TAMIL NADU AGRICULTURAL UNIVERSITY

PROCEEDINGS

12th Agricultural Engineering Scientists Meet
(22.05.2024)

LEAD CENTER

Agricultural Engineering College and Research Institute
Coimbatore

VENUE

Agricultural Engineering College & Research Institute
Kumulur

Directorate of Research
Tamil Nadu Agricultural University
Coimbatore - 641 003

2024

PROCEEDINGS

12th Agricultural Engineering Scientists Meet

The 12th Agricultural Engineering Scientists' Meet was held at Seminar Hall of AEC&RI, Kumulur on 22nd May 2024.

The meeting was chaired by **Dr. V. Geethalakshmi**, Vice-Chancellor and offered opening remarks. Madam insisted to formulate multi-disciplinary research projects involving scientists from DCM & CPBG. It was suggested to develop a digital repository farm machinery specific to crops and hosted in Web portal for the benefit of farmers and stakeholders.

Dr. M. Raveendran, Director of Research, TNAU, Coimbatore delivered welcome address. It was emphasized on the development of machineries for small farmers and farm women. Efforts may be taken to mass produce farm machineries at a nominal cost for the benefit of farmers.

Dr. A. Raviraj, Dean, AEC&RI, Coimbatore presented the research highlights and major outcomes of the agricultural engineering research 2023-24. **Dr. P. Rajkumar**, Dean, AEC&RI, Kumulur presented the Action plan for 2024-25. The Professor and Heads of various Departments presented the Action Taken Report on the recommendations of 11th Agricultural Engg. Scientists Meet as per the agenda given below. **Dr. P. Rajkumar**, Dean, AEC&RI, Kumulur proposed formal vote of thanks.

The proceedings of 12th Agricultural Engineering Scientists' meet is furnished below:

I. Farm Machinery and Power Engineering

1. Technologies for MLT
2. Remarks on the ongoing research projects
3. Action Plan for the year 2024-25

II. Renewable Energy Engineering

1. Technologies for OFT
2. Technologies for Adoption
3. Remarks on the ongoing research projects
4. Action Plan for the year 2024-25

III. Food Process Engineering

1. Technologies for Adoption
2. Technologies for OFT
3. Remarks on the ongoing research projects
4. Action Plan for the year 2024-25

IV. Soil and Water Conservation Engineering

1. Technologies for OFT
2. Technologies for Adoption
3. Remarks on the ongoing research projects
4. Action Plan for the year 2024-25

V. Remarks

VI. List of Participants

I. FARM MACHINERY AND POWER ENGINEERING

1. Technologies for Multi Location Trials:

1.1 Mini tractor operated adjustable sugarcane detrasher

The de-trashing of sugarcane reduces the infestation of pests and diseases. The removal of unproductive leaves enhances the exposure of canes to the sun light which can increase the yield. Due to non-availability of labour and drudgery, most of the farmers are not practicing the de-trashing operation. Hence, the development of adjustable sugarcane detrasher could solve the issue of de-trashing of sugarcane and also to increase the cane yield. The proposed unit is more flexible and compact when compared to mechanical driven sugarcane detrasher. The de-trashing rollers unit can be operated by hydraulic motors with bi-directional rotation with help of Direction Control Valve (DCV) that will eliminate the problem of leaf entanglement during operation.

Salient features:

- The adjustable sugarcane de-trasher is suitable for 5 feet row spacing. It can be operated in the erect canes to avoid the crop damage.
- It can be operated till 450 mm from the bottom of the cane.
- Field capacity: 0.3 to 0.4 ha per h
- De-trashing efficiency and damage are 87 and 1.5%, respectively.
- Cost of attachment: Rs.60,000/-.
- Saving in time: 70 %
- Saving in cost: 66 %

Location: TNAU farms and farmer's field in Erode district.

1.2. Engine operated drum seeder

The engine operated drum seeder was developed as the combination drum seeder with engine operated paddy power weeder. The manually operated four row drum seeder which comprises of two seed drums, two lugged wheels and float were mounted on the existing power weeder frame by replacing the rotary blades. The unit is operated by a two stroke 1.75 hp petrol engine.

Salient features:

- It is used for sowing pre germinated paddy seeds in wetlands.
- Cost of power operated drum seeder: Rs. 50,000/
- Cost of operation: Rs.2150/ha including two labour for operating drum seeder
- Reduction in drudgery of the operation of drum seeder in puddled soil
- Can be used for dual purposes *viz*, weeding in between the rows and sowing of pre-germinated paddy seeds by replacement of weeding blades.

Location: Farmers' field

1.3. Palmyrah harvester

Palmyrah tree climber is designed and developed in such a way that any unskilled labour can climb with the help of it. Tree climbing frame is made of Mild steel square tube to withstand weight up to 150 kg. The machine is powered by hydraulic. The ornamental design for a Palmyrah Tree Climber comprising adaptability to varying trunk sizes, utilizing a hydraulic power source for efficient lifting of both the climbing device and the user, employing a hydraulic fluid-powered motor for torque output, and incorporating a bevel gear mechanism for smooth counter-clockwise rotation during ascending and descending motions.

Location: Kumulur, Trichy dt. and Killikulam, Tuticorin dt.

2. REMARKS ON THE ONGOING PROJECTS:

AICRP - Research projects

S. No	Number and Title of the Projects	Duration	Name of the PI & Co-PI	Remarks
AICRP on Farm Implements and Machinery				
1.	**AICRP/AGE/CBE/FMR/ 002** Studies on spray droplet parameters using drones and development of drone seeder	01.04.2020 to 31.03.2024	PI: Dr. R. Kavitha Co-PI: Dr. A.P. Mohankumar	Results of the projects from 2020-2024 may be compiled.

2.	**AICRP/AGE/CBE/FMR/ 002/2020/02** Design and Development of small groundnut combine harvester	01.04.2020 to 31.03.2024	PI: Dr. R. Kavitha Co-PI: Dr. A.P. Mohankumar	Groundnut combine may be popularized.
3.	**AICRP/AGE/CBE/FMR/ 002/2020/03** Automatic transplanter for protray grown vegetable seedlings	01.04.2022 to 31.03.2023	PI: Dr. R. Kavitha Co-PI: Dr. P. Dhananchezhiyan	Copy right and Product patent may be submitted.
4.	**AICRP/AGE/CBE/FMR/ 002/2021/02** Design and development of tractor operated turmeric combine harvester	01.04.2021 to 31.3.2024	PI: Dr. P. Dhananchezhiyan Co-PI: Dr. R. Kavitha	Intensive field evaluation may be conducted.
5.	**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	Intensive field evaluation may be conducted in collaboration with sugar mill.
6.	**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	Necessary modifications may be carried out to operate even in the undulated field conditions and field evaluation may be conducted.
7.	**AICRP/AGE/CBE/FMR/ 002/2023/01** Drone Based Variable rate Fertilizer Applicator	01.04.2023 to 31.03.2025	Dr. R.Kavitha, Dr. A. Surendrakumar Dr. A.P. Mohankumar Dr. Balaji Kannan	Algorithm may be submitted for copy right.
8.	**AICRP/AGE/CBE/FMR/ 002/2023/02** Development of Robotic Cotton Harvester	01.04.2023 to 31.03.2025	Dr. R. Kavitha Dr. A. Surendrakumar Dr. P. Dhananchezhiyan Dr. S. Thambidurai	Design of robotic cotton picker may be submitted for patent.
9.	**AICRP/AGE/CBE/FMR/ 002/2023/03** **Prototype Feasibility Testing** • Tractor operated Phule hydro mechanically based inter row cum intra row weeder for Orchard (MPKV, Rahuri)	01.04.2023 to 31.03.2024	Dr. R. Kavitha Dr. P. Dhananchezhiyan Dr. A.P. Mohankumar Dr. S. Thambidurai	The feasibility trials may be conducted as per the test standards.

