TAMIL NADU AGRICULTURAL UNIVERSITY

PROCEEDINGS

11th Agricultural Engineering Crop Scientists Meet
(May 2-4, 2023)

Lead Center

Agricultural Engineering College and Research Institute,
TNAU, Coimbatore

Directorate of Research
Tamil Nadu Agricultural University
Coimbatore - 641 003

2023

PROCEEDINGS
11th Agricultural Engineering Scientists' Meet
(2-4 May, 2023)

The 11th Agricultural Engineering Scientists' Meet was held at Seminar Hall, RI Building, Tamil Nadu Agricultural University, Coimbatore on May 4th 2023. The session was chaired by the Vice-Chancellor, **Dr. V. Geethalakshmi**. **Dr. M. Raveendran**, Director of Research, **Dr. A. Raviraj**, Dean (Engg.), Coimbatore, **Dr. P. Rajkumar**, Dean (Engg.), Kumulur and **Dr. S. Kanchana**, Dean CSC&RI, Madurai were also present.

The Vice Chancellor emphasized the scientists of Agricultural Engineering to popularize the TNAU released technologies and farm machineries among the farmers and stake holders. Inventory of all the machineries may be prepared and posted in Agricart for promoting the sales. It was suggested to develop small machineries to suit to the requirements of marginal farmers. Efforts may be taken to apply for patenting of products/designs wherever required. It was suggested to collect data on borewells/ deep borewells and possible areas of groundwater recharging in Tamil Nadu in association with CWGS, TNAU and documented.

The Director of Research in his opening remarks highlighted the research accomplishments and listed the research gaps. It was suggested to propose research projects involving multi-disciplinary scientists on the emerging issues. Research on end-to-end mechanization may be attempted in all major crops and popularized through demonstrations.

Dr. A. Raviraj, Dean (Engg.), AEC& RI, Coimbatore presented the action taken on the recommendations of the 10th Agricultural Engineering Scientists' Meet 2022, Research highlights 2022-23 and theme-wise action plan for the year 2023-24 comprising all disciplines. Dean (Engg.) presented on the technologies for on farm trials, adoption, patenting, commercialization and technology/implements release for discussion and approval.

The formal vote of thanks was proposed by Dr. P. Rajkumar, Dean, AEC&RI, Kumulur.

The proceedings of the 11th Agricultural Engineering Scientists' Meet is furnished below:

I. Farm Machinery

1. Technologies for OFT
2. Technologies for Adoption
3. Remarks on the ongoing research projects
4. Action Plan for the year 2023-24

II. Renewable Energy Engineering

1. Technologies for OFT
2. Remarks on the ongoing research projects
3. Action Plan for the year 2023-24

III. Food Process Engineering

1. Technologies for OFT
2. Technologies for Adoption
3. Remarks on the ongoing research projects
4. Action Plan for the year 2023-24

IV. Soil and Water Conservation Engineering

1. Technologies for Commercialization
2. Technologies for Patenting
3. Technologies for Adoption
4. Technologies for OFT
5. Remarks on the ongoing research projects
6. Action Plan for the year 2023-24

V. REMARKS

VI. LIST OF PARTICIPANTS

I. FARM MACHINERY

1. TECHNOLOGIES FOR ON FARM TRIALS:

1.1. Improved Portable Power Operated Cono-Weeder

The 2 hp two stroke air cooled petrol engine was used as a power source for this improved power operated cono-weeder. In the developed power operated cono weeder, to-and-fro motion to the weeding cones was achieved by using Scotch Yoke mechanism. A double clutch has been provided to the drive wheels for turning at the head land. The weight of the developed power operated cono weeder is around 30 kg. The weight reduction was eliminated using the gear box (1:25 gear ratio). The fabrication of unit was completed and field trials will be conducted.

Salient features:

- Providing to-and-fro motion of the weeding cones to achieve weeding, churning and mulching.
- Providing clutch mechanism to turn in the head lands.
- Weight: around 30 kg.
- Weeding efficiency: 85-92 %
- Percentage of plant damage: 0-1.2 %
- Field capacity: 0.21 to 0.35 ha/day
- Cost of the unit Rs.25000/-
- Cost of operation: Rs. 2500 to 4500 / ha

Location: Agricultural Research Station, TNAU, Bhavanisagar.

Recommendation: Patent filing may be given priority

1.2. Groundnut combine harvester

A tractor operated groundnut combine was developed. It consisted of digging blade, chain conveyor, pod stripping mechanism, pod collection box, depth control A straight blade of size, 600 x 80 x 8, mm suitable for both flat as well as raised bed system of groundnut cultivation was used to cover 2 rows of plants. The conveyor unit consisted of 21 sprockets out of which 6 nos of sprockets with 11 teeth and 9 nos of 15 teeth sprocket. A pair of endless chain of 5300 mm, rotating in the opposite directions was used for conveying the dug plants from the blade to the stripping unit. The stripping system is having two rotating drums made of 4 rods provided with rubber flap of 650 x 60 mm to avoid the damage of pods. The length of the stripping rods was about 650 mm. The drums were rotating in the opposite directions. A box of 850 x 640 x 330 mm was mounted below the

stripping unit for the collection of stripped groundnut pods. Two wheels of 300 mm diameter were provided with adjustable height to control the depth of operation. Two crop dividers were provided at the front to push the plants towards the sides to avoid the chocking of plants at the digging blade. Field trials were conducted in farmers' field and the performance of the machine was evaluated. The digging and conveying efficiency of 93 and 90 % were observed whereas the stripping efficiency of the combine was found as 78 %.

Salient features:

- Suitable for both flat bed and raised bed system of groundnut cultivation.
- Digging efficiency, conveying efficiency and stripping efficiency were 96, 97 and 82%, respectively.

Commercialization: Received a request from M/S. Lakshmi Environtech Pvt. Ltd., Coimbatore for signing of MoU

1.3. Self-propelled maize harvester

A maize harvester was developed as self proplelled unit with 11 hp prime mover. The harvester consists of two essential components viz., snapping rollers for snapping of cobs from the stalk and harvesting of corn stalks. The snapping rollers grab maize stalks and pull them between the snapping bars, mean while maize cob cannot pass through the spacing between the snapping bars. Spiral-lugged rolls made of cast iron with spiral ribs on their surfaces was adopted for shearing of cobs from the plants. The snapping rollers spin opposite to each other to grab the stalk just below the cob and guide them into the rolls, and the rotary cutting blade provided at the bottom cuts the maize stalk at ground level. The snapping rollers were fixed at different levels to collect the harvested cobs in the box provided by the side of the rollers.

Salient features:

- The self propelled maize harvester snaps the cobs and harvest the maize stalks simultaneously.
- Field capacity: 0.19 ha h^{-1}
- Labour requirement: 5.5-man hour ha^{-1}
- Saving in cost of operation: 25 per cent
- Saving in Time: 96 per cent
- Saving in Labour: 91 per cent

Location: Maize Research Station, TNAU, Vagarai.

2. Technologies for Adoption

2.1. Tractor operated 2-row Briquette cum Cotton seed sowing equipment

For precision application of fertilizers, it is contemplated that the fertilizers can be apply in the form of briquette. The briquette can be placed near to the seed to

avoid excess fertilizer and also effective utilization of crop. There is no machine available for placing seed and briquette simultaneously. Various mechanisms were analysed to achieve this. A Geneva mechanism would require intricate profiling of the components and would additionally require some power transmission gears and chain drive. Hence a simpler toggle mechanism was selected with a cogged gear (bevel gear), toggle wheel with cutter mounted on the power transmission shaft, which rotates the toggle wheel it cuts the briquette stem with 10 mm thickness. The briquettes stem hold by cylindrical hopper with size of 1000 mm length and 60 mm diameter. The hopper mounted on the main frame perpendicular to the cutter. Each rotation of toggle wheel, a cutter crosses a briquette stem which hold by hopper with stopper, it cut and pushes the briquette pellet into the furrow bottom through delivery channel.

