maps of three blocks of Pollachi taluk

5.Department of Agricultural Microbiology

A. Decisions made on Adoption / OFT/ Information:

A1 For information:

1. Sago wastewater (SWW) used a substrate for biodiesel production and simultaneous decontamination resulted in maximum lipid content (48.59 %) and lipid yield (1.21 $g.L^{-1}$) was attained at 120 h with consumption of 83.89% of spent starch in the SWW. Also achieved maximum removal of COD (83.5%) and BOD (92.1%) with a reduction in cyanide to the tune of more than 70%.

2. 2. Xylose reductase (*Xr*) gene was over expressed *Escherichia coli*for production of xylitol using corncob as a feedstock. In this investigation, XR protein produced was 5.32 mg/100 ml with activity of 270 U/mg. Xylitol production is under progress

B. Projects Reviewed:

Department	Centre	URP	Core Project	EFP	Private	AICRP	Total
Agricultural Microbiology	TNAU, Coimbatore	1	2	3	-	-	**6**
	AC&RI, Kudumiyanmalai	1	-	-	-	-	**1**
	AC&RI, Killikulam	-	-	1	-	-	**1**
	Total	**2**	**2**	**4**	**-**	**-**	**8**

C.Remarks on the ongoing University Research projects/AICRP/Externally funded projects

S. No.	Project No. and Title	Project leader(s) / Co-Project Leader(s)	Duration	Remarks
University Research Projects				
1.	**NRM/ KDM/ AGM/ 2016/001** Development of seaweed extract based mineral solubilizing microbial consortium for liquid biofertilizer production	Dr. K.G. Anitha Asst. Prof. (AGM) AC & RI, Kudumiyanmalai	April 2016 to March 2019	The project may be closed
2.	**NRM/CBE/AGM/2017/001.** Development of gamma mutants of oleaginous mixotrophic microalgae for higher lipid productivity	T.Kalaiselvi, Professor (AGM), TNAU, Coimbatore	Jan. 2017-Dec.19	The project may be closed. With these results, the PI is advised to propose project for external funding
Core Projects				
3.	**NRM/CBE/AGM/BAC/2018/CP064** Evaluation of biofilm-forming bacteria and mycorrhizalfungus for effective management of root-knot nematode	Dr. A.Ramalakshmi, Asst. Prof. (AGM) TNAU, Coimbatore	Nov. 2018 to Sep. 2019	The project may be continued
4.	**NRM/CBE/AGM/2018/CP016** Enzymatic Production of xylitol from corncob biomass: a cost economic approach for biorefineries	Dr. U.Sivakumar, Professor (AGM), TNAU, Coimbatore	April 2018 to March 2020	The project may be continued
EXTERNALLY FUNDED PROJECTS				
5	**BT/PR18134/BIC/101/795/2016** dated 10.07.2017 Novel Biocatalysts for Biomass Valorization: Functional analysis and Engineering of Glycosyl Hydrolases and Laccases from thermal springs and *Haloferaxvolcanii*	Prof.U.Sivakumar (Mentor) Dr.R.Priyadharshini (Women Scientist &PI)	2017-2020	The project may be continued
6.	**DBT/AGM/KKM/SAC/2018/T002** "Raising the livelihood of women farmers in selected villages of Thoothukudi district through development of *Azolla* bio-	Dr. B.JeberlinPrabina Associate Prof. (AGM) Dept. of SS & AC AC & RI, Killikulam	2018-2021	The project may be continued

	village"	Co-PI: Dr.M.Hemalatha Associate Prof. (Agronomy) Dr. S. MerinaPremkumari Asst. Prof. (Biotechnology)		
7.	**CIRCOT/NRM/CBE/AGM/2016/R020** ICAR – CIRCOT, Mumbai under CR-Natural Fibres entitled "ICAR – Consort. Res. Platform on Natural Fibres: Production and characterization of bacterial cellulose from natural fibre biomass" (C31 WL)	Dr. U.Sivakumar, Professor (AGM), TNAU, Coimbatore	2016-2020	The project may be continued
8.	**No.BT/PR8280/PBD/26/382/2013** & "Biodiesel production: Sago processing industrial wastewater as feedstock for the microbial production of oil and derived co-products"	Dr.U.Sivakumar, Professor Dr. K. Kumutha, Co-PI, Professor Dr. D. Ramesh, Co-PI, Associate professor	2013-2019	The project may be closed

