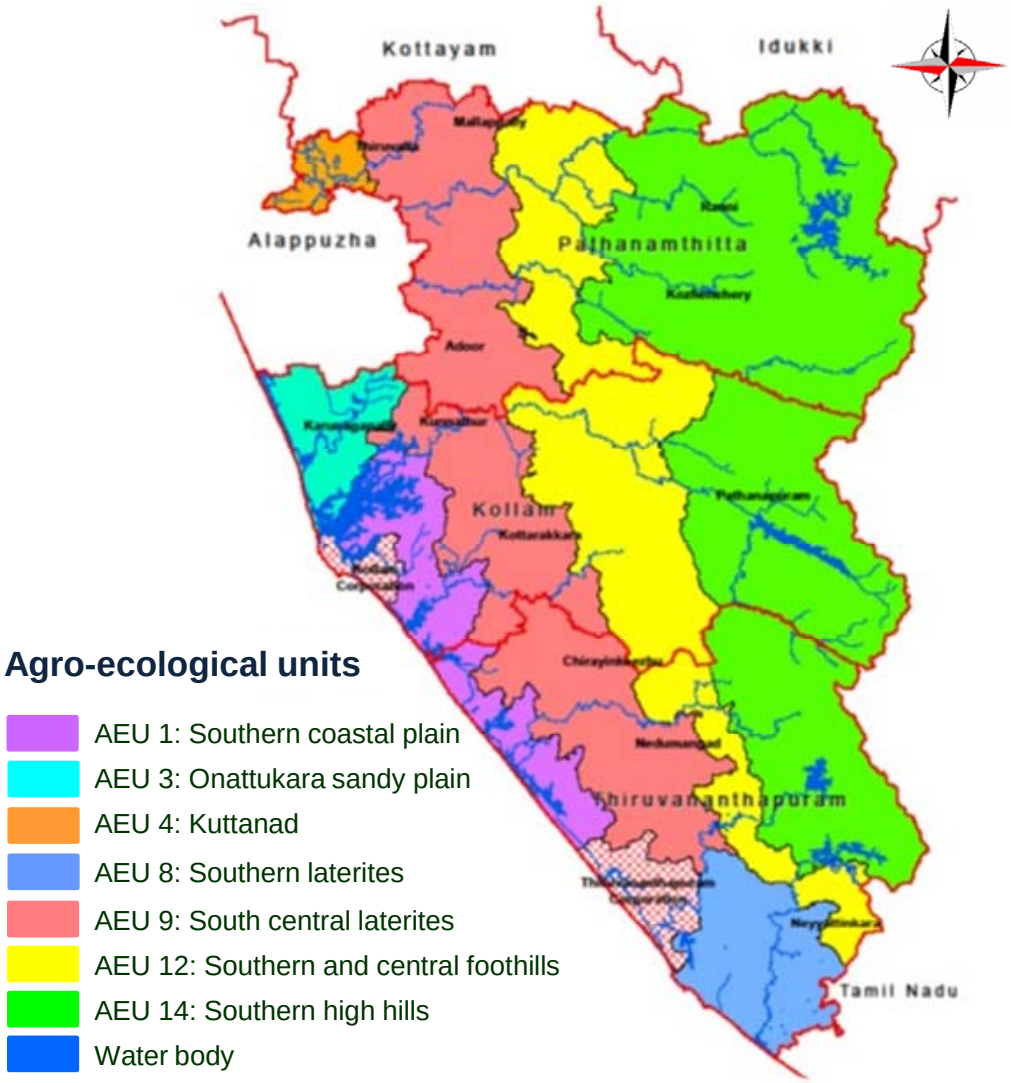
XXXVII ZREAC MEETING

07 – 08 January 2021

ZONAL RESEARCH REPORT 2019-20



Kerala Agricultural University
Regional Agricultural Research Station (Southern Zone)
College of Agriculture, Vellayani
Thiruvananthapuram, Kerala – 695 522

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2019-20

Kerala Agricultural University
RARS (Southern Zone), College of Agriculture, Vellayani,
Thiruvananthapuram, Kerala – 695522

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Regional Agricultural Research Station (Southern Zone)

The Regional Agricultural Research Station (Southern Zone), Vellayani is situated 13 km away from Thiruvananthapuram and loacated at 8.5^0N latitude, 76.9^0 E longitude and at an altitude of 29 m above mean sea level. The RARS headquarters is attached to the campus of College of Agriculture, Vellayani. The mandates of the station are

- Development of improved varieties of crops suited to various locations in the Southern Region of Kerala.
- Development of location specific agro technology for different crops, cropping systems and farming systems suitable for Southern Kerala.
- Production of breeder seed materials of improved varieties and mother cultures of beneficial organisms.
- Development, dissemination and promotion of proven deliverable technologies to the farmers.

Satellite stations of RARS (Southern Zone)

1. **Integrated Farming Systems Research Station (IFSRS), Karamana, Thiruvananthapuram**
   Professor & Head : Dr. Jacob John (Mobile : 9847022929)

   The IFSRS is situated at Nedumcaud, Karamana. The mandate of the station is to develop and validate region-specific integrated farming system models for enhanced productivity, profitability and sustainability and to undertake research, training, extension and developmental activities on various aspects of urban and periurban agriculture.

2. **Coconut Research Station (CRS), Balaramapuram, Thiruvananthapuram**
   Professor & Head : Dr. N.V.Radhakrishnan (Mobile : 9446283898)

   The CRS is situated at Kattachalkuzhy near Balaramapuram. The mandate of the station is to evolve agrotechniques for coconut based farming system in red loam soils, intercropping in coconut and pest and disease management in coconut.

3. **Farming Systems Research Station (FSRS), Sadanandapuram, Kottarakkara, Kollam**
   Professor & Head : Dr. Bindu M.R. (Mobile : 9447595912)

   The FSRS is situated at Sadanandapuram near Kottarakkara. The mandate of the station is to undertake research on homestead farming, soil and water conservation and management.

4. **Krishi Vigyan Kendra (KVK), Kollam**
   Programme Co-ordinator : Dr Bindu Podikunju (Mobile : 9745643733)

   The KVK is situated at Sadanandapuram near Kottarakkara. The mandate of the station is to impart training and conduct on-farm trials and front line demonstrations for technology dissemination.

KAU PLAN PROJECTS

1. Horticulture therapy - A tool to rehabilitate differently abled children at schools

(PI : Dr. Beela G K., Associate Professor, Department of Community Science)

Objectives :

1. To empower the physically and mentally challenged children at schools through horticulture therapy and enable them to generate income through the skills attained.
2. To assess children's rehabilitation progress individually.
3. To assess the social intelligence of physically and mentally challenged school going students undergoing horticultural therapy.

Major Research Highlights :

The study was conducted in ten schools/institutes located at various districts in Kerala where differently abled students were enrolled. Horticultural therapy garden was set up in each school which consisted of the structures like wheel chair accessible pavements, separate gardens for vegetable plants, ornamental plants, sensory plants, herbal plants, adaptive structures for therapy like pergola, raised garden beds, hanging baskets, rotating pots, hanging baskets with pulley, vertical garden, round bench around the tree, hugging tree, garden bench, swing and umbrella.

Fig. 1 Inauguration of the horticultural therapy garden at Vimala Hridaya school Kollam

Pre Horticultural therapy assessments were carried out in more than 100 differently abled students. Three workshop cum training was organized for teachers. Horticultural therapy was implemented in the schools for the students in the inclusive education mode.

Fig. 2 A differently abled child at Government school Arnatukkara Trissur watering the plants using sponge in the rotating pots which is complimenting physiotherapy

2. Development and evaluation of anthurium hybrids

(PI : Dr. Beena Thomas, Assistant Professor, Department of Plant Breeding & Genetics)

Objectives :

1. To develop and evaluate commercially important anthurium hybrids for yield and quality.

Major Research Highlights :

Establishment of sprinkler irrigation system in anthurium net houses of the Department of Plant Breeding and Genetics was undertaken. Morphological characterization of anthurium hybrids developed was carried out. Floral characters such as spathe size and life of spadix were found to be the highest in the hybrid Hounduras Red x Kalympong Red (HoR x KR). Orange coloured hybrid Orange Glory x Nitta Orange (OG x NO) recorded the highest spadix life and was found superior considering

the qualitative traits. The hybrid Honeymoon Red x Liver Red (HR x LR) had an attractive heart shaped spathe and also recorded high spathe size. The best performing hybrid combinations are to be utilised in crop improvement programmes. Commercially important valuable anthurium plants were collected and maintained in the germplasm collection and evaluation is in progress.

As tissue culture studies are essential for mass propagation of anthurium, a PG research programme was also carried out utilizing the hybrids under the project. Of the various regeneration treatments, half strength MS medium supplemented with 0.5 mg L^{-1} BA showed shoot initiation response ranging from 50.0 (LJ x OG and HR x LR) to 87.5 (OG x NO and HoR x KR) percent among the hybrids. The fastest and the maximum root initiation percentage of 87.5 per cent was observed for the genotype OG x NO and HoR x KR followed by 62.5 per cent for the hybrid HR x MR and PR x HR in the regeneration medium supplemented with 0.5 mgL^{-1} BA.

3. Development and standardization of nutrient capsules for vegetable cultivation

(PI : Dr. Biju Joseph, Assistant Professor (SS&AC), Instructional Farm, Vellayani)

Objectives :

1. To develop nutrient capsules for vegetables grown in home gardens.
2. To evaluate the nutrient capsules in vegetables and to standardize the dose and time of application.

Major Research Highlights :

Nutrient sources suitable for the preparation of nutrient capsules were identified based on compatibility and capsules with 4 combinations of nutrient sources were prepared. The capsules prepared were CAPSULE 1- (Urea , Dicalcium phosphate , Potassium sulphate, Calcium sulphate , Magnesium oxide , Zinc EDTA , Boric acid), CAPSULE 2- (Urea , Diammonium phosphate, Muriate of potash ,Calcium sulphate, Magnesium sulphate, Zinc EDTA , Borax), CAPSULE 3 – (Neem coated urea , Factomphos , Muriate of potash ,Magnesium oxide , Phosphogypsum , Zinc sulphate, Borax) and CAPSULE 4 – (Urea , Rajphos, Muriate of potash, Vegetable Micronutrient mixture). Pot culture experiments were conducted to standardize the nutrient capsules for solanaceous vegetables with treatments of 50, 75 and 100 % recommended dose of fertilizers as nutrient capsules which were compared with soil test based POP recommendation of fertilizers and no fertilizer control. Significant difference was not observed between application of capsules at 100% recommended dose and the treatment receiving soil test based POP recommendation of fertilizers. Stability of

capsules were also evaluated. The results on stability of capsules on storage indicated that all the 4 capsules disintegrated within one week of storage. The results revealed that slow release of nutrients could not be achieved by the application of nutrients through capsules due to the quick disintegration and dissolution of capsules in soil. This has also reflected in the on par yield obtained by the application of capsules at 100% recommended dose and the treatment where soil test based POP recommendation of fertilizers were applied.

4. Product development on functional ready to serve beverages: refinement and protocol development

(PI : Dr. P.R. Geetha Lekshmi, Assistant Professor, Department of Post Harvest Technology)

Objectives :

1. Product development on functional ready to serve beverages, refinement and protocol development
2. To assess the storage stability and change in nutritional composition during storage

Major Research Highlights :

Storage stability studies of functional beverages from jackfruit, pineapple and lime with osmodehydrated aloe gel were completed. Standardisation of Ready to Serve functional beverage from passionfruit with aloe juice and osmodehydrated aloe gel, bilimbi, ginger, red banana, and other blended fruit beverages as per FSSAI specification are in progress. Nutritional analysis and storage stability studies of the processed products are also continuing.

5. Refining technologies for by product utilization of major crops like jackfruit, banana, pineapple and nutmeg

(PI : Dr. P.R. Geetha Lekshmi, Assistant Professor, Department of Post Harvest Technology)

Objectives :

1. Refining/ standardization of byproduct utilization from pineapple
2. Refining/ standardization of byproduct utilization from jackfruit

Major Research Highlights :

Standardized protocol for pineapple wine, a low alcoholic beverage from pineapple and edible pineapple waste (pineapple core and edible peel) as per FSSAI standards and conducted biochemical, nutritional and sensory analysis. Storage studies of wine are in progress. Standardised the process of pineapple core candy and conducting storage stability studies. Work on development of functional jackfruit pasta using appropriate combinations of jackfruit bulb flour, jackfruit seed flour is in progress. The selected best jackfruit pasta combination will be used for the development of vegetable enriched pasta so as to develop attractively coloured nutritionally rich jackfruit pasta.

6. Development and evaluation of multinutrient tablets/ spikes for vegetables grown in home gardens

(PI : Dr. R.Gladis, Assistant Professor, Department of Soil Science & Agricultural Chemistry)

Objectives:

1. To develop multi nutrient tablets for vegetables grown in home gardens.
2. To evaluate the multi nutrient tablets in vegetables and to standardize the dose and time of application**.**

Major Research Highlights:

Multi nutrient tablet formulations containing major, secondary and micronutrients were prepared using different compatible fertilizer materials, binding agents and filler materials. Compatibility and stability of nutrient tablets were studied and four number of multi nutrient tablets were standardized which were found non hygroscopic , stable, no caking or colour change were observed, disintegration time ranged from 10 to 12 hours, moisture content from 6.46 to 8.01% and pH between 6.42 and 8.21. The nutrient content in tablets ranged from 12.69 to 13.21 % nitrogen, 6.43 to 7.82 % phosphorus, 4.15 to 4.54 % potassium, 3.08 to 3.64% calcium, 1.35 to 1.48 % magnesium, 2.37 to 4.27 % sulphur, 0.19 to 0.22 % boron and 0.68 to 0.75 % zinc. The release of nutrients from tablets were increasing gradually from 15 to 90 days and maximum release was obtained between 60 and 90 days of incubation. Experiments conducted to standardize the dose of multi nutrient tablets for vegetables viz. tomato, brinjal and chilli with treatments of 75% and 100 % recommended dose of fertilizers as tablets, POP recommendation, soil test based POP recommendation and control (no fertilizers) revealed that application of multi nutrient tablet prepared with neem coated

urea, factomphos, muriate of potash, magnesium oxide, zinc sulphate, borax and binding agent methyl cellulose, talc as filler material applied at 75 % of recommended dose of fertilizers (@ 6 tablets / plant) in two splits (basal and 1 MAP) significantly increased the yield, availability and uptake of nutrients and the nutrient use efficiency of nitrogen, phosphorus and potassium.

7. Development of hybrid rice technology for the State of Kerala

(PI : Dr. Jayalekshmy V.G., Professor & Head, Department of Seed Science & Technology)

Objectives :

1. Standardization of hybrid seed production technique for Kerala
2. Comparative yield trial of the promising hybrids developed for Kerala

Major Research Highlights

Standardization of hybrid seed production technique suitable to a particular area is the prerequisite for the release of hybrid rice in that particular area. In Kerala so far no hybrid variety has been released. One major constraint is the lack of economic seed production package. The experiment was conducted in the hybrid rice developed for Kerala CRMS 31Ax Remya. In this study the row ratio of the female parent to the restorer was found to be better in the ratio 8:2 considering the increased seed yield realized. Application of hormones increased the panicle exsertion and thereby high yield. The doze of the hormones Brassino steroids 2ppm and GA 70 ppm in both planting ratios of 6:2 and 8:2 had given substantially higher yield over the control. So hybrid rice seed production in Kerala can be enhanced by spraying of GA_3 70ppm and brassinosteroid 2ppm at 15-20% heading of tillers and 35-40% panicle emergence. The row ratio of the female parent to the restorer parent can be 8:2 considering the increased seed yield realized. In this study an attempt is made to derive a package for economic hybrid rice seed production for Kerala. The highest per pot yield was reported for treatment T6 (1599.503g/plot) on par with treatment T5 (1465.127g/plot). The plot size being $9m^2$ the per hectare yield can be projected as 1.77tons/ha and 1.66 tons/ha respectively.

8. Comparative yield trial of the promosing tomato and cherry tomato hybrids.

(PI : Dr. Jayalekshmy V.G., Professor & Head, Department of Seed Science & Technology)

Objectives :

1. Comparative yield trial of the promising hybrids

Major Research Highlights :

Four hybrids produced from Anagha as one parent and varieties Vaibhav,Nandhi, IIHR 2372 and IIHR 2200 as male parents were found superior and with TOLCV resistance in the student PhD Research project. The hybrid from Anagha and *Solanum lycopersicum* var. *cerasiformae* L. cerasiformae also was found superior with more of cherry tomato characters. The male parents and female parent were raised and hybridization was done using hand emasculation and Pollination technique. Hybrid seeds of the five crosses is produced and seedlings are being raised for field evaluation.

9. Investigation on etiology of root (wilt) and mid whorl yellowing diseases in coconut

(PI : Dr. Joy. M., Associate Professor & Head, Department of Plant Pathology)

Objectives :

1. To survey the incidence and intensity of root (wilt) and yellowing diseases of coconut in southern districts of Kerala (Thiruvananthapuram, Kollam, Alappuzha, Kottayam, and Pathanamthitta)
2. To assess the yield loss due to root (wilt) and yellowing diseases in coconut
3. To identify the cause / etiology of root (wilt) and yellowing disease in coconut
4. To develop suitable diagnosis tools (serological and molecular) for the early and quick detection and identification of these diseases.

Major Research Highlights :

To survey the incidence and intensity of root (wilt) and mid whorl yellowing diseases of coconut in southern districts of Kerala (Thiruvananthapuram, Kollam, Alappuzha, Kottayam, and Pathanamthitta):

Survey to assess the incidence and intensity of root (wilt) and mid whorl yellowing diseases are progressing in Thiruvananthapuram district. The coconut palms in Instructional Farm Vellayani are being surveyed. There are incidences of root (wilt)

and mid whorl yellowing diseases individually and in combination are seen in IF Vellayani. Incidences of these two diseases were seen in most of the varieties grown in IFVellayani. The survey work is progressing in other punchayaths of Thiruvananthapuram district but yet to start the same in other districts.

To assess the yield loss due to root (wilt) and mid whorl yellowing diseases in coconut:

The yield loss assessment due to root (wilt) and mid whorl yellowing diseases in coconut is progressing from the surveyed locations. There were partial yield loss in root (wilt) affected coconut palms; and complete yield loss in mid whorl yellowing affected coconut palms.

To identify the cause / etiology of root (wilt) and yellowing disease in coconut:

Histo-pathological changes associated with mid whorl yellowing affected plant parts are progressing. Roots, leaf (outer, mid and inner whorls) and inflorescence of most susceptible and healthy palms are used to study the histopathological changes associated with the diseases. Chemodiagnostic methods viz. DAPI / Diene's staining to detect the presence of phytoplasma are being continued.

The symptomatological studies of mid whorl / lethal yellowing disease of coconut revealed that the disease is lethal to coconut, killing the affected palm in 2-3 year. The disease is characterized by the sudden yellowing of mid whorl leaves or yellowing / bronzing / browning from the lower leaves rapidly progressing to inner whorls of leaves, abnormal shedding of immature nuts and flowers, drying and rotting of inflorescence etc. The infected palms become permanently barren. Representative coconut fields from ten panchayaths in Thiruvananthapuram district were surveyed for the incidence of mid whorl yellowing disease. The PDI of the surveyed plots varied from 0 - 12.5%. Traditional varieties viz. West Coast Tall and Komadan were the most susceptible to mid whorl yellowing. This disease is also found in different parts of Thiruvananthapuram, Kollam, Alappuzha and Pathanamthitta districts. The studies on the cause of the disease are progressing.

10. Evaluation of rapid organic fertilizer (*Suchitha*) as a potting medium for soil less culture

(PI : Dr. K. C. Manorama Thampatti, Professor, Department of Soil Science & Agricultural Chemistry)

Objectives :

1. To test the suitability of ROF (Suchitha) for making potting medium including soil less medium with test crops okra and cowpea.

Major Research Highlights :

The experiments carried out for okra and cowpea had revealed that the performance of rapid organic fertilizer (*Suchitha*) was better in presence of soil than in soilless combinations with regard to fruit / pod yield. In both the cases highest yield was recorded by the treatment combination of rapid organic fertilizer (*Suchitha*) mixed with cocopeat and soil in 1:1:1 proportion on volume basis. Though the soilless media with rapid organic fertilizer could support both vegetative and reproductive growth, the absence of soil in these treatments combinations did not provide an optimum condition for plant growth and resulted in poor yield.

11. Centre of excellence in Microbial Technology

(PI : Dr. K.S Meenakumari, Professor & Head, Department of Agricultural Microbiology)

Objectives :

1. To act as a nodal center for catering the technological requirement of the State by supplying mother cultures of biocontrol and biofertilizer organisms.
2. Development of Liquid formulations of Biocontrol agents and Biofertilizers-PGPR's.
3. Evaluation of shelf life of the liquid and bead formulations developed and its efficiency.
4. Training for creating awareness on microbial technology to farmers, extension officials, private entrepreneurs, job trainees etc.
5. Dissemination of technologies through publication of pamphlets, leaflets, popular articles etc.
6. Continuous advisory service to the farmers visiting the centre.
7. Quality analysis of microbial products marketed in Kerala.
8. Search for new organisms of agricultural importance.

Major Research Highlights :

The Centre is functioning as the nodal center of the State providing mother cultures of Biocontrol agents and biofertilizers, catering the technological requirement of all the production centers in Kerala.

Liquid formulation of PGPR Mix- I was developed and shelf life studies revealed significant population of component cultures even after **twenty three months** of storage. The efficiency of the liquid formulation has to be further evaluated under different field conditions

Composting Inoculum for biowaste management developed by the centre and the waste management Technology developed is being adopted by the office of the Accountant General in Thiruvananthapuram, different households of Thiruvananthapuram and Kollam district. Vegetable waste from Ayyankali sports school, Instructional farm, Departments such as Community science, Agronomy, Processing Technology etc. process their waste using the inoculum developed by the Department. During 2019-20, **1299 kg** of composting inoculum was marketed and a revenue of **Rs. 1,16,910/-** could be generated. Approximately 130 Tof kitchen waste could be converted to 26 T of manure.

Studies on the effect of PPFMs on drought tolerance in Paddy revealed that the isolates PPFM 37 and PPFM 38 were effective in improving the growth, yield and drought tolerance characters of rice. The isolates have to be evaluated under field conditions.

Twenty seven isolates of silicate solubilizing bacteria were isolated from Paddy ecosystem. Based on qualitative and quantitative estimation of silicate, phosphorous and potassium solubilization potential of these bacterial isolates under *in vitro* conditions, best five isolates were selected for further studies.

One hundred and seventy five farmers could be trained on microbial inoculant technology. **1172 nos** of farmers visited the centre during the period.

12. Establishment of centre for post harvest management and value addition for under exploited fruits and vegetables of Southern Kerala

(PI : Dr. Mini. C., Professor & Head, Department of Post Harvest Technology)

Objectives :

1. Refinement and Perfection of Technology for commercial production and marketing

Major Research Highlights :

Product diversification was tried in papaya and protocol was standardized for development of osmo dehydrated papaya.

Standardized the protocol for hygienically packed jack fruit portions with prolonged shelf life, which may help to transform the current trend of unhygienic marketing system into a different style.

Fruit and vegetable jam was formulated with combination of suitable fruits and vegetables, with no added colour and preservative having high nutritive value and sensory acceptance

Quality and storage stability analysis of beverages from under exploited fruits.

Developmental activity

Civil work for the Centre for post harvest management and value addition for under exploited fruits and vegetables is partially completed with the funds released.

13. Extraction and utilization of plant based natural colors for safe to eat food production

(PI : Dr. Mini. C., Professor & Head, Department of Post Harvest Technology)

Objectives :

1. To standardize an efficient, cost effective technology for plant based natural food colour production for utilization in food processing

Major Research Highlights :

Horticultural plant parts (skin & whole fruits of grape, beetroot, pineapple waste, amaranth leaves, hibiscus flowers, tomato fruits, aril & skin of pomegranate) were screened for natural colour. Solvent extraction and estimation of pigments viz., betalin from beetroot peel & flesh, anthocyanin from amaranth, pomegranate peel and aril, grape and lovi- lovi, carotenoid from pineapple waste and lycopene from tomato, were carried out. Incorporation of extracted colour to fruit beverages was done storage

studies of colour incorporated products in different conditions and packaging materials to analyse the storage stability were initiated.

14. Establishment of Techno-incubation centre for the commercialization of value added products from under exploited fruits and vegetables

(PI : Dr. Mini. C., Professor & Head, Department of Post Harvest Technology)

Objectives :

1. Setting up of a Techno-Incubation Centre at College of Agriculture, Vellayani with the essential facilities required for the manufacture of value added products & to effectively disseminate the value addition technologies.

Major Research Highlights :

Developmental project

Civil work for the establishment of Techno-incubation centre is nearing completion. Different processing equipments were purchased for the Incubation Centre. Online training programmes have been organized for the entrepreneurs.

15. Multidisciplinary Diagnostic support to address field problems of farmers of Kerala

(PI : Dr. Santhoshkumar T, Assistant Professor, Department of Agricultural Entomology)

Objectives :

1. Render full technical advice to farmers in the field (Farm Advisory Service) at all times of need with the support of Multidisciplinary team
2. Strengthen the already existing provisions of the Department of Agriculture in sorting out field problems
3. Integrate IPM ,INM and other technologies to economize the production
4. Help University or Government to tackle emergency field problems
5. Promote safer food production
6. Provide technical support particularly to residents associations in the town areas in promoting kitchen gardens
7. Equip the farming community to meet challenges in hi-tech farming

Major Research Highlights :

I Extension activities

Thousands of field problems have been addressed through Tele-solutions and whatsApp helping farmers to enhance the yield. Field visits have been conducted in many districts. Trainings were provided to vegetable farmers in Idukki district to overcome the pests, disease and nutrient related problems. Provided consultancy to many Governmental and non -governmental organizations to address their problems related to agriculture.

a. Participated in the exhibition in connection with the South Zone ZREAC, Workshop at College of Agriculture, Vellayani and RAWE programme of 2016 batch students.
b. Conducted several field visits in farmer's field and rectified many field problems.

Around 15 field visits were conducted in Trivandrum, Pathanamthitta, and Kottayam districts of Kerala. Field problems were also solved through Tele-solutions, WhatsApp and E mail also. All these timely interventions lead to immediate correction of varied kinds of problems and ultimately an enhancement in productivity and generation of more income to farmers.

Details of field visits made by Team Karshaka Santhwanam during the year 2019-20

Sl.No.	Name of the district	No. of field visits
1.	Thiruvananthapuram	5
2.	Pathanamthitta	6
3.	Kottayam	4
	Total	**15**

I. Significant interventions made

1. JNTBGRI- Management of sclerotial rot in Victoria lily

JNTBGRI maintains a collection of giant Victoria lily in ponds. Scientists from the institute requested the college authorities to examine and suggest management of rotting of giant Victoria lily. Team visited on 17.07.2019 and identified the association of *Sclerotium* sp., a fungal pathogen in inciting rotting and suggested an elaborative management strategy for same.

Fig. 1 Pond of giant water lily before the incidence of infection

Fig. 2 Sclerotium of the pathogen seen attached to the walls of the tank

Fig. 3 Pond of giant water lily with only one plant remaining as a result of fungal infection

2. Flowering of oranges in Chittar, Pathanamthitta

Fig. 4 Team at the location

As per the instruction of Director of Research, KAU, a team visited plots of farmers where orange and acid lime had flowered and produced fruits. There was no unusual flowering of fruiting and has no link with the floods or deposition of silt in the area due to landslide. The visited plots had no history of landslides.

3. Drying of Phyllanthus in Zoo and museum, Thiruvananthapuram

Museum authorities reported the drying of hedge Phyllanthus which was inspected by the team on 17.7.2019.Remedial measures for rejuvenation of the hedge was suggested by the team.

16. Nutrient management for maximizing productivity in minisett cassava cultivation

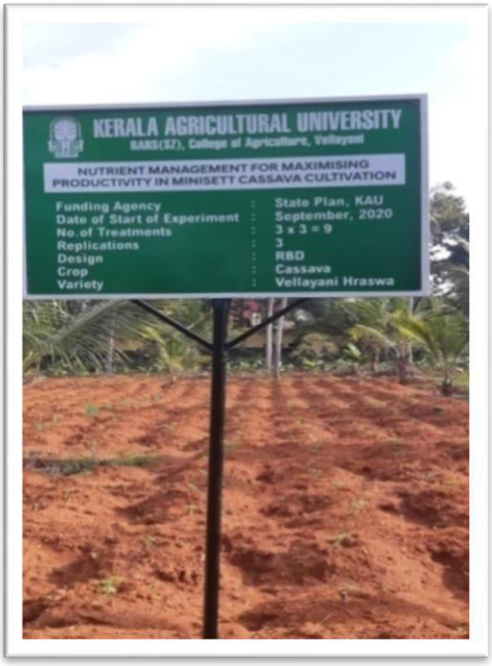
(PI : Dr. Rajasree. G., Associate Professor, Department of Agronomy)

Objectives :

1. To develop nutrient management practices for higher productivity and better quality in minisett cassava cultivation.

Major Research Highlights :

Field experiment started in September 2020 and minisetts were planted with and without PGPR mix I application in 50 cavity portrays filled with potting medium. Potting medium was prepared by mixing coirpithcompost and vermicompost in 3:1 ratio.



Observations in the nursery were taken at 2 Weeks After Planting (WAP) and 3 WAP and included days to sprouting, shoot length, root length and number of roots per minisett. All the parameters were found to be higher in minisetts raised under PGPR mix I though there was no difference between PGPR and no PGPR treatment in nursery with respect to days to sprouting.

Minisetts were transplanted on 18th day to the main field and being evaluated for field performance under different nutrient management treatments.

17. Development of secondary and micronutrient fertilizer mixture formulations for different crops in Southern Kerala

(PI : Dr. Rani. B., Professor, Department of Soil Science and Agricultural Chemistry)

Objectives :

1. Development of secondary and micronutrient fertilizer mixture formulations for various modes of application for wetland and upland rice and rubber in the southern zone agro ecosystems of Kerala.

Major Research Highlights :

- Secondary and micronutrient mixtures involving magnesium, zinc, boron, copper, manganese and iron were formulated for determining the best formulation in rice.
- Field experiments were conducted in wetland rice for determining the best micronutrient mixture combination for optimum yield.
- One experiment is to be conducted on upland rice with the prepared micro nutrient formulation for finalizing the results.

18. Product formulation and standardization of secondary and micronutrient fertilizer mixtures for southern Kerala

(PI : Dr. Rani. B., Professor, Department of Soil Science and Agricultural Chemistry)

Objectives :

1. Formulation of secondary and micronutrient fertilizer mixtures for various modes of application

2. Experiments in the different crops viz. ginger, turmeric, pepper and cardamom, for scheduling the mode and time of application of secondary and micronutrient fertilizer formulations for increased yield.

Major Research Highlights :

The experiment was initiated during August 2019. Survey of farmers fields for ginger, turmeric and pepper fields were completed.

Plant and soil samples from ginger, turmeric and pepper were collected and processed for analysis.

Based on soil and plant analysis, secondary and micronutrient fertilizer mixtures will be formulated

These fertilizer mixtures will be sprayed on the crops raised for the purpose and the effect studied. Suitable formulations will be selected for further validation

19. Standardization of hybrid rice production technique using thermosensitive genic male sterile system

(PI : Dr. Roy Stephen, Professor, Department of Plant Physiology)

Objectives :

1. Standardisation of two line hybrid rice seed production system

Major Research Highlights :

Hybrid rice production using TGMS system is the ideal approach in tropical system as in Kerala where there is significant variation in temperature between seasons and between altitudes. The TGMS plants will be male sterile at higher temperature and become fertile at lower temperature. Thermosensitive genic male sterility is controlled by one or two recessive nuclear gene and hence the character can be transferred to any line of interest to us with respect to quality or yield. Hence red rice hybrids suitable to the state of Kerala can be generated using TGMS system.

The popular Kerala red rice variety Jyothi was used as pollen donor and the stable TGMS line EC720903 was used as female parent for the standardization of hybrid rice seed production system. The pollen parent was transplanted in two rows with spacing of 15 X 20cm. The TGMS lines were transplanted in four or six rows between the pollen parent Jyothi. Supplementary pollination techniques (*i.e.*, pushing

the pollen parent plants over the male sterile plants to facilitate pollen movement) using rope or bamboo poles substantially increased seed yield.

The weather parameters observed during the experimental period revealed that the critical sterility inducing average temperature was above 26.9ºC. The minimum, maximum and average temperature was 23.75 ºC, 31.18 ºC and 27.47 ºC. Since the average temperature was above the CST, the TGMS line was completely pollen sterile during the experimental period. Pollen sterility was confirmed by staining the pollen with IKI to assess the sterility percentage.

Significant difference was not observed in the seed setting percentage counted in the two system- 2:4 or 2:6, *i.e.,* two rows of pollen parent Jyothi with four rows of TGMS line and two rows of Jyothi with six rows of TGMS line transplanted between the pollen parents. Therefore two rows of pollen parent with six rows of female parent (TGMS line) can be recommended for hybridization in the field level.

20. Strengthening and maintenance of lead centers for organic farming

(PI : Dr. Aparna B, Asst. Professor, Department of Soil Science & Agricultural Chemistry)

Objectives :

1. To maintain the existing Lead Centre for Organic Farming in the Department of Soil Science and Agricultural Chemistry, College of Agriculture, Vellayani to promote teaching, research and extension activities in the field of organic farming, organic certification and good agricultural practices.

Major Research Highlights :

Model Organic Farm (3 acres) under the Department of Soil Science & Agricultural Chemistry, College of Agriculture is maintained as a permanent field study centre for teaching, research, demonstration and training purpose in the area of Organic Farming. Lead centre acts as a permanent knowledge and learning centre for all aspects of Organic Agriculture & Agribusiness with a mission to build competence for organizations and individuals which contribute to ecologically, economically and socially sustainable agriculture and livelihood system.

The farm with compost production units ,Azolla unit, Organic museum and various crops is being utilized for conducting practical classes for Under graduate students for courses like Principles of Organic farming (III Sem) and all the four experiential learning courses offered by the department of SS&AC .Besides many of

the field trails by the post graduate students of the Dept of SS & AC and other Departments with organic farming goals are being undertaken in this farm.

The Organic museum was set up in the organic farm with models (vermicompost unit model, Vermiwash collection model etc) and various organic inputs like Vermicompost, Coirpith compost, Mineral compost, Panchagavya, Dashagavya, Fish Amino Acid, Egg Amino Acid biofertilizers etc which is an asset to the institution which benefits the student community. About 125 visitors had visited this museum during the period 2019-2020 which includes farmers, school children and college students from various institutions.

A factory place with coir block production machine, wrapping and sealing machine, shredding machine etc is also functioning in the farm with specific objectives of coir block production, wrapping of coir blocks, shredding of wastes for composting etc

Many vegetables are grown in the students plots with for Diploma students and Under graduate students to understand the technologies involved in organic crop production.