	• Tractor front mounted reaper (PAU) for sesame • Smart Seeder for paddy straw management (PAU- • Tractor operated potato planter for turmeric			
10.	**AICRP/AGE/CBE/FMR/002/2023/04** • **Frontline demonstration of** Tractor operated Check basin former (MPKV), Drone spraying, IISR modified sugarcane cutter planter, Complete Mechanization package of millet crops and Small maize harvester (TNAU)	01.04.2023 to 31.03.2024	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/003/2021/01** Development of remote-controlled drum seeder	01.12.2021 to 31.3.2024	Dr. A. Surendrakumar,	Modified model may also be patented.
12.	**AICRP/AGE/CBE/AMC/003/2021/02** Accident survey in selected districts of Tamil Nadu	01.12.2021 to 31.3.2024	Dr. P.K. Padmanathan Dr. A. Surendrakumar	Expedite the survey work as per the objectives.
EXTERNALLY FUNDED PROJECT				
13.	NADP /AECRI/ CBE/FMPE/ 2022/ R001 Establishment of Farm Machinery and Plant Protection Equipment Testing Centre at Madurai	01.04.2022 to 31.03.2024	PI Dr. A. Raviraj, Dr. R. Kavitha, Co-PI Dr. M. Rajeswari, Dr. P.K. Padmanathan, Dr. P. Dhananchezhiyan Dr. A.P. Mohan Kumar	Process of obtaining approval for the testing centre may be initiated after the purchase of spray particle analyzer.
14.	**GOI/ACRI/KKM/HOR/2022/R0001** Innovative Research and development Components in Palmyrah for upliftment of marginal farmers in Tamil Nadu	2021 to July 2024	Dr. A. Surendrakumar, Dr. R. Thiyagarajan	Trials may be conducted at Killikulam
15.	**CIL/AEC&RI/CBE/FMPE/2021/R001**	01.07.2021 to 31.06.2024	Dr. A. Surendrakumar Dr. B. Suthakar	Intensive field trials may be conducted.

	Design and development of machinery for harvesting and collection of neem fruit			
University Research Projects				
16.	**AEC&RI/ PKM/ FMP/AGRL. ENGG/ 2023/150** Development of manual operated fruit harvesting tool (Mango/Sapota/Guava)	June 2023 to May 2024	Dr. P. Kamaraj, Dr. P. Aruna, P&H, Dept. of Post Harvest Technology, HC&RI, Trichy	Intensive field trials may be conducted.
PG Thesis Work				
17.	Design and Development of Inter and Intra Row Weeder	June 2020 to May 2023	Student: Kommanaboyina Rajuyadav 2020644001, Chairman: Dr. A. Surendrakumar, Professor	The work has been completed as per the objectives.
18.	Design and Development of Autonomous Site-Specific Variable Rate Fertilizer Applicator for Maize	2020-2024	Student: Rita Patle, Chairman: Dr. R. Kavitha, Professor and Head	The work has been completed as per the objectives.
19.	Development and evaluation of Mechanical type Neem fruit picker collector	2020-2024	Student: M. Gowtham Chairman: Dr. B. Suthakar, Associate Professor	The work has been completed as per the objectives.
20.	Development of sensor based self-adjusting check row system for transplanter in SRI method of transplanting	2020-2024	Student: Gund Rajesh Ramesh Chairman: Dr. P. Dhananchezhiyan	The work has been completed as per the objectives.

3. ACTION PLAN FOR THE YEAR 2024-25

Broad area	Activity	Deliverables	Scientist in-charge
Action Plan 1 Small Farm Mechanization	Design and development of mini tractor operated adjustable sugarcane detrasher (Continuing)	Mini tractor adjustable detrasher operated sugarcane	Dr. A.P. Mohankumar Dr. R. Kavitha
	Development of rice transplanter for small farm holdings (New)	Low-cost rice transplanter	Dr. R. Thiyagarajan

	Development of engine operated hand-held sugarcane detrasher (New)	Engine operated hand-held sugarcane detrasher	Dr. A. Surendrakumar Dr. R. Kavitha
	Development battery operated sugarcane sett cutter (New)	Battery operated sugarcane sett cutter	Dr. P. Kamaraj Dr. R. Thiyagarajan
Action Plan 2: Mechanization of Horticulture crops	Development of mechanization package in Turmeric cultivation (Continuing)	Tractor operated combine harvester for turmeric.	Dr. P. Dhananchezhiyan Dr. A.P. Mohankumar
	Design and development of machinery for the collection of neem fruit (Continuing)	Autonomous neem fruit collector	Dr. A. Surendrakumar Dr. B. Suthakar
	Development of tractor hydraulic operated palmyrah tree climber (Continuing)	Tractor hydraulic operated tree climber for palmyrah	Dr. A. Surendrakumar Dr. R. Thiyagarajan
	Development of automatic turmeric rhizome planter (New)	Automatic turmeric rhizome planter	Dr. R. Kavitha Dr. A.P. Mohankumar
	Development of Garlic planter (New)	Battery operated garlic planter	Dr. P. Padmanathan Dr. S. Thambidurai
	Development of hydraulically operated cassava harvester (New)	Cassava harvester	Dr. S. Thambidurai Dr. R. Kavitha
Action Plan 3: UAV in Agriculture	Drone based variable rate fertilizer applicator (New)	Drone based variable rate fertilizer applicator for paddy	Dr. R. Kavitha Dr. A. Surendrakumar Dr. A.P. Mohankumar Dr. BalajiKannan
	Development of Radio Frequency (RF)controlled pesticide applicator (Continuing)	Radio Frequency (RF) controlled sprayer	Dr. B. Suthakar

II. RENEWABLE ENERGY ENGINEERING

1. Technologies for On Farm Trials:

1.1. Solar powered weeder

The walk-behind solar powered rotary weeder was developed for weeding of 30 cm crops spacing for small holder agriculture. The unit consists of Solar array, DC motor, gearbox, lithium-ion battery pack inbuilt battery management system, traction wheels, rotary blades, supporting frame and control panel. 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.

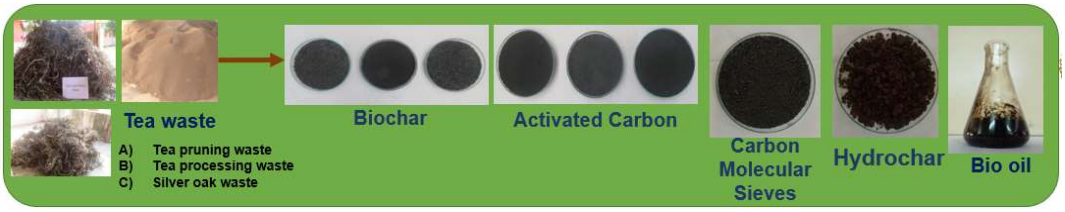
Salient features:

- Suitable for small farm holdings
- Walk behind type and gender friendly equipment
- Weeding in crops with 30 cm spacing
- Field capacity: 0.7 ha/day
- Field efficiency: 62%
- Weeding efficiency: 88%.
- Total operational cost: Rs. 580/ha.