D.Action Plan 2019 - 2022

Action plan 1	***Unravelling the mechanism of Bacillus altitudinus FD48 induced drought tolerance in rice by Metabolomic and Transcriptomic profiling***		
Project leader (s)	Dr.U.Sivakumar, Professor (AGM), Dept. of Agrl. Microbiology, TNAU, Coimbatore		
Name Scientists and Centre	**2019-2020**	**2020-2021**	**Deliverables / Expected outcome**
Dr.U.Sivakumar, Professor (AGM), Dept. of Agrl. Microbiology, TNAU, Coimbatore	Assess the expression pattern of defense responsive genes in rice as influenced by *B.altitudinis* FD48 under moisture stress.	Finger print the metabolite (mVOC and soluble) changes upon inoculation of *B. altitudinis* FD48 under induced moisture stress in rice.	Identify the defence genes up/down regulated due to FD8 inoculation. Up/down regulation and identify the metabolite(s) responsible for moisture stress tolerance. A new microbe for drought stress protection will be identified.

Action plan 2	***Development of microbial formulation for effective management of root knot nematode***		
Project leader (s)	Dr.V.Gomathi, Professor and Head, Dept. of Agrl. Microbiology, TNAU, Coimbatore		
Name Scientists and Centre	**2019-2020**	**2020-2021**	**Deliverables / Expected outcome**
Dr.V.Gomathi, Professor and Head, Dept. of Agrl. Microbiology, TNAU, Coimbatore	Invitro: Compatibility studies *Invitro*: Testing the existing bioformulation along with newer bioformulation through seed priming / soil drenching	*Invivo*: Evaluation of best performing strains-individually/ or in combination	A newer microbial formulation will be developed for effective management of root knot nematode

Closing remarks and way forward

Vice Chancellor

- In the use of water hyacinth as bioremedial measure for heavy metals like chromium, the fate of removed metals from the environment perspective needs to be explained

- In micronutrient studies, as Copper injury to crop is reported, the status of copper in Tamil Nadu soils may be assessed

- In the use of Chitosan nanoemulsion as antitransparent drought mitigation strategy efforts may be taken to extend its effect behind 5 days. Adoptability of this antitransparent in field level also to be considered.

- While assessing the raw, boiled and cooked rice for the presence of heavy metals, samples may be drawn from the hot spot areas instead of market samples.

- Use of low cost banana peel based biochar as biosorbent of heavy metal may be encouraged.

- While assessing the mercury contamination in Kodaikanal, the exact location of mercury dumping has to be identified with the local people and the contamination level may be assessed on the water bodies/rivers of Periyakulam area originating from the dumping site.

- Demonstration on the management of water contamination as a result of coffee pulp disposal at lower Palani hills may be considered. Water decontamination measures for *E.coli* in water bodies of pilgrimage important places like Thamirabharani may be considered.

- Environmental issues faced in Industry rich areas like Tuticorin may taken up as researchable issues

- As an Agricultural Scientist priority may be on to save the soil and water bodies from the existing environmental issues

- Emerging areas like millipede compost may be tried.

- Through RSGIS, the major water bodies serving as irrigation sources of Tamil Nadu may be assessed.

- Possibility of using biofertilizers to mitigate the soil 'Zn' deficiency may be explored

- While developing products for organic agriculture, care may be taken to use inputs from organic areas.

- Possibilities for bioherbicide may be explored

- In mushroom production arecanut and cassava based biowastes may be considred as containers.

- Technology to develop *Ganoderma* based antiviral compound may be strengthened.

- Dammer bee colonies may be supplied to farmers to assess its impact on productivity of mango, amla, tamarind etc.

- Due care may be taken to avoid the overlapping nature of work observed between ACRC and RSGIS.