The Model Organic Farm is an certified organic farm by INDOCERT meeting all the standards of an quality Organic Farm

The performance of organic Nano fertilizers was evaluated in the model Organic farm.A field experiment was carried out to study the effect of soil and foliar application of organic nano NPK formulations on during the year 2017-18 at College of Agriculture, Vellayani. The results revealed that among the different treatment combinations, application of FYM (12 t ha^{-1}) + Soil application of nano NPK (12.5 kg ha^{-1}) + Foliar application of Nano NPK (0.4%) recorded the highest yield of Bhindi and other biological properties such as bacterial count, dehydrogenase, urease and acid phosphatase content in soil.

A revolving Fund on Organic Input Production is being operated and its functions are oriented in the model organic farm viz. production of various solid and liquid organic manures and sale of the same, organic seed production etc.

21. Monitoring soil health status (biochemical and microbiological) under organic management systems in Kerala

(PI : Dr. Gowri Priya, Asst. Professor, Department of Soil Science & Agricultural Chemistry)

Objectives:

1. To monitor the biochemical and microbiological soil health status under organic management system in Kerala.

Major Research Highlights:

The soil organic matter content of organic farms and conventional farms did not show any significant difference, but a higher mean value was observed in soils of organic farms than the soils in conventional farms. pH was found to be significantly higher in soils of conventional farms than in soils of organic farms. Electrical conductivity was found to be higher in organic than in conventional soil, but there was no significant difference. EC was within safe limits in organically managed soils. There was no significant difference between the organic and conventional management systems with regard to available phosphorus content while available nitrogen and potassium contents were significantly higher under organic management. Significantly higher dehydrogenase activity and respiratory activity were noticed in soils of organic farms than in soils of conventional farms. A significantly higher number of earthworms and arthropods were found in organic farms than in conventional farms.

22. Yield enhancement strategies for production of anticancer and other therapeutic compounds by cell and tissue culture of *Tinospora cordifolia* and *Withania somnifera*

(PI : Dr. M. M. Viji, Professor & Head, Department of Plant Physiology)

Objectives :

1. To standardize *in-vitro* culture techniques for enhancing the production of anticancer and other therapeutic compounds in *Tinospora cordifolia* and *Withania somnifera.*

Major Research Highlights :

In this study, the basal media responding well for callus cultures of both *Tinospora cordifolia* and *Withania somnifera* were identified. *In vitro* culture techniques were standardised and callus cultures of both *Withania somnifera* and *Tinospora cordifolia* were established. Certain specific secondary metabolite contents of callus cultures of *Withania somnifera* and *Tinospora cordifolia* were estimated using HPLC technique and compared with that of field grown plant samples.

In *Withania somnifera*, the explant responding well for callus induction was identified as the leaf segments. Callus induction in withania started from 8th day of inoculation onwards. The best medium for maximum callusing in withania was identified as MS medium containing 2 mg/L 2, 4-D and 0.2 mg/L KIN. Withaferin A (an anticancer compound) content of the callus tissues as well as the leaf tissues of *Withania somnifera* were obtained as2.1 mg/l, and 2.4 mg/l respectively. Also an increase of about 9.1 fold of withaferin A, production (19.2 mg/l) in callus tissues of *Withania somnifera* was obtained due to the addition of sodium acetate 25 mg/L (precursor) in the callusing medium (MS medium with 0.2 mg/L KIN and 2 mg/L 2, 4-D) as revealed by high-performance liquid chromatography (HPLC) analysis.

The explants which responded well for callus induction in Tinospora were identified as internodes and nodal segments. Callus induction in Tinospora started from 4th day of inoculation onwards. For Tinospora, the best medium for maximum callusing was identified as MS medium containing 0.2 mg/L KIN and 1mg/L 2, 4-D.The berberine content (anticancer compound) of the callus tissues as well as the internodal segment tissues of *Tinospora cordifolia* were abtained as 723 µg g^{-1}dw, and 651µg g^{-1}dw respectively. Also an increase of about 3.02 fold of berberine production (2183 µg g^{-1} dw) in callus tissues of *Tinospora cordifolia*was found, due to the addition of 40 µM tyrosine (precursor of berberin) in the callusing medium (MS medium with 0.2 mg/L KIN and 1mg/L 2, 4-D) as revealed by high-performance liquid chromatography (HPLC) analysis. Hence the results of this study could be used for developing suspension culture and other elicitation studies to enhance the anticancer and other therapeutic compounds of both these plants.

23. Standardization of agrotechniques for protected cultivation of leafy vegetables

(PI : Dr. Sheeba Rebecca Isaac, Professor, Department of Agronomy)

Objectives :

1. To standardize the seed treatment method to enhance germination in coriander
2. To identify the most appropriate planting method, season, spacing, and
3. To assess the economic number of harvests for higher leaf yields in palak and coriander under protected conditions.

Major Research Highlights :

The lab experiment on the standardization of seed treatment methods in coriander revealed the use of potassium dihygrogen phosphate (1%) to record better germination percentage in both whole and split seeds. In palak, seedlings raised in a

potting medium of soil + vermicompost + coir pith compost in 1: 0.5 : .5 and transplanted 2 WAS proved to be superior in growth and yield than those transplanted 3 and 4 WAS.

24. Productivity enhancement of coconut based cropping system through vertical intensification

(PI : Dr. Shalini Pillai. P., Professor, Department of Agronomy)

Objectives :

1. To assess the suitability of maize, finger millet, black gram and green gram as intercrops in coconut garden
2. To study the impact of intercropping on the nutrient status of soil
3. To work out the economics.

Major Research Highlights :

The field experiment is proposed to be laid out in November 2020, after the cessation of heavy rains of NE monsoon

25. Elucidation of high temperature stress tolerance in rice and development of suitable management strategies

(P.I .Dr. Beena R. Asst professor, Dept of Post Harvest Technology, College of Agriculture, Vellayani)

Objectives :

1. To study the management method for high temperature tolerance in rice
2. Screening of 50 rice genotypes for high temperature tolerance

Major Research Highlights :

An experiment was conducted to study the effect of foliar application of plant growth regulators (PGR) and nutrients on high temperature stress mitigation in rice (variety Uma (MO-16). PGR and nutrients namely brassinosteroid (5ppm), boron (100ppm), calcium chloride (0.6%), salicylic acid (50ppm), glycine betaine (20ppm), pink-pigmented facultative methylotrophs (PPFM) (1%), 1-methyl cyclopropane (50ppm), gibberllic acid (50ppm), water spray and absolute control (no spray) were applied as foliar spray at three stages viz., panicle initiation, heading and flowering stage. Physiological observations were taken at 50% flowering stage and yield

parameters were taken at harvest stage. There was significant variation for physiological, biochemical, morphological and yield components among the treatments. Brassinosteroid- 5ppm recorded the highest pollen viability (78.45%). This treatment was on par with PPFM-1% (78.29%). Grain yield per plant was highest for brassinosteroid-5 ppm (18.89 g), whereas the lowest grain yield/plant was recorded in control plants (5.66 g) under high temperature stress. Highest spikelet fertility was recorded in brassinosteroid-5ppm (76.20 %) and this treatment was on par with pink-pigmented facultative methylotrophs-1% (75.23 %) whereas, control recorded the lowest spikelet fertility (28.45%). Thus it was found that brassinosteroid 5ppm was on par with PPFM-1% and recorded high pollen viability, spikelet fertility and grain yield per plant by improving the physiological traits such as cell membrane stability index (CMSI), photosynthetic rate (Pn), stomatal conductance (Gs), Fv/Fm ratio, chlorophyll stability index (CSI).

26. Germplasm collection, evaluation and evolving management practices for regular bearing in clove (*Syzigium aromaticum* (L) Merr. & Perry) accessions.

(P.I. Dr. Sreekala G.S., Assistant Professor, Department of Plantation Crops & Spices, College of Agriculture, Vellayani)

Objectives :

1. To observe growth and yield parameters of elite accessions of clove
2. To standardize high density planting and canopy management

Major Research Highlights :

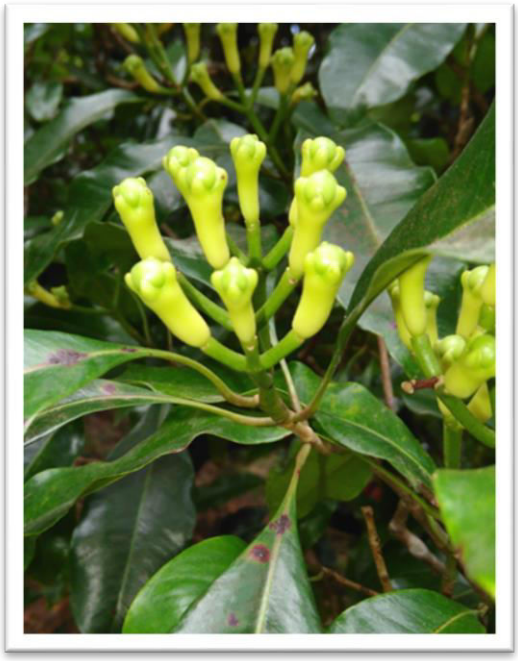
A purposive survey was conducted in fifteen different locations from the clove growing areas at Trivandrum, Kollam and Pathanamthitta districts of Kerala and Kanyakumari district of Tamil Nadu for characterization and evaluation of clove accessions. After surveying 1800 plants, accessions which showed special characters and superiority in yield based on survey were selected for characterization and evaluation. Twenty two different accessions were identified and labelled as BRC-1, BRC-2, BRC-3, BRC-4, MRC-5, MRC-6, MRC-7, MRC-8, AMC-9, AMC-10, AMC-11, AMC-12, AMC-13, MMC-14, MMC-15, BLC-16, BLC-17, BLC-18, MGC-19 ANC-20, MRC- 21 and MRC-22 according to the name of the estates from where the plants were identified. Selected accessions were characterized with the help of descriptors of Mangosteen (*Garcinia mangostana*) developed by IPGRI(2003) and minimal descriptors for other tree spices published by NBPGR, NewDelhi. Twenty two genotypes were evaluated for yield for 2019. Qualitative characters including tree, leaf, bud, flower, fruit and seed characters were also observed. Plant height, girth at 30 cm,

canopy spread, leaf length, leaf breadth, leaf area, number of inflorescence per m^2, number of flower buds per inflorescence, single bud weight (fresh), single bud weight(dry), mature bud length, mature bud diameter, flowering period, fresh bud yield per tree and dry bud yield per tree , fruit weight , seed weight were determined. Majority of the accessions were having combination of 1,2,3 flower buds per cluster while BRC-1, MRC-5 and MRC-21had combination of 1,2,3,4,5 flower buds per cluster. MRC- 7, MRC-5, AMC-10, BRC-1 and MRC-21 were good yielders.

Four replications of four clove genotypes (AMC-10, MRC-6, MRC-5, BRC-3) maintained in Block 1 of Instructional Farm, Vellayani were observed for seedling characters. Nutritional application were undertaken as per package of practices recommendation of Kerala Agricultural University.

BRC-1

Combination of 1,2,3,4,5 flower buds /cluster



MRC-7

Combination of 1,2,3 flower buds/ cluster

27. Role of nutrients in the management of viral diseases in vegetables

(P.I. Dr. Radhika. N.S, Assistant Professor, College of Agriculture, Padannakad)

Objectives :

1. Evolve a suitable soil and plant nutrient based management system for amelioration of viral diseases in vegetables especially chilli (Chilli leaf curl virus)
2. Survey in agroclimatological zones for chilli leaf curl assessment
3. Collection of soil for nutrient analysis
4. Assessment of nutrient status in the infected plant (major, secondary and micronutrient like boron, Zinc)
5. Characterization of virus (serological and molecular with universal primer and specific primer for coat protein)

Major Research Highlights :

Samples of chilli leaf curl infected plants (Var. Ujwala, Athulya and Thejus) were collected from Vellayani. Total DNA was extracted from samples and evaluated for quality analysis in spectrophotometer. All DNA was of good quality with a $A_{260/280}$ ratio of 1.79-1.87. The coat protein of chilli leaf curl virus was amplified using the cp specific primer (Deng *et al*.1994). Amplicons of size 520 bp were obtained after running the PCR.

Fig. 1 Infected chilli plants with chilli leaf curl virus

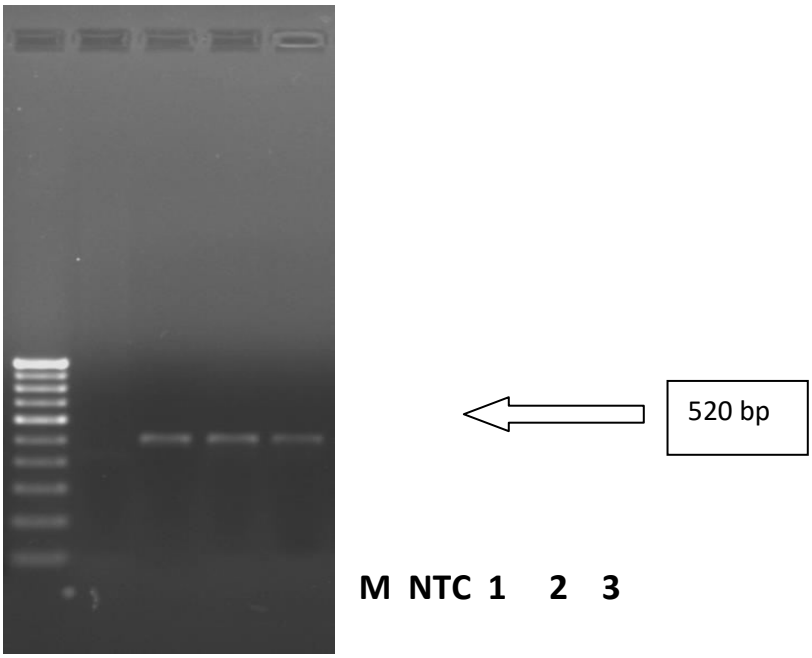


Fig. 2 Gel profile showing detection of begomovirus in the chilli plants using degenerate primers (Deng *et al*., 1994). Lane M: 100 bp DNA ladder, Lane NTC: Non template control Lane 1: Detection of begomovirus in Ujwala variety, Lane 2. Detection of begomovirus in Athulya variety, Lane 3. Detection of begomovirus in Thejus variety.

28. Feasibility of low cost Hydroponics fodder Production system in Kerala - Qualitative and Quantitative study

(Dr. Usha C. Thomas, Assistant Professor, AICRP on Forage Crops & Utilization, RARS(SZ), Vellayani)

Objectives :

1. The study is aimed to identify suitable fodder crops for hydroponics fodder production, to standardize seed rate and period of harvest of fodder in hydroponics fodder production unit and to popularize fodder production technology among dairy farmers.

Major Research Highlights :

A low cost hydroponics machine (Cost-Rs. 18000) was purchased and installed in the Agronomy Crop Museum at College of Agriculture, Vellayani. The machine was made rat proof and work was done to identify suitable fodder crops for hydroponics fodder production from ten crops *viz.*, rice, barley, maize, wheat, sorghum, bajra, ragi,

cowpea, horse gram and green gram. The seeds were soaked in 0.1 percent sodium hypochlorite for 12 hours, and tied in gunny bag and kept for germination for 24 hours. The seeds were then transferred to trays following a seed rate of 200 g ft^{-2} (2.15 kg cm^{-2}). The total yield of green fodder was recorded at harvest and among the crops, maize recorded highest B:C (2.51) ratio and net income. Considering yield and quality, green gram recorded significantly superior GFY (10.17 kg kg^{-1} seed), protein content (20.97 %), lowest values for fibre and ash, and a B:C ratio more than 1.0. Considering all these factors, maize and green gram were found to be the best among the ten crops grown in hydroponics fodder production system.

One day training was conducted on 'Dairy farming and fodder cultivation' at KVK, Kollam on 15.02.2020. 30 dairy farmers from different parts of Kollam district participated in the programme.

29. Breeding vegetable crops for resistance to biotic and abiotic stress

(PI : Dr. S. Sarada, Assistant Professor & Head, Department of Vegetable Science)

Objectives :

1. To develop high yielding tomato hybrids resistant to bacterial wilt

Major Research Highlights :

Four high yielding tomato lines identified from earlier trials conducted at Department of Vegetable Science (LE 13, LE 16, LE 19 and LE 20), used as female parents and three bacterial wilt resistant KAU varieties *viz.* LE 38 (Manulakshmi), LE 53 (Anagha) and LE 45 (Vellayani Vijai), used as male parents, were crossed in a line x tester manner to produce eight hybrids. The performance of the selected eight hybrids for yield and bacterial wilt resistance were evaluated along with 7 parents and a check hybrid Naveen. All the hybrids showed field resistance to bacterial wilt. The highest yield was recorded by the cross LE 16 x Vellayani Vijai (2376.37 g $plant^{-1}$).

30. Evaluation of chilli hybrids for yield and leaf curl resistance

(PI : Dr. S. Sarada, Assistant Professor & Head, Department of Vegetable Science)

Objectives :

1. To develop high yielding chilli hybrids resistant to leaf curl virus

Major Research Highlights :

Five high yielding chilli lines identified from earlier trials conducted at Department of Vegetable Science (Chivar-3, Chivar-6, CA 32, Keerthi and Chivar 10), used as female parents and four leaf curl resistant genotypes (Sel-3, Sel-4, Sel-6 and Chivar-1), used as male parents, were crossed in a line x tester manner to produce nine hybrids. The performance of the selected nine hybrids for yield and leaf curl resistance were evaluated along with 9 parents and two checks. Out of the nine hybrids tested, three hybrids viz., CA- 32 x Sel-4 (972.42 g plant^{-1}), Chivar 3 x Sel 4 and Chivar 3 x Chivar-6 were found superior for yield and leaf curl resistance.

31. Growth and Defense trade-off in unstable continuum: Exploration of root endophytes including *Piriformospora indica* & their biomolecules for enhanced yield and management of biotic and abiotic stress in tropical fruit and vegetable crops

(PI : Dr. Joy. M., Associate Professor & Head, Department of Plant Pathology)

Objectives :

1. Standardization of the protocol for the co-cultivation of *P. indica* (root endophytes) with major tropical fruit and vegetable crops
2. Determining the stage of fruits and vegetable seedlings for *P. indica* (root endophytes) colonisation
3. Deciphering the mechanisms: how the recruitment of *P. indica* (root endophytes) to the roots of TC plants and seedlings helps their establishment in the field under moderate to extreme abiotic stress conditions
4. Evaluation of the *P. indica*-colonised fruit and vegetable seedlings against various biotic stress
5. Development of an ideal and efficient methodology and medium for the mass multiplication and commercial formulation of *P. indica*

Major Research Highlights :

Standardization of the protocol for the co-cultivation of P. indica (root endophytes) with major tropical fruit and vegetable crops:

The best co-cultivation method for *P. indica* with tissue cultured banana plantlets and vegetables viz. vegetable cowpea, tomato, okra, chilly, bitter gourd, and cucumber were standardized under *in vitro* and pot culture conditions. The fungus could promote growth of seedlings with enhanced root and shoot biomass in banana tissue cultured plants and seedlings of vegetables. Seeds of vegetable cowpea, chilly,

bhindi and tomato were grown in portrays filled with *P. indica*-mass multiplied medium which exhibited high and early germination in addition to enhanced seedling vigour, plant height, leaf area, root and shoot biomass, secondary and tertiary roots and growth ratewith many mature chlamydospores in the root cells at 15 day after colonisation.

Determining the best stage of seedlings for P. indica (root endophytes) colonisation:

Vegetable seeds and seedlings of different ages 3, 5, 7 and 10 days after germination were used for this study. Irrespective of the age, the fungus could promote growth of the vegetable seedlings with their better establishment in pots and also in the field. Vegetable seeds directly sown on the *P. indica* multiplied potting medium had early and better germination with high seedling vigour compared to *P. indica* non-colonized plants by increased biomass of roots and shoots.

In vitroantagonistic activity of P. indica against different foliar and root fungal pathogens:

Antagonistic properties of *P. indica* were studied against different fungal pathogens through the dual culture technique. Antagonistic activity of *P. indica* against *Fusarium* / *Rhizoctonia* / *Colletotrichum* was tested using dual culture technique. The purpose of dual culture assay is to assess the inhibition or damage to phytopathogenic fungi in *in vitro* system. The tested isolates of *P. indica* were grown on PDA medium at room temperature for 2 – 3 weeks and used as inoculum. Five mm diameter *P. indica* culture was taken from actively growing plate and inoculated on PDA medium in one side of petri plate and the opposite side is inoculated by *Fusarium/ Rhizoctonia* / *Colletotrichum*inocula. Both cultures are placed 2 cm apart from the side of the petri plate. Control plates were kept which contained the test pathogen and *P.indica* only. The dual culture assay plates were then compared with the control plates and the observations were taken regularly to see the growth. *P.indica* could successfully antagonize different root and foliar pathogens (*Fusarium/ Rhizoctonia* / *Colletotrichum*) through antibiosis, lysis, coiling and overgrowth.

In vivo evaluation of P. indica-colonised seedlings of vegetables against fungal and viral diseases (Pot culture experiments):

P. indica-colonised seedlings of vegetable cowpea were evaluated on natural and artificial infections of *Black eye cowpea mosaic virus* and *Colletotrichumgloeosporioides* in pot culture. The results revealed that in addition to more than 50 per cent growth promotion, the colonised plants could reduce the virus disease incidence by more than 90 per cent and the disease severity by more than 95 per

cent. The endophyte could exceptionally reduce the viral disease both prophylactically and curatively. Similarly, the colonised vegetable cowpea plants could substantially delay and reduce the incidence and severity of anthracnose (more than 90 %) compared to the non-colonised control plants at different intervals. In bhindi also, the disease incidence and intensity on artificial and natural infections of *Okra yellow vein mosaic virus* was substantially reduced by *P. indica* at different intervals.

In vivo evaluation of P. indica-colonised vegetable cowpea plants against fungal, bacterial and viral diseases (Field experiments):

Ten days old *P. indica*-colonized seedlings of vegetable cowpea variety Vellayani Jyothika and non-colonised seedlings were planted in field during November-February 2019 (Rabi) and March-June 2019 (Summer). The field experiments were carried out with two treatments replicated 15 times. All cultural operations were carried out as per the Package of Package recommendations of Kerala Agricultural University. Natural incidence of fungal, viral and bacterial disease was recorded regularly. Initiation of anthracnose infection was observed in the non-colonised control plants at 30-35 days after transplanting. Black eye cowpea mosaic disease was observed on control plants at 35-40 days after transplanting. No disease was noticed in *P. indica*-colonised vegetable cowpea plants. Disease incidence was recorded at different intervals *viz.,* 45, 60, 75 and 90 days aftertransplanting. It was noticed that *P. indica* significantly reduced natural infection of aphid borne black eye cowpea mosaic virus, anthracnose and Cercospora leaf spot upto 70, 68.88 and 65.66 per cent respectively at 90 days after transplanting (towards the fag end of the crop). *P. indica*-colonised plants recorded increased root and shoot biomass. After 90 days, *P. indica*-colonised plants recorded a fresh shoot and root weight of 389 g and 65 g, whereas the control plants recorded only 250 g and 23 g respectively. *P. indica* also improved the number of root nodules by 41 per cent. The yield was also substantially increased in the colonised plants. Thus it is inferred that *P. indica*-colonised vegetable cowpea could tolerate natural incidence of fungal and viral diseases in addition to enhanced growth traits.

32. State Plan Project-Development of improved formulations of Biopesticides

(PI : Dr. Reji Rani O.P., Assistant Professor, Department of Agricultural Entomology)

Objectives :

1. To develop a tablet formulation of Entomopathogenic Fungus *Lecanicillium saksenae.*
2. To standardize the consistency and composition of the tablet.

3. Evaluate the effectiveness of tablet against a test insect

Major Research Highlights :

The constituents and percentage composition of mycotablets of L.saksenae were standardized . Bran or talc can be selected as carrier with suitable binding agent, lubricant, supplement and desiccant agents. The composition of each of these were standardized. Irrespective of the filler materials and the adjuvant composition all the components selected for preparing tablets did not affect the germination percentage, as there was 100 % germination in all combinations after 24 hours of preparation. The ideal moisture content and dissolution time was determined. The experiment is being continued.

Observational Trial

33. Initial evaluation trial of ginger genotypes for yield and quality

(P.I. Dr. Sreekala G.S., Assistant Professor, Dept of Plantation Crops & Spices, College of Agriculture, Vellayani)

Objectives :

1. To evaluate ginger accessions for yield and quality

Major Research Highlights :

The observational trial "Initial evaluation trial of ginger genotypes for yield and quality" was undertaken in the Department of Plantation Crops and Spices, College of Agriculture, Vellayani, Thiruvananthapuram during the period from 2019 to 2020. Significant variation in plant height was observed in the ginger genotypes during 8 MAP. T_1 (Mananthavady) recorded the highest plant height (86.87cm) during 8 MAP which was on par with T_{13} (Sultan bathery) and T_{14}(Murickkashery) genotype which had a plant height of 85.12cm and 84.57cm respectively. Highest number of tillers (10.25) was observed in T_7 (Kothamangalam) which was on par with T_{14} (Murickkashery) genotype (9.75) during 8MAP. Leaf length was the highest (23.67 cm) in T_6 (Ambalavayal) genotype. At 8 MAP, T_4 (Haripad) recorded the highest leaf breadth of 2.87cm, which was followed by T_{11}(Kazhakootam) genotype.Leaf area was highest (37.21 cm^2) in T_{11}(Kazhakootam) which was on par with T_1 (Mananthavady) with a leaf area of 36.55 cm^2 at 8 MAP.

The mean fresh yield per plant varied from 0.036 to 0.113 kg. The highest fresh yield per plant (0.113 kg) was observed in T_{16} (Pozhuthana), followed by T_{13}

(Sultan bathery) genotype (0.094 kg). Genotypes such as T_{11}(Kazhakootam) and T_1 (Mananthavady) recorded an yield of 0.084 and 0.078 kg per plant and these four genotypes recorded significantly higher mean fresh yield than control variety T_{22} (Aswathy) which had a per plant fresh yield of 0.077 kg. The dry yield per plant varied from 0.0104 to 0.0213 kg. The highest dry yield per plant (0.0213 kg) was noted in T_{16} (Pozhuthana) genotype followed by T_{11} (Kazhakootam) (0.0195 kg) genotype.

Fig. 1 Ginger genotypes in the field 2019-2020

Essential oil content of the ginger genotypes varied from 0.88 to 1.97 per cent. The highest percentage of essential oil content was observed in T_{20} (Thalavur) genotype (1.97%) followed by T_{16} (Pozhuthana). Oleoresin among genotypes varied from 4.26 to 9.35 per cent. Significantly superior oleoresin content was observed in T_{16} (Pozhutana) (9.35%) which was on par with T_{12} (Irinjalakkuda) and T_{17} (Kalliyur) genotype. Thus in terms of yield and quality T_{16} (Pozhuthana) was superior.

ALL INDIA CO-ORDINATED RESEARCH PROJECTS (AICRP)

1. AICRP on Nematodes in Agriculture

(PI : Dr. Nisha M.S., Assistant Professor, Department of Nematology)

Objectives :

1. To identify endemic areas of economically important crops showing major nematode problems in *hitherto* unexplored areas of the country; and documentation of emerging nematode problems through molecular diagnostic tools and sustained surveillance all over the country.
2. To prepare inventories on nematode dissemination through planting materials and sharing with concerned government departments for strict compliance of phyto-sanitary provisions.
3. Priority testing of new green molecules against major nematode pest of crops through special emphasis on crops grown under protected cultivation systems, fruit crops, vegetable crops, spices and ornamentals.
4. Development of indigenous biocontrol agents for major phytonematodes
5. To develop root knot nematode resistant cultivars of rice; and identify sources of nematode resistance in other crops.
6. To isolate, identify and develop indigenous strains of entomopathogenic nematodes for the management of major insect pests of crops.
7. Special drive to impart training to farmers on nematode damage symptoms, dissemination and management technology.

Major Research Highlights :

1. A.I. Diversity and distribution mapping of economically important plant parasitic nematodes in the country

Survey conducted in Thripunthura, Kodanad, Kothamangalam, Moovattupuzha, Aluva, Vazhakkulam blocks in Ernakulum and Aryad block of Alapuuzha revealed presence of lesion nematode, *Pratylenchus coffeae,* root-knot nematode, *Meloidogyne incognita*, spiral nematode, *Helicotylenchus dihystera*, lance nematode, *Hoplolaimus indicus* and reniform nematode, *Rotylenchulus reniformis* in banana. *M. incognita* and *R. reniformis* were the major nematodes associated with vegetables. Occurrence of *M. incognita, R.reniformis P.coffeae, H. dihystera* and *H. indicus* were observed in pepper, ginger and turmeric. In Thumboli area of Alappuzha district highest population of *M. incognita* (range- 210-440 J_2/200cc soil with 80% frequency of occurrence) was observed in ginger, while in Poomkavu area population of *R. reniformis* (210-400/

200cc soil) was high. Samples collected from rhizhosphere of Pepper from Muvattupuzha area of Ernakulm district recorded high population of *M. incognita* (230-440 J_2/200cc soil).

2. **B.D.1. Demonstration on management of root-knot nematode (*Meloidogyne graminicola*) in rice**

In rice, result of the demonstration trial conducted in farmer's field revealed that soil solarization of nursery bed with 25µm polythene sheet for 15 days during May/June significantly reduced the nematode population (61.54 per cent reduction over untreated) and increased the yield (85.30 per cent increase over untreated).

3. **C.2. Management of root-knot nematode, *M. incognita* infesting vegetable cowpea using bioagents.**

In cow pea, soil application of *Purpureocillium lilacinum* (CFU $2x10^6$/g) @ 20 g/m^2+ neem cake @100 g/m^2 was found effective in reducing the nematode population in soil (85.77 per cent reduction over untreated) and root (76.88 per cent reduction over untreated). Pod yied increasing the yield (57.48 per cent increase over untreated). Highest per ha yield (26.5 tones) was recorded in *P.lilacinum*+ neem cake treatment. So *P.lilacinum* in combination with neem cake can be recommended for the management of *M. incognita* in cowpea.

4. **C.4/C.5. Management of *Meloidogyne incognita/M. javanica* in okra through bioagents**

Result of experiment to test the effect of bio fumigation with cauliflower leaves@25 t/ha alone and in combination with seed treatment using bio agents (*P. lilacinum*, *Pochonia chlamydosporium, Pseudomonas putida, Bacillus megaterium* and *P. flourescens*) and seed soaking with carbosulfan 25 EC@0.2% for 12 hours for the management root-knot nematode in okra revealed that maximum reduction in nematode population in soil (91.36 per cent reduction over untreated) and root (78.75 per cent reduction over untreated) was recorded in biofumigation with cauliflower crop residues @25t/ha+seed treatment with *P.lilacinum* @5g/kg seed. Lowest root-knot index (1.41) and highest yield was recorded in biofumigation with cauliflower crop residues @25t/ha+seed treatment with *P. lilacinum* @5g/kg seed.

5. **CD.1. Demonstration of Efficacy of bioagents in the management of *Meloidogyne* species in bitter gourd**

Result of the demonstration trial to test the efficacy of bioagent conducted in two locations in farmer's field revealed that application of *P. lilacinum* (cfu 2x 10^6) @ 2.5 kg along with 2.5 tons of FYM / ha + *Pseudomonas fluorescens* (cfu 2x 10^6) @ 2.5 kg along with 2.5 tons of FYM / ha reduced nematode population (76.89 per cent reduction over untreated) and increased yield (58.24 per cent increase over untreated) in bittergourd.

6. **H.7. Evaluation of new chemical molecules against *Meloidogyne incognita* infecting cucumber in polyhouse**

Fluensulfone @ 1.5 g (product)/plant one DAT, again 25 DAT by ring method manually and fluopyram 400 SC @ 250 g a.i./ha one DAT, again 25 DAT (200 ml/plant) manually was statistically on par in reducing the nematode population (soil and root) and number galls of salad cucumber under polyhouse condition (50 to 93 per cent reduction over untreated). Highest yield was recorded in Fluensulfone @ 1.5 g (product)/plant one DAT, again 25 DAT by ring method manually which was significantly superior to all other treatments.

7. **Coordinated trial on exploitation of potential biocontrol agents from different agro climatic regions of India**

Among forty five indigenous bacterial isolates isolated from rhizhospere of cow pea, four showed 88.33 to 96.67 per cent egg hatching inhibition and 98.50 to 100.00 per cent juvenile mortality of *Rotylenchulus reniformis* under *in vitro* condition. In pot culture study, the four isolates showed 87.35 to 91.45 per cent reduction in total number of nematodes than control, reduced egg mass number (1.75 to 7.00) and reproduction factor less than 0.50. Molecular characterization was done and based on the BLAST analysis, the isolated bacterial sequences were identified and deposited in NCBI as *Lysinibacillus capsici* strain NSK-KAU (accession number - MT509533), *Bacillus paramycoides* strain NSK-KAU (accession number - MT510176), *Bacillus thuringiensis* strain NSK-KAU (accession number - MT509428) and *Bacillus sp.* strain NSK-KAU (Accession number -MT510172).

2. AICRP on Forage Crops & Utilization

(PI : Dr. Usha C. Thomas, Assistant Professor & Officer i/c, AICRP on Forage Crops)

Concluded AICRP trials 2018-19 - 2

1. Studies on carbon sequestration in perennial grass based cropping systems

The trial was laid out in Kharif 2015, First year was considered as establishment period and the observations were taken from Kharif 2016 onwards. Treatments are T_1- BN hybrid sole, T_2-Guinea Grass sole, T_3-BN hybrid paired row+ fodder cowpea, T_4-BN hybrid paired row+Desmanthes, T_5-BN hybrid+ Agase, T_6-Guinea Grass+ fodder cowpea, T_7- Guinea Grass+ Desmanthes, T_8- Guinea Grass+Agase. The study was concluded in June 2019.

Technology recommendation by ICAR (Rabi NGM Proceedings, June 1, 2020 of AICRP on Forage Crops)

In Kerala, perennial grass based cropping systemBajra Napier hybrid grass in paired rows (60/120 cm) with *Sesbania grandiflora* is recommended for achieving higher yield, net return and total carbon sequestration

2. Intensive forage production through Agase based (*Sesbania grandiflora*) cropping system under protective irrigation.

The trial was laid out in Kharif 2015, First year was considered as establishment period and the observations were taken from Kharif 2016 onwards. Treatments are T_1-Agase+ Congo signal(2:2), T_2- Agase + Rhodes grass(2:2), T_3- Agase + Guinea grass(2:2), T_4- Agase+ Napier Bajra (2:1), T_5- Agase+Setaria(2:2), T_6- Agase+perennial fodder Sorghum(2:5), T_7-Agase sole. The study was concluded in June 2019.