Specifications of the 2-row Briquette cum Cotton seed sowing equipment

S. No.	Particulars	Dimensions
1.	Overall dimension	1860×1500×1200
2.	Number of rows	2
3.	Briquette spacing (Adjustable)	150 to 600 mm
4.	Seed sowing spacing (Adjustable)	150 to 750 mm
5.	Row spacing (Adjustable)	600 mm1200 mm
6.	Briquette hopper (Length × Diameter)	1000 × 60 mm
7.	Metering mechanism for briquette	Cogged shaft with toggle wheel
8.	Toggle Wheel diameter	180 mm
9.	Seed metering mechanism	Inclined plate planter
10.	Transmission ratio from ground wheel to metering mechanism	1:1
11	Ground wheel dia.	360 mm

Salient features:

- Briquette sowing mechanism: Briquette size: 50 mm dia. & 10 mm thick, Placing depth: 150 mm
- Cotton sowing system: Sowing depth: 20 mm to 50 mm
- Spacing: variety 60×30 cm, Hybrid 120×60 cm
- Operating speed: 2 to 4 km/h.
- Briquette & Seeds are sowing simultaneously
- Sowing precisely with check row pattern

Recommendation: Patent filing may be given priority

2.2. Studies on spray droplet parameters using drones and development of drone seeder

To study the uniformity of spray distribution of drone sprayer in outdoor condition, an exclusive spray patternator was developed as first of its kind as per the BIS standard with a size of 5 m x 5m with 91 continuous V- type channels. There is no patternator available for testing spray volume distribution pattern of UAV spray with boom and hexa type spray nozzles arrangement. The study was conducted to assess the operational parameters of drone spray, viz., height of spray, discharge rate, swath width, and uniformity of the spray at different operating pressures and different

heights of spray. The spray distribution pattern of 10 litre capacity battery operated drone was evaluated with two types of nozzle arrangements *viz*., standard hexacopter nozzles arrangements and boom type nozzle arrangements to optimize the height of spray above the crops at outdoor condition.

Uniform application of agricultural granular materials such as seeds and granular solid fertilizers is very essential for optimum utilization. In the conventional method, uniform spreading of seed and fertilizer is not possible. Conventionally, rice fallow pulses and sesame are sown by broadcasting method. To overcome the drudgery involved and also to avoid the manual contact of chemical fertilizer, a drone operated broadcaster was developed for seed and also granular fertilizer. The drone seed and fertilizer broadcaster consist of BLDC motors, LiPo (Lithium polymer) batteries, centrifugal broadcaster, air frame structure, flight controller, PMU, power distribution unit, recover and GPS system. This drone assisted broadcaster system has the functions of route planning and wireless flow rate control system which can complete aerial operation autonomously. The field trials were conducted for broadcasting sunnhemp, daincha, paddy and sesame. The area coverage of drone seeder was observed as 1.3 ha h^{-1}

Salient features:

- An exclusive spray patternator was developed as first of its kind as per the BIS standard with a size of 5 m x 5m with 91 continuous V- type channels to study the uniformity of spray distribution of drone sprayer in outdoor condition.
- Obvious differences in the distribution of spray volume patterns for boom and hexa configuration nozzles and good spray volume distribution was found in hexa configuration nozzle arrangement as compared to the boom arrangement of nozzles.
- The round vertex pattern shows more impact on spray volume distribution of boom type nozzle arrangement than the hexa-copter due to the direct impact of downwash airflow generated by the rotor propeller.
- When the spray height is increased from 1 m to 3 m, the distribution of downwash air flow was more uniform. So the spray volume distribution was uniform.
- The downwash airflow produced by the rotor propellers caused a worsening of the liquid distribution uniformity coefficient and significantly influenced the change of the lateral distribution pattern of spray drops produced by the flat fan spray nozzles.
- The optimum spray height was 2.0 m, in which the downwash air flow has a better effect on spray volume distribution. The drone should be operated at an appropriate spray height to attain the recommended application rate of pesticide.

Recommendation: Patent filing may be given priority

3. REMARKS ON THE ONGOING PROJECTS:

S. No.	Number and Title of the Projects	Duration	Name of the PI & Co-PI	Remarks
University Research Projects				
1.	**AECRI/CBE/FMP/2021/002** Modification of raised bed seed drill and combine harvester suitable for mechanical harvesting and standardization of crop geometry for mechanized groundnut cultivation	01.02.2021 to 31.03.2023	Dr. A.P. Mohan Kumar Dr. A. Surendrakumar	To get the assistance from soil scientist for consolidation of soil to maintain raised bed till harvest of the crop.
2.	**AECRI/KUM/FMP/2021/001** Development of Mini-Tractor operated onion harvester with de-topping unit	2021-2022	Dr. P.K. Padmanathan Dr. V. Alex Albert (SS&T)	Trails may be conducted and report may be submitted
AICRP on Farm Implements and Machinery				
3.	**AICRP/AGE/CBE/FMR/002/ 20/004** Automation of sowing vegetable seeds in protray	01.04.2020 to 31.03.2023	PI: Dr. R. Kavitha	Trials may be conducted for different vegetables seeds.
4.	**AICRP/AGE/CBE/FMR/002/ 21/004** Automatic transplanter for protray grown vegetable seedlings	01.04.2021 to 31.03.2024	PI: Dr. R. Kavitha Co-PI: Dr. P. Dhananchezhiyan	The two-row unit may be completed.
5.	**AICRP/AGE/CBE/FMR/002/ 21/005** Development of multi row rotary weeder attachment to Ride on rice transplanter	01.04.2022 to 31.03.2023	PI: Dr. R. Kavitha Co-PI: Dr. A.P. Mohankumar	Fertilizer application attachment may incorporate with the same unit.
6.	**AICRP/AGE/CBE/FMR/002/ 21/006** Design and development of tractor operated turmeric combine harvester	01.04.2021 to 31.03.2024	PI: Dr. P. Dhananchezhiyan Co-PI: Dr. R. Kavitha	Modification may be carried as per the crop geometry and trials may be conducted
7.	**AICRP/AGE/CBE/FMR/002/ 21/003** Design and development of mini tractor operated adjustable sugarcane detrasher	01.04.2021 to 31.03.2024	PI: Dr. A.P. Mohankumar Co-PI: Dr. R. Kavitha	Trials may be conducted with different age of sugarcane crop.
8.	**AICRP/AGE/CBE/FMR/002/ 21/007** Design and development of Radio Frequency (RF) controlled pesticide applicator	01.04.2021 to 31.03.2024	PI: Dr. S. Thambidurai Co-PI: Dr. R. Kavitha Dr. A.P. Mohankumar	The fabrication may be completed and trials may be conducted at different crops
9.	**Prototype Feasibility Testing** • Smart Seeder for paddy straw management (PAU)	01.04.2022 to 31.03.2023	Dr. R. Kavitha Dr. P. Dhananchezhiyan Dr. A.P. Mohankumar Dr. S. Thambidurai	The feasibility trials may be conducted as

	• Tractor operated Phule hydro mechanically based inter row cum intra row weeder for Orchard (MPKV, Rahuri) • Tractor operated potato planter for turmeric • Tractor front mounted reaper (PAU) for sesame • Auto track system for straight path guidance with planters (Inclined planter/sugarcane planter)			per the test standards.
10.	**Front Line Demonstration** • Tractor operated Check basin former (MPKV), Tractor operated semi-automatic vegetable transplanter (MPKV) • IISR modified sugarcane cutter planter • Tractor operated millet planter (CIAE design-inclined plate planter), • Small maize harvester (TNAU) • Complete Mechanization package of paddy, sugarcane, cotton, maize *etc*.	01.04.2022 to 31.03.2023	Dr. R. Kavitha Dr. P. Dhananchezhiyan Dr. A.P. Mohankumar Dr. S. Thambidurai	The assigned target area may be achieved.
AICRP on Ergonomics and Safety in Agriculture				
11.	**AICRP/AGE/CBE/AMC/003/ 2017/02** Studies on ergonomic interventions in semi-automatic vegetable transplanters	01.12.2017 to 31.03.2023	Dr. P.K. Padmanathan Dr. M. Saravanakumar	The OFT may be conducted
12.	**AICRP/AGE/CBE/AMC/003/ 2019/01** Studies on ergonomic interventions in Engine operated auger digger to make it women friendly	01.04.2019 to 31.03.2023	Dr. P.K. Padmanathan Dr. M. Saravanakumar	The OFT may be conducted
13.	**ICAR/ESA/TNAU/2021/01** Accident survey in selected districts of Tamil Nadu	01.04.2021 to 31.03.2024	Dr. M. Saravanakumar Dr. P.K. Padmanathan	The APP developed by AICRP on ESA may be effectively utilized for conducting accident survey.
14.	**ICAR/ESA/TNAU/2021/02** Development of remote-controlled drum seeder	01.12.2021 to 31.03.2024	Dr. P.K. Padmanathan Dr. M. Saravanakumar	More field trials may be conducted.
Externally funded projects				
15.	**CIL/AEC&RI/CBE/FMPE/202 1/R001** Design and development of machinery for harvesting and collection of neem fruit	01.07.2021 to 31.06.2024	Dr. A. Surendrakumar Dr. B. Suthakar	