2. Technologies for Adoption:

2.1. Synthesis of carbon rich products from tea industry wastes

Physicochemical characteristics of tea processing wastes, tea pruning wastes and silver oak pruning wastes were studied as per the ASTM procedures. The thermal degradation behaviour was studied in a thermogravimetric analyser at 10, 20, 30, and 40^{o}C min^{-1} for tea processing waste, tea pruning wastes and silver oak pruning waste. The process conditions were optimized for the production of biochar and activated carbon from tea processing waste, tea pruning waste and silver oak waste. Notably, the maximum biochar yield of 36.36% was obtained from tea processing waste at 569^{o}C and 30 min with an N_2 flow rate of 150 ml min^{-1}. The maximum activated carbon yield of 28.08 % was obtained at the optimized conditions of 964^{o}C and 76 min with an N_2 flow rate of 150 ml min^{-1} for tea processing waste. Biooil yield of 30-50% was recorded for tea pruning and tea processing wastes. Hydrochar yield was 55.72% at 225^{o}C for tea processing waste. The carbon molecular sieves (CMS) yield was 23.75 % at 450-500^{o}C for tea pruning waste. It was found that reaction time and reaction temperature significantly influence the yield of carbon rich bioproducts.



2.2. Hydrogen production from agro-residues through steam gasification

Hydrogen production through steam gasification is developed for Biomass *viz.*, coconut shell, casuarina wood and corn cobs. From the biomass characterization results, corncob boasts the highest carbon content among the materials compared (40.09%), contributing to a suitable heating value. It contains a significant amount of cellulose (38.34%) - a readily convertible biofuel source. Nanometal-based catalysts are promising for hydrogen production due to their chemical stability, low toxicity, excellent photoactive properties, and ease of separation from reaction mixtures. Four nanometals were chosen for the study, biochar as the supporting material, and the nanocatalyst was optimized based on factors like catalyst type, loading and percentage. The optimized nanocatalyst, *i.e.*, 5% of 0.3% selenium loaded in biochar was used in the developed downdraft gasifier with a gas conditioning system, and the hydrogen production has been optimized. Under the optimized conditions of air flow rate (AFR) – 30 l/min, steam biomass ratio (SBR) – 3:1 and catalyst – 5 %, the feedstock consumption rate (FCR) was found to be 3.4 kg/h with a hydrogen-enriched syngas flow rate of 5.746 m^3/h and a syngas yield of 1.69 m^3 kg^{-1} with cold gas efficiency of catalytic steam gasification (CSG) of 82.5 %. The hydrogen-enriched syngas was forced into the separation column containing CaO, zeolite and carbon molecular sieve (CMS) for further purification, and the purified gas was tested.

3. Remarks on the Ongoing Research Projects:

S. No.	Number and Title of the Projects	Duration	Name of PI & Co-PI	Status
University Research Projects				
1.	**AECRI/ECK/REE/RIC/2021/001** Farm scale solar dryer drying characteristics and their influence on germination of paddy seeds	Apr 2021 to Mar 2024	Dr. P. Subramanian Dr. P. Masilamani	The project is to be completed
2.	**AECRI/KUM/BOE/2020/001** Development of Portable Forced Convective Solar Dryer	Nov 2020 to Dec 2024	Dr. Joshuva Davidson	Work may be expedited as per the objectives
ICAR - AICRP on EAAI Projects				
1.	**CMB/EAAI/DRET-SET/2022/1** Development and Standardization of Hybridized Controlled Atmosphere Solar Dryer for enhancing commercial value of fruits	Sep 2020 to Mar 2024	Dr. A. Kamaraj	The project is to be completed

2.	**CMB/ EAAI/ DRET-TCT/ 2022/ 1** Energy rich syngas generation through low-cost catalytic gasification	Sep 2022 to Mar 2024	Dr. D. Ramesh	The project is to be completed
3.	**CMB/EAAI/DRET-BCT/2022/1** Bioethanol production from matured coconut waste water by single phase fermentation	Sep 2022 to Mar 2024	Dr. R. Parimaladevi Dr. P. Vijayakumary	The project is to be completed
4.	**CMB/EAAI/DRET-BCT/2023/1** Hydrodynamic cavitation of sago processing wastewater for enhanced biogas production	Dec 2023 to Nov 2025	Dr. P. Vijayakumary Dr. R. Parimaladevi	Work may be expedited as per the objectives
5.	**CMB/EAAI/DRET-LBT/2022/1** Biocrude oil production from water living biomass through Biological and Thermochemical process	Sep 2022 to Mar 2024	Dr. V. Palaniselvam Dr. K. Chandrakumar	The project is to be completed
6.	**CMB/EAAI/DRET-LBT/2022/2** Production of aromatic hydrocarbons and olefins from coir pith biooil through hydrodeoxygenation using catalysts	Sep 2022 to Mar 2024	Dr. K. Chandrakumar Dr. V. Palaniselvam	The project is to be completed
7.	**CMB/EAAI/DRES/2022/1** Popularization of large-scale pyrolytic reactor	Apr 2022 to Mar 2024	Dr. R. Mahendiran	Success story may be prepared
8.	**CMB/EAAI/EMA/2023/1** Design and development/adoption of equipment and practices to reduce energy intensity in the identified operations of sugarcane production and jaggery processing	Apr 2023 to Mar 2025	Dr. R. Mahendiran Dr. P. Vijayakumary	Work may be expedited as per the objectives and design patenting may be applied.
ICAR - CRP on EA Projects				
1.	**TNAU/CRP-EA/2022/01** Hydrogen production from agro residues through steam gasification	Aug 2022 to Mar 2024	Dr. D. Ramesh Dr. V. Palaniselvam	The project is to be completed
2.	**TNAU/CRP-EA/2022/03** Quantum Dots embedded PE films for improving biomass production of microalgae used for biofuel production	Apr 2022 to Mar 2024	Dr. D. Ramesh Dr. S. Karthikeyan	The project is to be completed
Externally funded Scheme				
1.	Promotion of Sustainable Agriculture for Economic Empowerment of Malayali tribes of Pachamalai	Sep 2020 to Mar 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	Apr 2022 to Mar 2025	Dr. P. Subramanian Dr. D. Ramesh Dr. P. Vijayakumary	Work may be expedited as per the objectives.
3.	**ICAR-NASF/AEC/CBE/REE/2023/R001** Design and development of solar-powered prime mover with multi-tool attachments for small farm holdings	June 2023 to May 2026	Dr. R. Mahendiran Dr. B. Suthakar	Work may be expedited as per the objectives.
4.	**SUR/2022/001739** Development of yeast inoculant for soil and plant health improvement and drought mitigation	26.10.2023 to 25.10.2026	Dr. R. Parimaladevi	Work may be expedited as per the objectives.

4. ACTION PLAN FOR THE YEAR 2024-25

Activity	Name of the Scientist	2024 -25	Deliverables/ expected outcome
Solar assisted biomass pyrolysis	Dr. D. Ramesh Dr. A. Kamaraj Dr. S. Sriramajayam	Design and development of pilot scale solar assisted biomass pyrolysis reactor for biochar production: Process optimization and product quality assessment	Optimized process condition for biochar production
Biomethanation process for industrial effluents	Dr. R. Parimaladevi Dr. P. Vijayakumary Dr. S. A. Ramjani	Preprocessing techniques for industrial effluents	Enhanced biogas yield
Development of solar powered prime mover with multi-tool attachments	Dr. R. Mahendiran Dr. B. Suthakar	Development of solar powered prime mover with multi-tool attachments for small holder agriculture	Solar powered prime mover for low draft power operations
Solar powered AI based automated weed controller	Dr. P. Subramanian Dr. S. Joshua Davidson	Solar powered AI based self-driving automated weed controller	AI based solar weed controller

III. FOOD PROCESS ENGINEERING

1. TECHNOLOGIES FOR ADOPTION

a. Development of mango fruit stone remover cum pulper

Mango fruit stone remover cum pulper with food grade stainless steel was developed to remove stone from mango fruit. The unit consists of two compartments one for removing stone and pulp at the top and another for straining the mango pulp at the bottom.