Technology recommendation by ICAR (2020 Rabi NGM Proceedings, June 1, 2020 of AICRP on Forage Crops)

In Kerala, Agase inter-cropping with Setaria grass (2:2) or BN Hybrid (2:1) is recommended higher fodder productivity, economic returns and sustainability**.**

Ongoing Forage Crop Production Trials - 4

1. Studies on the performance of top feeds under varied planting geometry with and without intercrop

A field experiment was laid out during 2017, to assess the performance of different plant species as top feed, standardize their population under sole and intercropping system green forage yield. The experiment was laid out in split-split plot design with three replications. The treatments consisted of two cropping systems-sole crop and intercrop of bajra napier hybrid, three top feed species- agase, moringa and erythrina and three planting geometry- 2X1 m, 2X0.5m and paired system. The results of first year data indicated that among the main crops sole crops produced higher green fodder yield and in terms of total productivity, intercropping proved to be better. Among topfeeds agase proved to be better and among planting geometry, planting top feed species at 2X 0.5m spacing proved most suitable.

2. Studies on organic source of nutrient on green forage yield and quality of Cowpea- Fodder maize under irrigated situation.

A field experiment was started during kharif-2019 to study the effect of organic source of nutrients on forage yield, quality and soil properties and to compare the economics of organic source with inorganic in fodder cowpea-Maize cropping system. The treatments included are T_1-100% RDN through inorganic fertilizers, T_2-100% RDN through FYM, , T_3-75% RDN through FYM+ 25% RDN through vermin compost, T_4-75% RDN through FYM + 25% RDN through bio-compost, T_5-50% RDN through FYM + 50% RDN through vermin compost, T_6-50% RDN through FYM + 50% RDN through bio-compost, T_7-75% RDN of T_2 (both source), T_8-75% RDN of T_3 (both source), T_9-75% RDN of T_4 (both source), T_{10}-75% of RDN T_5 (both source), T_{11}-75% RDN of T_6 (both source) and T_{12}-50% RDN through FYM+ 25% RDN through vermin compost + 25% RDN through poultry. The trial was laid out in Randomized block design with replicated thrice.

The data revealed that among organic nutrient sources, application of 75% RDN through FYM + 25% RDN through bio-compost (T_4) recorded higher total green forage (577.0 q/ha), dry matter (127.0 q/ha) and crude protein yield (17.7 q/ha). The same treatment recorded higher net monitory returns (59613 Rs/ha) and B: C (1.9).

3. Evaluation of promising fodder grass varieties under shade conditions

The study was sanctioned in Kharif 2020 and the objective of the study was to assess the influence of different shade levels on the growth, quality and yield of promising fodder grass varieties.2020-2021 is the establishment year and data will be recorded from June 2021.

4. Standardization of Magnesium nutrition in Bajra Napier Hybrid

The study was laid out in Rabi 2020 to assess the impact of varying doses and frequency of application of $MgSO_4$ on the growth, yield and quality attributes of hybrid napier. The study is in progress.

Plant Breeding- Kharif trials 2019-20 - 5

1. **Initial Varietal Trial in Forage Maize**
   Among nineteen accessions, IVTM-2 (268 q/ha) recorded highest green fodder yield.
2. **Initial Varietal Trial in Fodder cowpea.**
   Among nine accessions, IVTC-9 (264 q/ha) recorded highest green fodder yield.
3. **Advanced Varietal Trial-1 in fodder cowpea.**
   Among six accessions, AVTC-1-1 (269 q/ha) recorded highest green fodder yield.
4. **Initial Varietal Trial in Fodder Rice bean**
   Among seven accessions, IVTRB-6 (117 q/ha) recorded highest green fodder yield.
5. **Advanced Varietal Trial-1 in Fodder Rice bean**
   Among four accessions, AVTRB-1-3 (132 q/ha) recorded highest green fodder yield.

Rabi Trials 2019-2020 - 2

1. **IVT Oat (SC) Initial Varietal Trial in Oat (Single Cut).**
   Among fourteen accessions, IVTO (SC)-10(530 q/ha) recorded highest green fodder yield.
2. **AVT Oat (SC)-1 Advanced Varietal Trial in Oat (Single Cut)**
   Among thirteen accessions, AVTO-3 (870q/ha) recorded highest green fodder yield.

Summer Trial 2019-20 - 1

1. **AVT Bajra (Multicut):**

Advanced Varietal Trial in fodder bajra (multicut) in summer - Among six accessions, AVTBJ-MC-2 (216.75 q/ha) recorded highest green fodder yield.

Perennial Trial - 1

1. VT BxNBajra Napier Hybrid

Started in 2019. Sixteen accessions planted and are being evaluated.

In-house breeding trials

Comparative yield trial of fodder cowpea accessions were undertaken in Kharif 2019 season and one accession (VFC-1) has out yielded the check variety Aiswarya by 11.3% . This accession is proposed to be advanced to Farm trials for evaluation in the next season.

Extension programmes

Fodder Technology Demonstration (FTD)

To popularize the fodder production technologies and make the farmers aware about new fodder crop varieties, a total of 40 FTD's were allotted to Vellayani centre during 2019-20 for the crop- BN hybrid variety Suguna.

3. AICRP on Honeybees and Pollinators

(PI : Dr. Amritha V.S., Assistant Professor, Department of Agricultural Entomology)

Objectives :

1. To undertake need based apicultural research on problems faced by beekeepers in the southern part of the country.
2. To standardize advanced scientific technologies in bee management, bee health, bee pollination, in *Apis cerana indica*, *Apis mellifera*, stingless bee *Tetragonula iridipennis* and value added products of honey.
3. Transfer of technology to beekeepers through training programmes.
4. Teaching apicultural course to the students.

1. Bee Pollination: Utilization of specific pollinators in protected cultivation

Significant increase in per cent fruit set was observed in stingless bee pollinated crop (76%) compared to hand pollinated one (54%) whereas the qualitative yield parameters like per cent malformed fruit, length and diameter of fruit were statistically on par. With regard to the quantitative yield parameters significantly higher single fruit weight, number of seeds per fruit and germination per cent (2 DAS) (685.00 g, 344.10 seeds/ fruit and 90.60 % respectively) was recorded from the stingless bee pollinated crop than that of the control crop (555.00 g, 210.90 seeds/ fruit and 63.00 %

respectively). Thus, augmentative pollination with stingless under protected cultivation resulted an increased yield of 61 per cent in *C. sativus*.

2. Field evaluation of alternative pollinators under protected cultivation: Stingless bee-crop chilli

Pollination efficacy of stingless bee in chilli was studied in pot culture experiment in field, three treatments were stingless bee pollinated, open pollinated and self-pollinated ones.

Significant difference was observed between number of fruits per plant and yield per plant (Kg) among all the treatments. The highest number of fruits per plant and yield per plant was in stingless bee pollinated treatment (80 Nos. and 0.81 Kg) followed by open pollination (68 Nos. and 0.57 Kg) and self-pollination (59 Nos. and 0.48kg) respectively. Increased fruit weight and percent fruit set was also recorded in stingless bee pollinated treatment followed by open and self-pollination.

3. Palynology: Stingless bees

Melissopalynological studies on stingless bee *Tetragonula travancorica* (Apidae: Meliponini)was conducted to study the foraging activity of stingless bee,*T. travancorica* and to identify its floral pollen resources occurring in Thiruvananthapuram districtduring the three seasons, viz. north-east monsoon season (October- December), dry season (January- May) and south-west monsoon season (June- September). The collected samples were processed and analysed using standard acetolysis procedure recommended by the International Commission for Bee Botany (Louveaux*et al*., 1978). In the study, out of 115 plant types recorded as foraging sources, 93 were identified. Sixty-seven plants were identified up to the species level, 16 to genus level and 10 up to family level.Most frequently observed pollen type in honey sampleswere *C. nucifera* and *M. pinnata* whereas *C. nucifera* and *M. pudica* were very frequent in pollen samples common to all seasons.

4. Pollen production potential : *Apiscerana indica*

As a part of the pollen production potential of Indian bee, *Apiscerana indica,* a suitable pollen trap for Indian bee was designed.

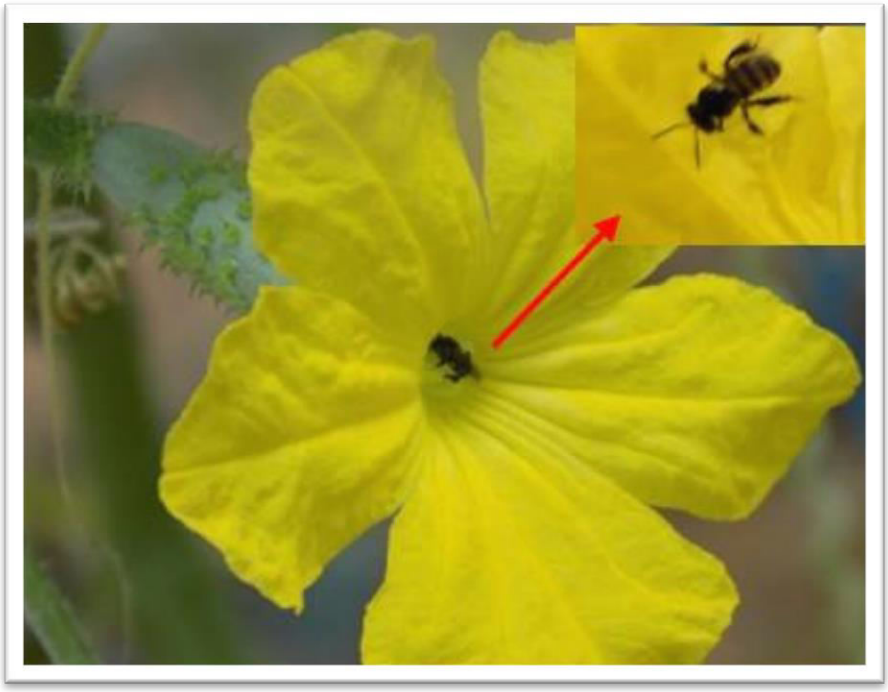


Fig. 1 Stingless bee pollination on salad cucumber

Fig. 2 Stingless bee hive in polyhouse (crop: salad cucumber)

Fig. 3 Stingless bee pollination on chilly

4. AICRP on Mushrooms

(PI : Dr. Heera. G., Assistant Professor, Department of Plant Pathology)

Objectives :

The main objectives are

1. To conduct survey of naturally occurring wild mushrooms, cataloguing of the edible / medicinal species
2. To evaluate the promising and high yielding strains for regional adaptability
3. Standardisation of cultivation techniques
4. Exploring the possibility of using locally available materials as substrates
5. Supply good spawn to the mushroom growers
6. Popularization of mushroom cultivation in different agro ecosystems

Major Research Highlights :

Expt. 1: Collection, identification and conservation of wild edible mushrooms.

Surveys were conducted in different parts of Thiruvananthapuram and Kollam districts. A total of twelve specimens were obtained. These were isolated and brought into pure culture. Cultures of these specimens were sent to DMR and accession numbers obtained for four cultures. These include Calocybe, Tricholoma, *Volvariella volvacae, Lentinus squarrosulus,* Cyathius, *Pleurotus tuber regium*, Auricularia, *P. eous* etc. The promising edible species of mushrooms were evaluated for the suitability of the cultivation.

Expt. 2: Advanced varietal trial-1 of high yielding varieties/strains of oyster mushroom (*Pleurotus* spp.) (PL-19-101 to PL-19-107)

The advanced varietal trial for *Pleurotus* sp. PL-19-101 to PL- 19-107 was carried out in December 2019. The strain PL-19-105 with minimum days for spawn run , first harvest and good yield attributes was identified as a promising strain. PL-19-105 had the maximum biological efficiency of 73.25%. The strain PL-19-106 had the maximum fruiting body weight. The strain PL-19-101 was a poor yielder.

Expt 3: Advanced varietal trial-2 for high yielding strains of milky mushroom (CI-19-101 to CI-19-107).

The advanced varietal trial for milky mushroom strains CI-19-101 to CI-19-107 was laid out in March 2020. Among the different strains CI-19-103 took minimum days for spawn run and first harvest. CI-19-103 and CI-19-106 were on par with a biological efficiency (71.12 and 60.14 %) and highest fruiting body weight. The strain CI-19-103 with minimum days for spawn run, first harvest and maximum yield was identified as promising strain of milky mushroom.

Expt 4 : Advanced varietal trial – 1 for strains of paddy straw mushroom, *Volvariella volvaceae* VV-19-101 to VV-19-106

The advanced trial for high yielding strains of Volvariella was laid out. A promising strain VV-19-103 was identified.

Expt 5. Extension activities – Awareness and Training programmes

Four one day awareness programme on mushroom cultivation were conducted to various participant's *viz.,* unemployed youth, women / housewives and senior citizens. One two day training was conducted at AICRP on Mushrooms, Vellayani with 36 participants. As part of SC Sub Plan, trainings were conducted in different parts of Thiruvananthapuram. Improvement of livelihood and social empowerment of women

belonging to marginal and low income group were conducted at Kuttichal and Peringamala with 50 participants. A total of 225 participants has been benefitted from mushroom training. An off campus training was conducted at KVK Mitranikethan for the progressive mushroom growers. A video on mushroom spawn and bed preparation was prepared by KAU and uploaded into the web site. The problems of the mushroom growers were addressed directly or over telephone and email. AICRP on Mushrooms also participated in the three exhibitions conducted at different parts of Thiruvananthapuram.

Sales

813 kg spawn; 21 kg mushroom and 92 kg compost spawn were sold from the centre.

5. AICRP on Biological Control of Crop Pests

(PI : Dr. Reji Rani O.P., Assistant Professor, Department of Agricultural Entomology)

Objectives :

1. To validate the efficacy of chitin enriched formulation of KAU isolate of *Beauveria bassiana* (ITCC 6063), against the major pest of rice, Rice leaf roller *Cnaphalocrocis medinalis*
2. To assess the comparative efficacy of KAU isolate of *Lecanicillium saksenae* (ITCC Ls Vs 1 7714) with NBAIR isolates of *L.lecanii*, *M. anisopliae* and *B. bassiana* in the management of major sucking pest of rice *Leptocorisa acuta*
3. To monitor the population build up of Rugose white fly in coconut and to study the biotic and abiotic factors associated with it.
4. Evaluation of biocontrol methods for the management of rugose spiralling whitefly in coconut

Major Research Highlights :

Experiment I:Improved formulation of *B.bassiana* against Rice leaf roller *Cnaphalocrocis medinalis*

Chitin enriched oil formulation of *Beauveria bassiana* ITCC 6063 (KAU isolate) was effective in managing the rice leaf roller. Prior to treatment the mean population per plot ranged from 18.75 to 25.50 per 10hills/plot , while it was reduced to 0 to 5 after two sprayings. Effect of treatment was reflected only after one week. There was no leaf rollers at the end of the experimental period (14 days after second spraying), in the treated. Negligible count (0.5 larvae per 10 hills) was noted with chitin enriched oil formulation of NBAIR isolate of Beauveria (Bb5).

Experiment II Comparative efficacy of entomopathogenic fungi against sucking pests of rice, *Leptocorisa acuta*

Analysis of data revealed that *L.saksenae*the indigenous isolate from Vellayani @ 10^7 spores ml^{-1}, was the best treatment to manage *L.acuta* population, when sprayed twice at the panicle initiation and milky stage of the crop. NBAIR isolate Bb5 which ranked second could also control *L.acuta* and these treatments were superior to thiamethoxam. However Ma 4 and Vl8 of NBAIR was infective in managing *L.acuta* and were inferior to thiamethoxam. The precount in experimental plot was 30to35.5 bugs per 5 sweeps per plot while it was successfully reduced to 0 to 12.75 in the treatment plot. It is notable that the bug population was nil in the *L.saksenae* treated plots after the second spraying . Data on mean count of natural enemies which included the total count of spiders, coccinellids, scarbids and mirid, revealed that the population did not vary among treatments.

Experiment III Surveillance of Rugose white fly in coconut and as the population of natural biocontrol agents

Observations recorded for a period of 10 months revealed that, the pest population is dwindling between low and severe levels. The peak was noted during December 19 to February 2020. Three species have been observed the spiralling white fly *Aleurodichus rugioperculatus,* and the nesting whiteflies *Paraleurodes mineyi* and *P. bondari.* Whenever the parasitisation percentage was less (28.74) it was observed that the predominant species were nesting whiteflies. During those months when *A. rugioperculatus* was more, parasitisation was high (75.72 %).

Experiment IV Biological suppression of rugose spiralling whitefly in coconut.

Percentage reduction i number of spirals was maximum in water spray (37.01%) followed by natural conservation 27.18%). Palms treated with *Isaria* had 27.18 % reduction in live spirals. Neem oil 0.5 % was least effective (20%). Reductionin population of adults was higher in water spray (25.2%) followed by natural conservation of parasitoids (24.64 %). *Isaria* could reduce the population by 23.67 % while neem oil 0.5% was less effective (12.61%). However, parasitisation was found to be greatly reduced when treated with *Isaria* treatment (68.8 %). Water spray and neem oil 0.5% did not affect the parasitisation efficacy of *Encarsia*

6. AINP on Soil Biodiversity - Biofertilizers - Integration of Biofertilizer Technology with farming practices of tribal farmers of Attappady

(PI : Dr. K. N. Anith, Professor, Department of Agricultural Microbiology)

Objectives :

1. Mass production and distribution of Biofertilizer organisms such as *Azospirillum*, *Azotobacter,* AMF, P solubilizers and PGPR MIX-I developed by KAU for cashew , millets and vegetables cultivated by tribal farmers.
2. Field trials at different locations of Attappady to demonstrate the beneficial effects of microbial inoculants.
3. Training to create awareness on beneficial aspects and method of application of biofertilizers to tribal farmers, SHG's and Extension officials.
4. Publication of bulletins in vernacular language for dissemination of biofertilizer technology among tribal farmers.
5. Isolation and evaluation of native efficient strains of biofertilizer organisms such as *Azospirillum*, *Azotobacter* and *Rhizobium* from Attappady hill tract.

Major Research Highlights:

Mass production and distribution of Biofertilizer organisms:

A consortium of NPK biofertilizers (PGPR Mix- I) developed by Kerala Agricultural University was mass multiplied and distributed to selected farmers of Attappady area. During 2019-20, a total quantity of 470 kg of PGPR Mix -I was distributed to 470 tribal farmers engaged in the cultivation of vegetables, pulses, banana, sorghum, groundnut, ragi etc. One kg each of PGPR Mix- I was distributed uniformly to the selected farmers.

Field trials at different locations of Attappady to demonstrate the beneficial effect of microbial inoculants:

Trials were conducted in vegetable crops at different locations of Attappady hill tract to demonstrate the effect of PGPR Mix -1. Local varieties of brinjal chilli, tomato and cauliflower popular among tribal farmers were selected. In the trials all solanaceous crops showed increase in number of fruits and yield due to application of PGPR Mix -1 compared to control. The incidence of pest and disease were also found to be less in plants treated with PGPR Mix 1. The field trials conducted till date in different areas of Attappady showed that PGPR Mix 1 is capable of increasing the yield by 20 to 30 % in different crops when integrated with the farming practices of tribal farmers. Fifteen isolates of Nitrogen fixers (including *Azotobacter* spp. and *Azospirillum* spp.), nine isolates of P- solubilizers, four isolates of K-solubilizers and four isolates of *Rhizobium* spp. were obtained from the soil samples collected from different areas of Attappady. Five isolates of potential bacterial biocontrol agents were also obtained. *In vitro* studies of the isolates are progressing.

6. All India Net work Project on Pesticide Residues

(PI : Dr. Thomas George, Professor & Head, PRRAL)

Objectives :

1. To study the dissipation of pesticides in crops by conducting supervised field trials using recommended pesticides and to work out safe time limits between pesticide application and harvest of the produce.
2. To devise simple, sensitive and cost effective analytical methodology for quantification of pesticide residues and their degradation products in different components of the environment.
3. To maintain up-to-date information on pesticide residues and to provide guidelines in this regard to research and extension workers in the country.

Major Research Highlights:

1. Status of NABL Accreditation of Laboratory

Re assessment of the laboratory under ISO 17025:2017 was conducted on 18-19 January, 2020 and was granted accreditation w.e.f. **12.03.2020 up to 11.03.2023**. By this, the laboratory can issue test results with NABL logo, for the level of pesticide residues estimated in various commodities, including water, fresh fruits, vegetables, cereals, pulses, spices, meat, milk up to a maximum of 97 pesticides.

2. Results / Z-score obtained in the national and international PT programme

ISO 17025 accredited laboratories are required to take part in proficiency testing (PT) programs to demonstrate performance, competence and excellence. Accordingly PRRAL has participated in four PT programmes and secured satisfactory Z-scores.

PT/ ILC programme conducted by	Commodity	Pesticide Detected	Z-score
National Institute of Plant Health Management	Water	Quinalphos	0.03
National Institute of Plant Health Management	Guava	Acephate	1.21
		Acetamiprid	-0.17
		Fenvalerate	-0.22
		Imidacloprid	0.65

National Institute of Plant Health Management	Guava	Malathion	-1.14
		Monocrotophos	-0.19
		Quinalphos	-0.13
		Thiamethoxam	-0.09
National Institute of Plant Health Management	Red Gram	Buprofezin	0.14
		Chlorpyriphos	-0.03
		Dicofol	-1.48
		Fenpropathrin	-1.12
		Fenvalerate	-1.25
		Monocrotophos	0.42
		Tricyclazole	0.33
National Institute of Plant Health Management	Okra	Bifenthrin	-2.03
		Chlorpyriphos	-0.96
		Ethion	-0.9
		Fenpropathrin	-2.07

3. Dr. Thomas George and Dr. Ambily Paul received the **"Best Team Research Award-2019"** in recognition of the outstanding research contributions by KAU.

4. KAU centre hosted 13 th Annual workshop of CSS on MPRNL and 27th workshop of AINP on PR from 2-3rd August, 2019 at Kovalam

2. Supervised field trials

(PI : Dr. Thomas George, Professor & Head, PRRAL)

Objectives :

1. To study the dissipation of residues of newer molecules for data generation and registration.
2. The laboratory has generated data under supervised field trials on persistence and dissipation behaviour of new pesticides on different crops under Kerala conditions. The data generated have been used for the registration of the pesticides in the country, label expansion purposes as well as for the fixation of the MRL value on the particular crop. A total of 80 trials have been completed during the period.

Major Research Highlights :

Sl. No	Crop	Pesticide	Days taken to reach BDL		Half life (days)	
			Recommended	Double the recommended	Recommended	Double the recommended
1	Brinjal	Sivanto prime (Flupyradifurone 200 SL) in Brinjal Dose-875 g ha^{-1} (X), 1750 g ha^{-1} (2X).	35	35	9.347	8.818
2	Paddy	Azoxystrobin 8.3%+ Mancozeb 66.7% WG (Avancer Glow) Dose Rate (g a.i./ha)-175 (x), 350(2x)				
		Azoxystrobin	----	----	6.672	12.293
		Mancozeb	---	----	6.080	5.842
3	Tomato	Tebuconazole 430 SC Dose Rate (g a.i./ha)- 268.75 (x), 537.5 (2x)	30	30	6.00	5.800
4	Paddy	Mancozeb 52.6 % + Hexaconazole 2.4% WG (UPF 9b) Dose Rate (g a.i./ha)- 2000(x), 4000(2x)				
		Mancozeb	45	45	4.371	3.907
		Hexaconazole	45	45	7.747	7.064
5	Tomato	GPI 1316 (Novaluron 9.45%+Lambda-cyhalothrin 1.9% ZC)in Tomato Dose –ml/ha - 750(x), 1500(2x)				
		Novaluron	10	10	2.26	5.42
		Lambda-cyhalothrin	7	7	9.92	5.81
6	Tomato	Azoxystrobin 8.3%+ Mancozeb 66.7% WG (Avancer Glow) in Tomato Dose Rate (ml/ha)- 1500(x), 3000(2x)				
		Azoxystrobin	---	---	5.91	5.18
		Mancozeb	---	---	4.21	4.40

7	Cucumber.	Azoxystrobin 4.7%+ Mancozeb 59.7% Wg+ Tebuconazole 5.6% WG (GPF 215) Dose Rate (ml/ha)- 2000(x), 4000(2x)				
		Azoxystrobin	3	5	1.79	3.59
		Mancozeb	1	1	----	----
		Tebuconazole	7	10	3.10	3.27
8	Paddy	Thiamethoxam 25WG (Actara 25%WG) in Paddy .Dose Rate (g a.i./ha)- 25(x), 50(2x)	14	14	2.36	2.14

Photographs

1. KAU centre has hosted 13 th Annual workshop of CSS on MPRNL and 27th workshop of AINP on PR from 2-3rd August, 2019 at Kovalam

2. Published a book on "Pesticide residue research in Kerala-at a glance" during AINP workshop-2019

3. Received BEST TEAM RESEARCH AWARD-KAU -2019

National Accreditation Board for Testing and Calibration Laboratories

NABL

CERTIFICATE OF ACCREDITATION

ALL INDIA NETWORK PROJECT ON PESTICIDE RESIDUES, COLLEGE OF AGRICULTURE

has been assessed and accredited in accordance with the standard

ISO/IEC 17025:2017

"General Requirements for the Competence of Testing & Calibration Laboratories"

for its facilities at

VELLAYANI P. O., THIRUVANANTHAPURAM, KERALA, INDIA

in the field of

TESTING

Certificate Number: TC-5721

Issue Date: 12/03/2020 Valid Until: 11/03/2022

This certificate remains valid for the Scope of Accreditation as specified in the annexure subject to continued satisfactory compliance to the above standard & the relevant requirements of NABL.

(To see the scope of accreditation of this laboratory, you may also visit NABL website www.nabl-india.org)

Signed for and on behalf of NABL

N. Venkateswaran
Chief Executive Officer

4. Extended NABL accreditation under ISO 17025:2017 up to 2022.

PROJECTS FUNDED BY OTHER AGENCIES

RASHTRIYA KRISHI VIKAS YOJANA (RKVY)

1. Establishment of National level Quality control lab for Honey

(PI : Dr. Amritha V.S., Assistant Professor, Department of Agricultural Entomology)

Objectives :

1. To establish laboratory facility for analysis of honey upto enzymatic level to assess the quality and serve as certifying laboratory for honey as per the approved national and international standards.
2. Rendering analytical and certifying services to beekeepers, institutions and entrepreneurs.
3. Serve as a Referral Laboratory for quality honey and adulteration identification.
4. Streamline the processing procedures for good quality hygienic honey production among the bee keepers of the state.
5. To equip unemployed youth/ women for the production of value added products of honey.

Major Research Highlights:

The construction of the building (6000 sq. ft.) for Quality Control laboratoryhas been completed. The equipments, LC MS/MS and HPLC have been purchased through e-tender. Two more equipments, FTIR and Lovibond colorimeter, furniture and fixtures have to purchased.

2. Development of technologies including alternatives for banned pesticides for the management of pest and diseases of major crops in Kerala. Subproject 2: Evaluation of selected Fungicides and bio pesticides for the management of pest and diseases of vegetables - Disease management

(PI : Dr. Joy. M., Professor & Head, Department of Plant Pathology)

Objectives :

1. Evaluation of new generation fungicides for effective and economical management of major diseases of vegetable crops.

Major Research Highlights :

a. Management of Fusarium wilt, Rhizoctonia root rot & web blight, and Pythium collar rot of vegetable cowpea

The ad-hoc recommendation of soil drenching of hexaconazole 5 EC - 0.2% or flusilazole 40 EC - 0.1% or carbendazim+mancozeb 75 WP - 0.3% at 20 and 40 days after sowing included in the package of practice of KAU for the management of Fusarium wilt and Rhizoctoniaroot rot & web blightof vegetable cowpeawere further field tested at Instructional Farm, Vellayani with the above concentrations and double the recommended dose. Based on the results of the residue studies at AINP on Pesticide Residue Lab Vellayani, with Pods / fruits harvested at 0, 1, 3, 5 and 7 days after drenching of the chemicals, the fungicides with label claim viz. hexaconazole 5 EC, flusilazole 40 EC, and carbendazim+mancozeb 75 WP may be included in the POP recommendations for the management of Fusarium wilt and Rhizoctoniaroot rot & web blightof vegetable cowpea.

b. Management of downy mildew disease of cucurbits (bitter gourd and snake gourd)

The ad-hoc recommendation of spraying pyraclostrobin 20 EC @ 0.5g/l and cymoxanil + mancozeb72 WP @ 2 g/l at fortnightly intervals twice after the symptom appearance for the management of downy mildew disease of cucurbits including bitter gourd and snake gourd and were further field tested at Instructional Farm, Vellayani. Based on the results of the residue studies at AINP on Pesticide Residue Lab Vellayani, with fruits harvested at 0, 1, 3, 5, 7, 10 and 15 days after spraying of the chemicals, the fungicides with label claim viz. pyraclostrobin and cymoxanil(blue labels) could be included in the POP recommendationsfor the management of downy mildew disease of cucurbits including bitter gourd and snake gourd with a waiting period of 3 days.

c. Management of Powdery mildew disease of cucurbits (bitter gourd or snake gourd)

The ad-hoc recommendation of 2 foliar sprays of tebuconazole 25.9% EC @ 1ml / l at fortnightly intervals after the symptom appearance for the management of powdery mildew disease of cucurbits including bitter gourd and snake gourd were further tested at field level at Instructional Farm, Vellayani. Based on the results of the residue studies at AINP on Pesticide Residue Lab Vellayani, with fruits harvested at 0, 1, 3, 5, 7, 10 and 15 days after spraying of the chemicals, the fungicide with label claim viz. tebuconazole (blue label) may be included in the POP recommendations for the

management of powdery mildew disease of cucurbits including bitter gourd and snake gourd.

d. Management of Cercospora leaf spot of bhindi

The ad-hoc recommendation of foliar spraying of tebuconazole 25.9% EC @ 1 ml / l and difenoconazole 25 EC @ 0.5 ml / l at fortnightly interval twice after the symptom appearance was further field tested at Instructional Farm, Vellayani. Based on the results of the residue studies at AINP on Pesticide Residue Lab Vellayani, with fruits harvested at 0, 1, 3, 5, 7, 10 and 15 days after spraying of the chemicals, the fungicides, tebuconazole and difenoconazol, with label claim (blue labels) could be included in the POP recommendations for the management of Cercospora leaf spot of bhindi.

3. Development of technologies including alternatives for banned pesticides for the management of pests and diseases of major crops in Kerala. Sub project - 9: Registration of Biopesticides

(PI : Dr. Reji Rani O.P., Assistant Professor, Department of Agricultural Entomology)

Objectives :

1. To register potential bioagents as per the Insecticide Act of CIB& RC.

Major Research Highlights :

Two potential bioagents, isolated from Vellayani Viz. Beauveria bassiana Accession No. ITCC 6063 and *Lecanicillium saksenae* Accession No. ITCC LsVs1 7714 has been proposed for toxicological studies. Expression of interest received through KAU website was scrutinized and the Committee constituted for the same has decided to accept the rate quoted by Indian Institute of Toxicological Research, Lucknow. Accordingly action has been taken up by the Director of Research to execute an MOU between KAU and IITR, to undertake the study. Later the Institute has withdrawn, for the want of publications on human safety. Further the Director of Research has invited EOI during 20-21 for which there were no respondents.

KERALA STATE COUNCIL FOR SCIENCE, TECHNOLOGY AND ENVIRONMENT (KSCSTE)

1. Synergism in Defense and Growth: Exploration of a root endophytic fungus *Piriformospora indica* for the management of *Fusarium* wilt in banana with enhanced crop production

(PI : Dr. Joy. M., Associate Professor & Head, Department of Plant Pathology)

Objectives :

1. Standardization of the co-cultivation of *P. indica* with major banana varieties grown in the state.
2. Determining the best stage of seedling to prime the roots with *P. indica*.
3. Evaluation of the primed banana seedlings (TC Plants) and suckers against *Fusarium. oxysporum f.sp.cubens* and *R. similis* for root and foliar infection of *Fusarium* (Panama) wilt.
4. Evaluation of the primed banana seedling against the natural incidence yellow and black sigatoka and other foliar diseases including major viral diseases.
5. The compatibility study of *P. indica* with commonly used pesticides in banana cultivation.
6. Mass multiplication and commercial formulation of *P.indica*.

Major Research Highlights :

The incidence of panama wilt disease in banana fields in the seven selected districts *viz.,* Thiruvananthapuram, Alappuzha, Kottayam, Ernakulam, Thrissur, Wayanad and Kasaragodvaried from 6.68 to 10.84. The lowest disease incidence was recorded in Thiruvananthapuram (6.68 %) and the highest in Thrissur (10.84 %). Nendran was the most susceptible variety. The pathogen isolated from the diseased samples and from BRSKannara and College of HorticultureVellanikkara; and the colonization efficiency of *P. indica*are being maintained. *P. indica*could endophytically colonize in different varieties of banana*viz.,*Nendran, Red banana, Robusta, Poovan, quintal banana and Monthan). The colonization efficiency and sporulation of *P. indica*was high in roots of Nendran. Antagonistic properties viz.,lysis, antibiosis, over growth and sporulation of *P. indica*against *F. oxysporum. f.sp. cubense* cultures were confirmed in different mediawhere both the fungi were grown and interacting.The water diffusible exudates of *P. indica* could also inhibit the growth of the pathogen. *In vitro* and *in vivo* evaluationof*P. indica*-colonised TC plants against*F. oxysporum. f. sp.*

*cubense*revealed cent per cent control of the panama wilt pathogen. The optimum stage of TC plants for *P. indica*-colonizationin roots were standardized in major banana varieties viz. Nendran, Red banana, Robusta, Quintal, Monthan etc. *P. indica*-colonised TC plants could establish and survive well under *in vivo* condition compared to the non-colonised TC plants. *P. indica*could significantly enhance growth and biomass production in banana TC plants. *P. indica*-colonized plants exhibited increasedplant height, number and size of leaves, and also robust growth compared to the non-colonized plants.*In vitro* compatibility study of *P. indica* with different pesticides (*viz.*, imidachlorpid, flubendamide,quinalphos, chlorantraniliprole, dimethoate, spiromesifen, difenthiuron, thiamethoxam, chlorpyriphose, carbendazim, strobulurins, triazoles, combination fungicidesetc. at 10, 25, 50, 100, 250and 500ppm of active ingredient) used in banana cultivation and also in other crops revealed that *P. indica* is compatible with most of the above pesticides tested even at 500 ppm except for organophosphorus pesticides and triazole fungicides. The best substrate for the growth of *P. indica* including potting mixture / portray mix has also been standardized. Efficient methodology for quick and rapid mass multiplication of *P. indica*in potting mixture / portray mix with a population of 4-12 x 10^8cfu / g of substrate in a week time has also been standardized. The experiment on assessing the shelf life of *P. indica* on different substrate indicated that *P. indica* is viable even after one and half year. The field trials to evaluate the effectiveness of *P. indica* against the natural incidence of panama wilt, fungal, bacterial and viral diseases at IF Vellayani, CRS Balaramapuram and FSRS Kottarakkara are initiated.

KERALA LIVESTOCK DEVELOPMENT BOARD (KLDB)

1. Establishment of fodder museum at College of Agriculture, Vellayani

(Dr.Usha C. Thomas, Assistant Professor, AICRP on Forage Crops & Utilization, RARS(SZ), Vellayani)

Objectives:

1. To establish a forage museum at College of Agriculture, Vellayani

Major Research Highlights:

A fodder museum is established at AICRP on Forage Crops & Utilization field at College of Agriculture, Vellayani with the financial assistance from Kerala Livestock Development Board during February 2020. 35 different fodder crops/ varieties suited for cultivation in Kerala are maintained in the fodder museum to sensitize different stakeholders including the students and visitors from outside.