Director of Research

Way Forward

- Enable nano-products reaching the farm gate by fulfilling the requirements of commercialization and regulatory frameworks
- Augment eco-friendly environmental remediation processes and products
- Document of success stories on GIS & RS based Risk Assessment and Monitoring Systems
- Design robust Agro-Meteorology Advisory Services using intellectual & indigenous knowledge
- Map TNAU farm soils to rationalize fertilizers and enable smart farming

F.CONTACT DETAILS OF SCIENTISTS PARTICIPATED IN THE NCSP MEET, 2019

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TAMIL NADU AGRICULTURAL UNIVERSITY
Centre for Plant Protection Studies
PROCEEDINGS OF THE 7th NON CROP SPECIFIC PROJECT SCIENTISTS' MEET 2019

Present: **1. Dr. K. Prabakar,** Director (CPPS), TNAU, Coimbatore
2. Dr. S.Mohankumar, Director, CPMB, Coimbatore
3. Dr. N. Sathiah, Professor & Head, Dept. of Agrl. Entomology
4. Dr. M. Muthamilan, Professor & Head, Dept. of Plant Pathology
5. Dr. K. Poornima, Professor & Head, Dept. of Nematology
6.Dr.M.R.Srinivasan, Professor & Head, Dept. of Agrl. Entomology, AC&RI, Killikulam

University Research Projects, University Core Projects, Externally funded projects, AICRP projects and students theses work carried out by Crop Protection Scientists working in Non crop specific projects were reviewed on 06.05.2019 and 07.05.2019 and remarks offered. The following scientists attended the Review Meeting of Crop Scientists Meet on Non crop specific projects on 06.05.2019 and 07.05.2019.

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III. CROP PROTECTION

A. Decisions Made on OFT

A1. For Adoption

Nil

A2. For OFT

OFT-1 : Pollination of moringa with *Apis cerana indica* for improved crop productivity

Treatments proposed:

T1: 4 bee colonies / acre

T2: 2 bee colonies /acre

T3: Control (no bee colonies)

T4: Pollinator exclusion (sleeve cages for 10 inflorescences per tree)

For individual treatment minimum one km isolation distance should maintained

Design: RBD, Replication: Five (three trees per replication)

Observations to be recorded:

- No. of fruits/ tree
- Fruit length (cm)
- Fruit girth (cm)
- Individual fruit weight
- Total fruit weight
- Bee visitation rate/5 inflorescence/tree/3 min.
- Colony growth parameters namely brood area and honey store (cm_2)

Participating Centres:

- AC&RI, Coimbatore, (Dr.P.A. Saravanan)
- AC & RI, Madurai, (Dr. K. Suresh)
- HC & RI, Periyakulam (Dr.S. Irulandi)
- AC&RI,Killikulam (Dr.M.R. Srinivasan)

OFT-2: PP containers (reusable) as an alternative to PP bags for oyster mushroom cultivation

Treatments proposed:

T1: PP containers (18 cm height, 10 cm dia.)

T2: PP bags (80 gauge; 60x30 cm) (Existing method)

Design: CRD, Replication: 13

Mushroom species: *Hypsizygus ulmarius* variety CO (OM)2 / *Pleurotus florida* (PF)

Observations to be recorded:

- Days for spawn run (DFSR)
- Days for pinhead formation (DFPF)
- Days for first harvest (DFFH)
- Yield - first, second and third flush (g/bed; weight of single sporophore (g)
- Bioefficiency (%)
- Pest and diseases

Participating centres:

- AC&RI, Coimbatore, (Dr.G.Thiribhuvanamala)
- AC&RI, Madurai, (Dr.M.Theradimani)
- AC&RI,Killikulam, (Dr.V. Ramamoorthy)
- RRS,Aruppukottai, (Dr.P. Mareeswari)
- HC&RI,Periyakulam, (Dr. K.Manonmani)
- AC&RI,Vazhavachanoor, (Dr.M. Devanathan)

OFT-3 Evaluation of CBE-TNAU-1523 milky mushroom (*Calocybe indica*)

Treatments proposed:

T1: Test culture - *Calocybe indica* CBE-TNAU-1523

T2: Commercial variety *Calocybe indica* (APK2)

Design: CRD, Replication: 13

Observations to be recorded:

- Days for spawn run (DFSR)
- Days for pinhead formation (DFPF)
- Days for first harvest (DFFH)
- Yield – first, second and third flush(g/bed; weight of single sporophore (g)

- Bioefficiency (%)
- Pest and diseases

Participating centres:

- AC&RI, Coimbatore, (Dr.G. Thiribhuvanamala)
- AC&RI,Madurai, (Dr.M.Theradimani)
- AC&RI,Killikulam, (Dr.V. Ramamoorthy)
- RRS,Aruppukottai, (Dr. P. Mareeswari)
- AC&RI,Trichy, (Dr.S. Sangeetha)
- KVK, Tindivanam , (Dr.M. Satya)

A3 For Information

Nil

B. Research Projects on Non crops

Crop	Centre	URP	AICRP	EFP	Core	Total
Agrl.Entomology						
	AC&RI, Coimbatore	3	1	2	-	6
	AC&RI, Madurai	1	-	-	-	1
	AC&RI, Trichy	1	-	-	-	1
Plant Pathology						
	AC&RI, Coimbatore	-	1	-	1	2
	AC&RI, Madurai	-	-	-	-	-
Nematology	AC&RI, Coimbatore	-	-	1	-	1
	Total	**5**	**2**	**3**	**1**	**11**

ON-GOING URP / AICRP / EXTERNALLY FUNDED PROJECTS

Agricultural Entomology

No.	Project Number and Title	Name and Designation of the Project leader	Duration	Remarks
University Research Project				
1.	**CPPS/CBE/ENT/NCR/2018/001** Evaluation of stingless bees as potential pollinators of polyhouse greenhouse vegetables	**Dr. P.A.Saravanan**, Assistant Professor (Entomology)	April 2018-March 2020	The project may be continued.
2.	**CPPS/CBE/RES/2018/001** Multiresidue analysis of diamide group insecticides in vegetable ecosystem and their risk assessment	**Dr. M.Paramasivam** Assistant Professor (SS & AC)	January 2018 to December 2021	The project may be continued.
3.	**CPPS/CBE/ENT/RES/2018/001** Multiresidue method for the determination of neonicotinoid pesticide residues in pollen, honey and bees using LC/MS/MS	**Dr.A.Suganthi** Assistant Professor (Entomology)	July 2018-June 2020	The project may be continued.
4.	**CPPS/MDU/ENT/EVA/2017/001** Evaluation of different bait material to attract termites and formulation of termite poison cake.	**Dr. K. Premalatha** Assistant Professor (Ento.)	Aug 2017 to July 2020	The project may be continued.
5.	**CPPS/TRY/ENT/RES/2018/CP027** Early detection of insecticide residues on crop samples at market/household level using the instant residue indicator drop (i-RID) in comparison with analytical procedures	**Dr.P.Yasodha** Assistant Professor (Agrl. Entomology)	September 2018 to August 2021	The project may be continued. Further tests should be conducted to validate the methodology.
AICRP				
6.	**AICRP/PPS/CBE/AEN/006** All India Coordinated Research Project on Honey bees and Pollinators	**Dr. P.A.Saravanan**, Assistant Professor (Agrl. Entomology)	2019 - 2020	The project may be continued.

No.	Project Number and Title	Name and Designation of the Project leader	Duration	Remarks
External Funded Projects				
7.	**ICAR/CPPS/CBE/ AEN/2017/R011** Evaluating the impact of neonicotinoids on pollinators in cotton	**Dr. P.A.Saravanan**, Assistant Professor (Entomology)	2019-2020	The project may be continued.
8.	**BT/PR7713/NDB/39/261/2013** Morphometry and phylogeography of honeybees and stingless bees in India Phase II	**Dr.S.Mohankumar Director (CPMB&B)**	2018-19	Completion report may be submitted.