Salient features:

- Capacity of the unit: 1000 kg/h
- Average pulp recovery: 65% (20% more than manual method)
- Cost of the unit: Rs. 2,50,000/-

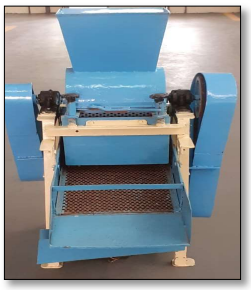
b. Development of and mango stone decorticator

Mango stone decorticator consists of a main frame, fabricated using mild steel angle iron. It consists of a cylinder connected at the centre of a shaft. A concave is fixed to the main frame along the cylinder cover. A blower is installed in the decorticator unit separation of shell and kernel. Material passing through the sieve falls into a trapezoidal chamber which is fixed below the decortication section. This opening lead to shell outlet. The blower facilitates separation of kernel from dust and shell.

Salient features:

- Capacity: 1000 kg/h
- Average pulp recovery: 65% [20% more than manual method]
- Hygienic and less time consuming

c. Development of seed decorticator for Vahl fruit (*Sapindus emarginatus*)



A desheller for soapnut was developed. It consists of a metallic drum provided with rasp bars, concave, an oscillating sieve, power source and power drive. For optimizing the moisture content for deshelling, preliminary trials were conducted and 10% (db) moisture content was found effective for the deshelling operation. The performance of the developed desheller was evaluated in terms of deshelling efficiency by varying the peripheral speed of the deshelling drum and feed

rate. Saponin was extracted from the shell of soapnut using aqueous extraction and conducted HPLC analysis.

Salient features:

- Capacity: 60 kg/h
- Moisture content: 10%
- Drum speed: 9 m/s
- Deshelling efficiency: 98 %

d. Development of annatto pod decorticator

Annatto decorticator cum cleaner unit comprises of a roller sheller and concave with sieve clearance to facilitate breaking the pods and conveying broken pods and seeds through the blower towards the cleaner for separating the seeds. The shelling efficiency of 99.53 % was obtained at 8 % (w.b.) moisture content at the sheller roller speed of 350 rpm with a minimum seed loss of 1.62 %. On the other hand, the maximum cleaning efficiency of 98.94 % was observed at a moisture content of 11.75 % (w.b.), and a sieve unit speed of 250 rpm with a minimum seed loss of 1.59 %.

Salient features:

- Capacity: 200 kg/h
- Shelling efficiency: 99 % - 300 rpm with 8% moisture content (wb)
- Cleaning efficiency: 98 %

e. Development of neem fruit depulper

Neem fruit depulper consists of a hopper, drum cylinder, roller, motor with pulley, water supply system, recirculation tank, supporting frame and outlet. The highest depulping efficiency was obtained at 15 mm clearance between roller and cylinder, roller speed of 550 rpm and feed rate of 125 kg/h. It was also observed that when the feed rate was increased above 125 kg/h, there was a decrease in depulping efficiency.

Salient features:

- Optimum speed of the roller: 550 rpm Clearance between perforated cylinder and roller:15 mm
- Capacity: 125 kg/h
- Depulping efficiency: 94 %
- Percentage of broken: 6 %

f. Development of hybrid system for pulse fractionation for high value pulse based functional foods

An air classifier consisting of nine outlets was developed. The first outlet for coarse flour, while the last outlet had very fine flour. The air classifier efficiency was calculated based on the air flow rate. The average air classifying efficiency of the pulses at 0.01615 m^3/s and 0.0494 m^3/s are 69.6 % and 52.36 %. The percentage of protein content was increased in red lentils from 22.4 % to 71.2 %; lupin from 33.1 % to 56.7 %; and chickpeas from 20.3 % to 55.9 %. The percentage of starch content was increased in red lentils from 14.6 % to 21.8 %; lupin from 7.5 % to 30.5 %; and chickpeas from 14.4 % to 28.5 %.

Salient features:

- 940 rpm & 1.5 mm screen opening was found to be the best for protein fractionation
- Average particle size of starch fraction was 0.18 mm
- Average particle size of fibre fraction was 0.12 mm
- Average particle size of protein fraction was 0.09 mm

2. TECHNOLOGIES FOR ON FARM TRIAL

a. Development of turmeric slicer

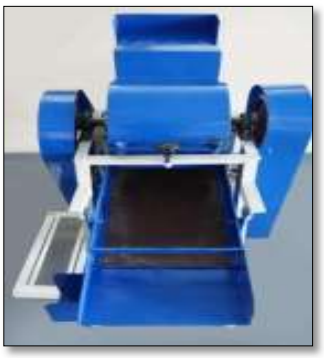
The turmeric slicer consists of main frame, feed hopper, rotary disc with blades, guiding plate and outlet. Feed hopper is provided with two openings each of 25 and 35 mm diameter. The rotary disc is connected to the central shaft. The clearance shall be adjusted in order to vary the slice thickness as 2, 4 and 6 mm. The guided plate is fitted below rotary disc to help the distribution of slices uniformly. The guiding plate, shaft and rotary disc rotates at same speed. The turmeric rhizomes fed to the feed hopper get sliced when it hits the rotating blade. Thus the turmeric slices are obtained.

Salient features:

- Slicer capacity: 15 kg/h
- Slicing efficiency: 94%
- Percent broken: 6%

Location: Ulavan Producer Company, Erode

b. Design and development of thresher for grain amaranthus



The grain amaranthus thresher consists of threshing drum, feeding hopper and top cover, concave, blower, sieve assembly, main frame and power transmission. The grain amaranthus stalks are fed through the hopper and are pressed between the two roller and concave. The impurities are blown away and the seeds are obtained in the clean grain outlet. The machine parameters are concave clearance 9 mm, power requirement 1 hp, speed 90 rpm and the mechanism of action is rubbing.

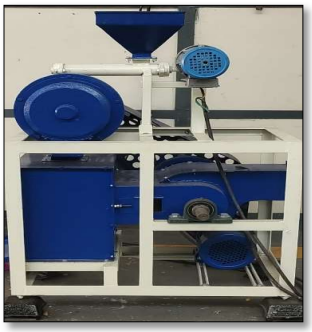
Salient features:

- Capacity 18 kg/h with concave clearances at 22 mm
- Threshing efficiency 94 %
- Cleaning efficiency 92 %
- Feed rate of 13 kg/h with concave clearances at 9mm resulted in threshing efficiency of 94% in TNAU model.

Location: Keystone foundation, Kothagiri

c. Development of household centrifugal dehuller for small millets

A household millet dehuller was developed for de-hulling of small millets. The unit consists of feed hopper, screw auger, impeller with curved vanes, de-hulling chamber, separation chamber, grain outlet, husk outlet, motor and power transmission. The splitting of the husk occurs due to impact of the impeller vanes and the husk is separated from the kernels.



The husk and kernel mixture passes through a chamber where the dehulled millets and husk are separated by means of a blower provided at the bottom of the unit. The dehulled millets and the husk are collected from different outlets. The performance of the unit was evaluated for various millets.