16.	**NADP /AECRI/ CBE/FMPE/ 2022/ R001** Establishment of Farm Machinery and Plant Protection Equipment Testing Centre at Madurai	01.04.2022 to 31.03.2023	Dr. A. Raviraj Dr. R. Kavitha Dr. P. Subramanian Dr. A.P. Mohan Kumar Dr. P. Dhananchezhiyan Dr. P.K. Padmanathan	Speedup the purchase and installation of testing machinery.

3. ACTION PLAN FOR THE YEAR 2023-24

Action Plan 1: Small Farm Mechanization			
Activity	**Name of the scientists**	**2023-24**	**Deliverables/expected out come**
Design and development of mini tractor operated adjustable sugarcane detrasher	Dr. A.P. Mohankumar Dr. R. Kavitha	Fabrication of prototype and evaluation	Mini tractor operated adjustable sugarcane detrasher
Development of engine operated drum seeder	Dr. A. Surendrakumar Dr. R. Kavitha	Design and fabrication of engine operated drum seeder	Prototype engine operated drum seeder
Development of machineries for small farm mechanization	Dr. A. Surendrakumar Dr. R. Kavitha Dr. G. Vasuki Dr. P. Vivek	Design and development of fertilizer broadcasting attachment to the existing power weeder for paddy Design and development of self-propelled narrow row weeder for groundnut	• Prototype Fertilizer broadcaster for paddy • Prototype Self-propelled power weeder for narrow spaced crops
Development of mini tractor operated weeder for narrow spaced crops	Dr. R. Thiyagarajan Dr. A. Surendrakumar M. Dinesh Pandi	Design and development of narrow row weeder attachment for mini-Tractor	Mini tractor operated weeder for narrow spaced crops
Development of Package of machinery for Sesame	Dr. A.P. Mohankumar Dr. R. Kavitha Dr. A. Surendrakumar	Identification of machinery for various operations *viz*., sowing, weeding, harvesting and threshing of sesame Multi location trials with identified machineries	Package of machinery of sesame crop cultivation
Frontline demonstration of front mounted reaper binder for minor millets	Dr. P. Dhananchezhiyan Dr. M. Saravanakumar	Front line demonstrations at different locations	To create awareness among the farmers and complete mechanization of minor millet cultivation

Action Plan 2: Mechanization of Horticulture crops			
Development of package machinery for mechanization of Turmeric cultivation	Dr. P. Dhananchezhiyan Dr. A.P. Mohankumar	Identification of machineries for various operations *viz*., planter, weeder, digger / combine harvester for turmeric cultivation. Multi location trials with identified machinery	Package of machinery of turmeric cultivation
Design and development of machinery for harvesting and collection of neem fruit	Dr. A. Surendrakumar Dr. B. Suthakar	Development of harvesting unit for neem fruit Development of collection unit for neem fruit	Prototype of harvester cum collection unit of neem fruit
Development of Palmyra harvester	Dr. R. Thiyagarajan Dr. A. Surendrakumar	Fabrication of Prototype Palmyra harvester	Prototype Palmyra harvester
Development of fruit harvester	Dr. P. Kamaraj Dr. A. Surendrakumar	Fabrication of fruit harvester	Fruit harvester
Action Plan 3: UAV in Agriculture			
Drone sowing of pulses / minor millets	Dr. R. Kavitha Dr. A. Surendrakumar Dr. A.P. Mohankumar	Standardization and development of SOP for drone seeding	Sowing of pulses/ minor millets by using Drone
Design and development of Radio Frequency (RF) controlled pesticide applicator	Dr. B. Suthakar Dr. A. Surendrakumar	Design and fabrication of RF controlled pesticide applicator	Radio frequency-controlled pesticide applicator
Feasibility study on smart seeder for rice fallow pulses	Dr. S. Thambidurai Dr. A.P. Mohankumar	Feasibility study of smart seeder at various locations	Adoptability of smart seeder for rice fallow pulses and creating awareness among the farmers

II. RENEWABLE ENERGY ENGINEERING

1. TECHNOLOGIES FOR ON FARM TRIALS:

1.1. Development of walk-behind solar powered rotary weeder

The walk-behind solar powered rotary weeder was developed based on the concept for mechanical weeding actions (rotary blade) in the field. The unit consists of DC motor, gearbox, lithium-ion battery pack inbuilt battery management system, ground wheel, traction wheels for rotary action, supporting frame and control panel. The total weight of unit was 52 kg. Solar energy is converted into electricity by a standalone solar PV charging system and the energy stored in battery was used for operating the weeder. During operation, the rotor blades cut the weeds while the weeder moves forward. Speed adjustment handle in the weeder was used for controlling the operations and holding the unit. The field capacity, field efficiency and the weeding efficiency of the weeder were 0.14 ha/h, 62 % and 88% respectively.

Salient features:

- More effective weeding in crops with 30 cm spacing
- Field capacity of the solar powered weeder: 0.14 ha/h
- Field efficiency: 62%
- Weeding efficiency: 88%.

Location: Department of Pulses, TNAU, Coimbatore and Famers' field, Coimbatore

2. REMARKS ON THE ONGOING RESEARCH PROJECTS:

S. No.	Number and Title of the Projects	Duration	Name of the PI & Co-PI	Remarks
University Research Projects				
1.	AECRI / KUM / BOE / 2020 /001 Design and development of portable forced convective solar dryer	April 2020 to March 2022 (Extension sought)	S. Joshua Davidson	Expedite the work as per the objectives.
2.	AECRI/ECK/REE/RIC/2021/001 Farm scale solar dryer drying characteristics and their influence on germination of paddy seeds	April 2021 to March 2024	Dr. P. Subramanian Dr. P. Masilamani	Expedite the work as per the objectives.
3.	ENGG/KKM/BIO.EN/AG.ENGG/2022/001 Evaluating the energy resource potential and feasibility of biochar derived from palmyra plant waste.	May 2022 to March 2023	Dr. V. Palaniselvam	Results may be published
ICAR - AICRP on EAAI Projects				
1.	CMB/EAAI/DRET-TCT/2021/1 Hydrochar synthesis through microwave assisted artificial coalification	April 2021 to March 2023	Dr. D. Ramesh	Results may be published
2.	CMB/ EAAI/ DRET-TCT/ 2022/ 1 Energy rich syngas generation through low-cost catalytic gasification	September 2022 to August 2024	Dr. D. Ramesh	Work may be expedited as per the objectives.