List of Fodder Crops/varieties established in Fodder Museum

1. Fodder Maize (*Zea mays)*

2. Fodder Bajra (*Pennisetum americanum)*

3. Multicut Sorghum (TNFS 9602 X Sudan Grass) CO (FS) 29

4. Fodder ground nut (*Arachis pintoi)*

5. Fodder Cowpea (*Vigna unguiculata)*

6. Fodder Ricebean (*Vigna umbellate)*

7. Stylosanthes (*Stylosanthes guianensis)* var. CIAT-136

8. Bajra Napier Hybrid (*Pennisetum glaucum* × *P. purpureum)* var. Co-3

9. Bajra Napier Hybrid (*Pennisetum glaucum* × *P. purpureum)* var. Co-5

10. Bajra Napier Hybrid (*Pennisetum glaucum* × *P. purpureum)* var. Super Napier

11. Bajra Napier Hybrid (*Pennisetum glaucum* × *P. purpureum)* var. Suguna

12. Bajra Napier Hybrid (*Pennisetum glaucum* × *P. purpureum)* var. Supriya

13. Bajra Napier Hybrid (*Pennisetum glaucum* × *P. purpureum)* var. Susthira

14. Bajra Napier Hybrid (*Pennisetum glaucum* × *P. purpureum)* var. Killikulam

15. Bajra Napier Hybrid (*Pennisetum glaucum* × *P. purpureum)* var. Sampoorna

16. Guinea Grass (*Panicum maximum)* var. Haritha

17. Guinea Grass(*Panicum maximum)* var. Harithasree

18. Guinea Grass (*Panicum maximum)* var. Culture- 1

19. Guinea Grass (*Panicum maximum)* var. Culture - 2

20. Guinea Grass (*Panicum maximum)* var.Makueni

21. Guinea Grass (*Panicum maximum)* var. Hamil

22. Guinea Grass (*Panicum maximum)* var. Riversdale

23. Signal Grass (*Brachiaria decumbens)*

24. Congosignal (*Brachiaria ruziziensis)*

25. Coloured Guinea Grass *(Panicum coloratum)*

26. Setaria Grass *(Setaria sphacelata)*

27. Para Grass *(Brachiaria mutica)*

28. Gamba Grass *(Andropogan gayanus)*

29. Palisade Grass *(Brachiaria brizantha)*

30. Creeping Signal *(Brachiaria humidicola)*

31. Paspalum Grass *(Paspalum atratum)*

32. Agathi *(Sesbania grandiflora)*

33. Moringa *(Moringa oleifera)*

34. Subabul *(Leucaena leucocephala)*

35. Indian Coral Tree *(Erythrina indica)*

KERALA STATE SOCIAL SECURITY MISSION (KSSM)

1. Empowering Differently Abled Children through Horticulture Therapy and Social Farming

(PI : Dr. Beela G.K., Associate Professor, Department of Community Science)

Objectives :

1. To empower the differently abled children (15 years and above) through horticulture therapy and enable them to generate income through the skills attained.
2. To assess children's rehabilitation progress individually to formulate an entrance level functional rating to begin prevocational training.

Major Research Highlights :

A landscape design of the HT garden was designed to implement at College of Agriculture, Vellayani. The design consisted of the following structures like wheel

chair accessible pavements, separate gardens for vegetable plants, ornamental plants, sensory plants, herbal plants, adaptive structures for therapy like pergola, raised garden beds, hanging baskets, rotating pots, hanging baskets with pulley, vertical garden, round bench around the tree, hugging tree, garden bench, swing and umbrella.

Fourteen differently abled students were selected for the study . Students who have completed their 12^{th} grade and had medical board certificate for disability were selected for the study. Pre Horticultural therapy assessment were carried out . The students underwent Horticultural therapy training for one year.

After imparting the horticultural therapy training evaluation was conducted using the standardized psychomotor scales and social intelligence scale (VSMS). The scores were tabulated and was subjected to statistical analysis. Pre and post horticulture therapy psychometric scores were statistically analysed using SPSS software to evaluate the impact of Horticulture therapy in challenged children.

The Pre and post scores has been compared to find the impact of the horticultural therapy. The study concluded that the differently abled students that underwent horticultural therapy showed significant improvement in social intelligence and psychomotor functioning, Therefore Horticultural therapy can be recommended as a complimentary therapy for differentially abled students in their school curriculum.

INDIA METEOROLOGICAL DEPARTMENT (IMD)

1. Gramin Krishi Mausam Sewa (GKMS)

(PI : Smt Linitha Nair, Asst. Professor & Head, Department of Agricultural Meteorology)

Objectives :

1. Preparation and dissemination of Agromet Advisory bulletins to farmers using medium range weather forecasts received from India Meteorological Department

2. To validate the forecasts against the actual weather experienced

Major Research Highlights :

- District level Agromet advisory bulletins are prepared and uploaded in IMD website www.imd.gov.in on every Tuesdays and Fridays in English as well as in Malayalam for Thiruvananthapuram and Pathanamthitta districts

- Started issuing block level agroadvisories in English and Malayalam to eleven blocks of Thiruvananthapuram district

- Generation of crop specific agroadvisories based on district level medium range weather forecasts through agromet.imd.gov.in

- Sending email to scientists, government officials and progressive farmers

- Sending 1,22,231 nos SMS to farmers of Thiruvananthapuram and Pathanamthitta districts through mkisan.gov.in on every Tuesdays and Fridays

- Conducting FARMER AWARENESS PROGRAMME (FAP)

  Farmer Awareness programme is being conducted every year as part of this project "Gramin Krishi Mausam Sewa' (GKMS) at various locations in Thiruvananthapuram, Kollam and Pathanamthitta districts. During 2019-20 it was conducted in online mode at three panchayaths of Nedumangad block viz., Kudappanakunnu, Karakulam, and Panavoor

DEPARTMENT OF BIOTECHNOLOGY, MINISTRY OF SCIENCE AND TECHNOLOGY (GOVT. OF INDIA)

1. Development of Rice varieties for Kerala with pyramided genes for resistance to BLB by marker assisted selection

(PI : Dr. Jayalekshmy V.G., Professor & Head, Department of Seed Science & Technology)

Objectives :

1. Pyramid the genes of resistance to bacterial leaf blight (*xa 13, Xa 21, Xa 33 and Xa38*) into popular rice varieties Prathyasa and Aiswarya.
2. To evolve essentially derived varieties with durable resistance to bacterial Leaf blight (BLB).
3. Foreground selection for the genes using respective molecular markers.

Major research highlights :

The two popular rice varieties of Kerala "Aiswarya" from RARS Pattambi and Prathyasa from RRS Moncombu were selected as recipient recurrent parents. Donors selected were Improved Samba Mahsuryfor Xa21,xa13 and xa5, PR1146 for Xa38 and Samba Mahsuryintrogressed with Xa33. The recipients and donors were screened for

resistance to BLB under Kerala condition in RRS Moncombu. Since PR 146 with Xa 38 was found susceptible it was omitted from the programme.

BC_1F_1 plants of Aiswarya and Prathyasa the popular rice varieties, pyramided with 2/3 genes for resistance to Bacterial leaf blight and having maximum genome recovery of the recurrent parent were back crossed to raise BC_2F_1 plants . 149 BC_2F_1 plants of Aiswarya was screened for genes for resistance to BLB(xa13,Xa21 and Xa33).79plants with xa13gene,38plants with Xa21 and 28 BC_2F_1 plants pyramided with xa13 and Xa21 were located and five out of these had more than 80% genome recovery of the recurrent parent Aiswarya. In the 277 BC2F1 plants of Prathyasa screened, 78 plants with xa13,32plants with Xa21,8plants with Xa33,24plants with xa13 and Xa21,7plants with xa13 and Xa33 and 5 plants with xa13 ,Xa21 and Xa33 were located. Here seven plants with more than ninety percent and eighteen plants with more than 80% genome recovery of the recurrent parent Prathyasa were obtained. BC2F2 plants of these lines are carried forward for further evaluation.

Screening of BC_2F_2 could locate three plants in Aiswarya with three gene combination of xa5,xa13 and Xa21 and high recurrent parent genome recovery these were carried forward by selfing.BC_2F_3 plants were crossed to obtain BC_3F_1 as well as selfed to obtain BC_2F_4. In Prathyasa two BC_2F_2 plants with two gene combination (xa13 and Xa21) with maximum recurrent parent genome recovery was selected.

DEPARTMENT OF SCIENCE AND TECHNOLOGY - PROJECT UNDER WOMAN SCIENTIST SCHEME -A (WOS-A)]

1. Barcoding and Biosystematic Studies of Eulphoid wasps (Chalcidoidea: Eulophidae) associated with the Agro-Ecosystems of Kerala

(PI : Ms.Anju Krishnan. G, Department of Entomology)

Objectives :

1. Record hitherto known chalcid taxa and prepare inventories.
2. Exploration and collection of Eulophid wasps from major vegetable agro-ecosystems of Kerala.
3. Biosystematic studies: Identification, preparation of illustrations, descriptions and keys to all eulophid taxa, including new and undescribed ones.
4. DNA barcoding of Eulophid wasps obtained from different vegetable crop pests to develop a molecular taxonomy.

Major Research Highlights:

Twenty five Eulophid wasp specimens were collected from various Agro-ecosystems of Kollam and Thiruvananthapuram Districts.

Agricultural Crops Surveyed include Brinjal and cucurbitaceous vegetables.

Generic identification key to the Eulophid wasps reported from Kerala is being compiled from various reference sources.

MINISTRY OF HUMAN RESOURCE DEVELOPMENT (MHRD)

1. Design of a Surface-Enhanced Spectroscopy based Device for the Rapid Detection of Organophosphate Pesticides and Pyrethroid Insecticides in Fruits and Vegetables

(PI : Dr. Thomas George, Professor & Head, PRRAL)

Objectives :

1. Design of a Surface Enhanced Spectroscopy based Device for the Rapid Detection of Organophosphate Pesticides and Pyrethroid Insecticides in Fruits and Vegetables.

Major Research highlights :

A team of researchers from Indian Institute of Science Education and Research, Thiruvananthapuram in collaboration with Kerala Agricultural University proposes to develop a low cost, hand-held surface-enhanced spectroscopy based device for the detection of organophosphate pesticides and pyrethroid insecticides in fruits and vegetables.

The most important challenge for KAU research team in pesticide residue analysis is the effective removal of unwanted co-extractives from the extract without any loss of pesticide residues from complex matrices. This was achieved with satisfactory recovery of the pesticides using GCB (Graphitized Carbon Black). The research team has optimized the level of GCB for the removal of pigments from the selected matrices for selected pesticides at an amount of 200mg/sample, and the results on recovery were satisfactory. The efficiency of Z-Sep+ was also evaluated but it is not effective for removing coloured pigments. Another important challenge is to reduce the time taken for the preparation of extract. For this one of the commercially available extraction kits was tried and compared the cost, recovery and time taken for the

extraction and cleanup steps with normal QuEChERS method. It was concluded that the use of readymade kits were not of much advantages for reducing sample preparation cost and time. For reducing the time taken for the preparation of extract, surface washing was tried using Acetonitrile and Acetone as the extracting solvent. The pesticide residue dislodged with the solvent wash is 20%-50%. No direct correlation exist between the surface residue and total residue present, it is presumed that surface residue cannot be taken as a tool for assessing the total residue.

The research team of KAU developed a quick, low-cost and efficient method for the extraction of pesticides/insecticides with 90% recovery. The protocol for preparing processed vegetable extracts developed as a part of this project is cheaper than commercially available imported kits providing comparable processing time. A customised bench-top Raman spectrometer has been developed. A Raman spectral database (HTML based interface) with Raman spectra of pure pesticides, SERS spectra in the presence of nanoparticles and inteference matrices (vegetable extracts) has been completed. The project was selected as one of the 40 top performing projects under IMPRINT 1 scheme and participated in Exhibition cum Workshop conducted in IIT Delhi.

At present development of the software part of the instrument is going on and trying to correlate the results obtained from Raman spectroscopy based device with GC instrument.

DEPT. OF AGRICULTURAL DEVELOPMENT AND FARMERS WELFARE

1. Production and marketing of "Safe to Eat" vegetables and fruits for sale through government outlets

(PI : Dr. Ambily Paul, Assistant Professor, PRRAL)

Objectives :

1. Monitoring of pesticide residues in vegetables and fruits collected from government outlets, hyper markets and also from open market sand organic shops in Kerala and to provide the results in public domain periodically so as to make the consumers aware of high risk, low risk and risk free commodities to choose.
2. Testing the quality of vegetables and fruits procured directly from farmers' clusters/groups and sold through eco-shops by Krishi bhavans, farmers' markets and government outlets(Horticorp, VFPCK etc.) to assess whether they conform to "Safe to Eat Brand" or GAP standards and certification/branding of produce to promote marketing avenues of producers.

Major Research highlights :

Monitoring of pesticide residues was conducted in vegetables and fruits collected from public markets, farm gate, ecoshop and "Organic" shops in Kerala. Total of 51 periodic reports have been published in government website and these reports helped to create strong public awareness on pesticide residues in food commodities. It also helped to standardize and popularize methods to reduce pesticide residues. The project has developed a database on the residue data generated from 2013 to 2020. From the inception of the project in 2013, around 11,500 samples from open market, farm gate, eco shop and organic shop have been analysed for the presence of pesticide residues. Out of the total samples, around 3000 are the farmer's samples analysed free of cost. It is also established that the awareness about presence of pesticide residues on food commodities has sensitized people of Kerala to take up organic agriculture, terrace/balcony/backyard cultivation, vegetable cultivation even in the pandemic situation to get safe to eat food.

During 2019-2020, a total of 1353 samples of the various commodities such as vegetables, fruits, spices and other food products collected from various parts of the state was analysed for the presence of pesticide residues, out of which 233 (17.22 %) samples were found contaminated with pesticide residues. Of which only 5 samples (2.15 %) was above MRL as prescribed under Food Safety Standard Authority of India (FSSAI), Ministry of Health and Family welfare.

REVOLVING FUND

1. AICRP on Honey Bees and Pollinators - RF

(PI : Dr. Amritha V.S., Assistant Professor, Department of Agricultural Entomology)

Objectives :

Income generation through sale of honey, bee colonies, bee equipments, etc.

Sl. No.	Item	Quantity	Amount
1	Rubber Honey	698.5 Kg	2,51,460.00
2	Forest Honey	227 Kg	1,13,500.00
3.	Indian bee colony	73 Nos.	1,02,200.00
		Total	**4,67,160.00**

(Rupees Four lakh sixty seven thousand one hundred and sixty only)

Budget provision during2019-20 : Rs. 2, 50,000/-

Expenditure during 2019-20 : Rs.2, 27,742/-

Total receipts during 2019-20 : Rs. 4,67,160/-

Profit 2019-20 : Rs. 2,39,418/-

2. Revolving Fund on Soil Testing (RF - SSTL & MSTL)

(PI : Dr. R. Gladis (Stationary Soil Testing Lab), Dr. B. Aparna (Mobile Soil Testing Lab), Assistant Professors, Department of Soil Science & Agricultural Chemistry)

Objectives :

1. To carry out the analysis of soil, plant, water, compost and manure samples received from farmers, students and researchers on payment basis
2. To provide need based mobile soil testing services to the farmers
3. To provide soil test based fertilizer recommendations for soil samples received from farmers field.

Major Research Highlights :

Sl.No	Samples Details	No. of samples analysed	Income Generated (Rs)
1.	Soil	679	1,94,103 (Rupees One lakh ninety four thousand one hundred and three)
2.	Plant	157	
3.	Manure/ Compost	35	
4.	Water	3	
Soil Health Cards distributed to the farmers – 205 Nos. Profit : Rs.76,000/- (Rupees Seventy Six Thousand only)			

3. Solid Waste Management - Revolving Fund

(PI : Dr. Manorama Thampatti, Professor, Department of Soil Science & Agricultural Chemistry)

The project envisages to process the food waste generated in the hostels and canteen of the College of Agriculture, Vellayani using the patented rapid thermochemical decomposition technology (Suchitha). The organic fertilizer thus produced is fortified and sold through the KAU outlets.

Apart from waste processing, the centre provides waste processing kit (@4 /kg waste) for processing organic waste to the agencies those who have installed Suchitha machine. Analytical services of organic are also being done by the centre.

The details of income and expenditure for the year 2019-20 are furnished below:

Period	Income for the year 2019-20	Total income including previous year's balance	Expenditure	Balance (Profit)
2019-20	1,87,346	3,55,703	1,59,967	1,95,736

4. Revolving Fund for Mass multiplication and supply of Microbial Inoculants

(PI: Dr. K.S. Meenakumari, Professor & Head, Dept. of Agricultural Microbiology)

Gross income : Rs. 12,54,161/-

Expenditure : Rs. 10,59,802 /-

Profit : Rs. 1,94,359/-

Production details from 01-04-2019 to 31-3-2020

Sl. No	Item	Total Production (kg)	Amount (Rs.)
1.	Pseudomonas	1561	1,24,893
2.	Trichoderma	1494	1,70,413
3.	AMF	551.5	44,668
4.	Azospirillum	8	622
5.	Azotobacter	11	552
6.	P-solubilizer	57	4,573
7.	K-solubilizer	6.5	330
8.	PGPR Mix I	5860	4,53,516
9.	PGPR Mix II	1268	94,449
10.	Rhizobium	8	452
11.	Composting Inoculum	1337	1,13,053
12.	Quality analysis	13	13,000
13.	Training	5	7,500
14.	**Mother cultures** AMF	26.325	2,01,600
15.	Trichoderma	12	13,630
16.	Pseudomonas	7	8,780
17.	Azospirillum	1	565
18.	Azotobater	1	500
29.	P- solubilizer	1	565
20.	K- solubilizer	1	500
	Total	**12,188.325**	**12,54,161**

5. Revolving Fund - Integrated Management of Fruit Flies Infesting Fruits & Vegetable Crops - concluded project - Sustenance Programme

(PI : Dr. Reji Rani O.P., Assistant Professor, Department of Agricultural Entomology)

Objectives :

1. Fabrication and sale of pheromone traps (Methyl euginol & cue lure) : Mass production and sale of biopesticdes *Beauveria Bassiana, Metarhizium* anisopliae and *Lecanicillium lecanii*

Major Research Highlights :

Produced and sold biopesticides such as *Beauveria Bassiana, Metarhizium* anisopliae and *Lecanicillium lecanii* and pheromone traps such as cue lure traps and methyl eugenl traps worth Rs. 1.75 lakhs .

Period	Income for the year 2019-20 (Rs.)	Expenditure (Rs.)	Balance (Profit) (Rs.)
2019-20	1,74,634/-	1,61,027/-	13,607/-

6. Establishment of leaf/ tissue analytical laboratory at College of Agriculture, Vellayani

(PI : Dr. Shalini Pillai. P., Professor, Department of Agronomy)

Objectives :

1. To undertake analysis of plant and soil samples for ascertaining the nutrient status and providing suitable fertilizer recommendations

Major Research Highlights :

The lab was established in August 2008, under the State Horticulture Mission (Kerala) funded project, for a total outlay of Rs.20 lakhs. The project terminated in June 2011. On the lab started functioning on a revolving fund mode with a corpus of Rs.1.250 lakhs. The lab is undertaking analysis of plant and soil samples received to ascertain the nutrient status so as to provide suitable fertilizer recommendations. The Laboratory is catering to the needs of farmers, research scholars and scientists. An amount of Rs.2,00,000/- has been received as analytical charges during the period from April 2019 to March 2020. Profit – Rs.89744/-

7. Vegetable seed production - RF mode

(PI : Dr. S. Sarada, Assistant Professor & Head, Department of Vegetable Science)

Objectives :

Production of quality seeds and seedlings through revolving fund of KAU

Major Research Highlights :

Production of breeder seed and truthfully labeled seeds of different vegetables are being carried out. A total of **260.57 kg** of truthfully labeled seeds, **60358** protray seedlings and **6256** polybag seedlings worth Rs**. 7.012 lakhs** were distributed among the farmers during **2019-2020**.

Items	Economics		
	Total expenditure during 4/2020 to 10/2020	**Total income during 4/2020 to 10/2020**	**Profit**
Seeds	Rs.2,34,908/-	Rs. 3,20,198/-	**Rs.85,290/-**
Protray seedlings			
Polybag seedlings			

8. Revolving Fund - Commercialization of value added products

(PI : Dr. Suma Divakar, Professor & Head, Department of Community Science)

Objectives :

1. To utilize locally available farm produce for value addition.
2. To generate employment for rural women.

Major Research Highlights :

Period	Income for the year 2019-20 (Rs.)	Expenditure (Rs.)	Balance (Profit) (Rs.)
2019-20	Rs .94,528/-	Rs .94,528/-	Nil

9. RF scheme on Planting material production in Fodder crops

(Dr.Usha C Thomas, AICRP on Forage Crops Utilization)

The scheme was started in 29.06.2019 with an objective to establish a fodder seed production unit at College of Agriculture, Vellayani and the corpus fund allotment from university wasRs.1.0 lakh.A fodder seed production unit is established at College of Agriculture, Vellayani for the production and distribution of seed/planting materials of fodder crops like Hybrid napier varieties Suguna and Susthira and fodder cowpea variety Aiswarya.

The details of income and expenditure during the year 2019-20 is furnished below

Period	**Total income (Rs)**	**Expenditure upto31.03.2020 (Rs)**	**Balance (Profit) (Rs)**
2019-20	1,08,508.0	73,417.0	35,091.0

PERFORMANCE OF RF SCHEMES

Sl. No.	Name of PI	Title	Gross Income, Rs.
1	Dr. Amritha V.S	AICRP on Honey Bees and Pollinators	4,67,160/-
2	Dr. R. Gladis	Soil Testing (SSTL & MSTL)	1,94,103/-
3	Dr. Manorama Thampatti	Solid Waste Management	3,55,703/-
4	Dr. K.S. Meenakumari	Mass multiplication and supply of Microbial Inoculants	12,54,161/-
5	Dr. Reji Rani O.P	Integrated Management of Fruit Flies Infesting Fruits & Vegetable Crops - concluded project - Sustenance Programme	1,74,634/-
6	Dr. Shalini Pillai. P	Establishment of leaf/ tissue analytical laboratory at College of Agriculture, Vellayani	89,744/-
7	Dr. S. Sarada	Vegetable seed production	2,34,908/-
8	Dr. Suma Divakar	Commercialization of value added products	94,528/-
9.	Dr.Usha C Thomas	Planting material production in Fodder crops	1,08,508/-

SATELLITE STATIONS

1. COCONUT RESEARCH STATION (CRS), BALARAMAPURAM

1. Strengthening Research on coconut and Developmental Activities at Coconut Research Station, Balaramapuram

(PI : Dr. N.V. Radhakrishnan, Professor & Head, CRS, Balaramapuram)

Funding Agency : State Plan - 2018

Objectives :

1. Providing infrastructural facilities at CRS Balaramapuram.
2. Effect of secondary and micronutrients on yield, pest and disease incidence in coconut.
3. Performance evaluation of new and improved varieties of pepper as an intercrop in coconut in the red loam soil tracts of southern Kerala.
4. Establishment and standardization of agro-techniques for dwarf coconut palms suitable to southern Kerala under rainfed conditions.
5. Training on transfer of improved technologies of hybridization in coconut, coconut production practices, IFS, mushroom and spawn production, upland rice production technology and organic farming to rural youths, farmers and agricultural assistants.

Major Research Highlights :

a. Establishment and standardization of agro-techniques for dwarf coconut palms suitable to southern Kerala under rainfed conditions.

Laying out and planting of WCT x MYD, COD x WCT hybrid coconut seedlings**,** dwarf coconut seedlings mainly, COD, CGD, MGD, MYD and MOD were carried out in the main field of CRS, Balaramapuram with an objective to study the most optimum spacing for dwarf palms, DxT and TxD for higher yield and to standardize the nutrient requirement for maximum yield from seedling stage.

The seedlings were planted at four different spacing viz., 6 m x 6 m, 6.5 m x 6.5 m, 7 m x 7 m and 7.5 m x 7.5 m with two schedules of NPK fertilizer application.

The experiment is in progress. The plants are at 7 to 10 new leaves stage with maximum plant height of 255 cm to 395 cm with mean plant height of 166 cm to 337 cm. The plants are often infested by rhinoceros beetle and red palm weevil. Since coconut is a long duration perennial crop, the project has to be continued for more than

one decade. Though, hybrids and dwarf coconut palms start yielding after 4 years, stable yield could be obtained only by 8-10 years.

b. **Black pepper rooted cuttings of new and improved varieties**

(Panniyur I to VIII and Vijay) were planted and it is in progress with the objective to identify the best performing pepper variety for the region, from among the new releases from KAU and to compare the yield as well as quality advantage of the variety. The treatments are laid out in Randomized block Design with 3 replications.The pepper vines put forth 2-5 branches, with vine length of 180 cm to 290 cm. The pepper vines are trailed on to coconut tree. The study is in progress and need to continue in the coming years too.

c. Physical targets / Minor infrastructure development at CRS, Balaramapuram

Purchase of laboratory chemicals, manure and fertilizers, Plant protection chemicals and related research & farm developmental activities were carried out.Maintenance and repairs of farm machineries/implements purchase of pump set and motor and Honda Brush cutter for weeding.Plumbing works to strengthen the irrigation line and purchase of water storage tank and electrical works including repair of laboratory refrigerator and electronic balance. Canvas board to depict the project results at ZREAC.Purchase of 1000 lit. water storage tank, chairs, inverter with battery for training hall, duplex printer for office.

Construction of wash room for labourers and visitors at A and B blocks and platform for 5000 lit. Storage tank.

d. Effect of secondary and micronutrients on yield, pest and disease incidence in coconut with

Effect of secondary and micronutrients on yield, pest and disease incidence in coconut with objectives to study the effect of secondary nutrients *viz*., Calcium and Magnesium and micronutrients *viz*., B on the yield of coconut palm and to study the effect of secondary nutrients *viz*., Calcium and Magnesium and micronutrients viz., B on disease incidence in coconut palm. The infestation of major pest such as mite, coreid bug, rhinoceros beetle and diseases such as bud rot and leaf rot are being recorded. The percentage of infestation by mite ranges from 0 to 27.18 and coreid bug ranges from 22.61 to 66.33% in the first year and 17.58 to 33.12 and 9.88 to 30.11 in the second year. There were no incidences of bud rot in the experimental palms. The study is in progress and it has to be continued for another two years so that the data can be put into pooled analysis to come out with findings. The study is in progress.

e. Trainings on transfer of improved technologies of coconut

Trainings on transfer of improved technologies of coconut cultivation, hybridization in coconut, coconut production and plant protection practices, IFS, value addition in coconut were conducted to rural youths, farmers, trainees under DESAI and VHSE students on 20/7/2019, 18/09/2019, 30/09/2019, 5/10/2019, 29/10/2019 to 6/11/2019, 18/11/2019 to 23/11/2019, 19/11/2019 & 20/11/2019, 27/11/2019, 10/12/2019, 19/12/2019, 17/01/2020, 05/02/2020. Apart from this, On the Job Training (4 days per batch and 7 batches) on Gardener, Micro Irrigation Technician and Floriculturist (Open Cultivation) to VHSE students were given to +2 VHSE students.

Remarks:

Since coconut is a long duration perennial crop, the project has to be continued for more than one decade. Though DxT, TxD and dwarf coconut palms will start yielding after 4 years, stable yield could be obtained only after 8 to 10 years. Hence, the above projects have to be continued.

2. Strengthening production of quality planting materials and bioinputs in KAU & Elite Seeds and nursery programme - production of disease free seeds and quality planting material

(PI : Dr. N.V. Radhakrishnan, Professor & Head, CRS, Balaramapuram)

Funding Agency : State Plan – 2017-2018

Objectives :

1. To produce elite seeds and quality planting materials.

Major Research Highlights :

Production of seeds and planting materials are being carried out.

	GoK Plan schemes on Seeds and nursery programme		
	Details/name	***Variety***	***Quantity produced during 2019-2020 Nos./Kg***
	Plantations & Spices:		
1.	Coconut seednuts	WCT	18241+7450 (25691)
2.	Coconut seedlings	WCT	5495
3	Coconut seednuts Dwarf		104
4	Arecanut seedlings	Saigon	1714

5	Blackpepper rooted cuttings	Karimunda, Panniyur	2812
	Fruits		
1	Banana suckers	Red banana, Nendran	379
2	Banana suckers	Other vars.	93
	Vegetables:		
1	Amaranthus	Arun	4.800
2	Bhindi	Salkeerthi	5.075
3	Cowpea Yard long bean	Jyothika	4.900
4	Snakegourd	Koumudi	0.500
5	Clovebean	-	7.000
6	Cucumber	SambarVellari	0.650
7	Salad cucumber	AAUC	1.000
8	Bush Cowpea	Bhagyalakshmi	2.750
9	Papaya seedlings		186
10	Vegetable seed packets	All	2081

3. Standardizing Agro techniques for raising Finger millet in coconut garden

(PI : Dr.K.Prathapan, Professor, CRS, Balaramapuram)

Funding Agency : State Plan – 2020

Objectives :

1. To identify the best method of sowing
2. To standardize the N,P and K requirement while raised as intercrop in coconut garden
3. To identify the best time of nutrient application
4. To enhance the production and productivity per unit area

Major Research Highlights :

Experiment was conducted during 2020 to standardize the agro-techniques of finger millet in coconut garden in RBD with three factors as method of sowing, N:P:K dose and time of application of fertilizers. Among the three methods of establishment

viz., broadcasting seeds @ 5 kg ha^{-1}, line sowing at a row spacing of 25 and transplanting at a spacing of 25 x15 cm. Among the different establishment methods transplanting at a spacing of 25 cm x 15 cm recorded significantly higher number of productive tillers per plant, lesser number of days to attain 50 percent flowering and recorded significantly higher grain yield. Among the three methods of establishment, broadcasting recorded the lowest grain yield. N:P:K applied @ 50:25:25 was found to be the optimum dose for higher yield, earliness in flowering and productive tillers per plant, compared to lower dose (40:20:20), POP (45:22.5:22.5) and higher dose (60:30:30) . Results also revealed that time of application of fertilizers had significant effect on productive tillers per plant and time to 50 percent flowering. However, grain yield did not have significant effect. The interaction between method of sowing, fertilizer dose and time of application was found significant and the treatment combination $m_3d_3t_3$ recorded the highest grain yield. Hence it can be concluded from the results that for higher grain yield in ragi, raised the seeds in the nursery and transplanted in the main field at a spacing of 25 cm x 15 cm, adopt NPK dose of 50:25:25 kg ha^{-1} and fertilizer should be applied in three splits as full P, one third N and K as basal dose, one third N and K at 20 DAS and one third N and K at 40 DAS.

4. Performance evaluation of local banana cultivars of Southern Kerala in coconut garden

(PI : Dr. Sheeja K. Raj, Assistant Professor (Agronomy))

Funding Agency : State Plan – 2018

Objectives :

1. To find the cultivar suitability of banana under coconut garden.
2. To study the performance of various indigenous cultivars of Southern Kerala systematically.

Major Research Highlights :

Experiment was conducted at Coconut Research Station, Balaramapuram during 2018-19 and 2019-20. Local cultivars viz., Red banana, Pachavettan, Rasakadali, Nendran, Palayankodan, Padathy, Annaan, Kaveri, Monthan, Karpooravally, Peyan, Sannachenkadali, Ambalakadali, Matti, Poovan, Malayannan, Koombillkannan and Karimkadali were evaluated for yield attributes, quality and yield and also assess their performance as ratoon crop. It was revealed from the experiment results that all the above cultivars established well under the coconut having more than 50 years old. Results of the quality analysis revealed that the local cultivar Karimkadali (AAB

genomic group) recorded the highest total sugar and reducing sugar content. Nendran (AAB genomic group) recorded the highest non reducing sugar content and TSS and Karpooravally (ABB genomic group) recorded the highest ascorbic acid content. Yield attributes data revealed that the number of hands were found to be the highest in Palayankodan of AAB genomic group and Karpooravlly and Malayannan of ABB genomic group. Number of fingers were also the highest in Karpooravally and Palayankodan. Nendran recorded the highest finger length and breadth. Ambalakadali (AA genomic group) recorded the shortest finger length and Sannachenkadali (AA genomic group) recorded the shortest finger breadth. Yield data of the first crop and ratoon crop revealed that Red banana of AAA genomic group recorded the highest yield and net return. Hence, it can be concluded from the results that Red banana was found to be the best for higher bunch yield and net return under coconut in the red loam tracts of Sothern Kerala. With regard to quality, Karimkadali recorded the highest total sugar and reducing sugar content, Karpooravllay recorded the highest ascorbic content and Nendran recorded the highest non reducing sugar content and TSS. The major outcome of the experiment was to maintain the germplasm of all the above seventeen cultivars at CRS, Balaramapuram.

5. Quantitative and qualitative analysis of inflorescence sap of coconut varieties of Kerala (Network mode) at Coconut Research Station, Balaramapuram.

(PI : Dr.R.Sujatha, ADR(Coconut Mission))

(Co-PI : Dr. N.V. Radhakrishnan, Professor & Head, CRS, Balaramapuram)

Funding Agency : State Plan – 2019-20

Objectives :

1. To screen the existing germplasm of hybrids, dwarfs and tall with respect to the quantity and quality of neera production; to identify superior palms for better inflorescence sap (neera) production and those with better quality for further processing of neera as a healthy drink; to understand the effect of different seasons on neera production and quality; to study the influence of soil type and balanced nutrient application on neera yield and quality of selected palms and to standardize diversified byproducts from neera.

Major Research Highlights :

The selection of palms with good bunching characters of West Coast tall, Chowghat Orange Dwarf, Malayan Yellow dwarf and Gangabondham and T x D palms was carried out and mulching the basins with coconut husk.

Need license and training on neera tapping (KAU methodology)

6. Standardization of certain organic preparations for the management of major fungal and viral disease complex of vegetable cowpea.

(PI : Dr. N.V. Radhakrishnan, Professor & Head, CRS, Balaramapuram)

Funding Agency : State Plan **– 2019-20**

Objectives :

1. To study the effect of certain organic preparations for the management of major fungal and viral disease complex of vegetable cowpea, mainly yard long bean

Major Research Highlights :

An experimental trial was conducted at CRS Balaramapuram with six treatments for the study viz., T1 – *Pseudomonas fluorescens* (2%), T2 – Neem oil emulsion (2%), T3 – Curd + coconut water (25 times dilution), T4 – Fish amino acid (0.5%), T5- Papaya leaf extract (10%) and a control (T6) was also maintained. Treatments were sprayed at 10 days interval starting from two leaves stage of the cowpea plants. Different diseases affecting the plants were noted and observations were taken. Cercospora leaf spot was observed as the major disease affecting the plants. Plants treated with papaya leaf extract (10%) showed the control of the disease while the control plants were severely affected by the disease. Plants treated with *Pseudomonas fluorescens* (2%) and Curd + coconut water also gave good results. Plants treated with papaya leaf extract (10%) also gave control of pests such as mites and thrips while the control plants were severely affected.