PLANT PATHOLOGY

No.	Project Number and Title	Name and Designation of the Project leader	Duration	Remarks
AICRP				
1	**AICRP Project.** D32 AN **-**All India Coordinated Project on Mushroom Improvement	Dr.G.Thiribhuvanamala Assoc.Prof. (Plant Pathology)	2019-20	The project may be continued.
Core Project				
2	**Core Research Grant CPPS/CBE/PAT/MUS/2018/CP138** Innovative methods of oyster mushroom cultivation for home	Dr. P.Latha, Asst.Professor	2019-20	Cost effective crop residues like Banana pseudostem, Moringa stumps

	growing	(Plant Pathology)		may be utilized as containers for Oyster mushroom cultivation.
Nematology				
Externally Funded Project				
1	CPPS/NEM/EMR/2016 Development of novel biodegradable beads of nematode antagonistic bacterium *Pasteuria penetrans* as bionematicide	Dr.N.Swarnakumari Asst. Professor (Nematology)	2019-20	The project may be continued. Degradation of alginate beads in soil needs to be documented.

C. GENERAL REMARKS

1. AGRL. ENTOMOLOGY

- Sale price for stingless bee colonies has to be fixed.
- Joint survey studies on availability of feral little bee colonies to be taken up.
- The data available on pesticide residues for the past ten years shall be consolidated and presented category wise.

2. PLANT PATHOLOGY

- Research work on antimicrobial metabolites from mushroom fungi against plant pathogens needs to be intensified.
- New URP may be proposed (Scientists: Madurai and Killikulum)

D. <u>ACTION PLAN</u>
AGRICULTURAL ENTOMOLOGY

Action Plan 1: Identification and characterization of Bt isolates toxic to *S. frugiperda*

Theme leader	**Dr.V.Balasubramani, Professor (Agrl. Entomology), AC&RI, Coimbatore**		
Activity	**Name of the Scientist and Centre**	**Plan of work**	**Deliverable/ expected outcome**
• Identifying potential	AC&RI,Coimbatore Dr.V.Balasubramani	• Revival of isolates from	Potent isolates will be identified

indigenous Bt isolate(s) using spore-crystal mixture through leaf disc / leaf bit bioassay • Molecular characterization of effective isolates	Professor (Entomology) AC&RI, Killikulam Dr. N. Balakrishnan Assoc.Prof.(Entomology)	cryopreservation • Preparation of spore crystal mixture • Toxicity analysis with SF • Protein profiling with SDS –PAGE • Molecular analysis with PCR Duration :2019-2021	

Action Plan 2: Relocating *Apis florea* feral colonies for increasing the moringa productivity

Theme Leader	**Dr. K.Suresh , Asst. Professor (Agrl. Entomology), AC&RI, Madurai**		
Activity	**Name of the Scientist and Centre**	**Plan of work**	**Deliverable/ expected outcome**
Relocating *Apis florea* feral colonies for increasing moringa productivity through cross pollination	AC&RI, Madurai 1. Dr. K. Suresh Asst.Prof.(Entomology)	• Collection of viable feral colonies and relocating the colonies in moringa field • Observations on colony growth parameters and swarming, absconding behaviour • Data observation on yield improvement in moringa Duration:2019-2021	Increased fruit set through relocation

Action Plan 3: Diversity, multiplication and utilization of stingless bees

Theme Leader	**Dr.P.A.Saravanan, Asst. Professor (Agrl. Entomology), AC&RI, Coimbatore**		
Activity	**Name of the Scientist and Centre**	**Plan of work**	**Deliverable/ expected outcome**

Molecular characterization of stingless bees *Tetragonula irridipennis* and *Tetragonula laeviceps*	**Coimbatore** Dr.S.Mohankumar Director, CPMB&B TNAU, Coimbatore	Dr.S.Mohankumar Director, CPMB&B TNAU, Coimbatore	Molecular identity of stingless bees present in Tamil Nadu will be established
• Standardization of queen rearing in stingless bees • Promotion of *Tetragonula laeviceps*	**Coimbatore** Dr. P.A.Saravanan, Asst . Prof. (Ento.) Dept.of Agrl.Entomology, TNAU, Coimbatore	• Mass queen production methods will be standardized for stingless bees (2019-2021) • Colony growth parameters of *T. laeviceps* will be studied and production of colonies will be strengthened • Duration: 2019-2021	Standardized method of Colony multiplication in stingless bees