3.	CMB/EAAI/DRET-BCT/2019/3 Exploration and optimization of pretreatment processes for efficient biomethanation of lignocellulosic biomass	December 2019 to March 2023	Dr. R. Parimala devi Dr. P. Vijayakumary	Results may be published
4.	CMB/EAAI/DRET-BCT/2021/1 Valorisation of bakery wastes for biogas production	April 2021 to March 2023	Dr. R. Parimala devi Dr. P. Vijayakumary	Results may be published
5.	CMB/EAAI/DRET-BCT/2022/1 Bioethanol production from matured coconut wastewater by single phase fermentation	September 2022 to August 2024	Dr. R. Parimala devi Dr. P. Vijayakumary	Intensive trials may be carried out to get fruitful results.
6.	CMB/EAAI/DRET-LBT/2021/01 Development of continuous reactor for pretreatment of lignocellulosic biomass for bioethanol production	July 2021 to June 2023	Dr. V. Palaniselvam Dr. K. Chandrakumar	Results may be published
7.	CMB/EAAI/DRET-LBT/2021/2 Metabolic intervention for enhancing methanol production from methane	July 2021 to June 2023	Dr. V. Palaniselvam Dr. K. Chandrakumar Dr. R. Parimala devi	Results may be published
8.	CMB/EAAI/DRET-LBT/2022/ New project Biocrude oil production from water living biomass through Biological and Thermochemical process	September 2022 to August 2024	Dr. V. Palaniselvam Dr.K. Chandrakumar	Work may be expedited as per the objectives.
9.	CMB/EAAI/DRET-LBT/2022/2 Production of aromatic hydrocarbons and olefins from coir pith biooil through hydrodeoxygenation using catalysts	September 2022 to August 2024	Dr. K. Chandrakumar Dr. V. Palaniselvam	Work may be expedited as per the objectives.
10.	CMB/EAAI/DRET-SET/2020/3 Development of walk behind type solar powered rotary weeder	Sept. 2020 to March 2023	Dr. A. Kamaraj	Recommended for OFT
11.	CMB/EAAI/DRET-SET/2022/1 Development and standardization of hybridized controlled atmosphere solar dryer for enhancing commercial value of fruits	September 2022 to August 2024	Dr. A. Kamaraj	Speedup the work
12.	CMB/EAAI/DRES/2022/1 Popularization of large-scale pyrolytic reactor	April 2022 to March 2024	Dr. R. Mahendiran	More demonstrations may be conducted at users' site
13.	CMB/EAAI/DRES/2022/2 Demonstration of domestic solar dryer (4' x 4')	April 2022 to March 2023	Dr. R. Mahendiran	Feedback may be collected from the beneficiaries and success story may be prepared
ICAR - CRP on EA Projects				
1.	TNAU/CRP-EA/2021/01 Synthesis of carbon nanotubes from biomass through pyrolysis and carbon vapor deposition	April 2021 to March 2023	Dr. D. Ramesh, Dr. V. Palaniselvam	Results may be published

2.	TNAU/CRP-EA/2021/02 Biopolymer production from lignocellulosic biomass through physical and chemical techniques	October 2021 to March 2023	Dr. D. Ramesh, Dr. V. Palaniselvam,	Results may be published
3.	TNAU/CRP-EA/2022/01 Hydrogen production from agro residues through steam gasification	August 2022 to March 2024	Dr. D. Ramesh Dr. V. Palaniselvam	Work may be expedited as per the objectives.
4.	TNAU/CRP-EA/2022/03 Quantum Dots embedded PE films for improving biomass production of microalgae used for biofuel production	April 2022 to March 2024	Dr. D. Ramesh Dr. S. Karthikeyan	Work may be expedited as per the objectives.
Externally funded Scheme				
1.	Promotion of sustainable agriculture for economic empowerment of malayali tribes of Pachamalai	September 2020 to March 2025	Dr. S. A. Ramjani Dr. S.S. Sivakumar Dr. J. John Gunasekar Dr. V. Alex Albert Dr. M. Dhandapani	Work may be expedited as per the objectives.
2.	NRM/DBT/CBE/ENS&REE/2022/R002 - Sustainable management of tea waste to transform the tea industry into carbon neutral and zero waste industry	April 2022 to March 2025	Dr. P. Subramanian Dr. D. Ramesh Dr. P. Vijayakumary	Work may be expedited as per the objectives.

3. ACTION PLAN FOR THE YEAR 2023-24

Action Plan 1: Thermochemical Conversion Technology			
Activity	**Name of the scientists**	**2023-24**	**Deliverables/ expected out come**
Sustainable Waste Management in Tea Industry	Dr. P. Subramanian Dr. D. Ramesh Dr. P. Vijayakumary	Production of carbon rich products from tea wastes	Carbon rich products
Tool for calculating kinetic parameters from TGA data	Dr. D. Ramesh Dr. Balaji Kannan	Software development	REE_TGA Software tool
Action Plan 2: Biochemical Conversion Technology			
Bioconversion of promising Biomaterials for fuel and chemical production	Dr. R. Parimala devi Dr. P. Vijayakumary	Ethanol production from matured coconut wastewater (MCWW)	Fermentation technology for ethanol production from MCWW
Action Plan 3: Liquid Biofuel Technology			
Production of biofuels and solvents from renewable feedstock	Dr. V. Palaniselvam Dr. K. Chandrakumar	Biocrude oil production from water living biomass through Biological and Thermochemical process	Biocrude oil for engine applications
Action Plan 4: Solar Energy for Agriculture, Agro-based and allied industries			
Development of solar powered prime mover with multi-tool attachments for small holder agriculture	Dr. A. Kamaraj Dr. R. Mahendiran Dr. B. Suthakar	Solar powered gadgets/ equipment for low draft power applications	Solar powered prime mover for low draft power operations

III. FOOD PROCESS ENGINEERING

1. TECHNOLOGIES FOR ON FARM TRIALS:

1.1. Development of hybrid system for pulse fractionation for high value pulse based functional foods
1.2 Development of seed decorticator for Vahl fruit (*Sapinduse marginatus*)
1.3 Development of mango fruit stone remover cum pulper and mango stone decorticator
1.4 Development of neem fruit depulper
1.5 Development of turmeric slicer

2. TECHNOLOGIES FOR ADOPTION:

2.1. Development of process protocol for non-thermal processing of coconut neera for enhancement of shelf life
2.2. Development of annatto pod decorticator

3. REMARKS ON THE ONGOING RESEARCH PROJECT:

S. No.	Project Number and Title	Name PI and Co-PI	Duration	Remarks
AICRP–PHET Scheme projects				
1.	PH/CO/2021/001 Development of annatto pod decorticator	Dr. P. Sudha Asst. Prof. (FPE)	April 2021 to March 2023	Project may be closed
2.	PH/CO/2021/002 Development of seed decorticator for Vahl fruit (*Sapinduse marginatus*)	Dr. S. Parveen Asst. Prof. (FPE)	April 2021 to March 2023	Project may be closed
3.	PH/CO/2021/003 Post harvest Management Practices for Mitigating Aflatoxin Incidence in Groundnut	Dr. G. Amuthaselvi Asst. Professor (FPE)	April 2021 to March 2023	Project may be continued with the new cold plasma facility
4.	PH/CO/2021/004 Improved post-harvest handling of fruits and vegetables from production centre to urban Markets in Coimbatore district	Dr. G. Amuthaselvi Asst. Prof. (FPE)	April 2021 to March 2023	Project may be closed
5.	PH/CO/2021/005 Development of process protocol for non – thermal processing of coconut neera for enhancement of shelf life and to achieve food safety	Dr. M. Balakrishnan Professor & Head (FPE)	April 2021 to March 2023	Project may be closed
6.	PH/CO/2021/006 Development of Non-chemical Disinfection Technique for storing dried Turmeric Rhizomes	Dr. S. Parveen Asst. Professor (FPE)	April 2021 to March 2023	Project may be continued
New Projects: AICRP-PHET				
1.	PH/CO/2023/001 Encapsulation of monolaurin from coconut oil for enhancing its bioavailability	Dr. M. Balakrishnan Professor & Head (FPE)	April 2023 to March 2025	New Project
2.	PH/CO/2023/002 Development of Pulsed Magnetic	Dr. T. Pandiarajan Professor (FPE)	April 2023 to	New Project