7. Knowledge and Skill development on Coconut based Secondary Agriculture

(PI Dr.R.Sujatha, ADR(Coconut Mission))

(Co-PI : Dr. N.V. Radhakrishnan, Professor & Head, CRS, Balaramapuram)

Funding Agency : ICAR-NAHEP-CAAST

Objectives :

1. Capacity building among students for entrepreneurship development; facilitating establishment of coconut based industrial units on tie up with farmer collectives; promoting industry-research linkages for addressing the research gaps through postgraduate and doctoral research programmes and market research and Analysis. Special emphasis on product diversification in coconut based food sector

Major Research Highlights :

Coconut processing machineries sanctioned under the project viz; Coconut Milk extractor, Power Grinder, Coconut chips Slicer, Coconut dryer and Roaster were supplied at this station in the month of May 2020. Installation of the above said machineries are pending due to lack of proper infrastructural facilities. Produced Coconut oil, Virgin coconut oil by conventional method (heat process) and it is in the process of quality check analysis including storage life.Coconut water syrup incorporated with Sarsaparilla and ginger extract was done. Coco Nutri ball was prepared from the protenaceous residue of Virgin coconut oil which is considered as a byproduct of VCO. The production standardization of value added products from coconut water such as sip up was started.Coconut chips was produced from seven to nine months old coconut which are non-oily and prepared by drying at 60^0C for six to seven hours. Since the drying temperature is low the nutritional properties of coconut can be retained and is suitable alternative to oily snack products. Planning to conduct training programmes for budding entrepreneurs on value added products from coconut in this year once the renovation works of already existing coconut seed building has completed.

8. Report of Revolving fund scheme on, "Hybrid coconut seedlings and other planting material production" for 2019-2020 at CRS, Balaramapuram.

(PI : Dr. N.V. Radhakrishnan, Professor & Head, CRS, Balaramapuram)

Objectives:

1. Production of hybrid coconut seedlings and other planting materials
2. Maintenance of livestock unit including poultry
3. Production of value added products

Production of seeds and planting materials including value added products during 2019-2020 under RF scheme at Coconut Research Station, KAU, Balaramapuram

Sl.No.	Crop	Variety	Production/sale during 2019-2020
I	**Revolving Fund scheme**		
a.	**Seeds & Planting materials**		
1	Coconut seedlings (Bare Rooted)	Hybrids Kerasree&Kerasankara	2022
2	Coconut seedlings (PolyBag)	Hybrids Kerasree&Kerasankara	2717
3.	Coconut seednuts	Hybrids	13775
b.	**Value added products**		
1.	Coconut chutney powder		10.450 Kg
2.	UrukkuVelichenna		194.000 lit.
3	Theeyalkoottu		37.500 Kg
4	Turmeric powder		53.600 Kg
5	Coconut Oil		387.750 lit.
6	Ginger chutney powder		10.500 Kg
c.	**Livestock unit**		
1	Cow's milk		17163.55 lit
2	Egg		9539 nos.
3	Chicks		506 nos.
4	Goat Kids	Female	7 nos.
		Male	5 nos.
5	Culled chicken		296.55 Kg
6	Culled goat		120 Kg
7	Culled Beef		70 Kg
8	Cattle feed bag		353 nos.
9	Curd		67.5 lit
10	Butter milk		96.25 lit

2019-2020 Revenue generated: Rs.2377062/-

II. INTEGRATED FARMING SYSTEMS RESEARCH STATION (IFSRS), KARAMANA

AICRP on IFS [On Station Research]

The AICRP on IFS, Main (OSR) centre, Karamana of KAU was selected by ICAR as the best main centre among the 32 centres in India during the biennium 2016-18.

1. Development and validation of on-station integrated farming system models (4 models each of 0.2 ha)

(P.I. Dr. Jacob John, Professor & Head, IFSRS, Karamana)

Objectives :

1. Characterization of the existing farming systems to know the productivity, viability and constraints.
2. To optimize individual components of IFS in regional perspective

Major Research Highlights :

The four models / sub-projects are

i. Homestead based IFS model

ii. Coconut based IFS model

iii. Rice based IFS model

iv. Banana based IFS model

- The annual highest gross return was obtained from homestead based IFS model (Rs.289163/-) followed by rice based (Rs.279853/-), coconut based (Rs.236231/-) and banana based (Rs.209108/-) IFS models. Homestead based model recorded the highest net return.

- Employment generation was 83,91,142 and 97 man days in homestead, coconut based, rice based and banana based IFS models, respectively.

- On comparing the percentage contribution of different components to gross returns in each model, it was revealed that cattle rearing contributed the highest share *viz*.,

65, 68, 48 and 75 per cent, respectively, for homestead, coconut based, rice based and banana based IFS models.

2. Rice based cropping sequences to augment integrated farming systems in lowlands
(P.I. Dr. Jacob John, Professor & Head, IFSRS, Karamana)

Objectives :

1. To study the performance of different rice based cropping sequences to supplement integrated farming systems in lowlands

Major Research Highlights :

Different cropping sequences suited for rice based integrated farming are being investigated and has completed three years. During the third year (2019-20) of the crop cycle, significantly higher net return and B:C ratio were obtained in the sequences rice-bhindi-cucumber (Rs.5.1 lakhs ha^{-1}, 2.64) and rice-bhindi-yard long bean (Rs.5.45 lakhs ha^{-1}, 2.53) which were on par. The next best sequence was rice-cassava-amaranthus (Rs.3.11 lakhs ha^{-1}, 1.85). It was observed that the sequences rice-cassava-amaranthus and rice-cassava-bush cowpea were superior in terms of family nutrition and satisfied the nutritional requirements of a four member family as per the standards prescribed by ICMR. The sequences rice-para grass-fodder cowpea and rice-fodder cowpea-fodder maize were superior in terms of meeting livestock nutritional requirement.

OTHER ONGOING PROJECTS

1. Establishment of Plant Health Clinic at IFSRS, Karamana

(P.I. Dr. Sajeena A., Assistant Professor, IFSRS, Karamana)

Funding agency : State Horticulture Mission

Objectives :

To establish a plant health clinic for providing consultancy services and technical support to farmers by diagnosing diseases, pests and nutrition related problems of major crops and recommending suitable remedial measures

Major Research Highlights :

Technical consultancy services being provided to the farmers are still continuing. Construction of building is in its final stage.

2. Analysis, Development and Validation of Integrated Farming System Models for marginal and small farmers in different agro ecological zones of Kerala (Network)

(P.I. Dr. Jacob John, Professor & Head, IFSRS, Karamana)

Funding agency : State Plan 2018-19

Objectives :

1. Critically examine the sustainability of Integrated Farming Systems in different agroecological zones of Kerala.

Major Research Highlights :

Recommend sustainable enterprise combination and IFS for the region based on the data generated through this study and taking into account farmer's preferences and socio-economic considerations specific to the region.

Continuous sanction has been accorded and the project work is in progress.

Quality assessment, characterization and phytoremediation possibilities of Killi River, Karamana, Thiruvananthapuram district

(P.I. Dr.Meera, A. V., Assistant Professor, IFSRS, Karamana)

Funding agency : State Plan 2018-19

Objectives :

1. To analyse spatial and temporal variation in physical, chemical and biological properties of river water and sediments, identify potential sources of contaminants threatening river and utility based classification of water.

Major Research Highlights :

Continuous sanction has been accorded and the project work is in progress.

III. AICRP ON IFS [ON FARM RESEARCH]

1. On-farm crop response to plant nutrients in predominant cropping systems

(PI : Dr. Bindhu J.S., Assistant Professor (Agronomy), OFR Centre, Vellayani)

Funding Agency : ICAR-IIFSR

Objectives :

1. To find out the response of N P and K in farmers' fields under different agro-ecological zones.

Major Research Highlights :

In rice-rice-fallow cropping system having medium duration rice, application of recommended dose (RD) of NPK+Zn ($N:P_2O_5:K_2O$ @ 90:45:45 kg/ha + $ZnSO_4$ @ 20 kg/ha to *kharif* along with NPK alone to *rabi*) recorded higher grain yield (10753 kg/ha/year) which was on par with farmers practice with an yield of 10346 kg/ha/year. The farmers practice was application of NPK+Zn ($N:P_2O_5:K_2O$ @ 98:49:41 kg/ha + $ZnSO_4$ @ 20 kg/ha) to *kharif* along with NPK ($N:P_2O_5:K_2O$ @ 101:48:43 kg/ha) to *rabi*.Higher nutrient response (20.2 kg grain/kg nutrient applied) was observed in RDF (NPK+Zn to *kharif* along with NPK alone to *rabi)* followed by farmers practice (18.2 kg grain/kg nutrient applied).Net return (1.04 lakh/ha/year) and benefit: cost ratio (1.53) were higher in application of RD of NPK+Zn to *kharif* along with NPK alone to *rabi*which was followed by farmers practice with a net return (0.92 lakh/ha/year) and BCR (1.46), respectively.

2. Diversification of existing farming systems under marginal household conditions

(PI : Dr. Jacob D., Assistant Professor & Head, OFR Centre, Vellayani)

Funding Agency : ICAR-IIFSR

Objectives :

1. To enhance the productivity and profitability of marginal farmers households through IFS approach.
2. To improve the livelihood and nutritional security through diversification approach.
3. To estimate the impact of capacity building in diversification of crop + livestock system.

Major Research Highlights :

Hort + Crop + Dairy, Hort + Poultry and Hort + Dairy with mean holding size of 0.5, 0.3 and 0.4 ha, respectively were the three farming systems identified among marginal farmers in Varkala and Chairayinkeezhu blocks of Thiruvananthapuram district. Average family consisted of 2 male adults, 2 female adults and 1 child. Annual food consumption of family was 732 kg cereals, 152 kg pulses, 210 kg oilseeds, 171 kg vegetables, 181 kg fruits, 340 litre milk, 129 kg meat and 270 eggs. In each farming system, interventions were made at the start of first year for a total of Rs.10000 in cropping system diversification, livestock diversification, product diversification and capacity building modules. Interventions in cropping system diversification module were nutrient management for coconut with Muriate of Potash, Magnesium Sulphate and Lime for Rs.2000; Intercropping coconut with Nendran variety of banana for Rs. 1500 to Rs. 3000; Replacing local rice variety with high yielding Uma variety of rice for Rs.1500; Interventions in livestock diversification module were Incorporation of mineral mixture in feeding schedule of dairy cows for Rs.3000; Replacing local chicken breed with improved Gramalakshmi breed of poultry birds for Rs.3000; Interventions in product diversification module were Nutritional Kitchen Garden with Grow bag and Knapsack sprayer for Rs. 1500/-; Interventions in capacity building module were Training in Nutritional Kitchen Gardening for Rs.500/-.During third year of study, Hort + Crop + Dairy, Hort + Poultry and Hort + Dairy recorded net income of Rs. 1.69, 1.49 and 2.07 lakhs, respectively which resulted in an increase of 188, 160 and 149 %, respectively over benchmark.

3. On-farm evaluation of farming system modules for improving profitability and livelihood of small and marginal farmers

(PI : Dr. Jacob D., Assistant Professor & Head, OFR Centre, Vellayani)

Funding Agency : ICAR-IIFSR

Objectives :

1. To address critical constraints of small farms systems for overall productivity and improvement.

2. To increase the income of the size of the holdings and ensure the livelihood security.

Major Research Highlights :

Hort + Crop + Dairy and Hort + Poultry with mean holding size of 1.0 and 0.9 ha, respectively were the two farming systems identified among small and marginal farmers in Varkala and Chairayinkeezhu blocks of Thiruvananthapuram district. Average family consisted of 2 male adults, 2 female adults and 1 child. Annual food consumption of family was 470 kg cereals, 115 kg pulses, 140kg oilseeds, 230 kg vegetables, 121kg fruits, 260 litre milk, 97kg meat and 145 eggs. In each farming system, interventions were made at the start of first year for a total of Rs.10000 in cropping system intervention, livestock intervention, on-farm processing and value addition and optional component modules. Interventions in cropping system module were nutrient management for coconut with Muriate of Potash, Magnesium Sulphate and Lime for Rs.2000; Intercropping coconut with Nendran variety of banana for Rs. 1500 to Rs. 3000; Replacing local rice variety with high yielding Uma variety of rice for Rs.1500; Interventions in livestock module were Incorporation of mineral mixture in feeding schedule of dairy cows for Rs.3000; Replacing local chicken breed with improved Gramalakshmi breed of poultry birds for Rs.3000; Interventions in on-farm processing and value addition module were hygienically storing and local marketing of milk. Provision of milk can for Rs. 500; De-husking, grading and sale of coconut. Provision of coconut de-husker for Rs. 500; Interventions in optional component module were Nutritional Kitchen Garden with Grow bag and Knapsack sprayer for Rs. 1500.During third year of study, Hort + Crop + Dairy and Hort + Poultry recorded net income of Rs. 3.52 and 3.95 lakhs, respectively which resulted in an increase of 324 and 415 %, respectively over benchmark.

IV. FARMING SYSTEMS RESEARCH STATION (FSRS), SADANANDAPURAM

1. Developing mosaic tolerant varieties of Bitter gourd (*Momordica charantia L.*) suited to South Kerala. (VEG-02-00-01-2018-KTR-ATMA)

(PI : Dr. Bindu. M.R., Professor & Head, FSRS, Sadanandapuram)

Objectives :

1. To develop bitter gourd varieties with tolerance to mosaic disease.

Major Research Highlights :

Thirty seven accessions were collected for evaluation which includes two local varieties, 30 accessions from NBPGR, two varieties released from KAU and three hybrids used by the farmers. To collect local races survey was conducted at Kottayam, Pathanamthitta and Kollam districts and it was observed that farmers are using either released varieties or hybrids and they are not maintaining indigenous varieties. However two local types viz. Puthur local and Pala local were collected.

Genotypes collected were evaluated in the farm of FSRS, Sadanandapuram Kottarakkara during 2018-19and 2019-20.

The result showed that the different genotypes exhibited high variability in biometric and and yield characters and incidence of virus disease. Highest yield was recorded by T27(1380 g/vine) which was followed by T7(1120g/vine), T28(1090 g/vine) and T26 (916 g/vine).But the high yielding genotypes are affected by virus. Eight genotypes showed field tolerance to mosaic disease But these genotypes which showed field tolerance recorded poor yield.

2. Survey, collection, establishment and maintenance of superior lines of traditional mango variety Karpooram in southern Kerala (FR-01-00-02-2018-SHM)

(PI : Dr. Bindu. B., Assistant Professor (Horticulture))

Objectives :

1. To conduct survey in Sothern Kerala to locate traditional mango variety **'Karpooram'**
2. To identify superior lines of the traditional mango variety **'Karpooram'** for future studies
3. To establish germplasmby producing progenies of the selected superior trees of farmer's field by vegetative propagation method

Major Research Highlights :

Survey in 69 panchayaths in 11 blocks of Kollam district, 53 panchayaths in 8 blocks of Pathanamthitta district, 73 panchayat in 11 blocks of Thiruvananthapuram district were completed. Farmers having Karpooram variety of mango has been inventoried. This database formed the basis for further detailed studies

Data collection and field visits of farmers having traditional mango variety Karpooram in Kollam, Pathanamthitta and Thiruvananthapuram districts wereconducted .

Based on the survey it was found that number of farmers having Karpooram mango in Kollam district is 483, Pathanamthitta is 29 and Thiruvananthapuram district is 27.

Based on yield, flowering regularity and minimal pest and disease incidence, 43 plants were identified in Kollam ,12 inPathanamthitta and 17 in Thiruvananthapuram districts Detailed studies were conducted in these 72 selected plants. Of which 20 best performing accessions were carried forward for taking observations of second year and started taking observations of third year. Selected superior germplasm of best performing accessions were conserved in the Farming Systems Research Station , Sadanandapuram.

3. Evaluation of brinjal lines in AICVIP trial

(PI : Dr. Bindu. M.R., Professor & Head, FSRS, Sadanandapuram)

Objectives :

1. To identify high yielding variety of brinjal.

Major Research Highlights :

Yield evaluation was conducted with 10 lines and KAU-FSRS-SM-1 recorded the highest yield (7kg per plant)

4. Evaluation of turmeric and kacholam accessions in the homesteads

(PI : Dr. Bindu. M.R., Professor& Head, FSRS, Sadanandapuram)

Objectives :

1. To identify high yielding variety of turmeric and kacholam suitable for the homesteads.

Major Research Highlights :

- Evaluation was conducted with 28 accessions of turmeric and 20 accessions of kacholam
- Sobha recorded the highest yield in turmeric followed by Punjab Haldi-1 and SDPM local
- Palode local recorded the highest yield in kacholam and it was followed by Kannur local

5. Management of Blood grass (*Isahcnemiliacea*Roth ex Roem et Schult) in rice field

(P.I. Dr. Renjan B, Asst. Professor, FSRS, Sadanadapuram)

Objectives :

1. To develop an effective strategy for managing the Blood grass

Major Research Highlights :

The practices of intensive tillage (ploughing three times followed by puddling) as well as ponding of > 7.5 cm of water regime in the cropped field were helpful in suppressing the weed growth and enhanced crop performance. Among the herbicides, azimsulfuron @ 35g ha^{-1} recorded the maximum weed control efficiency.Fenoxyprop-p-ethyl @ 60 g ha^{-1} at 3-5 leaf stage of weed and (15 DAT) or preplant application of oxyflourfen @ 0.15 kg ha^{-1} *fb* one hand weeding were also helped to manage blood grass economically.

6. Organic nutrient management of papaya (*Carica papaya* L.**)**

(PI : Dr. Bindu. B., Assistant Professor (Horticulture))

Objectives :

1. To study the effect of organic nutrient management on growth, yield and quality of papaya

Major Research Highlights :

The trial had been conducted in RBD with 11 treatments and 3replications.

Results revealed that, application of 100% of recommended dose of N as organic along with PGPR Mix –I (10g/plant) and AMF (5g/plant) was found to increase the growth, yield and quality of papaya .

7. Establishment of rural agri technology park

(PI : Dr. Bindu. M.R., Professor& Head, FSRS, Sadanandapuram)

Objectives :

1. Establishment of a rural agri technology park
2. Training to unemployed youth and women

3. Equip the youth for prodution and sale of bio agents and planting materials to farmers of the State through interest groups/ SHGs.

Major Research Highlights :

Agri Technology park where farmers are getting training in apiculture, mushroom cultivation, plant propagation techniques,nursery management, vegetable seed production. production of biocontrol agents etc.was established.

Conducted nine trainings in apiculture, three trainings in mushroom cultivation two trainings on propagation techniques and landscaping and one on vegetable cultivation

Trained 294 of person in apiculture , 81 in mushroom cultivation Trained 15 unemployed youth in vegetable cultivation and 15 in propagation techniques and landscaping

Trained persons started mushroom cultivation, apiculture ,nursery units etc

Ongoing new research projects

Conservation of germplasm and developing climate resilient black pepper varieties for sustainable farming	Dr.MR.Bindu
Conservation of gene pool of traditional mango (*Mangiferaindica* L) varieties of South Kerala for climate resilient farming	Dr.Bindu.B

Other Projects

Comprehensive programme on hybrid/open pollinated seednut production in coconut	Dr.MR.Bindu
Graft production of fruit plants	Dr.Bindu.B
MIDH on spices	Dr.Bindu.B

Trainings

Conducted 29 on campus trainings and 8 vocational trainings to rural youth. In addition 6 On Job Trainings were organized.

Other extension activities:

Radio talksand mass media coverage of important activities were also done.

Revolving fund:

Under revolving fund various technological inputs like bio control agents (Psuedomonas, Trichoderma, Metarhizium, Beauveria, Verticillium) , biofertilizers (Azospirillum and AMF), Secondary and micronutrient mixture 'Ayar' , compost, value added products, mushroom spawn, coconut seedlings, nursery plants and grafts of various fruit crops and solanaceous vegetables were produced for distribution to farmers.The receipts from revolving fund activities amount to Rs.4623269/- for the year 2019-20.

V. KRISHI VIGYAN KENDRA (KVK), KOLLAM

Salient achievements 2019-20:
Technologies assessed/refined:

During 2019-20 KVK has conducted eight On Farm Trials in the thematic areas of varietal evaluation, mechanization etc. In all 48 trials were conducted in the farmer's field, the following technologies were tested/ refined during the period 2019-20:

1. **Assessment of high yielding short duration paddy varieties for the second crop season in Kollam district**

   Following technologies were assessed:
   TO 1 - Farmers practice- Uma
   TO 2 – Hraswa
   TO 3- Manuratna
   Outcome: Though the variety Uma recorded more yield and BCR, than the variety Manuratna, the total crop duration was only 95.14 days for Manuratna while 124.43 days for Uma . The variety Hraswa was a low yielder although it recorded the lowest crop duration (89.43 days). Hence the variety Manuratna is recommended for wide spread adoption in the areas which are prone to moisture stress during the later stages of growth.

2. **Assessment of high yielding, heat tolerant and short duration grain cowpea varieties in Kollam District**

   Following technologies were assessed:
   TO 1 - Farmers practice –Local
   TO 2 – PGCP 6
   TO 3- DC 15

TO4- Subhra

Outcome: The highest yield, net return and BCR was recorded by DC15 with a yield of 0.645 t/ha and duration of 76 days. When comparing the crop duration, PGCP 6 recorded a short duration of 66.73 days with a yield of 0.55t/ha. Hence it can be concluded that moisture stress prone areas PGCP is found to be good.

3. **Assessment of nutrient use efficient (NUE) cassava genotypes for reducing chemical NPK fertilizers**

Following technologies were assessed:
TO 1 - Farmers practice –Local
TO 2 – CI 905
TO 3- 7III E3-5
TO4- Sree Pavithra

Outcome: The variety 7III E 3-5 gave maximum yield of 38.36 t/ha and BCR of 2.56. The next best one was Sree Pavithra which recorded a yield of 35.71 t/ha and BCR of 2.38. Both varieties showed comparable mosaic incidence. The organoleptic studies showed that the variety Sree Pavithra was more tasty and acceptability than the high yielder 7III E 3-5 whereas the variety CI-905 was superior in terms of organoleptic properties but it was a poor yielder. Hence the variety Sree Pavithra is recommended for large scale adoption in the district.

4. **Assessment of leaf coriander varieties in Kollam district**

Following technologies were assessed:

TO 1 - Farmer's practice: Nil
TO 2 – Co-1
TO 3- Co (Cr)-4
TO4- Arka Isha
Outcome: The on farm testing of leaf coriander varieties revealed that the variety Arka Isha was superior to other varieties in terms of yield and lesser disease incidence

5. **Assessment of cabbage varieties for rainy season cultivation in rain shelters**

Following varieties were assessed:
TO 1 - Farmers practice: Nil
TO 2 – NS 183
TO 3- Green Voyager
TO4- Green Challenger

Outcome: The on farm testing of cabbage varieties revealed that Green Voyager was superior to all other varieties in terms of yield and acceptability

6. Assessment of high yielding cowpea varieties in Kollam district

Following varieties were assessed:

TO 1 - Farmer's practice: Local variety
TO 2 – Mithra
TO 3- Githika

Outcome: The on farm testing of cowpea varieties revealed that the varieties Mithra and Githika were comparable in terms of yield (18.2; 17.1 t/ha), BC ratio (1.79; 1.68) and acceptability

7. Assessment of suitability of self propelled paddy drum seeder for women farmers in Kollam district

Following varieties were assessed:
TO 1 - Farmers practice
TO 2 – Manually operated paddy drum seeder
TO 3- Self propelled paddy drum seeder

Outcome: Self propelled drum seeder showed a better performance. Women operator can comfortably sit and ride the drum seeder without much drudgery.

8. Assessment of ready to cook dehydrated Jack fruit

Following varieties were assessed:
TO 1 - Jack fruit dried under sunlight
TO 2 – Jack fruit dried after blanching with electrical drier
TO 3- Blanched, pre treated jack bulb is dehydrated with spice mix at 65^0 C for 4 to 5 hours (breaking stage)
Outcome: The on farm testing of cabbage varieties revealed that Green Voyager was superior to all other varieties in terms of yield and acceptability

9. Assessment of Fodder Cowpea Varieties in Kollam

Following varieties were assessed:
TO 1 - Aiswarya
TO 2 – TO2-Fodder cow pea CO9

Outcome: Fodder Cow pea CO-9 showed better yield and higher palatability.

Frontline demonstrations:

Under Frontline demonstrations, proven technologies were demonstrated in the farmers field. In 2019-20 KVK Kollam has conducted 90 demonstrations. The technologies demonstrated were:

Sl No	Crop	Technology demonstrated	No. of demo.
1	1Banana	Demonstration on non conventional soil ameliorants over lime in managing soil acidity in banana var Nendran	10
2	Elephant foot yam	Demonstration on customized fertilizer formulation for elephant foot yam intercropped in coconut gardens	5
3	Okra	Demonstration on open precision farming in okra	3
4	Ginger	Demonstration of IISR micronutrient mixture application in ginger for supplementing micronutrients	5
5	Yard long bean	Demonstration of high yielding yard long bean variety Arka Mangala in Kollam district	5
6.	Bittergourd	Demonstration of integrated management practices against downy mildew in bittergourd	10
7.	Bittergourd	Demonstration on soil test based nutrient management for pest and disease tolerance in Bitter gourd	10
8.	Coconut	Integrated crop management in coconut in FSRS farm (KALPARAKSHA model)	1
9.	Rice	Demonstration of 4 row walking type transplanter in Kollam district	5
10.	Rice	Demonstration of Power Paddy Weeder in Kollam district	5
11.	Poultry	Demonstration of low cost portable mini poultry brooder with package of practices for backyard poultry rearing	5
12.	Cattle	Demonstration of TANUVAS- Masti-Guard for prevention of common mastitis in dairy cattle in Kollam	5
13.	Goats	Demonstration of Oestrous synchronization and AI in Goats	10

14.	Poultry	Demonstration of fish silage supplement in backyard poultry	5
15.	Jack fruit	Demonstration of jack fruit flour as functional food in baked products	3
16.	Nuri garden	Demonstration of nutrition garden along with mushroom as a component through environmental clubs in schools	3

Trainings:

Type of training	No.of trainees (No. of trainings)	Category
Training (On and off campus)	1504 (66)	Farmers
Training (On and Off campus)	657 (30)	Rural Youths
Training including sponsored training programmes	928 (50)	Farmers
Vocational training programmes carried out by KVKs	255 (9)	Rural Youths

Other extension activities: In addition to the OFT, FLD and trainings the Kendra has undertaken other extension activities such field days, participation in exhibitions, method demonstrations, radio talks, soil health camps, field visits, ex trainee's samelan, seminars etc. Mass media coverage of the important activities was also done timely. In addition KVK celebrated world soil day, conducted programmes under Snakalap se sidhi programme and pre rabi programme.

Revolving Fund: Under revolving fund various technological inputs were produced for distribution to farmers of Kollam district. The receipts from revolving fund activities amounted to Rs.3939073/- for the year. The major share was contributed by Organic inputs, vegetable seedlings, grow bags, value added products, pheromone trap and TC banana.

Externally Aided Projects:
Completed Projects

1. **Strengthening of Agro Machinery Testing, Training and Service Centre for South Zone of Kerala**

(P.I. Dr.Bini Sam, Assistant Professor, KVK, Kollam)

Funding Agency :State Planning Board, Government of Kerala

Objectives :

1. To provide a central facility for the farmers of South Kerala to meet their agricultural mechanization demands by providing access to machinery and their service and maintenance
2. To conduct training on operation, repair, maintenance and servicing of agro machinery and implements so as to create a skilled labour bank to meet the mechanization needs
3. To provide a facility for refinement of Agrl machineries/implements suited to the locality and conditions prevailing in the South Zone of Kerala
4. To empower women through gender sensitive farm machination to reduce the workload/ drudgery of women labourers in farming operations and enhancing their opportunities for remunerative employment and income.

Major Research Highlights :

Different Farm Machinery training programmes such as "Operation and Maintenance of Tractor" 5 days duration , "Operation and Maintenance of Power Tiller" 3 days duration ," Operation of coconut tree climbing device and Brush Cutter" 2 days duration and "Operation and Maintenance of Mini Tillers" 2 days duration were conducted at KVK, Kollam. 120 participants were attended the training programme on "Operation and Maintenance of Tractor", 50 participants for "Operation and Maintenance of Power Tiller" ,80 participants for" Operation of coconut tree climbing device and Brush Cutter" and 20 participants for "Operation and Maintenance of Mini Tillers".

2. Ecofriendly and economic crop health package emphasizing mineral nutrition with special reference to silicon for yield enhancement in cucurbitaceous vegetables.

(P.I. Dr. PoornimaYadav. P.I, Assistant Professor, KVK, Kollam)

Funding Agency : Department of Agriculture and Farmers welfare

Objectives :

1. To develop an ecofriendly and economic crop health package emphasing mineral nutrition including silicon for higher growth and yield
2. To study the effect of silicon nutrition in reducing pests, diseases and water stress (abiotic and biotic stresses)
3. To find out the most effective foliar silicon fertilizer for cucurbitaceous vegetables.

Major Research Highlights :

An incubation study was conducted to find out the maximum release of available silicon from different sources viz fine silica, rice husk ash, enriched compost, silicate solubilizing bacteria in different combinations. It was found that the highest available silicon was recorded by T_{13}(Soil+rice husk ash@500 kg/ha+Silicate solubilizing bacteria)and it was on par with T_{11}(Soil +rice husk ash @500 kg/ha. Hence the treatmentT_{11}(Soil +rice husk ash @500 kg/ha was selected for the field study.

The results of the field study in bitter gourd showed that Soil test based nutrient management +rice husk ash @500 kg/ha (basal) + foliar application of potassium silicate at vegetative and flowering stage @0.5% gave the maximum yield of 20.61t/ha

3. Scheme on Crop Health Management 2017-18 – Support to KVK's for Supporting Surveillance and Clinics of Krishibhavans

(P.I. Dr. Lekha M, Assistant Professor, KVK, Kollam)

Funding Agency : DoA

Objectives :

1. Diagnosis of samples/specimens of insects, mites, nematodes other pathogens , weeds etc., Diagnostic field visits, Training, Preparation of technical materials for farmers.

Major Research Highlights :

- Purchased Laminar air flow chamber, Magnascope, tablet, Net book LED Projector, Jio sim,
- Strengthened facilities of KVK's existing Plant health clinic
- Helped farmers (156 nos) and VHSE students (7 batches, 175 no) for identifying the specimens especially nematode infestation in banana, vegetables, small insects like thrips, mite, jassids etc (112 nos) from 30-8-2018 onwards
- Sending MTA reports and photos through whatsapp group 'KVK LEADS' to extension personnels under Department of Agriculturre
- Conducted trainings(no of trainings-15 and number of trainees- 355) utilizing the portable AV aides purchased under the project
- Disseminated alert messages on possible pest incidence
- Prepared technical material - 5 leaflets

Ongoing projects

1. Establishment of 'Protein parks' in the rice growing tracts of Kollam district for food and nutritional security with special emphasis on soil health

(P.I. Dr. PoornimaYadav. P.I, Assistant Professor, KVK, Kollam)

Objectives :

1. Popularisation of important pulses including traditional one horse gram in the district by forming 2 clusters in 2 panchayath through trainings and FLDs
2. Establishment of a post harvest processing unit at KVK Kollam
3. Enhancement of productivity of rice and pulses through FLDs and trainings

Major Research Highlights :

1. Completed bench mark survey (total number of farmers selected for survey- 150 numbers)
2. Conducted seven trainings on various aspects of pulses from scientific cultivation to seed production(total number of farmers participated = 104 nos)
3. Conducted 2 Seminars on Importance of pulses and soilhealth and rice rice pulse cropping system and role FPOs in enhancing the rice production and profitability (total number of farmers participated = 138nos)
4. Formed clusters in Anayadi in Sooranadu north and west Kallada)).
5. Conducted 3 FLDs
   Black gram variety VNB 8-1.65 ha(15 farmers)

   Green gram variety co -8 – 1 ha(12 farmers)
   Grain cowpea variety DC-15-3ha(30 farmers)
6. Conducted one OFT in 5 farmers field and 1 in KVK farm
7. Assessment of grain cowpea varieties which includes one local collections Local variety Karimany was found to be the third best variety.
8. Local varieties with some characters early maturing easy to thresh etc were identified (now growing in KVK's farm as upland crop).
9. Purchased Mini Dal mill and rice mill for the small scale processing of pulses.

2. Drought management through control of soil erosion, *in situ* rain water harvest, organic waste utilization and crop diversification in coconut based mediculture systems of Kerala

(P.I. Dr. PoornimaYadav. P.I, Assistant Professor, KVK, Kollam)

Funding Agency : DoA

Objectives :

1. To develop appropriate cost effective, ecofriendly techniques for ground water recharging, slope stabilization and waste management in coconut based mediculture systems of selected watersheds

Major Research Highlights :

Field experiment 1: Ground water recharging and slope stabilization through vegetative barrier technology utilizing vetiver systems – continuing

Experiment 2: Efficient utilization of natural resources and waste management through vertical farming- fabricated a vertical farming structure and started experiment on standardization of rooting medium.

Observational trial

1. On farm production technology of Arbuscular mycorrhizal (AM) fungi

(P.I. Dr. PoornimaYadav. P.I, Assistant Professor, KVK, Kollam)

Objectives :

1. To develop a production protocol for AMF at farm level

Major Research Highlights :

The roasted or sterilized substrate combinations consisted coirpith compost-50%, coir fibre -25%,soil-15%,cowdung-10% or potting mixture(1:1:1-soil,coirpith,cowdung in equal proportion v/v) was found to be the best, easily available and economic medium for on farm production of AMF.

FARM TRIAL RESULTS

1. Integrated Nematode management in pepper

Dr. R. Narayana, Department of Entomology, COA, Vellayani

1.	Station	:	RARS (SZ)
2.	Season	:	2020-2021
3.	Crop	:	Pepper
4.	Objective	:	Integrated Nematode management in pepper
5.	Location	:	Nedumangad, Thiruvananthapuram
6.	Plot size	:	50 cents
7.	Name of farmer & Address	:	Ajikumar, Chettiyampara TVM.
8.	Treatments	:	T1- Neemcake@200g/plant (May/June)+ *P.fluorescens*@ 15 g/plant (May/June & Oct/Nov) T2- Neemcake (May/June)@200g/plant + AMF@15g/plant (May/june & Oct/Nov) T3- Untreated check
9.	Results	:	T1- Neemcake@200g/plant (May/June)+ *P.fluorescens*@ 15 g/plant (May/June & Oct/Nov) was found to be superior for reducing the nematode population and increasing the yield of pepper.