Salient features:

- Dehulling efficiency 90% at a moisture content of 11% d.b.
- Broken percentage was negligible
- Capacity of the unit: 3-10 kg/h

Location: Ramasamy Chinnammal Trust, Coimbatore

d. Development of turkey berry deseeder

Turkey berry deseeder consists of feed hopper, two corrugated rollers, water spray system, oscillating sieve, seed outlet and deseeded turkey berry colleting unit. The berry passes through the rollers and then through two sieves: the first sieve collects crushed berries, while the second collects seeds, and water is collected at the bottom. The highest deseeding efficiency was found at 5 mm of clearance. The increase or decrease in the clearance results in the decrease in the deseeding efficiency.

Salient features:

- Capacity: 5kg/h
- Power required: 1 hp
- Optimum speed: 50rpm
- Deseeding efficiency: 90%

Location: Department of Horticulture, Erode

e. Development of Moringa depodding machine

The moringa depodding machine consists of a feed picker roller, situated at the base of the hopper to regulate the movement of pods into the depodding rollers. The depodding rollers break open the pods by applying pressure, allowing the seeds and chaff to be detached from each other. Once the pods are broken, the mixture of seeds and chaff falls onto an inclined oscillating sieve. Meanwhile, the chaff, which is lighter and larger, remains on the surface of the sieve and is guided towards a separate outlet for disposal. A 0.5 hp motor, powers the entire operation, ensuring synchronized movement of the feed picker roller, depodding rollers, and the oscillating sieve.

Salient features:

- Capacity: 50 kg/h
- Depodding efficiency: 87 %

Location: HC & RI, Periyakulam

3. REMARKS ON ONGOING PROJECTS

AICRP-PHET scheme projects				
S. No.	**Number and Title of the Projects**	**Name of PI & Co-PI**	**Duration**	**Status**
1.	**PH/CO/2023/001** Encapsulation of monolaurin from coconut oil for enhancing its	Dr. M. Balakrishnan Dr. P. Sudha Dr. K. Gurusamy	April 2023 to March 2025	Product may be patented

	bioavailability			
2.	**PH/CO/2023/002** Development of process protocol for export potential value-added products from turmeric	Dr. M. Balakrishnan Dr. E. Jeyashree Dr. M. Anand Dr. A. Ramalakshmi Dr. K. Gurusamy	April 2023 to March 2025	The equipment may be given for on farm trials
3.	**PH/CO/2023/003** Development of pulsed magnetic field system for shelf-life extension of fruit juices	Dr. T. Pandiarajan Dr. M. Balakrishnan Dr. K. Gurusamy Dr. M. Anand	April 2023 to March 2025	Project may be speeded up for development of prototype
4.	**PH/CO/2023/004** Design and Development of thresher for grain amaranthus and extending the shelf life by different storage system	Dr. G. Amuthaselvi Dr. M. Balakrishnan Dr. M. Anand	April 2023 to March 2025	TNAU model thresher details to be provided in detail
5.	**PH/CO/2023/005** Development of finger millet sprout-based functional fermented beverage using probiotic, prebiotic and synbiotics	Dr. A. Ramalakshmi Dr. M. Balakrishnan Dr. K. Gurusamy	April 2023 to March 2025	Protocol may be given for technology release
6.	**PH/CO/2023/006** Development of machinery for continuous depulping and drying of neem fruit for extraction of Azadirachtin	Dr. P. Sudha Dr. M. Balakrishnan Dr. T. Pandiarajan Dr. A. Ramalakshmi	April 2023 to March 2025	The equipment may be released
7.	**PH/CO/2023/007** 3D food printing of micronutrient enriched millet based functional food	Dr. M. Balakrishnan Dr. S. Parveen	April 2023 to March 2025	Product may be given for technology release
8.	**CAR/AEC/KUM/APC/2017/D005** ICAR- Under Consortia Research Project on Secondary Agriculture - Value chain on commercial exploitation of tamarind seed and moringa and its derivatives	Dr. Rajkumar Dr. A. Balasubramanian Dr. I.P. Sudagar Dr. P. Masilamani Dr. R. Arulmari Dr. S. Arokiamary	April 2021 to March 2026	Project may be continued
University Research Projects				
1.	**AEC&RI/CBE/FPE/AGRL. ENGG/2023/132** Development of household centrifugal dehuller for small millets	Dr. M. Balakrishnan Dr. P. Preetha	April 2023 to March 2024	Field trial may be conducted
2.	**AECRI/CBE/FPE/2023/001** Development of weight grader for coconut	Dr. T. Pandiarajan Dr. P. Sudha	Jan 2023 to Mar2025	Grading standards need to be set as per market requirement
3.	**AEC&RI/CBE/FPE/HOR/2023/001** Detection of aflatoxin contamination	Dr. A. Ramalakshmi Dr. M. Balakrishnan	April 2023 to March 2025	The study may be conducted for other spices

	in spices and their decontamination using lactic acid bacteria			
4.	**AEC&RI/CBE/FPE/AG.ENGG/2023/002** Development of deseeder for turkey berry and studies on drying kinetics for extension of shelf life	Dr. G. Amuthaselvi Dr. M. Balakrishnan	January 2023 to December 2024	On farm trials may be conducted
5.	**AEC&RI/CBE/FPE/AG.ENG./2023/003** Development of table top aggregatum onion peeler	Dr. S. Parveen Dr. M. Balakrishnan	March 2023 to February 2025	Project may be continued
6.	**AEC&RI/CBE/FPE/AG.ENG. /2023/004** Supercritical fluid extraction of bixin from annatto pods	Dr. P. Sudha Dr. T. Pandiarajan	December 2023 to Jan' 2024	Project completion report may be submitted
7.	**AEC&RI/ KUM/ FPE/AGRL.ENGG/ 2023/163** Evaluation of radiofrequency dryer for non-chemical disinfestation of dehulled millet for enhancement of shelf-life	Dr. R. Arulmari Dr. M. Balakrishnan Dr. S. Jeyarajan Nelson	March 2023 to April 2025	Project may be continued
8.	**AEC&RI/ KUM/ FPE/AGRL.ENGG/ 2023/170** Modification and Performance evaluation of (*Moringa oleiferq L.*) pod cutting machine	Dr. R. Arulmari Dr. I.P. Sudagar Dr. M. Dinesh Pandi Dr. K. Balaji	March 2023 to April 2025	Project may be continued
9.	**ENGG/KUM/PFE/HOR/2022/001** Design and Development of a prototype moringa (*Moringa oleifera*) depodding and moringa seed deshelling machine	Dr. R. Arulmari Dr. T. Pandiarajan	January 2022 to December 2023	On-farm trials may be conducted
10.	**AECRI/CBE/CPHT/Ag. Engg./2022/001** Intensive evaluation of Mango fruit stone remover cum pulper and Mango stone decorticator in Mango processing industries	Dr. V. Thirupathi Dr. M. Balakrishnan	December 2022 to May 2024	Machinery may be released
11.	**ENGG./CBE/CPHT/2022/001** Processing of fruit extracts of Indian spinach (*Basella rubra.* L) for application as a natural food colourant	Dr. H. UshaNandhini Devi Dr. S. Karthikeyan Dr. P. Geetha	December 2022 to April 2024	Project may be continued