Action Plan 4: Trait analysis of diverse honeybee genotypes

Theme Leader	**Dr.S.Mohankumar, Director, CPMB&B, TNAU, Coimbatore**		
Activity	**Name of the Scientist and Centre**	**Plan of work**	**Deliverable/ expected out come**
Genetic diversity of honey bees and correlation with economic aspects including honey yield, foraging efficiency, resistance to diseases.	**Coimbatore** 1. Dr.S.Mohankumar Director, CPMB&B, TNAU, Coimbatore 2. Dr.P.A.Saravanan Asst.Professor (Ento.) Dept.of Agrl. Entomology	• Indian bee strains will be collected from different parts of the state and their genetic diversity will be studied using molecular tools • Indian bee colonies /strains with good economic traits will be identified among the selected genetic strains and it will be explored for further multiplication and commercialisation through acceptable colony breeding techniques Duration:2019-2022	Honey bee strains with economic traits will be identified

Action Plan 5: Development of mobile app for fall armyworm, *Spodopera frugiferda*

Theme Leader	1. Dr.N.Sathiah, Prof. and Head Dept. of Agrl.Entomology		
Activity	**Name of the Scientist and Centre**	**Plan of work**	**Deliverable/ expected outcome**
Survey and surveillance of fall armyworm in different parts of Tamil Nadu.	**Coimbatore** . Dr.S.Palanivelan Professor and Head, Dept. of Remote Sensing TNAU, Coimbatore 2. Dr.N.Muthukrishnan, Professor, Dept. of Agrl.Entomology 3. Dr.S.P.Ramanathan Professor and Head ACRC, TNAU, Coimbatore 4. Fall army worm task force scientists	• Monitoring the fall army worm incidence and population on maize and other crops at weekly /fortnightly intervals as per the protocol of mobile application • Linking with Uzhavan App of the Department of Agriculture Duration:2019-2020	Remote sensing based pest monitoring tool Decision support system for Fall Army worm management

PLANT PATHOLOGY

Action Plan 1: Identification of promising mushroom species and developing mass production techniques

Theme leader	**Dr.G.Thiribhuvanamala Assoc.Prof.(Pl.Path.)**		
Activity	**Name of the Scientist and Centre**	**Plan of work**	**Deliverable/ expected out come**
Collection and selection of potential mushroom strains/ species	Dr.G.Thiribhuvanamala Assoc.Prof.(Pl.Path.) TNAU, Coimbatore	• Collection , Identification and maintenance of different mushroom fungal collections.	• Strengthening of wild mushroom collections with taxonomy for further utilisation.

suitable for commercial utilisation		• Standardizing substrates for mass production of *Ganoderma lucidum*	• Techniques for mass production of *Ganoderma lucidum.*
	Dr.M.Theradimani, Prof.(Pl.Path.), AC&RI, Madurai	• Identification of promising milky mushroom strains/species	• New species / strains identified will be developed for commercial utilisation.
	Dr.V.Ramamoorthy,Asst.Prof. (Pl.Path.),AC&RI, Killilulam	• Identification of promising oyster mushroom strains/species	

Action Plan 2: Developing innovative methods for mushroom cultivation

Theme Leader	**Dr.** G.**Thiribhuvanamala, Assoc. Professor (Plant Pathology), Coimbatore**		
Activity	**Name of the Scientist and Centre**	**Plan of work**	**Deliverable/** **expected out come**
Testing various cost effective methods for commercial cultivation of mushrooms	Dr.G.Thiribhuvanamala Assoc.Prof.(Pl.Path.),TNAU, Coimbatore	• Out door cultivation of paddy straw mushroom (*Volvariella* spp will be standardized-*Insitu* in fields and Coastal areas	• Technology for paddy straw mushroom for cultivation in coastal areas
	Dr.P.Latha Asst.Prof.(Pl.Path.) TNAU, Coimbatore	• Standardizing different containers for oyster mushroom cultivation.	• Cost effective, easy handling containers for home growing

NEMATOLOGY

Action Plan: 1. Testing the efficacy of nematode hyper parasitic bacterium, *Pasteuria penetrans* against root knot nematode, *M. incognita*

Theme Leader	**Dr.N.Swarnakumari Asst. Prof.(Nematology)**		
Activity	**Name of the Scientist and Centre**	**Plan of work**	**Deliverable/** **expected out come**