Untreated
control


T1- Neemcake@200g/plant+
P.fluorescens@ 15 g/plant

2. Screening of new variety in Oyster mushroom (*Pleurotus* sp.)

Dr. Susha S Thara, Assistant Professor, College of Agriculture, Vellayani

1.	Station	:	College of Agriculture, Vellayani
2.	Season	:	October – November 2019
3.	Crop	:	Mushroom
4.	Objective	:	To develop improved strain of oyster mushroom
5.	Location	:	Thiruvananthapuram, Kollam, Kottayam, Alappuzha, Idukki and Kasargod
6.	Plot size	:	
7.	Name of farmer & Address	:	Farmer 1: Suma S, K R S Bhavan, Moolayam, Aliyad P O, Thiruvananthapuram Farmer 2: Lalu Thomas, Kalluvila Grace, Manjakkala P. O, Kunnokode (via) Kollam, Farmer 3: Jithin Joji, Athapallil House, Ayarkunnam P O, Kottayam, Farmer 4: Divya S Raj, Chaithanya, Chethiyara, Thamarakulam P O, Alapuzha – 690530 Farmer 5: Rhino Thomas, Maliekkal house, Anaviratty, P O Adimaly. Idukki Farmer 6: Satheeshan P, Mallakkara, Kanichira, Thaikkadappuram, Kasaragod
8.	Treatments	:	Variety 1 *Pleurotus djamor* Variety 2 *Pleurotus florida* Variety 3 Native isolate from Chirayinkeezh Variety 4 *Pleurotus djamor* X Variety 3
9.	Results	:	
	Two varieties 1) a native oyster mushroom isolate from Chirayinkeezh and 2) hybrid of *P.djamor* and the native isolate were subjected to farm trials and the data were recorded. The observations were compared with the cultivated *Pleurotus florida* and *Pleurotus djamor* isolates.. Observation on number of days needed for spawn run revealed that the hybrid completed spawn run in mushroom bed in 7.75 days. After spawning, the pinheads appeared first on hybrid (12.25 days) which was significantly earlier than its parents. Maximum BE of 82.83 per cent was obtained from native oyster mushroom isolate from Chirayinkeezh and the hybrid recorded BE of 60.33 per cent. Among the treatments, native isolate produced significantly higher number of sporocarps (125.50) followed by the hybrid (102.75). Hybrid produced light pink coloured fruiting bodies which were intermediate to the parents.		

3. Nutrient recruitment of Grand Nain banana (*Musa* AAA. Grand Nain)

PI : Dr.BindhuJ.S., Assistant Professor, OFR, Vellayani

1.	Station	Department of Agronomy, College of Agriculture, Vellayani and AICRP on IFS, OFRC, Vellayani
2.	Season	2018-2019 (2018, December- November2019) , Annual
3.	Crop	Banana- Grand Nain
4.	Objective	To evaluate the nutrient requirement of Grand Nain banana
5.	Location	Thiruvanathapuram, Kollam and Pathanamthitta Districts
6.	Plot size	10 cents/location
7.	Name of farmer & Address	1. Mini Suresh Puthen purakal, Venpala, Thiruvalla. Pathanamthitta 2. Zakir Y. M. PodikalaThundil, Kurampala, Pandalam, Pathanamthitta 3. Gopinathan Unnithan Kaleekkal, Anayadi P.O., Pathanamthitta 4. Rini Mary Thomas Meprath House, Nannuvakadu, Pathanamthitta 5. Balasubramanyan Aishwarya, R.O Junction, Anchal, Kollam 6. T. Marydasan Montwilly, Perayam, Mulavana P.O. Kollam 7. AmbikaKumari Krishnavilasam, Vadakkumbhagam, Chavara south P.O, Kollam 8. Ashok Kumar N. N. Vellayaniyil, Maru North, Alumkadavu, Karunagapally, kollam 9. Radhakrishnan Nair Rajani Nivas, Perukavu, Mangattu kadavu, Trivandrum 10. Ajish B. V. ParamehsvaraVilasom, Palappooru, Vellayani P.O. Thiruvananthapuram

		11. N. Rajakumaran Nair SreeNivas, Anthiyoorkonam, Kollodu Thiruvananthapuram 12. Ganesh K. Chekkalavilakam, Muthana P.O. Varkala, Thiruvananthapuram
8.	Treatments	N_1: 160: 40: 640 g N: P_2O_5: K_2O plant^{-1} year^{-1} (P- basal , N and K in 2 equal splits at 2 and 4 months after planting) N_2: 160: 40: 640 g N: P_2O_5: K_2O plant^{-1} year^{-1}(P- basal, N and K in 4 equal splits at 2, 3, 4 and 5 MAP) N_3: Farmers practice (200: 200: 400 g N: P_2O_5: K_2O plant^{-1} year^{-1} (P- basal , N and K in 2 equal splits at 2 and 4 months after plantings)
9.	Results	
	The results of the farm trial are summarized below:- The nutrient levels significantly influenced the yield attributes of Grand Nain banana. The number of hands and total fingers were the highest in four splits application of nutrients @ 160: 40: 640 g N: P_2O_5: K_2O plant^{-1} year^{-1}(N_2). The application of nutrients @ 160: 40: 640 g N: P_2O_5: K_2O plant^{-1} year^{-1} in four splits (N_2) recorded the highest bunch weight (28.8 kg plant^{-1}) and yield (89 t ha^{-1}) and was significantly superior to application of nutrients in two splits (N_1) and farmers practice (N_3). The average duration for bunch emergence varied from 195 to 220 days over different nutrient levels. The application of nutrients @ 160: 40: 640 g N: P_2O_5: K_2O plant^{-1} (P- basal, N and K in 4 equal splits at 2, 3, 4 and 5 MAP) recorded the highest gross income and net income and B: C ratio. It can be concluded that application of nutrients @ 160: 40: 640 g N: P_2O_5: K_2O plant^{-1} (N_2) with full P as basal N and K in 4 equal splits at 2, 3, 4 and 5 MAP can be recommended for tissue culture Grand Nain banana for yield and economics under irrigated condition.	


KERALA AGRICULTURAL UNIVERISTY
Farm Trial on Nutrient Requirement of
Grand Nain Banana
(Musa AAA, Grand Nain)
RARS (S2), Vellayani

FARM TRIAL PROPOSALS

FARM TRIAL PROPOSAL-1		
1	Station	Department of Nematology, College of Agriculture, Vellayani
2	Season	2021-22
3	Crop	Okra
4	Name of the trial	Management of root-knot nematode infesting cowpea using bio agents
5	Officer proposing	Dr.Nisha.M.S, Assistant Professor, AICRP on Nematodes, Department of Nematology
6	Objective	To test efficacy of bio agents in management of root-knot nematode in cowpea
7	Justification	Based on the results of the trials conducted in two consecutive years, soil application of *Purpureocillium lilacinum* (cfu $2x10^6$) @20g/m^2 +neem cake @100g/m^2 found superior in reducing nematode population and increasing yield in cowpea
8	Location	Thiruvananthapuram, Kollam
9	No. of trials	One each for two districts
10	Plot size	5 cents
11	Treatments	T1- *Purpureocillium lilacinum* (cfu $2x10^6$) @20g/m^2 +neem cake @100g/m^2 T2-untreated
12	Instructions for conducting trial	To be decided
13	Observations to be recorded	Nematode population in soil (200cc) Nematode population in root (5g) Root-knot index Yield
14	Budget estimate	Rs. 15,000/-
15	Information required to be furnished	1. Name and address of the farmer 2. Location of the plot 3. Date of planting

FARM TRIAL PROPOSAL-2		
1	Station	Department of Nematology, College of Agriculture, Vellayani
2	Season	2021-22
3	Crop	Okra
4	Name of the trial	Management of root-knot nematode on okra by biofumigation and bioagents
5	Officer proposing	Dr.Nisha.M.S, Assistant Professor, AICRP on Nematodes, Department of Nematology
6	Objective	To test efficacy of bio fumigation using cauliflower crop residues and seed treatment using bio agents in management of root-knot nematode in okra
7	Justification	Based on the results of the trials conducted in two consecutive years , bio fumigation using cauliflower crop residues @ 25t/ha +seed treatment with *Purpureocillium lilacinum* @5g/kg seed found superior in reducing nematode population and increasing yield in okra
8	Location	Thiruvananthapuram, Kollam
9	No. of trials	One each for two districts
10	Plot size	5 cents
11	Treatments	T1- Bio fumigation using cauliflower crop residues @ 25t/ha +seed treatment with *Purpureocillium lilacinum* @5g/kg seed T2-untreated
12	Instructions for conducting trial	To be decided
13	Observations to be recorded	Nematode population in soil (200cc) Nematode population in root (5g) Root-knot index Yield
14	Budget estimate	Rs. 10,000/-
15	Information required to be furnished	1. Name and address of the farmer 2. Location of the plot 3. Date of planting

FARM TRIAL PROPOSAL-3			
1	Station	:	AICRP on Forage Crops and Utilisation, RARS(SZ), Vellayani
2	Season	:	Kharif 2021-22
3	Crop	:	Fodder Cowpea
4	Name of trial	:	Screening of new accession of fodder cowpea
5	Officer proposing	:	Dr.Gayathri G., Assistant Professor (Plant Breeding and Genetics), AICRP on Forage Crops and Utilisation, RARS(SZ), Vellayani
6	Objective	:	To test the performance of promising culture of fodder cowpea VFC-1 in the southern region of Kerala
7	Justification	:	The fodder cowpea varietyAiswarya released in 2013 from this centre is the only one till date released from KAU. Initial evaluation trials and consecutive three comparative yield trials have identified a promising culture of fodder cowpea VFC-1 which has outyielded Aiswarya. To release it as a variety, the performance of the superior culture in farmers field is inevitable.
8	Location	:	Thiruvananthapuram, Kollam and Pathanamthitta districts
9	Number of trials	:	Four in each district
10	Plot size	:	200 m^2 / 5 cents
11	Treatments	:	Two 1. VFC-1 2. Aiswarya
12	Instructions for conducting the trial	:	The crop will be raised as per KAU POP recommendation
13	Observations to be recorded	:	1. Green fodder yield 2. Dry fodder yield
14	Budget estimate	:	Rs. 24000/-
15	Information required to be furnished	:	1. Name and address of farmer 2. Location of plot

Farm Trial Proposal - 4			
1.	Station	:	RARS (SZ), Vellayani
2.	Season	:	2021-22
3.	Crop	:	Cabbage/Cauliflower
4.	Name of the trial		Management of Nematodes infecting cabbage/cauliflower
5.	Officer proposing & Official address	:	Dr. R. Narayana Assistant Professor Department of Entomology CoA Vellayani
6.	Objective		Management of nematodes infecting cabbage/cauliflower
7.	Justification	:	The findings were on the basis of experiments done in the lab, earthen pots and farmer's field located at Vattavada, Kanthaloor area of Idukki district and Marayamuttom area of Thiruvanathapuram District. GOK Plan Project.
8.	Location	:	AKC, Kottarakara, Kakkamoola Trivandrum District
9.	Number of trails	:	2
10.	Plot size	:	4x4 m^2 plots
11.	Treatments	:	T1.Soil application of *Trichoderma* sp @ 2.5 kg /ha T2. Cartap hydrochloride 1 kga.i/ha T3. Control
12.	Instructions for conducting the trail	:	
13.	Observations to be recorded	:	Initial nematode population Final nematode population of soil and roots Yield of cabbage/cauliflower
14.	Budget estimate	:	Rs. 20,000
15.	Information required to be furnished	:	Name and Address of the farmer Location of the plot

Farm Trial Proposal - 5			
1.	Station	:	RARS (SZ), Vellayani
2.	Season	:	2021-22
3.	Crop	:	Cardamom
4.	Name of the trial		Integrated Nematode Management in cardamom.
5.	Officer proposing & Official address	:	Dr. R. Narayana Assistant Professor Department of Entomology CoA Vellayani
6.	Objective		Management of nematodes infecting cardamom
7.	Justification	:	Based on the findings conducted for two consecutive years at two different locations, Idukki district. Mulching with Glyricida @2 kg/plant+ application of *Purpuriocillium lilacinum*@ 30g/plant, one month after mulching was the most effective treatment - AICRP Nematodes.
8.	Location	:	AKC, Kottarakara, Kakkamoola Trivandrum District
9.	Number of trails	:	2
10.	Plot size	:	50 cents
11.	Treatments	:	T1.Mulching with Glyricida @2 kg/plant+ application of *Purpuriocillium lilacinum*@ 30g/plant, one month after mulching T2. Mulching with Glyricida @2 kg/plant+ application of *Pseudomonas fluorescens*@ 30g/plant, one month after mulching. T3. Untreated check.
12.	Instructions for conducting the trail	:	
13.	Observations to be recorded	:	Initial nematode population Final nematode population of soil (200g of soil) and roots.(5g) Yield of cardamom
14.	Budget estimate	:	Rs. 20,000
15.	Information required to be furnished	:	Name and Address of the farmer Location of the plot
FARM TRIAL PROPOSAL-6			
1.	Station	:	RARS (SZ), College of Agriculture,

			Vellayani, Thiruvananthapuram
2.	Season	:	Three years, starting from June 2021
3.	Crop	:	Black pepper
4.	Name of the trial		Evaluation of the PGPF (plant growth promoting endophytic fungus) *Piriformosporaindica* for plant growth promotion in black pepper
5.	Officer proposing & Official address	:	Dr. K. N. Anith, Professor of Microbiology, Dept. of Agricultural Microbiology, College of Agriculture, Vellayani
6.	Objective		To assess the impact of inoculation of the PGPF *Piriformospora indica* for plant growth promotion in black pepper
7.	Justification	:	It has been found that the PGPF *Piriformospora indica* improves the plant growth and yield in bush pepper plants in previous studies
8.	Location	:	RARS Ambalavayal, PRS Panniyur, CRS Pampadumpara
9.	Number of trails	:	Three
10.	Plot size	:	20 plants in each location
11.	Treatments	:	1. Inoculated with PGPF *Piriformospora indica* 2. Uninoculated control
12.	Instructions for conducting the trail	:	Inoculation with PGPF *Piriformospora indica* will be done in standing crop of less than 1-2 year old uniformly grown pepper vines
13.	Observations to be recorded	:	Biometric observations on plant growth, Flowering and fruit set if any
14.	Budget estimate	:	Rs. 5000 for each location. Total Rs. 15000/-
15.	Information required to be furnished	:	The outcome of results generated from the KSESTE project entitled "Exploitation of the endophytic fungus *Piriformospora indica* for biotic and abiotic stress management in black pepper" and other related student projects. Research papers are included as attachment.

FARM TRIAL PROPOSAL-7			
1.	Station	:	RARS (SZ), Vellayani
2.	Season	:	December 2020- March 2021
3.	Crop	:	Tomato
4.	Name of the trial	:	Farm trial with one promising hybrid of tomato- LE 16 x Vellayani Vijai
5.	Officer proposing & Official address	:	Dr. S. Sarada, Assistant Professor and Head, Dept. of Vegetable Science, College of Agriculture, Vellayani
6.	Objective	:	To test the performance of a high yielding tomato hybrid- LE 16 x Vellayani Vijai, in Kerala
7.	Justification	:	Based on the analysis of yield data for three CYTs conducted with 24 F_1 hybrids produced by crossing six lines with high yield and quality attributes with four bacterial wilt resistant testers in a line x tester manner, LE 16 x Vellayani Vijai was found superior for yield and bacterial wilt resistance
8.	Location	:	Southern, Central and Northern Kerala
9.	Number of trails	:	15, five trials in each location
10.	Plot size	:	40 m^2/ treatment/ location
11.	Treatments	:	LE 16 x Vellayani Vijai, Jessica (bacterial wilt resistant check)
12.	Instructions for conducting the trail	:	Crop is to be raised as per POP recommendations for tomato
13.	Observations to be recorded	:	1. Days to first flowering 2. Fruits $plant^{-1}$ 3. Fruit length (cm) 4. Fruit girth (cm) 5. Fruit weight (g) 6. Yield $plant^{-1}$ 7. Bacterial wilt incidence (%)
14.	Budget estimate	:	Rs. 50,000/-
15.	Information required to be furnished	:	-

FARM TRIAL PROPOSAL - 8

1.	Name of the Station	:	College of Agriculture, Vellayani
2.	Season	:	2020-21
3.	Crop	:	Banana
4.	Technology	:	Efficacy of *Piriformospora indica* on production and protection of banana
5.	Name of the trial	:	Field performance of *P. indica*-colonised banana plants against natural incidence of fungal, bacterial and viral diseases
6.	Objective	:	Evaluation of *P. indica*-colonised banana plants against the natural incidence of fungal diseases including panama wilt, bacterial and viral diseases
7.	Justification	:	The results of KSCSTE project on "Synergism in Defense and Growth: Exploration of a root endophytic fungus *Piriformospora indica* for the management of *Fusarium* wilt in banana with enhanced crop production", revealed that the *P. indica*-colonised plants had increased root and shoot biomass; reduced incidence and intensity of fungal, bacterial and viral diseases in banana var. Nendran.
8.	Locations	:	Trivandrum, Kollam and Pathanamthitta
9.	No. of Trials	:	3
10.	Plot size	:	20 cents (100 plants each for two treatments)
11.	Treatments	:	T1: *P. indica*-colonised plants T2: Control (non-colonised plants)
12.	Observations	:	Biometric observations including number of leaves, length and breadth of leaves, plant height, time for bunch emergence, number of fruits per bunch and bunch weight. Incidence and intensity of fungal, bacterial and viral diseases
13.	Budget estimate	:	Rs. 50,000/-
14.	Name of Major Advisor	:	Dr. Joy M.
15.	Title of Thesis	:	KSCSTE Project "Synergism in Defense and Growth: Exploration of a root endophytic fungus *Piriformospora indica* for the management of *Fusarium* wilt in banana with enhanced crop production" Results of PhD thesis of Ms, Sinijadas K. on "Management of *Banana bract mosaic virus* using the beneficial fungal root endophyte, *Piriformospora indica*" (Now in third year)
16.	Year of completion	:	2020-21

FARM TRIAL PROPOSAL - 9			
1.	Name of the Station	:	College of Agriculture, Vellayani
2.	Season	:	2020-21
3.	Crop	:	Vegetable crops viz. vegetable cowpea and bhindi
4.	Technology	:	Efficacy of *Piriformospora indica* on production and protection of vegetable crops
5.	Name of the trial	:	Field performance of *P. indica*-colonised vegetable crops against natural incidence of fungal, bacterial, phytoplasmal and viral diseases
6.	Objective	:	Evaluation of *P. indica*-colonised vegetable crops against the natural incidence of fungal, bacterial, phytoplasmaland viral diseases
7.	Justification	:	The results of PG, PhD and plan projects revealed that the *P. indica*-colonised plants had increased root and shoot biomass with enhanced yield, and reduced incidence and intensity of fungal, bacterial, phytoplasmal and viral diseases in vegetable crops.
8.	Locations	:	Trivandrum, Kollam and Pathanamthitta
9.	No. of Trials	:	3
10.	Plot size	:	10 cents
11.	Treatments	:	T1: *P. indica*-colonised plants T2: Control (non-colonised plants)
12.	Observations	:	Biometric observations including number of leaves, length and breadth of leaves, leaf area, plant height, time for flowering, , number of fruits per plant, fruit weight. Incidence and intensity of fungal, bacterial, phytoplasmal and viral diseases
13.	Budget estimate	:	Rs. 60,000/-
14.	Name of Major Advisor	:	Dr. Joy M.
15.	Title of Thesis	:	- Plan Project ""Growth and Defense trade-off in unstable continuum: Exploration of root endophytes including *Piriformospora indica* & their biomolecules for enhanced yield and management of biotic and abiotic stress in tropical fruit and vegetable crops" - Management of *Blackeye cowpea mosaic virus* using natural products from botanicals and the fungal root endophyte *Piriformospora indica* (PG; completed in 2019) - Management of *Bhendi yellow vein mosaic virus* using

			beneficial fungal root endophyte *Piriformospora indica*(PG; completed in 2020) - *Piriformospora indica* and new generation fungicides for the management of anthracnose incited by *Colletotrichumgloeosporioides*(Penz.) Sacc. in vegetable cowpea. (PhD; will be completed in 2021; Field studies in two seasons are over).
16.	Year of completion	:	2019, 2020, 2020-21

FARM TRIAL PROPOSAL-10			
1.	Station	:	**FSRS,Sadanandapuram**
2.	Season	:	
3.	Crop	:	Rice
4.	Name of the trial		Management of Blood grass (*Isahcnemiliacea*Roth ex RoemetSchult) in rice field
5.	Officer proposing & Official address	:	Dr. Renjan B. Assistant Professor (Agronomy), FSRS.Sadanandapuram
6.	Objective		To develop an effective strategy for managing the Blood grass
7.	Justification	:	The selected management strategy resulted in lowering of the weed intensity and recorded higher yield yield attributes and net income
8.	Location	:	Farmer's field
9.	Number of trails	:	10
10.	Plot size	:	2 cents
11.	Treatments	:	Four treatments viz. T_1-Intensive tillage (three ploughings+ puddling)+Deep ponding of water i.e., >7.5 cm from days of transplanting till panicle initiation and 1-2 cm till maturity +Fenoxyprop-p-ethyl @ 60 g ha^{-1} at 3-5 leaf stage of weed(15 DAT) T_2-Intensive tillage (three ploughings+ puddling) + Deep ponding of water i.e., >7.5 cm from days of transplanting till panicle initiation and 1-2 cm till maturity+ Oxyfluorfen @ 0.15 kg ha^{-1} at 3 days before transplanting *fb* one hand weeding at 20 DAT T_3-PoP of KAU T_4- Farmer's practice
12.	Instructions for conducting the trail	:	POP has to be followed
13.	Observations to be recorded	:	Productive tillers, filled grains per panicle, thousand grain weight, grain yield, straw yield , Weed dry weight, net income
14.	Budget estimate	:	-
15.	Information required to be furnished	:	Weed control efficiency, weed index, benefit cost ratio

FARM TRIAL PROPOSAL-11			
1	Station	:	AICRP on Forage Crops and Utilization, RARS(SZ), Vellayani
2	Season	:	2020-21
3	Crop	:	Agase, Hybrid napierand Setaria grass
4	Name of trial	:	Intensive Forage Production through Agase based (*Sesbaniagrandiflora*) cropping system .
5	Officer proposing	:	Dr.Usha C Thomas Assistant Professor(Agronomy) & Officer i/c, AICRP on Forage Crops & Utilization, Vellayani
6	Objective	:	To check the suitability of Agase based fodder production systems in southern districts of Kerala
7	Justification	:	Three year trial was conducted at AICRP on Forage Crops &Utilization, Vellayani to study the effect of cropping system on fodder yield, quality & soil fertility during Kharif 2015-2019. After three years, the study was concluded, pooled analysis of data was done and recommendation was published as **Technology recommendation by ICAR (2020 Rabi NGM Proceedings, June 1, 2020 of AICRP on Forage Crops)** - In Kerala, Agase inter-cropping with Setaria grass (2:2) or BN Hybrid (2:1) is recommended higher fodder productivity, economic returns and sustainability**.**
8	Location	:	Southern Kerala 3 (Thiruvananthapuram, Kollam and Pathanamthitta) Number of farmers - 3X4= 12
9	Number of trials	:	1
10	Plot size	:	6 mx 5 m
11	Treatments	:	1.Sole planting of Agase 2. Agase inter-cropping with Setaria grass (2:2) 3. Agase inter-cropping with BN Hybrid (2:1)
12	Instructions for conducting the trial	:	
13	Observations to be recorded	:	Green fodder yield, Dry fodder yield
14	Budget estimate	:	Rs. 40,000 (Rupees. Forty thousand only)
15	Information required to be furnished	:	1. Name and address of the farmer 2. Location of the plot 3. Date of planting

FARM TRIAL PROPOSAL-12			
1	Station	:	AICRP on Forage Crops and Utilization, RARS(SZ), Vellayani
2	Season	:	2020-21
3	Crop	:	Hybrid napier and Agase
4.	Name of trial	:	BN hybrid based quality fodder production systems
5	Officer proposing	:	Dr.Usha C Thomas Assistant Professor(Agronomy) & Officer i/c, AICRP on Forage Crops & Utilization, Vellayani
6	Objective	:	To study the suitability of BN hybrid based quality fodder production systems in southern districts of Kerala
7	Justification	:	Three year trial was conducted at AICRP on Forage Crops&Utilization, Vellayani to assess the effect of cropping system on carbon sequestration, fodder yield, quality, Soil fertility and economics from Kharif 2015-2019. After three years, the study was concluded, pooled analysis of data was done and recommendation was published as **Technology recommendation by ICAR (Rabi NGM Proceedings, June 1, 2020 of AICRP on Forage Crops) -** In Kerala, perennial grass based cropping system Bajra Napier hybrid grass in paired rows (60/120 cm) with *Sesbaniagrandiflora* is recommended for achieving higher yield, net return and total carbon sequestration
8	Location	:	Southern Kerala Number of districts - 3 (Thiruvananthapuram, Kollam and Pathanamthitta) Number of farmers - 3X4= 12
9	Number of trials	:	1
10	Plot size	:	4.8 mx 4 m
11	Treatments	:	1. BN hybrid sole planting at a spacing of 60cmx 60cm. 2.Bajra Napier hybrid grass in paired rows (60/120 cm) with a row of *Sesbaniagrandiflora*as intercrop
12	Instructions for conducting the trial	:	As per the package of practice recommendations, KAU
13	Observations to be recorded	:	Green fodder yield, Dry fodder yield
14	Budget estimate	:	Rs. 40,000 (Rupees. Forty thousand only)

15	Information required to be furnished	:	1. Name and address of the farmer 2. Location of the plot 3. Date of planting

FARM TRIAL PROPOSAL-13			
1.	Station	:	**FSRS, Sadanandapuram**
2.	Season	:	
3.	Crop	:	Brinjal *Solanum melongena*
4.	Name of the trial		Evaluation of brinjal in AIVIP
5.	Officer proposing & Official address	:	Dr.M.R.Bindu Professor & Head, FSRS, Sadanandapuram
6.	Objective		To develop a high yielding brinjal variety suited to South Kerala
7.	Justification	:	The selected genotype recorded higher fruit yield per plant and large fruit size and purple colour
8.	Location	:	Farmer's field
9.	Number of trails	:	10
10.	Plot size	:	2 cents
11.	Treatments	:	Three varieties viz. T1FSRS SM-1, T2-Surya T3-farmer'svariety
12.	Instructions for conducting the trail	:	POP has to be followed
13.	Observations to be recorded	:	No. of fruits per plant, weight/ fruit, duration and yield per hectare, incidence of pests and diseases
14.	Budget estimate	:	-
15.	Information required to be furnished	:	No. of fruits per plant, weight/ fruit, duration and yield per hectare, incidence of pests and diseases

Report of the Agricultural Knowledge Centres of Southern Zone

Agricultural Knowledge Centres of Thiruvananthapuram District

1. **Name of AKC** : **Nedumangad Block, Thiruvananthapuram**

Name of the Nodal Officer : Dr.Meera, A. V.
Assistant Professor, IFSRS, Karamana

Date of start : 17.08.2020

Objectives:

1. Identification of fallow lands for cultivation under Subhiksha Keralam project
2. Training programmes for farmers and other entrepreneurs
3. Establishment of seed village
4. Supply of quality planting materials and seeds
5. Preparation of production plan and protocols at block level in consultation with local bodies

Major activities:

Action plan was set up for starting IFS demonstration plots at panchayath level in consultation with ADA and agricultural officers. Required planting materials (vegetable seeds of newly released KAU varieties, planting materials of tuber crops from CTCRI) were supplied. Training sessions- both offline and online- were arranged in connection with Krishipadashalas, giving special emphasis on diverse IFS activities. Bio inoculants were also supplied. Field visit by Karshaka Santhwanam team was also arranged.

2. **Name of the AKC** : **Nemom Block, Thiruvananthapuram**

Nodal Officer : Dr. Reji Rani O.P, Assistant Professor,
Dept. of Agricultural Entomology, CoA, Vellayani

Date of start : 17.8.2020

Objectives:

To serve as a knowledge hub for the farmers of Krishi bhavans under the block Viz., Malayinkezhu, Maranalloor, Vilappil, Vilavoorkkal, Pallichal, Balaramapuram, Nemom and Trivandrum Corporation.

Major Activities:

The Nemom AKC was inaugurated on 17.8.2020, on the auspicious farmers day observing Covid protocol with ADA Sri. Jayaram on chair. Thereafter monthly meetings are being held at the Block office situated at Malayinkeezhu. The following activities were undertaken during August – December period with the wholehearted cooperation of ADA Smt. Jyothi V. Pillai and Agricultural officers of various Krishi Bhavans under Pallichal /Nemom Block.

1. Discussion of Production plan based on AEU
2. Decision to initiate cultivation of pulse crops like black gram and green gram for which farmers were given training by KAU Scientists and seeds were arranged from RARS Pattambi. It has been decided to undertake the cultivation in 1 ha under KB Maranalloor and KB Malayinkeezhu.
3. Organised 17 training programs on various aspects of production and protection aspects of vegetables and pulses including IFS models, IPM in Vegetables, IDM in vegetables, awareness of safe use of insecticides, Integration of Apiculture and Mushroom cultivation, Fisheries and Animal husbandary in IFS etc.
4. Visited IFS plots of KB Pallichal (1), KB Malayinkeezh (1) and KB Kallliyoor (1) and given suggestions for improvement.
5. Multi Disciplinary Diagnostic Team visits to 5 farmers fields under KB Balaramapuram
6. Initiatives to start a seed village program under KB Kalliyoor. Three farmers plots selected for seed production of amaranthus, bhindi and chilli.
7. Established Demonstration plots on new cowpea variety Deepika (KB Vilaveerkkal), Biocontrol of sucking pest in cowpea (KB Balaramapuram) , Biocontrol of fusarium wilt in cowpea (KB Malayineezh) , BIPM in rice (KB Kalliyoor)
8. Supply of Biopesticides and pheromone traps to KB Nemom and KB Vilappil.
9. Formed Plant Health Clinic group for advisory services through social media wherein the field problems presented are diagnosed and remedies suggested .

3. Name of the AKC **:** **Parassala Block, Thiruvananthapuram**

Name of the Nodal Officer : Dr.B.Sudha,
Assistant Professor, IFSRS, Karamana

Date of start : 17.8.2020

Objectives:

Offer technical handholding to farmers in scientific management of crop farms in close co ordination with the officials of the Department of Agricultural Development and Farmers Welfare; promote agricultural activities well in support of agricultural projects - "Subhiksha Keralam"/Jaiva Griham etc.

Major Activities:

Parassala block comprises of six panchayats viz., Kulathur, Parassala, Chenkal, Karode, Thirupuram and Poovar. AKC team comprising of Agricultural officers of these panchayats (team members), Assistant Director, Agriculture (Convenor) and Nodal officer are working in coordination in arranging training classes for farmers, arranging production inputs from KAU and other outlets, deciding Frontline Demonstrations, answering to various queries of farmers especially on plant protection aspects (after seeking expert opinion), sharing of agricultural information (especially publications and videos from KAU). Periodic field visits and meetings are in progress.

4. Name of the AKC : Vamanapuram Block, Thiruvananthapuram

Name of the Nodal Officer : Dr.Sajeena A., Assistant Professor, IFSRS, Karamana

Date of start : 17-08-2020

Objectives:

1. Formulate agricultural development programmes based on Agro ecological zones jointly with other agencies
2. Development of crop production protocols in grama panchayats with the joint cooperation of farmers, scientists and other agencies
3. Organization of panchayat level training and consultancy programmes
4. Organization of training programme based on agro ecological zones
5. Timely review of the progress of various successful model projects, integrated pest management programmes and production of agricultural inputs
6. Provide technical support on crop production, pest management and value addition activities
7. Aid in the conduct of karshaka padashala and demonstration plots in farmers fields

8. Efforts to combine the activities of RAWE programme of students of KAU with Subhiksha Keralam programme

Major Activities:

The functioning of the AKC was initiated during the inaugural session of Karshakadinam celebrations at Vamanapuram block. Meetings of the AKC including the Assistant Director of Agriculture, the Agricultural Officers along with the officers of allied departments under the block are being convened every month. A meeting of Block Level Advisory Committee (BLAC) was convened by the Assistant Director of Agriculture to undertake multi-disciplinary team visits to IFS fields in the different panchayats of the block and to propose suggestions for the modification of the existing units for their better functioning. Planting materials of sweet potato were provided to a farmer of Nellanad panchayat as part of ATMA demonstration, which were multiplied for supply to "Seed Village Programme for tuber crops" of Manickal Panchayat. Field visits have been regularly conducted in the fields of IFS units in the various panchayats of the block and suggestions for improvement of the units are being provided. Various classes have been organized focusing on the basic needs and problems faced by the farmers including, management strategies for wild animal attack, production technology for cool season vegetables in Kerala and integrated pest management strategies in different crops. Krishipadashala demonstration and training programmes have been organized in farmers fields on various topics. Financial support was provided by Krishibhavan Nellanad to facilitate irrigation facility to a fallow area of nearly 8 ha near the city limits and hence, conversion of the fallow land for the cultivation of tuber crops such as sweet potato, tapioca etc. has been initiated. Technical support for double sucker cultivation of banana was provided to a farmer of Pangode panchayat as part of banana area expansion programme of State Horticulture Mission, Kerala. The beneficiary effect of trichocards for the management of stem borer and leaf roller of rice has been demonstrated in a farmer's field at Pullampara panchayat. Consultancy and advisory services are being extended to farmers of the block for the problems addressed by them. Seedlings of cabbage, cauliflower, palak and raddish were supplied from IFSRS, Karamana and CoA, Vellayani for planting in fields of Manickal and Pullampara panchayats.

5. Name of the AKC : Athiyanoor Block, Thiruvananthapuram

Name of the Nodal Officer : Dr.N.V.Radhakrishnan, Professor (Plant Pathology)

Date of start : 17-08-2020

Objectives:

Identifying the fallow land and make it cultivable; production and productivity enhancement of all crops grown in the region; demonstration to be laid in connection with Integrated Farming System, INM, IPM, IDM etc.; Arranging market outlet to sale out farmer's produce; income through processing and value addition; training and field visit and involvement of other sister departments in all activities related to enhance the livelihood of farming community.

Major Activities:

Fallow land cultivation and intercropping in coconut garden with tapioca and banana.Conducted Krishi padasala in Krishi Bhavans of Athiyanoor, Kottukkal, Venganoor, Thiruvallam, Vizhinjam, Karunkulam, Kanjirankulam and Neyyattinkara on various topics viz., Plant health management, Coconut based Integrated farming System, biological control agents and biofertilizers in the crop production and crop protection, value addition in coconut for enhance income.

Friday Field Visits to farmers plot for their field problems. Identifying the problems in field, plantation crops and vegetables and giving solutions to overcome the problem.

Monthly meeting of Agricultural Officers and farmers at Office of Assistant Director of Agriculture, Neyyattinkara to have a discussion on current field problems.

Formed a Whatsapp group and giving solutions to their field problems then and there through it.

Disseminating the Agromet Advisory Bulletins published by RARS (Southern zone), Vellayani and giving forecast related to Weather and crop conditions by every four days for Athiyanoor Block.