12.	**AEC&RI/CBE/HOR/HORT.CROPS/ 2023 /187** Development of novel value-added products from high pungent chilli (*Capsicum chinense* Jacq.) genotype to enhance farmer's income	Dr. H. Usha Nandhini Devi Dr. S. Karthikeyan, Dr. P. Geetha,	August 2023 to January 2024	Project may be closed
Externally funded projects				
1.	**DST-SERB-SHRI/AECRI/CBE/FPE/2023/R00 1** Development of continuous 3D food printer for Millet based functional food	Dr. M. Balakrishnan Dr. A. Ramalakshmi	Novembe r 2023 to October 2025	Project may be continued
2.	**DST-SERB/AECRI/CBE/FPE/2022/R00 1** Design and Development of a decorticator for Annatto and development of prototype extraction unit with advanced techniques for bixin for sustainable use in food industry	Dr. P. Sudha	December 2021 toDecemb er2024	Product may be patented
3.	**CIL/AEC& RI/FPE/2021/R001** Design and development of machinery for depulping and drying of neem (*Azadirachta indica*) fruit	Dr. P.Sudha Dr. M. Balakrishnan Dr. T. Pandiarajan Dr. R. Mahendiran	Sep 2021 toMarch 2025	Field trial may be conducted
4.	**ICAR-NASF/AEC/KUM/FPE//2023/R001** Development of Smart Foods, Bio Composites, Green packaging and Bio energy from Agro residues	Dr. S. Parveen Dr. P. Rajkumar Dr. R. Arulmari	July 2023 to May 2026	Project may be continued

4. ACTION PLAN FOR THE YEAR 2024-25

Theme I: Improved Post-Harvest Handling of Fruits and Vegetables			
Action Plan 1: Post-harvest processing and value addition of palmyrah			
Activity	**Name of the scientists**	**2024-25**	**Deliverables/ expected outcome**
Post-harvest processing and value addition in palmyrah	Dr. G. Amuthaselvi Dr. M. Balakrishnan Dr. S. Ganapathy Dr. M. Anand	Development of tender palmyrah fruit remover Radio frequency sterilization and canning of ice apple	Development of process protocol for canning of ice apple

Action Plan 2: Development of deseeder for Indian Jujube fruit			
Design and development of deseeder for Indian Jujube fruit	Dr. P. Sudha Dr. M. Balakrishnan Dr. T. Pandiarajan	Development of deseeder for Indian Jujube fruit	Mechanized processing of Indian jujube to reduce human drudgery
Theme II: Novel Processing Technologies			
Action Plan 3: Mechanization and extraction of anthocyanin from Roselle using advanced methods			
Development of leaf, stem and calyx separator for Roselle	Dr. P. Sudha Dr. T. Pandiarajan Dr. M. Balakrishnan	Development of separator for Roselle	Anthocyanin extraction from calyx
Action Plan 4: Development of multi head 3D printing for millet products			
Development of multi head 3D printer for millet based functional foods	Dr. M. Balakrishnan Dr. S. Parveen Dr. A. Ramalakshmi	Development of multi nozzle system for 3D food printing	Micronutrient enriched millet based functional food products
Action Plan 5: Development of pulsed magnetic field system for beverages			
Development of continuous pulsed magnetic field system for fruit juices	Dr. T. Pandiarajan Dr. M. Balakrishnan Dr. M. Anand Dr. A. Ramalakshmi	Development of pulsed magnetic field processing system for beverages	Enhancement of shelf life of fruit juice by Continuous pulsed magnetic field processing system
Action Plan 6: Development of millet based probiotic functional beverage			
Development of finger millet probiotic functional fermented beverage	Dr. A. Ramalakshmi Dr. M. Balakrishnan Dr. G.G. Kavithashree	Development of process protocol for probiotic millet beverage Production of functional fermented foods at pilot scale level	Finger millet based probiotic functional beverages for gut health improvement
Action Plan 7: Supercritical fluid extraction of anthocyanin from karonda			
Supercritical fluid extraction of anthocyanin from karonda	Dr. M. Balakrishnan Dr. P. Sudha Dr. Udaykumar Nidoni Dr. A. Ramalakshmi	Optimization of process conditions for super critical fluid extraction of anthocyanin	Natural colourant from karonda fruit for food applications
Action Plan 8: Development of Cold plasma technology for mushroom preservation			
Cold plasma technology for	Dr. M. Balakrishnan Dr. S. Ganapathy	Enhancement of shelf life of mushroom by	Optimization of process parameters

enhancing the shelf life of mushroom	Dr. A. Ramalakshmi Dr. A. Senthil Dr. G. Thirubuvanamala	cold plasma technology Nutritional and microbial quality of mushroom will be ensured for consumption	for cold plasma treatment
Action Plan 9: Retort packaging of RTE foods			
Optimizing retort packaging for RTS and RTE foods	Dr. S. Karthikeyan Dr. V. Thirupathi Dr. P. Geetha Dr. V. ArunGiridhari Dr. G. G. Kavithashree	Optimization of process conditions - temperature, pressure and holding time Validation of nutritional quality and microbial safety	Chemical free long shelf life Improved export potential for RTS juice
Action Plan 10: Shelf-life study of Indian bakery foods			
Accelerated shelf-life study of Indian bakery foods	Dr. S. Karthikeyan Dr. V. ArunGiridhari Dr. P. Geetha Dr. G. G. Kavithashree Dr. V. Thirupathi	Developing system for Accelerated shelf life study Validation of developed data with real time data	Time saving Predictive Increased scope for food product development
Theme III: Bio-prospecting and Waste utilization			
Action Plan 11: Extraction of starch from tapioca			
Production of clean label starch from tapioca by physical modifications and its industrial pertinence	Dr. S. Parveen Dr. G. Amuthaselvi Dr. M. Anand Dr. K. Gurusamy	Production of Clean label starch from tapioca for food applications	Modification of tapioca starch by heat moisture treatment, annealing, and cold plasma
Action Plan 12: Development of Carbon Quantum dots-based biopolymer film			
Development of Carbon Quantum dots incorporated functional biopolymer films for food quality assurance	Dr. M. Balakrishnan Dr. A. Ramalakshmi Dr. Jong Whan Rhim Dr. V. Thirupathi	Synthesis and characterization of the Carbon Quantum Dots (CQD's) from various biomass Development of CQD's incorporated biodegradable packaging film	CQD based biopolymer packaging film for enhancing the shelf life of the fruits and vegetables
Action Plan 13: Development of green packaging materials from agro residues			
Development of	Dr. I. P. Sudagar	Green packaging	To develop and

green packaging materials from agro residues	Dr. P. Rajkumar Dr. R. Arulmari	boxes for secondary and tertiary food packaging	characterize the green packaging boxes from agro waste
Action Plan 14: Extraction of glucosinolates from Moringa			
Extraction of glucosinolates from Moringa	Dr. R. Arulmari Dr. P. Rajkumar Dr. I. P. Sudagar	Protocol for extraction of glucosinolates from Moringa	Optimization of process parameters for extraction of glucosinolates from Moringa

IV. SOIL AND WATER CONSERVATION ENGINEERING

1. Technologies for On-Farm Trials

Optimizing mulched ridge-furrow rainwater harvesting system for rainfed maize production

Trials were conducted to optimize rainwater harvesting system for maize production. Different width ridges, covering materials and mulched ridge-furrow system were used as treatments to quantify runoff water harvesting. Among the treatments, plastic mulched wide ridge (75 cm ridge /45 cm furrow) was found to be economically feasible by its higher net return and B-C ratio. Hence, plastic mulched ridge (75 cm ridge /45 cm furrow) may be recommended as in-field rainwater harvesting system for rainfed maize production.