Testing of *P. pentrans* entrapped beads against *M. incognia* in tomato and cucumber under ployhouse condition	Dr.N.Swarnakumari, Asst.Prof.(Nematology), TNAU, Coimbatore	• Field trial will be carried out in nematode infested tomato field at Coimbatore • Polyhouse trial will be conducted at Kariyamangalam, Krishnagiri	• Eco-friendly formulation of *P. penetrans* for the management of root knot nematode*, M. incognita*

Closing remarks and way forward

Vice Chancellor

- In the use of water hyacinth as bioremedial measure for heavy metals like chromium, the fate of removed metals from the environment perspective needs to be explained

- In micronutrient studies, as Copper injury to crop is reported, the status of copper in Tamil Nadu soils may be assessed

- In the use of Chitosan nanoemulsion as antitransparent drought mitigation strategy efforts may be taken to extend its effect behind 5 days. Adoptability of this antitransparent in field level also to be considered.

- While assessing the raw, boiled and cooked rice for the presence of heavy metals, samples may be drawn from the hot spot areas instead of market samples.

- Use of low cost banana peel based biochar as biosorbent of heavy metal may be encouraged.

- While assessing the mercury contamination in Kodaikanal, the exact location of mercury dumping has to be identified with the local people and the contamination level may be assessed on the water bodies/rivers of Periyakulam area originating from the dumping site.

- Demonstration on the management of water contamination as a result of coffee pulp disposal at lower Palani hills may be considered. Water decontamination measures for *E.coli* in water bodies of pilgrimage important places like Thamirabharani may be considered.

- Environmental issues faced in Industry rich areas like Tuticorin may taken up as researchable issues

- As an Agricultural Scientist priority may be on to save the soil and water bodies from the existing environmental issues

- Emerging areas like millipede compost may be tried.

- Through RSGIS, the major water bodies serving as irrigation sources of Tamil Nadu may be assessed.

- Possibility of using biofertilizers to mitigate the soil 'Zn' deficiency may be explored

- While developing products for organic agriculture, care may be taken to use inputs from organic areas.

- Possibilities for bioherbicide may be explored

- In mushroom production arecanut and cassava based biowastes may be considred as containers.

- Technology to develop *Ganoderma* based antiviral compound may be strengthened.

- Dammer bee colonies may be supplied to farmers to assess its impact on productivity of mango, amla, tamarind etc.

- Due care may be taken to avoid the overlapping nature of work observed between ACRC and RSGIS.

Director of Research

Way Forward

- Enable nano-products reaching the farm gate by fulfilling the requirements of commercialization and regulatory frameworks
- Augment eco-friendly environmental remediation processes and products
- Document of success stories on GIS & RS based Risk Assessment and Monitoring Systems
- Design robust Agro-Meteorology Advisory Services using intellectual & indigenous knowledge
- Map TNAU farm soils to rationalize fertilizers and enable smart farming

PROCEEDINGS OF NON-CROP SPECIFIC PROJECT MEET , 2019

Non-crop specific Research projects

Centre	URP	Core	Students Project	Total
AC&RI, CBE		1	1	2
HC &RI , (W), TRY	1			1
HC&RI, PKM	1			1
AC&RI, KDM	1			1
AC&RI, ECK	1			1
Total				6

S. No	Project No and Title	Project Leaders	Duration	Remarks
1.	HCRI /TRY / BIC/FRU/2017/001 Studies on nutritional and biochemical compositions of Guava and Mango varieties grown under salt affected soil	Dr.K.Gurusamy, Assistant Professor (Biochemistry)	January 2017 to December 2018	The project may be closed and Completion report may be prepared
2.	CPMB / KDM / BIC/2016/001 *In vitro* antioxidant properties of selected seaweeds of Manamelkudi coast, Pudukkottai District	Dr.P. Radha Assistant Professor (Biochemistry)	June 2016 - May 2018	Completion report may be sent
3.	Project No. to be obtained Effect of dehydration on the nutritive value of *Moringa oleifera* leaves	Dr.T.Anitha Assistant Professor (Biochemistry) Dr.R.Balakumbhagan Assistant Professor (Hort.)	Nov 2018- Oct 2020	The project may be closed . Fresh proposal may be submitted.