	field system for shelf-life extension of fruit juices.		March 2025	
3.	PH/CO/2023/003 Development of Millet Based Synbiotics Fermented Beverages for the Improvement of Gut Health and Immune System	Dr. A. Ramalakshmi Assoc. Professor (AGM)	April 2023 to March 2025	New Project
4.	PH/CO/2023/004 Valorisation of phenolic compounds from orange peel	Dr. K. Gurusamy Asst. Professor (Biochem.)	April 2023 to March 2025	New Project
5.	PH/CO/2023/005 Development of machinery for continuous depulping and drying of neem fruit for extraction of Azadirachtin	Dr. P. Sudha Asst. Professor (FPE)	April 2023 to March 2025	New Project
6.	PH/CO/2023/006 Design and Development of thresher for grain *Amaranthus* and extending the shelf life by different storage system	Dr. G. Amuthaselvi Asst. Professor (FPE)	April 2023 to March 2025	New Project
7.	PH/CO/2023/007 Optimization of process parameters for colour retention of nutmeg mace through radio frequency drying and quality attributes	Dr. M. Anand Assoc. Professor (Horti.)	April 2023 to March 2025	New Project
8.	PH/CO/2023/008 Development of millet based edible cutlery	Dr. S. Parveen Asst. Prof. (FPE)	April 2023 to March 2025	New Project
University Research Projects				
1.	AEC&RI/CBE/FPE/Ag.Engg./ 2023/ 001 Development of household centrifugal dehuller for small millets	Dr. M. Balakrishnan Prof. & Head (FPE)	April 2023 to Mar. 2024	Project may be continued
2.	AEC&RI/CBE/FPE/AG.ENG. /2023/001 Development of weight grader for coconut	Dr. T. Pandiarajan Professor (FPE)		Project may be continued
3.	AEC&RI/CBE/FPE/HOR. /2023/001 Detection of aflatoxin contamination in spices and their decontamination using lactic acid bacteria	Dr. A. Ramalakshmi Assoc. Professor (FPE)	April 2023 to Dec 2024	Project may be continued
4.	AEC&RI/CBE/FPE/AG.ENG. /2023/002 Development of deseeder for turkey berry and studies on drying kinetics for extension of shelf life.	Dr. G. Amuthaselvi Asst. Professor (FPE)	Jan 2023 to Dec 2024	Project may be continued
5.	AEC&RI/CBE/FPE/AG.ENG./2023/003 Development of table top aggregatum onion peeler	Dr. S. Parveen Asst. Professor (FPE)	Jan 2023 to Dec 2024	Project may be continued
6.	AEC&RI/ CBE/ FPE/ AG.ENG. /2023/ 004 Supercritical fluid extraction of bixin from annatto pods	Dr. P. Sudha Asst. Professor (FPE)	Jan 2023 to Dec 2024	Project may be continued
Externally funded projects				
1.	DST-SERB/ AECRI/ CBE/ FPE/ 2022/ R001 Design and Development of a decorticator for Annatto and development of pro to type extraction unit with advanced techniques for bixin for Sustainable use in food industry	Dr. P. Sudha Asst. Prof. (FPE)	December 2020 to December 2024	Project may be continued

2.	CIL/AEC& RI/FPE/2021/R001 Design and development of neem (*Azadirachta indica*) fruit depulper	Dr. P. Sudha Asst. Prof. (FPE)	June 2021 to Mar. 2024	Project may be continued

4. ACTION PLAN FOR THE YEAR 2023 - 2024

Theme wise action plan is given below

Action Plan 1: Development of storage structure for groundnut			
Activity	**Name of the scientists**	**2023-24**	**Deliverables / expected outcome**
Development of storage methods/system for groundnut kernels	Dr. M. Balakrishnan Dr. A. Ramalakshmi Dr. G. Amuthaselvi	To study the traditional methods of storage of groundnut kernels To design and fabricate a storage system to enhance the shelf life of groundnut kernels	Optimization of storage conditions to mitigate the aflatoxin during storage of groundnut kernels
Action Plan 2: Development of household centrifugal dehuller for small millets			
Development of household centrifugal dehuller for small millets	Dr. M. Balakrishnan Dr. P. Preetha	To design and develop a small scale centrifugal dehuller for minor millets To optimize the grain and machine parameters to achieve maximum efficiency	A Household centrifugal dehuller for small millets will be developed with the capacity ranging between 10-20 kg/h to cater the needs of the household, small farmers, FPO's, SHG's *etc*.
Action Plan 3: Detection of aflatoxin contamination in spices and their decontamination using lactic acid bacteria			
Detection of aflatoxin contamination in spices and their decontamination using lactic acid bacteria	Dr. A. Ramalaksmi Dr. M. Balakrishnan Dr. A. Subbiah	Detection of aflatoxin contamination in spices using standard methods Screening of Lactic acid bacteria for effective decontamination of aflatoxin	Effective decontamination of aflatoxin by lactic acid bacterial isolates in spices during storage conditions
Action Plan 4: Development of protocol for processing and value addition of karonda fruit			
Development of protocol for processing and value addition of karonda fruit	Dr. M. Balakrishnan Dr. P. Sudha	• To study the engineering properties of karonda fruit • To design and develop deseeder for karonda fruit	Development of deeder for karonda fruit
Action Plan 4: Development of mobile paddy dryer for high moisture paddy			
Development of mobile paddy dryer for high moisture paddy	Dr. M. Balakrishnan Dr. T. Pandiarajan	• To study the conventional practices of drying paddy the monsoon season • To fabricate the mobile dyer for high moisture paddy	To solve the problems of drying paddy with high moisture during monsoon
Action Plan 5: Development of On-farm continuous grader for fruits			
Development of On-farm continuous weight-based grader for fruits	Dr. T. Pandiarajan Dr. M. Balakrishnan Dr. S. Parveen Dr. M. Anand	• Fabrication of a continuous weight-based grader • Performance evaluation of the grader for optimization of Machine parameters	The developed equipment will be useful for farmers, traders, FPO's, to grade the fruits based

			on weight for price fixation and better remuneration for their produce.
Action Plan 6: Improved processing and value addition of turmeric			
Development of turmeric slicer and low temperature grinding system for turmeric	Dr. M. Balakrishnan Dr. V. Thirupathi Dr. T. Pandiarajan Dr. S. Parveen Dr. M. Anand Dr. K. Gurusamy	Fabrication of turmeric slicer and optimization of process conditions for slicing of turmeric Quality assessment of sliced turmeric for value addition	Development of value-added products from turmeric, which will be an ingredient to develop functional foods To boost exports for earning foreign exchange
Action Plan 7: Cold plasma treatment to mitigate the aflatoxin in groundnut			
Controlling the incidence of aflatoxin in ground nut during	Dr. G. Amuthaselvi Dr. M. Balakrishnan Dr. A. Ramalakshmi	To conduct trials for optimization of process parameters of cold plasma to mitigate aflatoxin in groundnut	Technology for mitigation of aflatoxin in groundnut

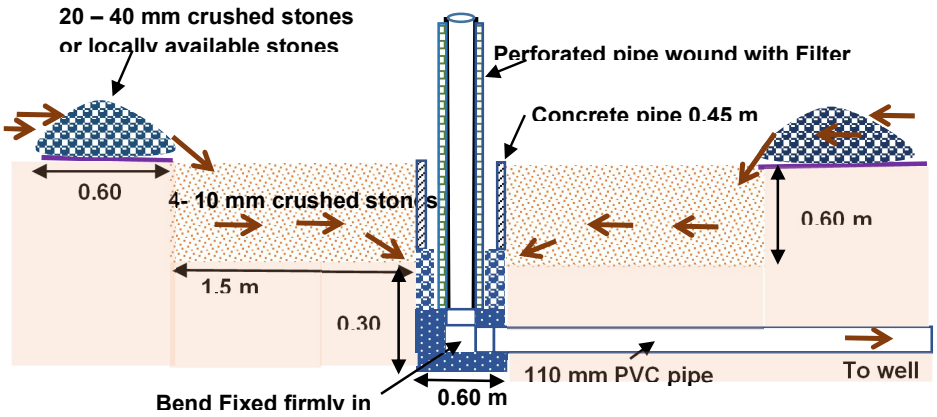
IV. SOIL AND WATER CONSERVATION ENGINEERING

1. Technology for Commercialization

1.1. Horizontal Roughing Filter for Open Wells

The horizontal roughing filter shown in Fig.1 was released as a technology during the last year for recharging groundwater through open wells. This filter may be popularized among the farmers through extension organizations.

In this filter, flow occurs horizontally through the filter media consisting of crushed stones. The sediments get deposited over the surface of the stones. As the deposited sediments grow in size gradually, they tend to drift down to the bottom. Hence, these filters need not be cleaned often and last for at least few years with very less maintenance. The cost estimate for installation of one filter is provided in Table.