Development stage

Vegetative stage

Flowering stage

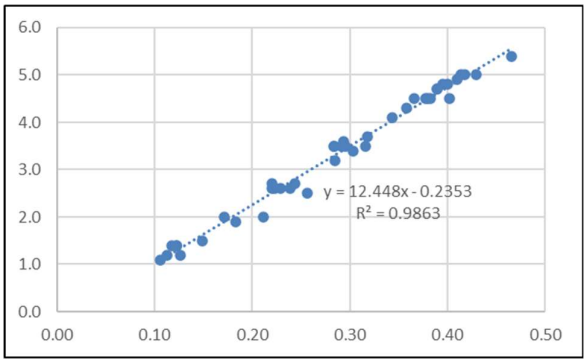
2. Technology for Adoption

a. Ventilation rates inside the naturally ventilated polyhouse for high value crops

A regression equation was fitted to estimate the ventilation rate based on the measured wind speed in a naturally ventilated green house is as follows:

$$y=12.448x-0.2353$$

where y is ventilation rate in m^3/sec and x is wind speed in km/hr.



Wind speed *vs* ventilation rate

The proposed regression model can be used to estimate the ventilation rate based on the measured wind speed. If the wind speed of the greenhouse location is known from weather station, then ventilation rate for similar greenhouse located in semi-arid region can be estimated.

b. Lysimeter based crop coefficients for Radish (*Raphanus sativus* L.) under protected cultivation

The reference evapotranspiration (ETo) in greenhouse was calculated using the Hargreaves model. Crop evapotranspiration was estimated by using electronic weighing lysimeter. Also, the crop coefficient value of radish grown under forced ventilated greenhouse were calculated.

The recommended crop coefficient values to be adopted for radish crop grown under naturally ventilated greenhouses are provided in Table below.

Table: Average ETo and Crop coefficient

S. No.	Stages	Average ETo (mm)	Recommended Crop coefficient	Crop coefficient from FAO
1	Initial	44.2	0.68	0.70
2	Development	45.3	0.80	0.80
3	Mid	71.9	0.92	0.90
4	Final	47.4	0.59	0.85

Digital lysimeter installed in the polyhouse

Raddish Crop in Lysimeter

c. Low Tunnel drip irrigation strategies on microclimate modification in horticulture crops

Low tunnels were equipped with colored covers (Red, Blue and White) to study the vegetable production, particularly for watermelons, by modifying microclimatic conditions to extend growing seasons and improve crop yield.

The result showed that red covers can be recommended for winter use to maximize warmth and light absorption, while white covers are preferable in summer to mitigate heat stress and distribute light evenly. Blue covers offer versatility for

transitional seasons, balancing warmth and light penetration. These insights are vital for farmers aiming to maximize yield and extend the production season through effective microclimate management.

Low Tunnel drip irrigation for watermelon crop

3. Remarks on the on-going project

S. No	Number and Title of the Projects	Duration	Name of the PI & Co-PI	Remarks
University Research Projects				
1	**AEC&RI/KUM/SWCE/AG. ENGG/2023/143** Performance evaluation of Phytorid wastewater treatment technology and reuse of effluent water for irrigation	April 2023 to March 2025	Dr. K. Nagarajan, Professor and Head (SWCE) Dr. R. Lalitha, Professor (SWCE) Dr. S.D. Sivakumar, Professor (agronomy) & Principal, Institute of Agriculture, Kumulur	Observations must be recorded for development of recommendations
2	**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, Professor and Head (IDE), AEC&RI, Kumulur	Project is to be continued
3	**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 and Head (IDE), AEC&RI, Kumulur Dr. Balaji Kannan, Professor and Head (PS&IT), AEC&RI, Cbe	Project is to be continued
4	**AEC & RI/KUM/SWC/ AGRL.ENGG/2023/140**	April 2023 to March 2025	Dr. R. Lalitha Professor (SWCE), AEC&RI, Kumulur Dr. K. Nagarajan	Project is to be continued

	Estimation of ventilation rates inside the naturally ventilated polyhouse for high value crops		Professor and Head (SWCE), AEC&RI, Kumulur Dr. K. Kayalvizhi Teaching assistant (Hort), AEC&RI, Kumulur	
5	**URPENGG/MDU/SWC/2022 /001** Studies on the effect of using structured water in micro irrigation	September 2022 to August 2024	Dr. M. Rajeswari, Professor and Head (SWCE), AC&RI, Madurai	The mechanism for structured water must be thoroughly studied
6	**AEC&RI/KUM/SWCE /AG. ENGG/2023/001** Standardization of irrigation scheduling for Okra crop Under drip fertigation through modeling	April 2023 to March 2025	Dr. A. Mani, Asst. Professor (SWCE), AEC&RI, Kumulur	Project is to be continued
7	**AEC&RI/CBE/SWC/AGRL. ENGG/ 2024/008** Comparison of Machine learning models in estimating reference evapotranspiration for the semi-arid region	January 2024 to March 2026	Dr. K. Arunadevi, Asst. Professor (SWCE), AEC&RI, Cbe Dr. C.S. Sumathi, Professor (CS), AEC&RI, Cbe	Project is to be continued
AICRP/GOI projects				
8	**GOI/AEC/CBE/SWC/2014/ D001** Demonstration of Latest Horticulture Technologies in Precision Farming Development Centre	2023-2025	Dr. V. Ravikumar Professor and Head (SWCE), AEC&RI, Cbe	Study must be oriented for farmers adoption
9	**ICAR/AEC/CBE/SWC/2018/ R001** Farm Mechanization and Precision Farming- CBE Centre- Micro irrigation system applications with appropriate technologies for using Treated Sewage Waste Water	2023-2025	Dr. V. Ravikumar Professor and Head (SWCE), AEC&RI, Cbe	Wet land construction may be completed soon and observations are to be recorded
10	**AICRP/DCM/KPT/AGR/197 1/004** Effect of mechanization on yield and economics of rainfed cotton production	2021-2024	Dr. M. Manikandan, Assistant Professor (SWC), ARS, Kovilpatti	Project is to be continued
11	**AICRP/DCM/KPT/AGR/197 1/004** Catchment - storage - command area relationship for enhancing water productivity in a micro – watershed (Vertisols)	2006 to Long Term	Dr. M. Manikandan, Assistant Professor (SWC), ARS, Kovilpatti	Project is to be continued

12	**AICRP/DCM/KPT/AGR/1971/004** Catchment - storage - command area relationship for enhancing water productivity in a micro - watershed (Alfisols)	2020 - 2023	Dr. M. Manikandan, Assistant Professor (SWC), ARS, Kovilpatti	Project is to be continued

4. Action Plan for the year 2024-2025

Department of Soil and Water Conservation Engineering, AEC&RI, Coimbatore

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

1. Agricultural Extension through cellphone application
2. Initiating research work in Vertical farming

Following project under Micro irrigation system applications with appropriate technologies for using Treated Sewage Waste Water funded by ICAR CRP will be taken up.

1. Performance evaluation of constructed wetlands in treating grey water.

Irrigation Drainage Engineering, AEC&RI, Kumulur

1. Geo spatial studies on groundwater quality assessment for domestic and Irrigation purposes for Lalgudi Block (Village wise), Trichy district

Following uncompleted AESM – 2023 works have to be expedited in the ensuing year 2024-2025

1. Salinity reduction in irrigation water - Project leader: Dr. M. Rajeswari, Professor (SWCE)
2. Field & Laboratory study of soil and nutrient erosion - Project leader: Dr. K. Arunadevi, Asst. Professor (SWCE)
3. Soil management in Entisol - Project leader: Dr. M. Nagarajan, Assistant Professor (SWCE)

PFDC, Coimbatore

1. A scientist from Horticulture discipline must be added as a Co-Principal Investigator in the Precision Farming Development Centre, Department of Soil and Water Conservation Engineering, AEC&RI, TNAU, Coimbatore.
2. A scientist from Plant Pathology and a scientist from Agriculture Entomology discipline must be added as a Co-Principal Investigator in the Precision Farming Development Centre, Department of Soil and Water Conservation Engineering, AEC&RI, TNAU, Coimbatore.