4.	CPMB/CBE/BIC/2018/CP078 Antioxidant and *in vitro* antidiabetic activity of *Basella alba*	Dr. P. Meenakshi Assistant Professor	November 2018 - October 2020	The project may be continued
5.	Bioprospecting for insecticidal principles from *Lantana camara*	P. Aarthi, ID NO: 2015600301 Agrl. Biotechnology, CPMB&B, TNAU, Coimbatore		Action may be taken for product development

Action plan (2019-2021)

Theme 1: Biochemistry of stress response in plants

Activity	**Name of the scientist and centre**	**2019-20**	**2020-21**	**Deliverables and expected outcome**
Exploration of trehalose pathway in drought tolerance in black gram	Dr. M. L. Mini Asst.Professor (Biochemistry), AC & RI, Madurai	• Project proposal and approval • Evaluation of changes in accumulation of trehalose and related metabolites during water stress in black gram	Studies on the changes in the activities of enzymes involved in trehalose metabolism	Understanding drought tolerant mechanism related to trehalose metabolism that can be used for developing strategies to enhance drought tolerance
Elucidating the changes in metabolism of polyamines in blackgram under water deficit	A.Kavitha Pushpam, Asst.Professor (Biochemistry) AC & RI, Killikulam	• Project proposal and approval • Evaluation of the changes in accumulation of polyamines during water stress in blackgram	Assessing the changes in the activity of enzymes involved in Polyamine biosynthesis	Understanding changes in polyamine metabolism during drought to develop strategies for stress-tolerance

Theme 2: Nutritional Biochemistry

Activity	Name of the scientist and centre	2019-20	2020-21	Deliverables and expected outcome
Nutritional analysis of selected traditional, ruling and TNAU released rice varieties to identify low GI lines	Dr. P. Radha, Asst.Professor (Biochemistry), AC & RI, KDM	• Project proposal and approval • Evaluation of the nutritional composition in traditional, ruling and TNAU released rice varieties	Assessing the factors influencing Glycemic index in these rice lines	Nutritious and low glycemic index rice lines can be identified
Profiling of nutritional and antinutritional factors in minor millets	Dr. S. Geethanjali, Asst.Professor (Biochemistry), AC & RI, VVNR	• Project proposal and approval • Studying the nutrients, mineral status in minor millets	Evaluation of the antinutritionals in minor millets	Complete nutrient and antinutrient profile of minor millets
Nutrient analysis of fresh and dehydrated Moringa leaf and flower	Dr. T. Anitha, Asst. Professor (Biochemistry), HC & RI, PKM			Analysis can be done for TNAU released varieties and new proposals may be sent

Theme 3 : Bioprospecting

Activity	Name of the scientist and centre	2019-20	2020-21	Deliverables and expected outcome
Bioprospecting of *Citrus medica L.* leaves for developing value added products	Dr. M. Chitra, Assistant Professor (Biochemistry), AC & RI, Eachankottai	• Project proposal and approval • Evaluation of the secondary metabolites in *Citrus medica L.* leaves	Exploration of the biopesticidal compounds in *Citrus medica L.* leaves	Identification of bioactive products from *Citrus medica L.*

Antioxidant and *in vitro* antidiabetic activity of *Basella alba*	Dr. P. Meenakshi, Assistant Professor (Biochemistry), AC & RI, Coimbatore	• Isolation of antidiabetic principles	Validation of anti diabetic activity	Antidiabetic principles from *B .alba*
Bioprospecting of *Psidium guajava L.* leaves for therapeutic principles	Dr. K. Gurusamy, Assistant Professor (Biochemistry), HC & RI (W) , Trichy	• Project proposal and approval • Studying the bioactive compounds present in the leaves of guava • Isolating the bioactive compound from guava leaves	Assessing the biological activity of guava leaves	Therapeutic properties and principles of *Psidium guajava L* leaves

*Projects on metabolic pathways may be initiated as suggested by the Vice- Chancellor.

Closing remarks and way forward

Vice Chancellor

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