S. No	Item	Cost (Rs)
1.	Excavation of Earth	2000
2.	4-10 mm crushed stones -2.5 units @ Rs.4000/unit	10000
3.	10-40 mm crushed stone – 1 unit @ Rs.4000/unit	4000
4.	110 mm PVC pipe – 2 lengths @ Rs.1600/unit	3200
5.	110 mm PVC bends – 2 nos @Rs.100 /unit	300
6.	Concrete ring 0.6 m diameter & 0.3 m height – 2 nos @ Rs 1000/unit	2000
7.	Nylon /Jute screens	500
8.	Installation cost	2000
Total Cost		**24000**

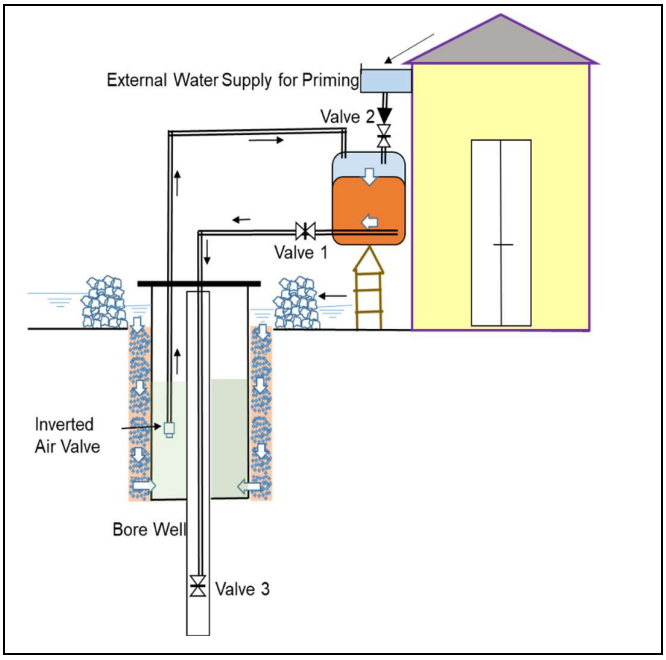
This filter is laid on the ground with a circular shape. A pit of 3.6 m diameter and 60 cm depth is dug. The first layer of crushed stones has the size of 20 mm to 40 mm and this layer is placed over the ground. If large stones are available in-situ, they can be also used because the purpose of this layer is to reduce the velocity of flow and to filter larger sediments and dried leaves. Then, a layer of crushed stone of size 4 to 10 mm is placed inside the pit. At the centre of the structure, cement rings of 60 cm diameter are placed. Inside the cement ring, a perforated PVC pipe of diameter 110 mm wound with filter screen is erected onto a firm soil base.

The number of layers of the screen depends on filtration efficiency needed by the farmer. If the open well used for recharge is an abandoned well and if it is not used for pumping out water again, the extent of filtration may be done at a coarse level. Three layers of screen on the central pipe provided a filtration efficiency of 70 % at a filtration rate of 2 l/s. If the open well used for recharge is to be used for pumping the water again, the extent of filtration must be done at a finer level and polyurethane foam may be used in place of nylon screen. If in a farm, more runoff water is received, more number of such structures can be laid one adjacent to the other.

2. Technology for Patenting

2.1. Siphon filter for groundwater recharge

An innovative filter namely Siphon filter for groundwater recharge has been developed. In this design, the filter is placed over the ground. The filter sucks the water from a lower elevation and filters the water inside the filter and pass it to the bore well. This filter works based on the siphon principle. This filter does not need any electric power for operation.



We need to prime the filter to initiate the filtering process. The priming process is filling the filter as well as the inlet and outlet pipes of the filter with water. The innovation in this filter is easy way of priming the siphon by a way of providing an inverted air valve as a non-return valve and providing a plug flow through the falling limb of siphon by properly designing the diameter of falling limb. For a filtration rate of 275 l/h, a filtration efficiency of 90 % was obtained for a filter media depth of 30 cm and a filter area of 0.2 m^2.

This technology may be submitted for getting patent.

3. Technologies for On-Farm Trials

3.1. Vertical Roughing Filter for Bore Wells

This filter has been developed for recharging the groundwater through bore wells. In this filter, 120 cm diameter concrete rings are installed by digging a pit of 1.50 m depth and 2.1 m diameter as in Fig. Around the rings, crushed stones of size 4 mm to 10 mm is placed for a width of 45 cm. Crushed stones of size 20 mm to 40 mm are place around the filter over the ground. Inside the concrete rings, polyurethane foam of thickness of 2.5 cm and of density 450 kg/m^3 is placed with an aluminium framework.

The perimeter of the foam is 80 cm. For a 30 cm height of water around the foam, the filtration rate was evaluated to be 2 l/s. When clogging occurs to a level of 50 %, at least a filtration rate of 3 l/s can be expected for a depth of 90 cm of water inside the rings. A filtration efficiency of 70 % was observed with this set up when only one layer of polyurethane foam was used. Table provides the cost estimate for installation of the Vertical Roughing Filter and a total expected cost is Rs.45000 per installation.

The filtration efficiency can be increased by providing more number of polyurethane foam layers around the casing pipe. The use of polyurethane foam in reducing turbidity for drinking water has been reported to be safe in literature

S. No	Item	Cost (Rs)
1.	Excavation of Earth	5000
2.	RCC rings 0.3 m height and 1.2 m diameter @Rs.3000/ring- 5 numbers	15000
3.	RCC/ Mild steel closure	3500
4.	Foam	1000
5.	Al. frame with PVC joiners	2000
6.	PVC pipe 50 mm of length 2 m with 4 Tees	500
8.	Crushed stones	16000
9.	Plastering the ring at the joints and installation cost for the labourers	2000
	Total	45000

This filter may be tested in at least two different locations.

3.2. Irrigation Scheduling for Banana under drip irrigation

Irrigation scheduling experiment was conducted to find out the crop coefficient values for Banana. The estimated crop coefficients are very close to the FAO reported values and hence, the estimated crop coefficients can be adopted by farmers. The experiment may be reproduced in at least 2 other locations.

Crop growth stages	Crop Coefficient (Kc) (First crop)		
	***Kadhali* Banana**	**Red Banana**	**FAO value**
Initial stage (120 days)	0.57	0.57	0.50
Developmental stage (90 days)	0.90	0.80	0.80
Middle stage (120 days)	1.17	1.23	1.10
End stage (60/100 days)	0.95	1.13	1.00
Crop growth stages	**Kc values (Ratoon crop)**		
	***Kadhali* Banana**	**Red Banana**	**FAO value**
Initial stage (120 days)	0.86	0.89	1.00
Developmental stage (90 days)	1.00	1.04	1.10
Middle stage (120 days)	1.16	1.20	1.25
End stage (60/100 days)	1.14	1.19	1.10

The recommended Irrigation interval is 2 to 3 days based on soil moisture status.

4. Technology for Adoption

4.1. Suitable Emitting Device for using Treated Sewage Water

An experiment was conducted to find out whether rain hose has advantage over inline and online drippers in using treated sewage waste water. Two diameters of rain hoses with 1 mm diameter holes and inline as well as online drippers were operated for 9 weeks continuously. It was found that online drippers and inline

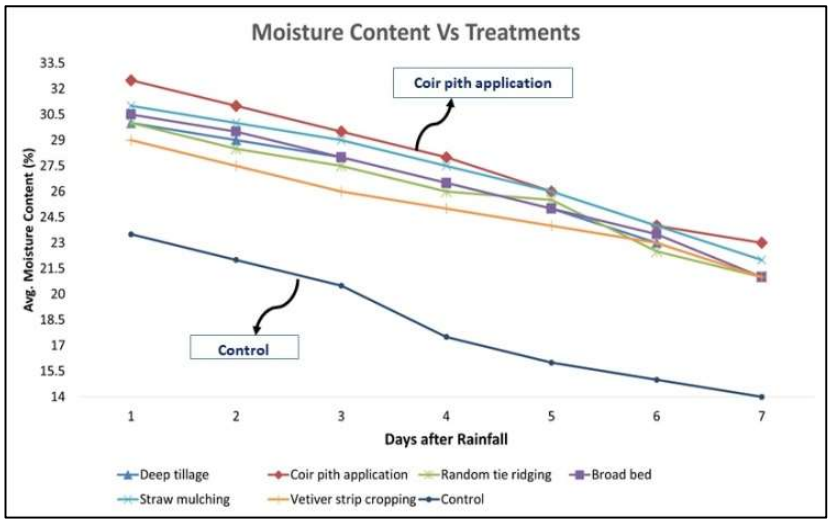
drippers showed less clogging than the rain hose. Hence it is recommended that rain hoses do not have any advantage in reduction of clogging when sewage treated waste water is used.