V. REMARKS

a. General recommendations

- Multi-disciplinary research involving scientists from DCM & CPBG may be taken up (**Action:** All scientists)
- Efforts may be taken to apply for more number patents in all the agricultural engineering disciplines (**Action:** All scientists).
- All the scientists 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 mobilize more externally funded schemes (**Action**: All Scientists).

b. Farm Machinery and Power Engineering

- A digital repository farm machinery specific to crops may be created and hosted in Web portal for the benefit of farmers and stakeholders (**Action**: FMPE, CBE/KUM).
- Emphasis may be given for the development of machineries for small farmers and farm women (**Action**: FMPE, CBE/KUM).
- Efforts may be taken to mass produce farm machineries at a nominal cost for the benefit of farmers (**Action**: FMPE, CBE/KUM).
- Package of machineries for mechanization in sesame may be developed and popularized (**Action**: FMPE, CBE/KUM).

c. Food Process Engineering

- Research may be intensified for decontamination of aflatoxin in spices during storage (**Action**: FPE, CBE/CPPS).
- Seeds from the turkey berry may be explored for further utilization (**Action**: FPE, CBE)
- Scaling up of turmeric slicer may be carried out (**Action**: FPE, CBE)
- Multi head 3D printer may be developed for large scale production (**Action**: FPE, CBE)
- Coconut grader may be commercialized (**Action**: FPE, CBE)

d. Renewable Energy Engineering

- Usage of solar gadgets for multiple agricultural operations may be explored (**Action**: REE, CBE /KUM).
- Biofuel potential of top ten high biomass yielding crops may be assessed and documented (**Action**: REE, CBE /KUM).
- Feasibility of biofuel production from high yielding aquatic plant biomass feedstocks and dry crop residues may be assessed (**Action**: REE, CBE /KUM)
- Research may be taken up on development of Fuel cell (**Action**: REE, CBE /KUM)

e. Soil and Water Conservation Engineering

- Data on declining ground water level in Tamil Nadu may be collected in association with CWGS, TNAU and documented (**Action:** SWCE, CBE/CWGS).

VI. LIST OF PARTICIPANTS

S. No.	Name	Designation and Department
1.	Dr. M. Raveendran	Director of Research, TNAU, Coimbatore
2.	Dr. P. Balasubramaniam	Director, NRM, TNAU, Coimbatore
3.	Dr. K. Kalarani	Director, CM, TNAU, Coimbatore
4.	Dr. P. Rajkumar	Dean (Agrl. Engg.), AEC&RI, Kumulur
5.	Dr. A. Raviraj	Dean (Agrl. Engg.), AEC&RI, Coimbatore
6.	Dr. S.D. Sivakumar	Principal, IOA, Kumulur
7.	Dr. K. Nagarajan	Prof. & Head (SWCE), AEC&RI, Kumulur
8.	Dr. A. Valliammai	Prof. & Head, FM&PE, AEC&RI, Kumulur
9.	Dr. R. Thiyagarajan	Prof. & Head, FM&PE, AEC&RI, Kumulur
10.	Dr. R. Kavitha	Prof. & Head, FM&PE, AEC&RI, Coimbatore
11.	Dr. S. Karthikeyan	Prof. & Head, CPHT, TNAU, Coimbatore
12.	Dr. A. Kamaraj	Prof. & Head, REE, AEC&RI, Coimbatore
13.	Dr. D. Ramesh	Prof. & Head, REE, AEC&RI, Coimbatore
14.	Dr. I. Sudagar	Prof. & Head, FPE, AEC&RI, Coimbatore
15.	Dr. M. Rajeswari	Prof. & Head (Agrl. Engg.), SWC, AC&RI, Madurai
16.	Dr. S. Sriramajayam	Prof. & Head (Agrl.Engg.), VOC AC&RI, Killikulam
17.	Dr. M. Balakrishnan	Prof. & Head, FPE, AEC&RI, Coimbatore
18.	Dr. P. Subramanian	Professor, REE, AEC&RI, Coimbatore
19.	Dr. Balaji Kannan	Professor, PS&IT, AEC&RI, Coimbatore
20.	Dr. A. Suredrakumar	Professor, FM&PE, AEC&RI, Coimbatore
21.	Dr. V. Palaniselvam	Professor, REE, AEC&RI, Coimbatore
22.	Dr. N. Anandaraj	Professor, SWCE, AC&RI, Chettinad
23.	Dr. S. Umesh Kanna	Professor, TPO to VC, TNAU, Coimbatore
24.	Dr. R. Mahendiran	Professor, REE, AEC&RI, Coimbatore
25.	Dr. S. Selvakumar	Professor (SWCE), CWGS, TNAU, Coimbatore
26.	Dr. R. Lalitha	Professor (SWCE), AEC&RI, Kumulur
27.	Dr. V. Thirupathi	Professor, CPHT, AEC&RI, Coimbatore
28.	Dr. C. Babu	Professor (PBG), Directorate of Research, TNAU, Cbe
29.	Dr. N. Balakrishnan	Professor (Agrl. Ento.), Directorate of Research, TNAU, Cbe
30.	Dr. P. Padmanathan	Assoc. Professor, FM&PE, AEC&RI, Coimbatore
31.	Dr. B. Suthakar	Assoc. Professor, FM&PE, AEC&RI, Coimbatore
32.	Dr. S.A. Ramajani	Assoc. Professor, REE, AEC&RI, Coimbatore
33.	Dr. P. Vijayakumary	Assoc. Professor, REE, AEC&RI, Coimbatore
34.	Dr. S. Parimala Devi	Assoc. Professor, REE, AEC&RI, Coimbatore
35.	Dr. Noorjahan A.K.A. Hanif	Assoc. Professor (Agrl. Extn.), BE&AS, AEC&RI, Kumulur
36.	Dr. P. Kamaraj	Assoc. Professor (FM), FM&PE, AEC&RI, Kumulur
37.	Dr. A. Ramalakshmi	Assoc. Professor (AGM), FPE, AEC&RI, Coimbatore
38.	Dr. K. Chandrakumar	Assoc. Professor (Biochem.), REE, AEC&RI, Coimbatore
39.	Dr. N. Raja	Assoc. Professor (Comp.Sci.), BE&AS, AEC&RI, Kumulur
40.	Dr. M. Nagarajan	Asst. Professor (SWCE), AEC&RI, Coimbatore

41.	Dr. A. Mani	Asst. Professor (SWCE), AEC&RI, Kumulur
42.	Dr. S. Thambidurai	Asst. Professor, FM&PE, AEC&RI, Kumulur
43.	Dr. R. Arulmari	Asst. Professor (FPE), AEC&RI, Kumulur
44.	Dr. M. Manikandan	Asst. Professor (SWC), ARS, Kovilpatti
45.	Dr. S. Parveen	Asst. Professor (FPE), AEC&RI, Coimbatore
46.	Dr. P. Sudha	Asst. Professor (EPE), AEC&RI, Coimbatore
47.	Dr. G. Amuthaselvi	Asst. Professor (FPE), AEC&RI, Coimbatore
48.	Dr. A.P. Mohankumar	Asst. Professor (FPE), AEC&RI, Coimbatore
49.	Dr. K. Arunadevi	Asst. Professor (SWCE), AEC&RI, Coimbatore
50.	Dr. P. Dhanachezhiyan	Asst. Professor (FM), FM&PE, AEC&RI, Coimbatore

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