6. Name of the AKC : Kazhakkuttom Block, Thiruvananthapuram

Name of the Nodal Officer : Dr. R. Pramod,
Assistant Professor, Department of Plant Pathology,
CoA, Vellayani

Date of start : 17.08.2020

Objectives:

1. Impart timely technical knowledge to farmers and solve their field level problems
2. To help the local bodies and AKC for the preparation of production plans and recommend crops according to Agro ecological zone
3. Facilitating scientific production of seeds and planting materials of cereals, pulses, tubers, fruit trees, bio-inputs etc. through seed production initiatives like seed village or seed clusters
4. To conduct block level training programmes in production, processing, value addition, marketing and plant protection
5. Provide technical support to the schemes and projects related to 'Subhiksha Keralam' by the LSGI's and Department of Agriculture

Major Activities:

1. Conducted Krishipadasala at Krishibhavans and handled different sessions and provide technical support to different areas of cultivation
2. Field visits areconducted based on need and give recommendations.
3. Identified the barren land suitable for cultivation in each panchayat and necessary steps were taken for initiating cultivation
4. Special importance given to terracecultivation in urban areas and indoor cultivation like mushroom production
5. Discussed the importance of soil less cultivation in Krishipadasala
6. Need based trainings and demonstration programmes has been arranged.
7. Special attention given to integrated farming system which include fish culture, poultry, livestock and other allied activities along with crop production
8. Regular meetings have been conducted in every month for evaluating the works and also for planning works for the coming month

7. Name of AKC	**:**	**Varkala Block, Thiruvananthapuram**
Name of Nodal Officer	:	Dr. Simi. S, Assistant Professor, CoA, Vellayani
Date of start	:	17-8-2020

Objectives:

Provide technical assistance for development of agriculture and allied sectors to ensure food self- reliance as part of 'Subhiksha Keralam' project

Major activities:

Inaugural ceremony of Agricultural Knowledge Centre (AKCs) at Varkala block of Thiruvananthapuram district as a part of Subhiksha Keralam was organized on 17th August 2020. The inaugural ceremony was conducted at the Office of The Assistant Director of Agriculture, Varkala at 12.00 noon following the COVID protocol. A total of 12 persons including officials, peoples' representatives and progressive farmers participated in the programme. The programme was chaired by Varkala Block development Standing Committee Chairman, Sri Rajeev. The gathering was welcomed by Smt. Beena Boniface, ADA, Varkala block. The block level Krishi Vigyan Kendra was formally inaugurated by hon. Block President Sri Yousuf. The Nodal officer, Dr. Simi S explained the objectives of AKCs and roles of AKCs in Subhiksha Keralam project. Meeting were conducted at ADA office, Varkala to discuss about the importance and role of AKCs in which ADA, Agriculture officer of Cherunniyoor, Ottur Panchayath president, Sri Subhash, Deputy Director of Agriculture, Smt. Jayarani, Senior Veterinary surgeon, Smt. Radha and Cherunniyoor Grama Panchayath President, Sri. Nava Prakash. Nodal officer explained about the importance and role of AKCs and implementation of AKC activities. Several meetings were conducted online on 4-8-2020, 26-9-2020, 1-10-2020 and 17-10-2020 to discus and plan future activities of AKC and review progress of Krishi Padashala and demonstrations. On 4-11-2020, second meeting was held at Varkala.

Farmer trainings conducted by the Nodal officer : Handled a class on 'Integrated pest and disease management in vegetables' on 4-11-2020 at Elakamon Krishi Bhavan, Varkala for the SC vegetable farmers. On 6-10-2020 visited Krishi Bhavan, Vilavoorkkal and handled a class on 'Management of seedlings at nursery' as part of one crore fruit seedling production programme and Krishi padashala under Subhiksha Keralam project

Field visits conducted: Made field visits to 9 IFS plots of Chemmaruthy panchayath of Varkala block as part of activities of AKC, Varkala along with ADA, Varkala, Ms Beena Boniface, ATMA staff and Staff of Krishi Bhavan, Chemmaruthy on 24-9-2020

Other activities: Created two whatsapp groups, one with all the AOs of Varkala block and ADA and Nodal Officer and the other with officers and progressive farmers of all the 8 panchayats of Varkala block to dicuss field problems and to suggest solutions to problems

Nodal officer attended an inaugural function of Chemmaruthy branded rice at Chemmaruthy (inauguration by MLA).

Conducted 24 krishi padashalas

Conducted 5 frontline demonstrations Technologies demonstrated includes Demonstration of yard long bean variety KAU Deepika, demonstration of amaranthus variety KAU Vaika, demonstration of yard long bean variety KAU Geetika and application of Sampoorna KAU multi mix in banana and vegetables.

8. Name of AKC : Kattakada Block, Thiruvananthapuram

Name of the Nodal Officer : Dr. Ambily Paul

Date of Start : 17/8/2020

Objectives:

1. To support the activities and scientific requirements of various activities under Subhikshakeralam project
2. Develop production plan based on AEZ characteristics in consultation with various stake holders
3. Develop production protocols of major crops in the constituent Gramapanchayats in consultation with farmers, scientists and devt. Personnel
4. Co-ordinate research stations, KVKs and other agencies to provide training, planting materials and consultancy to farmer groups
5. Organise training programmes in connection with krishipadasala

Major activities:

1. AKC, Kattakada has inaugurated on 17/8/2020 and the function arranged at the office of Asst. Director of Agriculture, Kattakada block.
2. Conducted 4 meetings and 11 field visits

3. Organised and conducted 4 online classes and 2 offline classes in each krishibhavans (total 8 krishibhavan) under this block in connection with Krishipadasala.

4. Given technical support and inputs for the Front line demonstrations n 8 krishibhavan.

5. To encourage the production of " Safe to eat food production of vegetables and fruits", samples of vegetables and fruits were collected from different farmers of AKC for the analysis of pesticide residues.

6. Started a WhatsApp group to strengthen the agro clinic services.

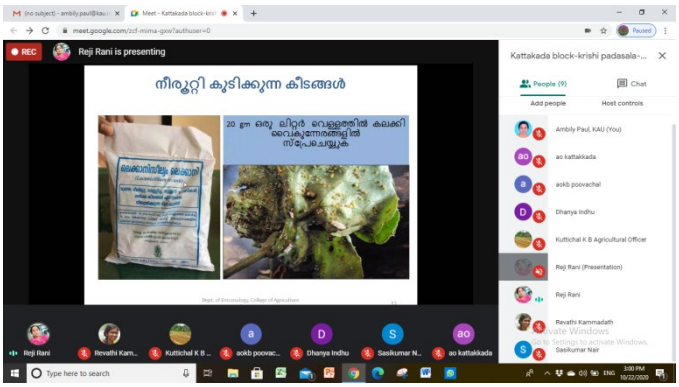
Documented activities

Inauguration of AKC, Kattakada

Class at Tholikodu krishibhavan

Class at Pankavu, Tribal settlement area, Kuttichal

Field visit at Poovachalkrishibhavan



Field visit at Uzhamalakkalkrishibhavan Screenshot of online classes

9. Name of AKC : Chirayankeezhu Block, Thiruvananthapuram District

Name of Nodal Officer : Dr Sheeba Rebecca Isaac, Professor,
Dept. of Agronomy, CoA, Vellayani

Date of start : 17.08.2020

Objectives:

1. Facilitate the Local Self Govt. in preparation of AEU wise agriculture production programmes / scientific crop production practices
2. Facilitate the establishment of seed villages and seed production clusters for the production of food grains, pulses, tuber crops, leafy crops, vegetables, fruits etc.
3. Provide Block level technical advisories and trainings on agriculture production, post harvest processing, value addition and marketing
4. Provide technical support to the schemes, projects of Local Self Govt as part of 'Subhiksha Keralam"
5. Provide support to the activities requiring technical guidance with respect to the 'Krishipadasala" scheme of Krishi Bhavans.

Major activities:

1. Trainings : Organised 24 no. of trainings (on line) for the registered farmers of the block and facilitated participation in FB agriculture related live streaming programmes
2. Field visits – 10 numbers
3. Field problems identified and solutions provided– 26nos (through FV, over phone and online- whatsapp)

4. Dissemination of Agromet advisories -20 nos
5. Facilitation of FLDs– Arrangement of technical inputs from CoA Vellayani (Consortium biofertilizers) and CTCRI, Sreekariyom (Cassava planting materials) and technical guidance for front line demonstrations
6. Krishipadasala – Number of Krishipadasala sessions organized -56 (7 / panchayat)
7. As resource person for padassalas : 5
8. AKC Meetings – 4 nos.

10. Name of AKC : AKC, Perumkadavila, Thiruvananthapuram District

Name of Nodal Officer : Dr Rajasree G

Date of start : 17.08.2020

Objectives:

1. To facilitate the Local Self Govt. in preparation of AEU wise agriculture production programmes / scientific crop production practices
2. To facilitate the establishment of seed villages and seed production clusters for the production of food grains, pulses, tuber crops, leafy crops, vegetables, fruits etc.
3. Provide Block level technical advisories and trainings on agriculture production, post harvest processing, value addition and marketing
4. Provide technical support to the schemes, projects of Local Self Govt as part of 'Subhiksha Keralam"
5. Provide support to the activities requiring technical guidance with respect to the 'Krishipadasala" scheme of Krishi Bhavans.

Major activities:

1. Trainings: Organised 47 no. of trainings for the farmers in the block. No. of participants from the block-54
2. Field visits – 5 numbers
3. Field problems identified and solutions provided – 6 nos
4. Dissemination of Agromet advisories -27 nos (including block level advisories)
5. Distribution of inputs and planting materials –3 kg PGPR Mix I, 200 kg Ayar and 4750 no. of slips of Hy. Napier distributed from CoA Vellayani to the block.

6. Krishipadasala – Number of Krishipadasala sessions organized - 27
7. AKC Meetings – 4 nos.

11. Name of the AKC : Pulimath Block, Thiruvananthapuram

Name of the Nodal Officer : Dr. G.S. Sreedaya,
Assistant Professor, Dept. of Agricultural Extension, College of Agriculture, Vellayani

Date of Start : 17/08/2020

Objectives:

Provide technical assistance for development of agriculture and allied sectors to ensure food self- reliance as part of "SubikshaKeralam' project.

Major Activities :

1. Meetings attended : 5 nos.
2. Farmer training attended : 10 Nos.
3. Field visits participated : 7 Nos.
4. Field problems identified :

Sl:No	Crop	Pest/disease
1	Mango	Dieback
2	Chilli	Leaf curl virus
3	Citrus	Leaf sucking pest
4	Banana	Leaf dry
5	Turmeric	Stem borer
6	Banana/bhindi	Fruit borer
7	Banana	Ca deficiency

Field photos of identified problems were shared with subject matter specialists in Kerala Agricultural University and remedial measures were communicated to Agricultural Officers of respective Krishi Bhavans.

Agricultural Knowledge Centres of Kollam District

12. Name of AKC	**:**	**Kottarakara Block, Kollam**
Name of the Nodal Officer	:	Dr. R Narayana, Assistant Professor, Dept. of Nematology, CoA, Vellayani
Date of Start	:	17.08.2020

Objectives:

1. Identify fallow lands in the panchayat and facilitate cultivation of crops
2. Facilitate the farmers to use the post- harvest handling and value addition facilities of the university
3. Conduct training programmes for farmers and entrepreneurs
4. Conduct demonstrations and other extension programmes
5. Supply seeds and planting materials to local bodies and farmer groups
6. Spare machineries for community level farming by local bodies
7. Consult the KrishiBhavan and other institutions and start the preparation of production plans and protocols at for local bodies at the block level in advance
8. Establishing seed villages
9. Release of videos and other documents/publications

Major activities:

1. Conducted Demonstration plots incorporating new technologies of KAU for 6 Krishi Bhavan areas
2. Conducted Krishipadasala classes
3. Online seminars organized for various subjects
4. Brought fallow lands under cultivation
5. Established fruit tree gardens
6. Medicinal plant cultivation
7. Farming and ecotourism (Ezhukone Panchyat)
8. Promoted farming in polyhouses
9. Field visits conducted and identified pest and diseases
10. New diseases in tapioca and citrus identified and management measures suggested.
11. Management of pest and diseases through farmer contact programme.

13. Name of the AKC : Chathannur Block, Kollam

Name of the nodal officer : Dr. Susha S. Thara,
Assistant Professor, Department of Plant Pathology

Date of start : 17.08.2020

Objectives:

1. To help in the preparation of production plans and protocols at for local bodies based on Agro ecological zone
2. To help in the establishment of seed production units of vegetables, fruits and other crops.
3. To conduct block level training programmes in production, processing, value addition, marketing and plant protection.
4. Provide technical support to the schemes and projects related to 'Subhiksha Keralam' at Krishibhavan
5. Provide technical support to the Krishipadasala conducting at Krishibhavan

Major Activities:

1. Identified the barren land suitable for cultivation in each panchayat and initiated cultivation.
2. Cultivation in the terrace of houses especially in urban areas. Measures have been taken for popularising soil less cultivation now initiated in the block which is found promising.
3. Need based trainings and demonstration programmes has been arranged.
4. Conduct field visit based on need and give recommendations.
5. Conducted Krishipadasala at Krishibhavans and handled different sessions and provide other technical support.
6. Agriculture bulletins have been prepared on pest and disease of banana and also for mushroom cultivation. Regular meetings were conducted in every month for evaluating the works and also for planning works for the coming month

14. Name of AKC : Sasthamcotta Block, Kollam

Name of the Nodal Officer : Dr. M. R Bindu,
Professor & Head, FSRS, Sadanandapuram, Kottarakkara

Date of start : 17.08.2020

Objectives:

1. Identify fallow lands in the block and facilitate cultivation of crops

2. Conduct training programmes for farmers and entrepreneurs on agricultural production
3. Conduct demonstrations and other extension programmes
4. Supply seeds and planting materials to local bodies and farmer group
5. Consult Krishibhavan & other institutions and start the preparation of production plans & protocols for local bodies at the block level in advance
6. Establishing seed villages
7. Provide technical assistance for Krishipadassala by Krishibhavans

Major Activities:

1. Conducted monthly meeting and reviewed of the krishibhavans under Sasthamkotta Block
2. Visited IFS plots of farmers and imparted technical guidance
3. Identified fallow lands in the station and nearby Govt. institute and facilitated the cultivation vegetables
4. Identified fallow lands of Sasthamkotta block and provided technical advice oocultivation of rice, pulses, tuber crops, banana and vegetables
5. Handled training classes in Krishipadassala in different Panchayats of Sasthamcotta block
6. Organized demonstration of newly released vegetable varieties of cowpea(KAU Deepika, cluster bean(KAU Suruchi) and amaranthus(KAU Vaiga) and supplied seeds
7. Supplied seeds & planting materials of vegetables, fruit plants and spices to local bodies and farmers
8. Production plans were prepared for different Panchayats of Sasthamkotta block
9. Identified farmers to conduct participatory seed production for pulses during summer.

15. Name of AKC : Chavara Block, Kollam

Name of Nodal officer : Dr. Lekha M

Date of start : 17.08.2020

Objectives:

To provide technical and scientific advisories to the various schemes and plans envisaged under Subhiksha Keralam project of LSGI and DOA.

Major Activities:

Training programmes of Krishipadashala, field visit of jaivagriham, MDT visits, area expansion of pulses under KVK's protein park project (black gram, cowpea and green gram).

Implemented the front line demonstrations and on farm trials of KVK, Kollam. Created whatsap group for easy communication including the staffs of Agricultural department and field staff of ATMA, LEADS etc.

16. Name of AKC : Mugathala Block, Kollam

Name of nodal officer : Shamsiya AH, Assistant Professor, KVK, Kollam

Date of start : 17.08.2020

Objectives:

1. Provide technical support to the schemes, projects of Local Self Govt as part of 'SubhikshaKeralam"
2. Provide support to the activities requiring technical guidance with respect to the 'Krishipadasala" scheme of KrishiBhavans.
3. Facilitate the Local Self Govt. in preparation of AEU wise agriculture production programmes / scientific crop production practices
4. Facilitate the establishment of seed villages and seed production clusters for the production of food grains, pulses, tuber crops, leafy crops, vegetables, fruits etc.
5. Provide Block level technical advisories and trainings on agriculture production, post harvest processing, value addition and marketing
6. Provide support to the activities requiring technical guidance with respect to the 'Krishipadasala" scheme of KrishiBhavans.

Major activities:

Trainings: Organised trainings (on line) for the registered farmers of the block and facilitated participation in FB agriculture related live streaming programmes of KVK

Field visits– 4 numbers

1. Field problems identified and solutions provided– 18, Arranged concerned scientist for recommendations.)
2. Dissemination of Agromet advisories – (KVK.Kollam,whats app group 4. Weekly twice every Tuesday and Friday) and technical guidance for front line demonstrations

3. Arranged REKSHA for controlling sucking pest attack in vegetables and **Sampoorna** vegetable(Micronutrient mix) (farmers from shakthikulangara KB) IFS Plot visits ,Fallow land cultivation field.
4. Krishipadasala – Number of Krishipadasala sessions organized -12(9 / panchayat)
5. Arranged resource persons for padassalas : 12
6. AKC Meetings – 3nos.

17. Name of the AKC : Ochira Block, Kollam

Name of the Nodal Officer : Dr. Jacob D,
Assistant Professor, OFR, Vellayani

Date of Start : 17/08/2020

Objectives:

Provide technical assistance for development of agriculture and allied sectors to ensure food self- reliance as part of "SubikshaKeralam' project.

Major activities:

1. Meetings attended: 2 nos.
2. Farmer training attended: 4 Nos.
3. Field visits participated: 4 Nos.
4. Field problems identified:

Pest and disease: Ant infestation in vegetables, Mite infestation in vegetables, Tea mosquito infestation in betelvine, Mealy bug infestation in vegetables. Thrips infestation in vegetables.
Imbalanced nutrition: Vegetables and fodder affected in Alapad, Krishi Bhavan.
Field photos of identified problems were shared with subject matter specialists in Kerala Agricultural University and remedial measures were communicated to Agricultural Officers of respective Krishi Bhavans.

18. Name of AKC : Anchal Block, Kollam

Name of Nodal Officer : Dr. Nisha S. K., Assistant Professor, KVK Kollam

Date of start : 17. 08. 2020

Objectives:

1. Provide extension support in enhancing production and productivity of agriculture and

allied sectors on the basis of Agro Ecological Units.

2. Assist line Departments in implementing Subhiksha Keralam project as a means to accomplish self reliance and increased livelihood option.

Major Activities:

Attended 2 AKC meetings, which were attended by the Assistant Director of Agriculture, Agricultural Officers and farmer representatives. Joint field visit (7 No's) to IFS units and demonstration plots were done along with ADA, AO's and LEADs field staff. Diagnostic visits to identify field problem in mango and lemon at Anchal, and paddy at Eroor was also done.

Krishipadasalas on 'Organic Vegetable Cultivation' and 'Cool season vegetables' were conducted at Eroor and Anchal Krishi Bhavans respectively. Weather Advisories prepared by DAMU was sent to farmers through whatsapp, weekly twice on Tuesday and Friday.

Established demonstration units on newly released vegetable varieties Yard long bean KAU Deepika, Cluster bean KAU Suruchi and Amaranthus KAU Vaika. Two trials on big onion is also done at Karavaloor and Eroor.

19. Name of AKC : Chadayamangalam Block, Kollam

Name of the Nodal Officer : Dr.SanthoshKumar. T, Assistant Professor,
Dept. of Agricultural Entomology, CoA, Vellayani

Date of Start : 17-08-2020

Objectives:

1. Preparation of Agro-ecological zone based projects and crop production techniques.
2. Establish seed villages and input production units
3. Impart technical advice and training to farmers about different aspects of agriculture.
4. Provide technical advice for the scemes related to subhikahaKeralam Project.
5. Provide technical assistance for the conduct of Krishipadasala.

Major Activities:

Conducted 32 krishipadasala in various Krishi bhavans of Chadayamangalam AKC and organised 10 online Krishipadsala from Department of Agricultural Entomology, COA, Vellayani for all AKC's of Kerala .Started field level demonstrations of proven technologies in agriculture. Four demonstration units established so far. Conducted field visits and given solutions for various field problems of Chadayamangalam, Kottarakkara, Chathannor,

Kilimanoor and Nedumangad AKC's with the help of SANTWANAM unit of RARS(SZ)and taken classes for Krishipadasala for various AKC's of Kollam and Thiruvananthapuram Districts.

20 . Name of the AKC : Chittumala, Kollam District

Name of the officer : Dr. K. N. Anith, Assistant Professor, Dept. of Agricultural Microbiology, CoA, Vellayani

Date of Start : 17.08.2020

Objectives:

Overall development of Chittumala Block with activities of Department of Agriculture and KAU

Major activities:

Organization of Trainings and Field Visits

21. Name of the AKC : Pathanapuram Block, Kollam

Name of Nodal officer : Dr.Bindu.B, Assistant Professor (Horticulture), FSRS, Sadanandapuram

Date of start : 17.08.2020

Objectives:

1. Identify fallow lands in the Panchayat and research centre and facilitate cultivation of crops
2. Conducting training programmes for farmers and entrepreneurs on agricultural production
3. Conducting demonstrations and other extension programmes
4. Make arrangements for the supply of seeds and planting materials to local bodies and farmer groups
5. Preparation of crop production plans and protocols for local bodies at the block level in advance
6. Conducting diagnostic field visits
7. Provide technical assistance for Krishipadassala conductedby Krishibhavans

Major Activities:

1. Conducted 6 trainings and one seminar on "Recent advances in the cultivation of spice crops"
2. Promoted fallow land cultivation in Pathanapuram blockand started cultivation of vegetables, banana and tubercrops

3. Conducted 7 Front line demonstrations
4. Conducted 4 diagnostic field visits
5. Handled training classes in Krishipadassala in different Panchayats of Pathanapuramblock
6. Conducted two IFS field visits
7. Made arrangements for the supply of mushroom spawn, seeds and planting materials of fruits and vegetables to the progressive farmers
8. Production plans were prepared for rice and banana
9. Provided technical support to Agricultural Officers, when required

22. Name of AKC : Vettikavala Block, Kollam District

Name of nodal officer : Dr Poornima Yadav P I

Date of start : 17.08.2020

Objectives:

Overall development of Vettikavala Block with activities of Department of Agriculture and KAU

Major activities:

1. Field visits : 7 nos
2. Krishipadashala: : 6 no
3. AKC meetings: : 4 nos
4. Number of trainings to rural youth : 1(7 days)
5. Number of trainings to Extension personnel :1
6. Demonstrations conducted : 20 numbers
7. Weather advisory : Weekly twice every Tuesday and Friday

Agricultural Knowledge Centres of Pathanamthitta District

23. **Name of AKC : AKC, Konni, Pathanamthitta District**

Name of Nodal Officer : Dr Bindu Podikunju,
Assistant Professor (Agricultural Extension),
KVK Kollam

Date of start : 17.08.2020

Objectives:

1. Facilitate the Local Self Govt. in preparation of AEU wise agriculture production programmes / scientific crop production practices
2. Facilitate the establishment of seed villages and seed production clusters for the production of food grains, pulses, tuber crops, leafy crops, vegetables, fruits etc.
3. Provide Block level technical advisories and trainings on agriculture production, post harvest processing, value addition and marketing
4. Provide technical support to the schemes, projects of Local Self Govt as part of 'Subhiksha Keralam"
5. Provide support to the activities requiring technical guidance with respect to the 'Krishipadasala" scheme of Krishi Bhavans.

Major Activities:

1. Field visits – 2 numbers
2. Field problems identified and solutions provided– 15 nos (through FV, over phone and online- whatsapp)
3. Dissemination of Agromet advisories -20 nos (Weekly twice every Tuesday and Friday)
4. Facilitation of FLDs– Technical guidance for front line demonstrations
5. Krishipadasala – Number of Krishipadasala sessions organized - 2 (2 panchayat)
6. As resource person for padassalas : 1
7. AKC Meetings – 3 nos.

24. Name of AKC	**:**	**Parakkode Block, Pathanamthitta District**
Name of Nodal Officer	:	Dr. Bini Sam, Professor and Head, KVK, Kollam
Date of start	:	17. 08. 2020

Objectives:

Overall development of Parakkode Block with activities of Department of Agriculture and KAU

Major Activities :

Block level Agricultural Knowledge Centres were established to support the activities and scientific requirements of various activities under Subhiksha Keralam project in 152 blocks with the participation of scientists, field level officials, people's representatives and farmer representative. The inaugural function of Parakode Block Level Agricultural Knowledge Centre was conducted at Kodumon Panchayat Conference Hall on 17th August, 2020 at 11.30 am along with Pathanamthitta District level celebration of Karshaka Dinam. Three block level meetings with members of AKC were conducted to plan the activities to be taken up in the Parakode Block. Three field visits were conducted and 10 Krishi Padasalas were organized in Parakode Block. A Whatsapp group of members of AKC and Krishi Officers was formed for specific crop advisories. Training on preparation of Mat Nursery and Operation and maintenance of Paddy transplanter was conducted for technicians of Karmasena of Kodumon Krishi Bhavan.

സേവനങ്ങളും സന്ദേശങ്ങളും

പ്രാദേശിക കാർഷിക ഗവേഷണകേന്ദ്രം, കാർഷിക കോളേജ് വെള്ളായണി

കാർഷിക മേഖലയിൽ പ്രശ്നാധിഷ്ഠിത ഗവേഷണ പരിപാടികൾ ഫലപ്രദമായി നടപ്പിലാക്കുന്നതിനും കർഷകരുടെ പ്രശ്നങ്ങൾ പരിഹരിക്കുന്നതിനും കാർഷിക സർവ്വകലാശാലയുടെ ദക്ഷിണ മേഖലാ പ്രാദേശിക കാർഷിക ഗവേഷണ കേന്ദ്രവും അനുബന്ധ സ്ഥാപനങ്ങളും എക്കാലവും നിലനിന്നിട്ടുണ്ട്. ഈ സ്ഥാപനങ്ങളിൽ നിന്നും പുതുതായി ലഭ്യമാകുന്ന വിവിധ ഗവേഷണ ഫലങ്ങളുടേയും നൂതന പരിപാടികളുടേയും വിവരണങ്ങൾ താഴെ നല്കിയിരിക്കുന്നു. ഇവ പരമാവധി പ്രയോജനപ്പെടത്തുവാൻ കർഷക സുഹൃത്തുക്കൾ ശ്രദ്ധിക്കുക.

കർഷക സാന്ത്വനം

കാർഷിക പ്രശ്നങ്ങൾക്ക് പരിഹാരം കണ്ടെത്തുവാൻ കർഷകരുടെ ആവശ്യ പ്രകാരം കാർഷിക ശാസ്ത്രജ്ഞർ കൃഷിയിടങ്ങൾ സന്ദർശിക്കുകയും പരിഹാരമാർഗ്ഗങ്ങൾ സൗജന്യമായി നിർദ്ദേശിക്കുകയും ചെയ്യുന്നതാണ്.

ബന്ധപ്പെടുക - **8075735657**

ജൈവകൃഷി

ജൈവകൃഷിയിൽ സാങ്കേതിക സഹായവും പരിശീലനവും ലഭ്യമാണ്.

ഒരു മാതൃക ജൈവ കൃഷിത്തോട്ടം

ജൈവവളങ്ങളായ മണ്ണിരകമ്പോസ്റ്റ്, ചകരിച്ചോർ കമ്പോസ്റ്റ്, ഇ.എം കമ്പോസ്റ്റ്, മിനറൽ കമ്പോസ്റ്റ്, കൂടാതെ പരിപോഷിപ്പിച്ച ജൈവവളങ്ങൾ തുടങ്ങിയവയുടെ നിർമ്മാണവും ജൈവ കൃഷി രീതികളും കണ്ടുമനസ്സിലാക്കി പ്രാവർത്തികമാക്കുന്നതിന് ഒരു മാതൃക ജൈവ കൃഷിത്തോട്ടം നിലവിലുണ്ട്.

ദ്രാവക ജൈവവളങ്ങളായ പഞ്ചഗവ്യം, ദശഗവ്യം, ഫിഷ് അമിനോ ആസിഡ് (മത്തി - ശർക്കര മിശ്രിതം), ജീവാമൃതം, വെർമിവാഷ് തുടങ്ങിയവയുടെ നിർമാണത്തിനും ഉപയോഗത്തിനുമുള്ള സാങ്കേതിക പരിശീലനവും കർഷകർക്ക് നൽകുന്നുണ്ട്. ഗുണമേന്മയേറിയ ജൈവവളങ്ങളും സൂക്ഷ്മമൂലക മിശ്രിതവും സെയിൽസ് കൗണ്ടറിൽ കൂടി വിതരണം ചെയ്യുന്നുണ്ട്.

മണ്ണിന്റെ ആരോഗ്യത്തിനും സുസ്ഥിരതയ്ക്കും പരിപ്പോഷിപ്പിച്ച ജൈവവളങ്ങൾ

മണ്ണിന്റെ ആരോഗ്യം വർദ്ധിപ്പിക്കുന്നതിനും സ്ഥായിയായി നിലനിർത്തുന്നതിനും വേണ്ടി യുള്ള സമഗ്രമായ സാങ്കേതിക പരിശീലനം. മണ്ണിര കമ്പോസ്റ്റ്, ചകിരിച്ചോർ കമ്പോസ്റ്റ്, മിനറൽ കമ്പോസ്റ്റ്, ഇ.എം. കമ്പോസ്റ്റ്, പരിപ്പോഷിപ്പിച്ച ജൈവവളങ്ങൾ തുടങ്ങിയവ കുറഞ്ഞ ചിലവിൽ ഉല്പാദിപ്പിക്കുന്നതിനുള്ള സാങ്കേതിക പരിശീലനം. വിപണിയിൽ ലഭ്യമാകുന്ന വിവിധയിനം ജൈവവളങ്ങളുടെ ഗുണമേന്മ നിർണ്ണയം.

ജൈവ കൃഷിയും നല്ലമുറ കൃഷിയും

ജൈവ കൃഷിയിലും നല്ലമുറ കൃഷിയിലും പരിശീലനവും സാങ്കേതിക സഹായവും കർഷകർക്ക് കാർഷിക കോളേജിലും കർഷകരുടെ കൃഷിയിടങ്ങളിലും നൽകുന്നു.

ബന്ധപ്പെടുക - **9633100344**

ഹോർട്ടികൾച്ചർ തെറാപ്പി - ഭിന്നശേഷിക്കാരായ സ്കൂൾ വിദ്യാർത്ഥികളുടെ ഉന്നമനം

ഹോർട്ടികൾച്ചർ തെറാപ്പി എന്ന നൂതനചികിത്സാരീതിയിലെ പൂന്തോട്ട നിർമിതികളും മറ്റു പ്രവർത്തനങ്ങളും ഭിന്നശേഷിക്കാരായ സ്കൂൾ വിദ്യാർത്ഥികളുടെ (എഡി.എച്ച്.ഡി, ഓട്ടിസം, കാഴ്ച പരിമിതിയുളളവർ, സംസാരകേൾവി പരിമിതിയുളളവർ, ബുദ്ധിപരമായ വെല്ലുവിളികൾ

പ്രവർത്തനങ്ങളും ഭിന്നശേഷിക്കാരായ സ്കൂൾ വിദ്യാർത്ഥികളുടെ (എഡി.എച്ച്.ഡി, ഓട്ടിസം, കാഴ്ച പരിമിതിയുളളവർ, സംസാരകേൾവി പരിമിതിയുളളവർ, ബുദ്ധിപരമായ വെല്ലുവിളികൾ നേരിടുന്നവർ) ഉന്നമനം ലക്ഷ്യമാക്കിയുളളതാണ്. സ്പെഷ്യൽസ്കൂളുകളിലും പുനരധിവാസ കേന്ദ്രങ്ങളിലുമാണ് ഈ ഹോർട്ടികൾച്ചർ തെറാപ്പി നടപ്പിലാക്കാൻ സാധിക്കുന്നത്.

ബന്ധപ്പെടുക - **9846103127**

മാലിന്യസംസ്കരണ സാങ്കേതിക വിദ്യകളും ജൈവവളനിർമ്മാണവും

ഖര മാലിന്യങ്ങൾ സംസ്കരിച്ച് കൃഷിക്ക് ഉപയുക്തമാക്കുന്ന വിധം സംപുഷ്ടീകരിച്ച ജൈവവളമാക്കി കുറഞ്ഞ സമയം കൊണ്ട് ലഭ്യമാക്കുന്ന സാങ്കേതിക വിദ്യകൾ വികസിപ്പിച്ചെടുത്തിട്ടുണ്ട്.

അതിവേഗ മാലിന്യ സംസ്കരണത്തിലൂടെ ജൈവവള ഉൽപാദനത്തിനായി രൂപകൽപന ചെയ്ത് വികസിപ്പിച്ചെടുത്ത യന്ത്രമാണ് ''ശുചിത''. വൻതോതിൽ ജൈവ മാലിന്യം ഉറവിടത്തിൽതന്നെ ദ്രുതഗതിയിൽ സംസ്കരിച്ച് ജൈവവളമാക്കാൻ ഏറ്റവും ഉത്തമമായ മാർഗമാണിത്. കേരളത്തിൽ പലയിടത്തും മാലിന്യ സംസ്കരണത്തിനുവേണ്ടി ശുചിത മിഷൻ സ്ഥാപിച്ചിട്ടുണ്ട്.

ബന്ധപ്പെടുക - **9495304892**

മണ്ണു പരിശോധനയും വളപ്രയോഗ നിർദ്ദേശങ്ങളും

മണ്ണുസാമ്പിളുകൾ. സസ്യസാമ്പിളുകൾ, രാസവളങ്ങൾ, ജൈവ വളങ്ങൾ, കുമ്മായ വസ്തുക്കൾ, ജലസാമ്പിളുകൾ എന്നിവ പരിശോധിച്ച് കൊടുക്കുന്ന സൗകര്യം നിലവിലുണ്ട്.

കർഷകരുടെ മണ്ണുസാമ്പിളുകൾ പരിശോധിച്ച്, അതിലടങ്ങിയിരിക്കുന്ന പോഷകമൂലകങ്ങളുടെയും അമ്ള - ക്ഷാരവസ്ഥയുടെയും അടിസ്ഥാനത്തിൽ ഓരോ കൃഷിക്കും വേണ്ട കുമ്മായ വസ്തുക്കളുടെയും വളത്തിന്റെയും അളവ് ചുരുങ്ങിയ ചെലവിൽ നിർദ്ദേശിച്ച് കൊടുക്കുന്നു. സഞ്ചരിക്കുന്ന മണ്ണുപരിശോധനശാല കർഷകരുടെ കൃഷിയിടത്തിലെത്തി മണ്ണു പരിശോധിച്ച് നൽകപ്പെടുന്നു. കർഷകർ ഉൽപാദിപ്പിക്കുന്ന ജൈവവളങ്ങളുടെയും വിപണിയിൽ ലഭ്യമാകുന്ന വിവിധയിനം ജൈവവളങ്ങളുടെയും കുമ്മായ വസ്തുക്കളുടേയും ഗുണമേന്മ ചുരുങ്ങിയ ചെലവിൽ നിർണ്ണയിച്ച് നൽകുന്നു.