4.2. Dry land technologies for water conservation

Effect of dry land technologies on water conservation was tested for the following treatments.

1. Random tie ridging
2. Coir pith application
3. Broad bed furrow
4. Straw mulching
5. Vetiver strip cropping
6. Deep tillage

All the treatments were found to be very useful in moisture conservation and the first three treatments performed very well compared to other treatments.



5. Remarks on the on-going project

S. No.	Number and Title of the Projects	Duration	Name of the PI & Co-PI	Remarks
Theme- Irrigation and Drainage Engineering				
1.	ICAR/AEC/CBE/SWC/2018/R001 ICAR- CRP on Farm Mechanization and Precision Farming –MIS (Components)MIS applications with appropriate technologies for using Treated Sewage Waste Water	January 2022 to Dec 2024	Dr. V. Ravikumar & Dr. K. Arunadevi, Dept. SWCE, AEC&RI, Cbe	Suitable filter media for filtration of treated sewage wastewater may be developed
2.	ICAR/AICRP/WTC/CBE/IWM/001 Automatic drip irrigation scheduling for Maize	Apr 2021 to March 2023	Dr. S. Selvakumar, Associate Professor (SWCE), Water Technology Centre	Project is extended for one more year and the field trial may be conducted
3.	AEC&RI/CBE/2020/002 Impact of Low Tunnel drip irrigation strategies on microclimate modification in horticulture crops	Septembe r 2022 to April 2024	Dr. S. Selvakumar, Assoc. Prof. (SWCE) Dr. I. Geethalakshmi, Asst. Prof. (Horti.)	Low tunnel technologies for water melon and musk melon cultivation may be investigated and validated
4.	URP2022-122/ ENGG/ MDU/ SWC/ 2022/001 Studies on the effect of using structured water in micro irrigation	Sept. 2022 To August 2024	Dr. M. Rajeswari Professor & Head (SWC) Dr. S. Sheeba Professor (Soil Science)	Impact of structured water on soil moisture distribution pattern and soil physical and chemical parameters may be studied. Effect of structured water on crop quality parameters may be assessed
5.	ICAR/AICRP/WTC/CBE/IWM/001 Estimation of crop coefficient for Banana for drip irrigation in Western Zone of Tamil Nadu	Sept. 2020 to Oct 2023	Dr. K. Arunadevi Assistant Professor (SWCE), ARS, Bhavanisagar	Trial may be continued with OFT
6.	AECRI/CBE/IDE/AG.ENGG/2023/ 001 Estimation of Lysimeter based crop coefficients for Radish (*Raphanus sativus* L.) under protected cultivation	Jan 2023 to Dec 2025	Dr. A. Valliammai, Prof. & Head (IDE) Dr. M. Nagarajan, Asst. Prof. (SWCE) Dr. E. Sujitha, TA (SWCE), AEC&RI, Kumulur	Crop coefficient for Radish for different phonological stages using lysimeter under protected cultivation may be estimated Correlation between leaf area index and crop evapotranspiration may be estimated
Theme: Surface and groundwater				
7.	ICAR/AICRP/WTC/CBE/IWM/001 Sediment filtration Design for Ground water Recharge through wells	2021-2024	Dr. V. Ravikumar, Professor (SWCE), CWGS.	Sediment filtration systems for groundwater recharge through wells may be evaluated
8.	ICAR/AICRP/WTC/CBE/IWM/001 Identification of Potential Ground water Recharge Zones in various River basins of Tamil Nadu	2020-23	Dr. V. Ravikumar, Professor (SWCE), CWGS.	Water quality indices for all river basins in TN may be mapped. Project may be extended for one more year

Theme: Soil and Water Conservation				
9.	ICAR/AICRP/WTC/CBE/IWM/001 Application of Soil and Water Assessment Tool (SWAT) model for estimation of surface water resources and temporal water demand for sustainable water management in a selected watershed of Bhavani River basin	2022-2024	Dr. K. Arunadevi, Assistant Professor (SWCE), ARS, Bhavanisagar	Annual water balance of the basin may be simulated Option to minimize the gap between supply and demand may be estimated.
10.	AECRI/KUM/SWC/2020/002 Effect of Dry land Technologies on water use and yield of millet crops	July 2020 to June 2022	Dr. M. Nagarajan, Assistant Professor (SWCE), Dept. of IDE, AEC & RI, Kumulur	Study may be carried out to suggest suitable dry land technology to sustain crop and to improve the water productivity.
11.	AICRP/DCM/KPT/AGR/1971/004 Catchment - storage - command area relationship for enhancing water productivity in a micro – watershed (Vertisols)	2006 to Long Term	Dr. M. Manikandan, Assistant Professor (SWCE), ARS, Kovilpatti	Water balance components of stored water in farm ponds may be studied
12.	AICRP/DCM/KPT/AGR/1971/004 Catchment - storage - command area relationship for enhancing water productivity in a micro - watershed (Alfisols)	2020 to 2023	Dr. M. Manikandan, Assistant Professor (SWCE), ARS, Kovilpatti	Confirmation trial may be carried out
13.	Effect of mechanization on yield and economics of rainfed cotton production	2021-2024	Dr. M. Manikandan, Assistant Professor (SWCE), ARS, Kovilpatti	Energy input and output for cotton production may be analyzed
14.	ENGG/KVP/MIL/2022/001 Optimizing mulched ridge-furrow rainwater harvesting system for rainfed maize production	April 2022 to March 2024	Dr. M. Manikandan, Assistant Professor (SWCE), ARS, Kovilpatti	Project may be continued
15.	Engg/Cbe/WTC/NON/2022/001- Prioritization of Watersheds in Noyyal river basin for implementing the soil and water conservation practices by using Remote sensing and GIS techniques	April 2022 to March 2024	Dr. A. Valliammai Professor (SWCE) Dr. Balaji Kannan, Professor (SWCE)	Morphological parameters with hydrological information to prioritize the watersheds for implementing the soil and water conservation practices and technology transfer may be integrated.

6. Action Plan for the year 2023-2024

1. Standardization of Irrigation scheduling for okra crop under drip fertigation through modelling - Project leader: Dr. A. Mani, Assistant Professor (SWCE)
2. Performance evaluation of Phytorid waste water treatment technology and reuse of effluent water for irrigation - Project leader: Dr. K. Nagarajan, Professor & Head (SWCE)
3. Estimation of ventilation rates inside the naturally ventilated poly house for high value crops - Project leader: Dr. R. Lalitha, Professor (SWCE)

Following new URP projects may be proposed:

4. Mapping of ground water level and ground water quality for all river basin of Tamil Nadu. Project leader - Dr. Balaji Kannan, Professor (SWCE)
5. Salinity reduction in irrigation water.
   Project leader- Dr. M. Rajeswari, Professor (SWCE)
6. Field and laboratory study of soil and nutrient erosion.
   Project leader- Dr. S. Selvakumar, Assoc. professor (SWCE)
7. Soil management in Entisol.
   Project leader-Dr. M. Nagarajan, Assistant professor (SWCE)

Following projects under Precision Farming Development Centre scheme funded by Government of India will be taken up.

1. Performance evaluation of different hydroponics system for capsicum
2. Performance Evaluation of different IoT based Automation systems
3. Optimization of environmental parameters in shade net for nursery
4. Energy assessment studies in solar greenhouse
5. Application of small drones for precision farming in greenhouses

V. REMARKS

a. General recommendations

- TNAU released technologies and farm machineries may be popularized. A catalogue may be prepared and posted in Agricart for promoting the sales. (**Action**: All the Departments)
- Efforts may be taken to promote innovations for patenting (**Action:** All scientists).
- All the scientists working may be encouraged to publish their research findings in the peer reviewed journals having NAAS rating more than 7 (**Action**: All Scientists).
- Efforts may be made to obtain more externally sponsored schemes (**Action**: All Scientists).

b. Farm Machinery & Power Engineering

- Efforts may be taken to develop machineries friendly to farm women (**Action:** FM&PE, CBE & KUM/DCSC&RI, Madurai)
- Development of machineries to suit to the requirements of small and marginal farmers (**Action:** FM&PE, CBE & KUM).

c. Renewable Energy Engineering

- Project proposal on production of Green-hydrogen may be prepared and submitted for external funding (**Action**: REE, CBE)

d. Food Process Engineering

- The hermetic storage bin developed may be explored for storage of pulses also (**Action:** FPE, CBE)
- Efforts may be taken to analyse the Curcumin content of turmeric without boiling (**Action:** FPE, CBE)
- Food safety issues in the pollutants in food chain may be explored (**Action:** FPE & CPHT, CBE)
- Multi-disciplinary research involving scientists from CPHT and CSC&RI, Madurai may be initiated (**Action:** FPE, CBE)
- Efforts may be taken to commercialize the technologies developed through DABD (**Action:** FPE, CBE)
- Research may be undertaken to study the effect of cold plasma on storage of groundnut (**Action:** FPE, CBE)
- Efforts may be taken to utilize food grade plastic for storing the dehulled millets in hermetic bin (**Action:** FPE, CBE)
- Acceptability of neem fruit pulp as active coating may be explored (**Action:** FPE, CBE)

e. Soil Water Conservation Engineering

- Data on borewells/deep borewells and possible areas of groundwater recharging in Tamil Nadu may be collected in association with CWGS, TNAU and documented (**Action:** SWCE, CBE/CWGS).
- A research project proposal may be submitted to TNPCB, Chennai with multidisciplinary approach involving scientists of WTC, SWCE Coimbatore and Kumulur, Environmental Sciences, Forestry and Food Process Engineering for solving pollution issues in Vellalalur region (**Action:** SWCE, CBE/KUM).

f. CPHT

- Research on value addition to agricultural wastes may be taken up (**Action:** CPHT, CBE)
- Student entrepreneurs may be involved in value addition of food products (**Action:** CPHT, CBE)

VI. List of Participants

S. No.	Name	Designation and Department
1.	Dr. A. Raviraj	Dean, AEC&RI, Coimbatore
2.	Dr. P. Rajkumar	Dean, AEC&RI, Periyakulam
3.	Dr. R. Ravikesavan	Director, CPBG, TNAU, Coimbatore
4.	Dr. K. Subrahmaniyan	Director, TRRI, Aduthurai
5.	Dr. P. Balasubramaniam	Director, NRM, TNAU, Coimbatore
6.	Dr. R. Umarani	Director, Seed Centre, TNAU, Coimbatore
7.	Dr. M. Rajeswari	Prof. and Head (Agrl. Engg.), AC&RI, Madurai
8.	Dr. Balaji Kannan	Prof. and Head, PS&IT, AEC&RI, Coimbatore
9.	Dr. V. Ravikumar	Prof. and Head, SWCE, AEC&RI, Coimbatore
10.	Dr. D. Ramesh	Prof. and Head, REE, AEC&RI, Coimbatore
11.	Dr. S. Karthikeyan	Prof. and Head (Micro.), PHTC, AEC&RI, CBE

12.	Dr. M. Balakrishnan	Prof. and Head, FPE, AEC&RI, Coimbatore
13.	Dr. A. Valliammai	Prof. and Head, Dept. of IDE, AEC&RI, Kumulur
14.	Dr. P. Subramanian	Prof. and Head, REE, AEC&RI, Kumulur
15.	Dr. K. Nagarajan	Prof. and Head, SWCE, AEC&RI, Kumulur
16.	Dr. A. Surendrakumar	Prof. and Head, FMPE, AEC&RI, Kumulur
17.	Dr. N. Anandaraj	Prof. and Head, Agrl. Engg. AC&RI, Eachangkottai
18.	Dr. S. Joshua Davidson	Prof. and Head, Agrl. Engg. AC&RI, Vazhavachanur
19.	Dr. S. Sriramajayam	Prof. and Head, Agrl. Engg. AC&RI, Killikulam
20.	Dr. J. John Gunasekar	Prof. and Head, Agrl. Engg. ADAC&RI, Trichy
21.	Dr. P. Geetha	Professor (FSN), CPHT, AEC&RI, Coimbatore
22.	Dr. V. Thirupathi	Professor (FPE). CPHT, AEC&RI, Coimbatore
23.	Dr. A. Kamaraj	Professor (REE), AEC&RI, Coimbatore
24.	Dr. C. Babu	Professor (PBG), DR Office, TNAU, Coimbatore
25.	Dr. N. Manikanda Boopathi	Professor (Bio Tech.), DR Office, Coimbatore
26.	Dr. N. Balakrishnan	Professor (Agrl. Ento.), DR Office, Coimbatore
27.	Dr. A. Christopher Lourduraj	Professor (ENS), DR Office, TNAU, Coimbatore
28.	Dr. V. Veeranan Arun Giridhari	Assoc. Prof. CPHT, AEC&RI, Coimbatore
29.	Dr. H. Usha Nandhini Devi	Assoc. Prof. (Hort), CPHT, AEC&RI, Coimbatore
30.	Dr. A. Ramalakshmi	Assoc. Prof. (Micro.), FPE, AEC&RI, Coimbatore
31.	Dr. R. Parimaladevi	Assoc. Prof. (Micro.), REE, AEC&RI, Coimbatore
37.	Dr. P. Vijayakumary	Assoc. Prof. (Bioenergy), REE, AEC&RI, Coimbatore
38.	Dr. S. Selvakumar	Assoc. Prof. (SWCE), CWGS, TNAU, Coimbatore
39.	Dr. P. Kamaraj	Assoc. Prof. (FM), PHT, HC&RI, Periyakulam
40.	Dr. V. Palaniselvam	Assoc. Prof. (Bioenergy), REE, AEC&RI, Coimbatore
41.	Dr. K. Chandrakumar	Assoc. Prof. (Biochemistry), REE, AEC&RI, CBE.
42.	Dr. M. Anand	Assoc. Prof. (Horticulture), FPE, AEC&RI, CBE
43.	Dr. P.K. Padmanathan	Assoc. Prof. (FMP), FMPE, AEC&RI, Coimbatore
44.	Dr. S.A. Ramjani	Assoc. Prof. (Bioenergy), AEC&RI, Kumulur
45.	Dr. B. Suthakar	Assoc. Prof. (FM), AEC&RI, Kumulur
46.	Dr. P. Suda	Asst. Prof. (FPE), AEC&RI, Coimbatore
47.	Dr. C. Hema Bharathi	Asst. Prof. (CS), PS&IT, AEC&RI, Coimbatore
49.	Dr. M. Nirmala Devi	Asst. Prof. (Stat.), PS&IT, AEC&RI, Coimbatore
50.	Dr. S. Parveen	Asst. Prof. (F&AP), FPE, AEC&RI, Coimbatore
51.	Dr. A.P. Mohan Kumar	Asst. Prof. (FM), FMPE, AEC&RI, Coimbatore
52.	Dr. K. Arunadevi	Asst. Prof. (SWCE), AEC&RI, Coimbatore
53.	Dr. P. Dhananchezhiyan	Asst. Prof. (FM), AEC&RI, Coimbatore
54.	Dr. G. Amudhaselvi	Asst. Prof. (FPE), AEC&RI, Coimbatore
55.	Dr. K. Gurusamy	Asst. Prof. (Biochemistry), FPE, AEC&RI, CBE
56.	Dr. R. Arulmari	Asst. Prof. (F&APE), AEC&RI, Kumulur
57.	Dr. A. Mani	Asst. Prof. (SWCE), Dept. of IDE, AEC&RI, Kumulur
58.	Dr. M. Nagarajan	Asst. Prof. (SWCE), Dept. of IDE, AEC&RI, Kumulur
59	Dr. M. Manikandan	Asst. Prof. (SWC), ARS, Kovilpatti

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