ബന്ധപ്പെടുക - **9633100344**

സസ്യ/മണ്ണു പരിശോധന ലബോറട്ടറി

അഗ്രോണമി വിഭാഗത്തിന്റെ ആഭിമുഖ്യത്തിൽ കേരള കാർഷിക സർവ്വകലാശാല റിവോൾവിംഗ് ഫണ്ട് പദ്ധതിയുടെ ഭാഗമായി സസ്യ / മണ്ണ് പരിശോധന ലബോറട്ടറി പ്രവർത്തിച്ചു വരുന്നു. മണ്ണു സാമ്പിളുകളും സസ്യ സാമ്പിളുകളും നിശ്ചിത ഫീസ് ഈടാക്കി, പരിശോധിച്ച് പോഷക മൂലകങ്ങളുടെയും വളങ്ങളുടെയും തോത് നൽകേണ്ട സമയം, രീതി തുടങ്ങിയവയെക്കുറിച്ചുള്ള ശുപാർശ നൽകി വരുന്നു.

ബന്ധപ്പെടുക - **9495121213**

നടീൽ വസ്തുക്കളുടെ ഉല്പാദനവും വിതരണവും

വെളളായണി കാർഷികകോളേജിലെ വിദ്യാർത്ഥികൾക്കും ഗവേഷകർക്കും പഠനത്തിനും ഗവേഷണത്തിനുമുളള സൗകര്യം നൽകുക എന്നതാണ് ഈ ഫാമിന്റെ പ്രധാന ചുമതല. ഇതോടൊപ്പം നടീൽവസ്തുക്കളുടെ ഉത്പാദനവും മറ്റു വിജ്ഞാനവ്യാപന പ്രവർത്തനങ്ങളും നടത്തി വരുന്നു. തദ്ദേശ സ്വയംഭരണ സ്ഥാപനങ്ങളും മറ്റ് സർക്കാർ സ്ഥാപനങ്ങളുമായി ചേർന്ന് കൃഷിക്കാർക്കുളള പരിശീലന പരിപാടികളും ഇവിടെ നടത്തി വരുന്നു.

അത്യുല്പാദന ശേഷിയുള്ള വിവിധയിനം പഴവർഗ്ഗങ്ങൾ, പച്ചക്കറികൾ, അലങ്കാരസസ്യങ്ങൾ, സുഗന്ധവ്യജ്ഞനങ്ങൾ, കിഴങ്ങ്വർഗ്ഗവിളകൾ എന്നിവയുടെ നടീൽവസ്തുക്കൾ ഉത്പാദിപ്പിച്ച് ഇവിടെ നിന്നും കർഷകർക്ക് വിതരണം ചെയ്യുന്നു. ജൈവകൃഷിയ്ക്ക് ആവശ്യമായ ജൈവവളങ്ങൾ, ജൈവരോഗകീട നിയന്ത്രണത്തിനുള്ള ഉപാധികൾ എന്നിവയും ഇവിടെ നിർമ്മിക്കുന്നു. ഫാമിന്റെ ഭാഗമായി പ്രവർത്തിക്കുന്ന വാല്യൂ അഡിഷൻ സെന്ററിൽ വിവിധ മൂല്യവർദ്ധിത ഉത്പന്നങ്ങൾ തയ്യാറാക്കിവരുന്നു. വാഴയ്ക്കും തെങ്ങിനും ഉപയോഗിക്കുന്ന ഉപസൂക്ഷ്മ മൂലക മിശ്രിതങ്ങൾ ഇവിടെ തയ്യാറാക്കുന്നു.

വിവിധയിനം കൂണുകൾ, കൂൺ വിത്ത്. കൂൺ കൃഷി പരിശീലനം എന്നിവ ഫാമിൽ നിന്ന് ലഭ്യമാണ്. ഇൻസ്ട്രക്ഷണൽ ഫാമിൽ ഉത്പാദിപ്പിക്കുന്ന എല്ലാ നടീൽവസ്തുക്കളും കാർഷികഉത്പന്നങ്ങളും മൂല്യവർദ്ധിത വസ്തുക്കളും ഫാമിന്റെ കീഴിൽ പ്രവർത്തിക്കുന്ന വില്പനകേന്ദ്രത്തിൽ നിന്ന് പ്രവൃത്തി ദിവസങ്ങളിൽ രാവിലെ 10 മുതൽ 12.30 വരെയും ഉച്ചയ്ക്ക് 1.30 മുതൽ 4.00 മണിവരെയും പൊതുജനങ്ങൾക്ക് വാങ്ങാവുന്നതാണ്.

ബന്ധപ്പെടുക - **0471 2383573**

തീറ്റപ്പുൽ ഉല്പാദനം

ക്ഷീരകർഷകന്റെ ലാഭനഷ്ട കണക്കിൽ മുഖ്യപങ്കും ഗുണമേന്മയുള്ള കാലിത്തീറ്റയുടേതാണ്. വീട്ടാവശ്യത്തിനായാലും, വാണിജ്യാടിസ്ഥാനത്തിലായാലും കന്നുകാലികളെ വളർത്തുന്ന കർഷകർക്ക് തീറ്റപ്പുൽ കൃഷിയെ ഒഴിവാക്കാൻ സാധ്യമല്ല.

ഭാരതീയ കാർഷികഗവേഷണ കൗൺസിലിന്റെ ധനസഹായത്തോടുകൂടി അഖിലേന്ത്യ സംയോജിതതീറ്റപ്പുൽ ഗവേഷണ പദ്ധതി കേരളകാർഷികസർവ്വകലാശാലയുടെ വെള്ളായണി കോളേജിൽ 1971-ൽ പ്രവർത്തനമാരംഭിച്ചു. ഈ പദ്ധതിയിൽ വിളപരിപാലനം, സസ്യപ്രജനനം എന്നീ വിഭാഗങ്ങളിലുള്ള ഗവേഷണ പ്രവർത്തനങ്ങളും പ്രധാനമായി നടന്നുവരുന്നു. ഈ പദ്ധതിയിലൂടെ ക്ഷീരകർഷകർക്ക് ആവശ്യമായ സേവനങ്ങൾ താഴെപ്പറയുന്ന രീതിയിൽ ലഭ്യമാണ്.

വിത്തുൽപ്പാദനം

ദീർഘകാല ഗവേഷണ ഫലമായി വികസിപ്പിച്ചെടുത്ത സങ്കരനേപ്പിയർ ഇനമായ സുഗുണയും ഹരിതശ്രീയും തീറ്റപ്പയറിനമായ ഐശ്വര്യയും ഉൽപ്പാദിപ്പിക്കുകയും ഇത് ആവശ്യാനുസരണം കർഷകർക്ക് ലഭ്യമാക്കുകയും ചെയ്തു വരുന്നു.

കുറച്ചു സ്ഥലത്ത് നിന്നും പശുവിന് കൂടുതൽ പോഷകമൂല്യമുളളതീറ്റ ലഭ്യമാക്കുന്നതിനായി മിശ്രവിളകൾ കൃഷിചെയ്യാം. പുല്ലിനത്തിൽ മാംസ്യത്തിന്റെ അളവ് കുറവും (8-9%), നാരിന്റെ അളവ് കൂടുതലുമാണ് (24-28%). എന്നാൽ പയറിനത്തിൽ മാംസ്യത്തിന്റെ അളവ് കൂടുതലും (16-18%), നാരിന്റെ അളവ് കുറവുമാണ് (20%). ആയതിനാൽ ഇവ രണ്ടും മിശ്രിതരീതിയിൽ കൃഷിചെയ്യുന്നത് നല്ലതാണ്. പശുവിന്റെ തീറ്റയിൽ പുല്ലും പയറും ചേർത്ത് ഉൾപ്പെടുത്തിയാൽ ആവശ്യമായ മാംസ്യവും, നാരും ലഭിക്കുന്നതിലൂടെ പോഷക സമൃദ്ധമായ പാലും നമുക്ക് ലഭിക്കും.

<u>വൃക്ഷവിളകളായ അഗത്തി, മുരിങ്ങ, മുരുക്ക്, ഡെസ്മാന്തസ്</u> എന്നിവയുടെ ഗവേഷണങ്ങളും

ഇവിടെ നടത്തിവരുന്നു. വേനൽ കാലങ്ങളിൽ പുല്ലിന്റെ ലഭ്യത കുറയുമ്പോൾ ഈ മരങ്ങളും, ശാഖകളും, ഇലകളും മുറിച്ച് കന്നുകാലികൾക്ക് തീറ്റയായി കൊടുക്കാവുന്നതാണ്. ഇവയിൽ മാംസ്യത്തിന്റെ അളവ് 20% കൂടുതലാണ്. ഗിനിപ്പുല്ല്, സങ്കരനേപ്പിയർ എന്നീ പുല്ലിനങ്ങളുമായി കലർത്തി വൃക്ഷവിളകൾ മിശ്രവിളയായും കൃഷി ചെയ്യാവുന്നതാണ്.

അത്യുൽപാദന ശേഷിയും ഗുണമേൻമയുള്ള സങ്കരനേപ്പിയറിന്റെ ഇനമായ സുസ്തിര പുറത്തിറക്കുകയുണ്ടായി. ഹെക്ടറൊന്നിന് ഒരു വർഷം ഏകദേശം 300 ടൺ വരെ പച്ചപ്പുല്ല് ഈ ഇനത്തിൽ ലഭിക്കുന്നു.

ഫോറേജ്ടെക്നോളജി ഡെമോൺസ്ട്രേഷൻ

കേരളത്തിലെ തിരഞ്ഞെടുത്ത ജില്ലകളിൽ നിന്നും മികച്ച കർഷകരുടെ കൃഷിയിടത്തിൽ നല്ല ഉൽപ്പാദന ശേഷിയുള്ള തീറ്റപ്പുല്ലിനങ്ങളായ സുഗുണയും, ഹരിതശ്രീയും, പയറിനമായ ഐശ്വര്യയും ശാസ്ത്രജ്ഞരുടെ മേൽനോട്ടത്തിൽ കൃഷി ചെയ്തു വരുന്നു. ഇതിനോടൊപ്പം നടീൽവസ്തുക്കളും, വളവും സൗജന്യമായി നൽകുകയും ചെയ്യുന്നു.

ബന്ധപ്പെടുക - **9496301170**

തേൻ ഉല്പാദനം

ശുദ്ധമായ തേൻ ലഭ്യമാക്കുന്നു

റബ്ബർ തേൻ - 1 കി.ഗ്രാം - 360/-

- രോഗവിമുക്തമായ ഇന്ത്യൻ തേനീച്ചകോളനികൾ 1400/- രൂപ നിരക്കിൽ നൽകി വരുന്നു.
- തേനീച്ച വളർത്തലിൽ കർഷകർക്കും, വിദ്യാർത്ഥികൾക്കും. തേനീച്ചകൃഷിയിൽ താത്പര്യമുള്ളവർക്കും പരിശീലനം നൽകിവരുന്നു.
- തേനീച്ച വളർത്തലിലെ സംശയങ്ങൾക്ക് ഫോണിലൂടെയും നേരിട്ടും സമീപിക്കുന്ന കർഷകർക്ക് ആവശ്യമായ സഹായം നൽകി വരുന്നു.

ബന്ധപ്പെടുക - **9447428656**

അത്യുൽപ്പാദന ശേഷിയുള്ള പച്ചക്കറി ഇനങ്ങൾ

വെള്ളായണി കാർഷിക കോളേജിലെ പച്ചക്കറി ശാസ്ത്ര വിഭാഗത്തിൽ നിന്നും അത്യുൽപ്പാദന ശേഷിയുള്ള പച്ചക്കറി ഇനങ്ങൾ വികസിപ്പിച്ചെടുത്തിട്ടുണ്ട്.

1. വള്ളിപ്പയർ- കെ.എ.യു. ദീപിക

   അത്യുല്പാദന ശേഷിയുള്ള ഇനം, നീണ്ട ഇളം പച്ച നിറത്തിലുള്ള കായ്കൾ.

   വിളവ് - 30 ടൺ/ഹെ. കായ്കളുടെ നീളം - 66 സെ.മീ. നല്ല പാചക നിലവാരം

2. ചീര - കെ.എ.യു. വൈക

   അത്യുല്പാദന ശേഷിയുള്ള ഇനം, ചുവന്ന തണ്ടും ഇലയും, നീണ്ട കായിക വളർച്ചാ കാലം, താമസിച്ചു പൂക്കുന്ന ഇനം

   വിളവ് - 35 ടൺ/ഹെ.

3. ചീനിയമര - കെ.എ.യു. സുരുചി അത്യുല്പാദന ശേഷിയുള്ള ഒറ്റ തണ്ടുള്ള ഇനം, നീണ്ട പച്ച നിറത്തിലുള്ള കായ്കൾ.

   വിളവ് - 21 ടൺ/ഹെ. കായ്കളുടെ നീളം - 13 സെ.മീ. നല്ല പാചക നിലവാരം

4. ചതുരപ്പയർ - കെ.എ.യു. നിത്യ

   അത്യുല്പാദന ശേഷിയുള്ള ഇനം, വർഷം മുഴുവൻ കായ്ഫലം തരുന്നു.

   വിളവ് - 30 ടൺ/ഹെ. കായ്കളുടെ നീളം - 20 സെ.മീ. നല്ല പാചക നിലവാരം

പച്ചക്കറി ശാസ്ത്ര വിഭാഗത്തിൽ നിന്നും മേൽപ്പറഞ്ഞ ഇനങ്ങളുടേയും മറ്റു പച്ചക്കറികളുടേയും വിത്തുകളും തക്കാളി, മുളക്, വഴുതന എന്നിവയുടെ പ്രോട്രേ തൈകളും പോളി ബാഗ്

തൈകളും ഉത്പ്പാദിപ്പിച്ച് വിതരണം ചെയ്തുവരുന്നു. പച്ചക്കറി കൃഷിയെക്കുറിച്ച് സന്ദർശകർക്കുണ്ടാകുന്ന സംശയങ്ങൾക്ക് മറുപടിയും നൽകി വരുന്നു.

ബന്ധപ്പെടുക - **9495974675**

ജൈവ കീടനിയന്ത്രണം

1. ബിവേറിയ ബസിയാന (Beaveria bassiana)
   (കീടനിയന്ത്രണത്തിനുള്ള മിത്രകുമിൾ) വില-43/- രൂപ / 500 ഗ്രാം
   - പയറിന്റെ മുഞ്ഞ, ചാഴി, വാഴയുടെ തടപ്പുഴു, ഇലതീനി പുഴുക്കൾ എന്നിവയ്ക്കെതിരെ ഫലപ്രദം.
   - 20 ഗ്രാം പൊടി ഒരു ലിറ്റർ വെള്ളത്തിൽ ലയിപ്പിച്ച് കീടാക്രമണം കണ്ടുതുടങ്ങുമ്പോൾ തളിക്കുക.
   - തടപ്പുഴുവിനെ നിയന്ത്രിക്കാൻ ഇലക്കവിളിൽ ഒഴിക്കണം.

2. ലെക്കാനിസീല്യം ലെക്കാനി (Lecanicillium lecanii) വില- 43/- രൂപ / 500 ഗ്രാം

   - മുഞ്ഞ, മീലിമൂട്ട, വെള്ളീച്ച, തുള്ളൽ പ്രാണികൾ, ശൽക്ക കീടങ്ങൾ എന്നിവയെ നിയന്ത്രിക്കുന്ന മിത്രകുമിൾ
     ഉപയോഗരീതി : 20 ഗ്രാം പൊടി ഒരു ലിറ്റർ വെള്ളത്തിൽ ലയിപ്പിച്ച് 10 ഗ്രാം ശർക്കരയും ചേർത്ത് അരിച്ച് വൈകുന്നേരങ്ങളിൽ ഇലയുടെ ഇരുവശവും നനയുന്ന രീതിയിൽ തളിക്കുക.

3. മെറ്റാറൈസിയം അനൈസോപ്ലിയെ (Metarhizium anisopliae) വില- 43/- രൂപ / 500 ഗ്രാം

   - തെങ്ങിനെ ആക്രമിക്കുന്ന കൊമ്പൻചെല്ലിയെ നശിപ്പിക്കാൻ ഫലപ്രദം.
     ഉപയോഗരീതി : 30 ഗ്രാം പൊടി ഒരു ലിറ്റർ വെള്ളത്തിൽ ചേർത്ത് വളക്കുഴികളിൽ തളിച്ച് കൊമ്പൻചെല്ലിയുടെ പുഴുക്കളെ നശിപ്പിക്കുക.
   - മാണ വണ്ടിനെതിരെയും ഫലപ്രദം: 30 ഗ്രാം ഒരു ലിറ്റർ വെള്ളത്തിൽ ചേർത്ത് വാഴക്കുഴിയിൽ ഒഴിച്ചു കൊടുക്കുക.

4. Methyl Euginol trap(മാമ്പഴയീച്ചക്കെണി) മാവ്, പേര, സപ്പോട്ട, എന്നിവയ്ക്ക് വില-110/- രൂപ

ശ്രദ്ധിക്കേണ്ട കാര്യങ്ങൾ

- ഉപയോഗിക്കുന്നതിന് തൊട്ടുമുമ്പുമാത്രം കവർ പൊട്ടിക്കുക.
- കായപിടിത്തത്തിന്റെ ആരംഭത്തിൽ തന്നെ ഉപയോഗിക്കുക.
- 25 സെന്റിന് ഒരു കെണി എന്ന തോതിൽ ഉപയോഗിക്കാം.
- 2.5 മാസത്തിനുശേഷം പുതിയ ബ്ലോക്ക് സ്ഥാപിക്കുക.
- അധികം വെയിലും മഴയും ഏൽക്കാത്ത സ്ഥലത്ത് വേണം സ്ഥാപിക്കാൻ.
- ഇതോടൊപ്പം തുളസി, കീടനാശിനി, എന്നിവ ചേർത്ത് ചിരട്ടക്കെണി ഉപയോഗിക്കുക.
- കുട്ടികൾ എടുക്കാതെ ശ്രദ്ധിക്കുക.

5. Cue lure trap (കായീച്ചക്കെണി) പാവൽ, പടവലം, വെള്ളരി എന്നിവയ്ക്ക് വില- 160/- രൂപ

ശ്രദ്ധിക്കേണ്ട കാര്യങ്ങൾ

- ഉപയോഗിക്കുന്നതിന് തൊട്ടുമുമ്പുമാത്രം കവർ പൊട്ടിക്കുക.
- കായപിടിത്തത്തിന്റെ ആരംഭത്തിൽ തന്നെ ഉപയോഗിക്കുക.
- 15 സെന്റിന് ഒരു കെണി എന്ന തോതിൽ ഉപയോഗിക്കാം.
- 2.5 മാസത്തിനുശേഷം പുതിയ ബ്ലോക്ക് സ്ഥാപിക്കുക.
- അധികം വെയിലും മഴയും ഏൽക്കാത്ത സ്ഥലത്ത് വേണം സ്ഥാപിക്കാൻ.

- ഈ കെണിയോടൊപ്പം പഴം, ശർക്കര, കീടനാശിനി, എന്നിവ ചേർത്ത ചിരട്ടക്കെണി ഉപയോഗിക്കുക.
- കുട്ടികൾ എടുക്കാതെ ശ്രദ്ധിക്കുക.

ബന്ധപ്പെടുക - **9495072307**

മണ്ണു പരിശോധന നിമവിരനിയന്ത്രണത്തിന്:

പോളി ഹൗസിൽ സാലഡ് വെള്ളരിയെ ആക്രമിക്കുന്ന വേരുബന്ധക നിമവിരയെ നിയന്ത്രിക്കുന്നതിന് ചതുരശ്ര മീറ്ററിന് 200 ഗ്രാം എന്ന തോതിൽ വിത്ത് വിതക്കുന്നതിനു മൂന്നാഴ്ച മുമ്പ് മണ്ണിൽ ചേർക്കുക. വിത്ത് വിതക്കുമ്പോൾ പർപ്യൂ റിയോസിലിയം ലൈലാസിനം എന്ന ജീവാണു ചതുരശ്ര മീറ്ററിന് 50 ഗ്രാം എന്ന തോതിൽ മണ്ണിൽ ചേർക്കുക.

വെണ്ടയിലെ നിമവിര ആക്രമണം തടയുന്നതിന് കോളീഫ്ളവർ ചെടിയുടെ അവശിഷ്ടങ്ങൾ ചെറു കഷണങ്ങളായി അരിഞ്ഞു മണ്ണിൽ ചേർത്ത ശേഷം ചെറുതായി നനയ്ക്കുക. അതിനുശേഷം വായു കടക്കാത്ത വിധം പൊളിത്തീൻ ഷീറ്റ് കൊണ്ട് മൂടുക. ഇങ്ങനെ രണ്ടാഴ്ത ജൈവധൂമീകരണം നടത്തിയ മണ്ണിൽ ശുപാർശ ചെയ്ത അളവിൽ ജൈവ വളം ചേർത്ത ശേഷം വെണ്ട വിത്തുകൾ പർപ്യൂ റിയോസിലിയം ലൈലാസിനം എന്ന ജീവാണു 5 ഗ്രാം ഒരു കിലോ വിത്തിന് എന്ന തോതിൽ വിത്ത് പരിചരണം നടത്തിയ ശേഷം നടുക.

ബന്ധപ്പെടുക - **9447026230**

മിത്രസൂക്ഷ്മാണു ഉത്പന്നങ്ങളും സേവനങ്ങളും

ക്രമ നമ്പർ	ഉത്പന്നങ്ങൾ	വില (രൂപ)
1.	സൂഡോമോണാസ് ഫ്ളൂറസെന്സ്	75
2.	ട്രൈക്കോഡർമ	100
3.	അസോസ്പൈറില്ലം	85
4.	അസറ്റോബാക്ടർ	85
5.	ഭാവക ലായക സൂക്ഷാമാണുക്കൾ (ബാസില്ലസ്സ് മെഗാതീരിയം)	85
6.	പി.ജി.പി.ആർ. മിക്സ് 1	80
7.	പി.ജി.പി.ആർ. മിക്സ് 2	80
8.	മൈക്കോറൈസ	85
9.	മാലിന്യ സംസ്കരണത്തിന് (കമ്പോസ്റ്റിംഗ് ഇനോകുലം)	90

മിത്രസൂക്ഷ്മാണു ഉത്പന്നങ്ങളെക്കുറിച്ചുള്ള സംശയങ്ങൾക്ക് നേരിട്ടോ ഫോൺ നമ്പറിലോ ബന്ധപ്പെടാവുന്നതാണ്.

ബന്ധപ്പെടുക - **8289945595**

ഐ.എഫ്.എസ്.ആർ.എസ്, കരമനയിൽ നൽകി വരുന്ന സേവനങ്ങൾ

- സംയോജിത കൃഷി സമ്പ്രദായം, മട്ടുപ്പാവ് കൃഷി, മാലിന്യനിർമാർജനം, ജൈവകൃഷി, മണ്ണിര കമ്പോസ്റ്റ് നിർമ്മാണം, പരിസ്ഥിതി സൗഹാർദ്ദ രോഗകീട നിയന്ത്രണം, മണ്ണിന്റെ ആരോഗ്യ പരിപാലനം, വിഷരഹിത പച്ചക്കറികൃഷി എന്നീ വിഷയങ്ങളിൽ പരിശീലനവും വിദഗ്ദ്ധ സഹായവും

- കർഷകർക്കും കൃഷി കാര്യങ്ങളിൽ തല്പരരായ സ്കൂൾ/കോളേജ് വിദ്യാർത്ഥികൾക്കും ഫാം സന്ദർശിക്കു ന്നതിനുള്ള സൗകര്യവും പരിശീലനവും
- കൃഷി സംബന്ധമായ വിഷയങ്ങളിൽ സംശയനിവാരണവും വിദഗ്ദ്ധ ഉപദേശവും
- അത്യുത്പാദന ശേഷിയുള്ള 'ഉമ' നെൽവിത്തിന്റെ വിതരണം
- നെല്ല് (ഇനം: ഉമ), നെൽക്കതിർ, പയർ, പച്ചക്കറികൾ, കരിക്ക്, വാഴക്കുല, പാൽ, മുട്ട (കോഴി, കാട, താറാവ്), മീൻ, കൂൺ, കൂൺ വിത്ത്, വയ്ക്കോൽ, ഇറച്ചി (കോഴി, താറാവ്) എന്നിവയുടെ വിപണനം

- ജൈവവളങ്ങളായ ചാണകം, മണ്ണിര കമ്പോസ്റ്റ്, അസോള എന്നിവയുടെ വിതരണം
- മണ്ണിരയുടെ വിതരണം
- മൂല്യവർദ്ധിത ഉത്പന്നങ്ങളായ അരിപ്പൊടി, ചെമ്പാപച്ചരി, മഞ്ഞൾപ്പൊടി, തുടങ്ങിയവയുടെ വിതരണം
- 'ക്രോപ്പ് ബസാറി'ലൂടെ പച്ചക്കറി തൈകളുടേയും (വെണ്ട, വെള്ളരി, മുളക്, വഴുതന, കുമ്പളം, പാവൽ), വളർച്ചാമാധ്യമം നിറച്ച കൂടകളുടേയും വിപണനം
- പുരയിട കൃഷിക്കും മട്ടുപ്പാവ് കൃഷിക്കും അനുയോജ്യമായ വിവിധ തരം ലംബഘടനകൾ വികസിപ്പിച്ചെടുത്തു. തിരനന സംവിധാനമുള്ള ഘടന വളരെ കാര്യക്ഷമമാണെന്ന് കണ്ടു.
- പുരയിട കൃഷി മാതൃകയിൽ ചുരുങ്ങിയ സ്ഥലത്തേക്ക് അനുയോജ്യമായ അക്വാപോണിക്സ് യൂണിറ്റ് രൂപകല്പന ചെയ്തു. ഇതിൽ തക്കാളി, മഞ്ഞൾ എന്നിവ വിജയകരമായി കൃഷി ചെയ്യാമെന്ന് കണ്ടെത്തി.
- മണ്ണില്ലാ കൃഷിയിലൂടെ ധാന്യങ്ങൾ മുളപ്പിച്ച് കന്നുകാലികൾക്ക് ആവശ്യമായ തീറ്റ ഉൽപ്പാദിപ്പിക്കുന്നതിനായി ഹൈഡ്രോപോണിക്സ് യൂണിറ്റ് രൂപകല്പന ചെയ്തു. ഇതിൽ, ചോളം വളരെ ഫലപ്രദമായി വളർത്താൻ കഴിയുമെന്ന് കണ്ടു.
- പപ്പായ ഇലച്ചാറ് നേർപ്പിച്ച ഗോമൂത്രവുമായി ചേർത്ത് (1:1:5 അനുപാതം), നാല് പ്രാവശ്യം (വിതച്ച് 30,45,60,75 ദിവസങ്ങൾക്കു ശേഷം) തളിക്കുന്നത് ഉമ ഇനം നെല്ലിൽ കൂടുതൽ വിളവ് ലഭിക്കുന്നതിനും തവിട്ടു പുള്ളിക്കുത്ത് രോഗം കുറയുന്നതിനും സഹായിക്കുന്നു എന്ന് കണ്ടെത്തി.

ബന്ധപ്പെടുക - **9847022929, 9446104347**

നാളികേര ഗവേഷണ കേന്ദ്രം, ബാലരാമപുരം നൽകി വരുന്ന സേവനങ്ങൾ

കേരള കാർഷിക സർവ്വകലാശാലയുടെ പ്രാദേശിക ഗവേഷണ കേന്ദ്രം വെള്ളായണിയുടെ കീഴിൽ തെങ്ങ് കൃഷി പരിപോഷിപ്പിക്കുന്ന ദൗത്യം വിജയകരമായി നടത്തിവരുന്ന തെക്കൻ കേരളത്തിലെ പ്രമുഖ സ്ഥാപനമാണ് ബാലരാമപുരം നാളികേര ഗവേഷണ കേന്ദ്രം. തെങ്ങ് അധിഷ്ഠിത സംയോജിത കൃഷി, വിവിധ ഇടവിള കൃഷികൾ, ജൈവ കൃഷി എന്നിവയുടെ നൂതന സങ്കേതങ്ങളെക്കുറിച്ച് നിരവധി ഗവേഷണങ്ങൾ ഇവിടെ നടന്നു വരുന്നു.

അത്യുൽപ്പാദന ശേഷിയുള്ളതും മൂന്നര നാല് വർഷം കൊണ്ട് കായ്ഫലം നൽകുന്നതുമായ കേരശ്രീ, കേരസങ്കര, കേരഗംഗ എന്നീ സങ്കരയിനം തെങ്ങിൻ തൈകളും നാടൻ (പശ്ചിമ തീര നെടിയൻ/WCT) തെങ്ങിൻ തൈകളും തികച്ചും ശാസ്ത്രീയമായ രീതിയിൽ ഇവിടെ ഉൽപാദിപ്പിക്കുന്നുണ്ട്. പ്രതിവർഷം 20000 തെങ്ങിൻ തൈകൾ ഉൽപാദിപ്പിച്ച് വിതരണം ചെയ്തു വരുന്നു.

ആധുനിക രീതിയിലുള്ള ഒരു മണ്ണ് പരിശോധന ലാബും തെങ്ങ് അധിഷ്ഠിത സംയോജിത കൃഷിയുടെ ഒരു യൂണിറ്റും ഇവിടെ വിജയകരമായി പ്രവർത്തിച്ചു വരുന്നു. സംയോജിത കൃഷി യൂണീറ്റിന്റെ ഭാഗമായി ഒരു കന്നുകാലി പരിപാലന യൂണീറ്റും (പശു, ആട്), പൗൾട്രി യൂണീറ്റും മാതൃകാപരമായി പ്രവർത്തിക്കുന്നു. ഗ്രാമപ്രിയ, ഗ്രാമലക്ഷ്മി എന്നീ ഇനങ്ങളിലെ കോഴിക്കുഞ്ഞുങ്ങളും, മലബാറി ഇനത്തിലെ ആട്ടിൻ കുട്ടികളും, മുട്ട, പാൽ എന്നീ ഉൽപ്പന്നങ്ങളും വിതരണം ചെയ്തു വരുന്നു. ഇവ കൂടാതെ അത്യുൽപ്പാദനശേഷിയും ഉയർന്ന ഗുണ നിലവാരവുമുള്ള കുരുമുളക്, അടയ്ക്ക, വാഴ എന്നിവയുടെ തൈകളും, പച്ചക്കറി വിത്തുകളും ഉൽപ്പാദിപ്പിച്ച് വിതരണം ചെയ്യുന്നു.

നാളികേരം അടിസ്ഥാനമാക്കിയുള്ള മൂല്യവർദ്ധിത ഉൽപ്പന്നങ്ങളുടെ ഒരു നിർമ്മാണ യൂണീറ്റും ഇവിടെ പ്രവർത്തിക്കുന്നു. ഗുണമേൻമയുള്ള ഉരുക്കു വെളിച്ചെണ്ണ, തേങ്ങാച്ചമ്മന്തിപ്പൊടി, തീയൽക്കൂട്ട്, ഇഞ്ചിച്ചമ്മന്തിപ്പൊടി, എന്നിവ ഉപഭോക്താക്കളുടെ പ്രശംസ പിടിച്ചു പറ്റിയ ഉൽപ്പന്നങ്ങളാണ്.

നാളികേരാധിഷ്ഠിത വിജ്ഞാന നൈപുണ്യ വികസന പരിപാടികൾ നാളികേര കർഷകർക്ക് പകരുക, കാർഷിക മേഖലയിൽ വിദ്യാർത്ഥികൾക്ക് സംരഭകത്വ

വികസനത്തിനുള്ള സാങ്കേതിക അറിവുകൾ, കഴിവുകൾ എന്നിവ ആർജ്ജിച്ചെടുക്കുക, തെങ്ങ് കർഷകരുടെ അഭിവൃദ്ധിക്കായി തെങ്ങ് മുഖ്യവിളയാക്കി സംയോജിത ശാസ്ത്രീയ കൃഷി രീതികൾ അവലംബിച്ച് നിരവധി മൂല്യവർദ്ധിത ഉത്പന്നങ്ങൾ ഉണ്ടാക്കി വ്യാവസായിക യൂണിറ്റുകൾ സ്ഥാപിക്കുന്നതിനുള്ള നൂതന സാങ്കേതിക വിദ്യകൾ, അിറവുകൾ പകരുക തുടങ്ങീ ലക്ഷ്യങ്ങളോട് കൂടി NAHEP-CAAST Project ഇവിടെ നടന്നു വരുന്നു.

കാർഷിക സർവ്വകലാശാലയുടെ അവസാന വർഷ ബിരുദ വിദ്യാർത്ഥികൾ ഗ്രാമീണ കാർഷിക പ്രവൃത്തി പരിശീലന പരിപാടിയുടെ ഭാഗമായി ഒരാഴ്ച വീതം നീണ്ട് നിൽക്കുന്ന പരിശീലനം (ഗവേഷണ കേന്ദ്രവുമായി ബന്ധപ്പെട്ടവ) നടത്തി വരുന്നു.

നാളികേരാധിഷ്ഠിത ഇടവിള കൃഷിയായി കരനെൽകൃഷി, ഭക്ഷ്യസുരക്ഷ പോഷക സുരക്ഷ എന്നിവയെ മുൻനിർത്തി റാഗി (കൂവരക്) പോലുള്ള ചെറുധാന്യകൃഷി ഗവേഷണങ്ങളും വിജയകരമായി നടപ്പിലാക്കി വരുന്നു. തെങ്ങുകളുടെ രോഗകീട നിയന്ത്രണം, സംയോജിതകൃഷിയുടെ നൂതന സങ്കേതങ്ങൾ, മൂല്യവർദ്ധിത ഉൽപ്പന്ന നിർമ്മാണം, സങ്കരയിനം തെങ്ങിൻ തൈകളുടെ ഉൽപ്പാദനം, യന്ത്രം ഉപയോഗിച്ചുള്ള തെങ്ങുകയറ്റം എന്നിവയിൽ വിദ്യാർത്ഥികൾക്കും, കർഷകർക്കും തൊഴിൽ രഹിതരായ യുവതീയുവാക്കൾക്കും ഇവിടെ പരിശീലനം നൽകി വരുന്നു. ഇതു കൂടാതെ തൊഴിലധിഷ്ഠിത ഹയർ സെക്കന്ററി (OJT), കൃഷി ബിരുദ വിദ്യാർത്ഥികൾക്ക് തൊഴിലധിഷ്ഠിത ഗ്രാമവാസ (RAWE) പരിശീലന പരിപാടികളും നൽകി വരുന്നു.

ബന്ധപ്പെടുക - **0471-2400621**

കൃഷി സമ്പ്രദായ ഗവേഷണ കേന്ദ്രം, സദാനന്ദപുരം നൽകി വരുന്ന സേവനങ്ങൾ

പ്രവർത്തന മേഖലകൾ

- പുരയിടങ്ങൾ കേന്ദ്രീകരിച്ച് സർവ്വേകളും വിലയിരുത്തലുകളും നടത്തുക.
- പുരയിടകൃഷിക്ക് അനുസൃതമായി വിവിധ മോഡലുകൾ വികസിപ്പിക്കുകയും അവയുടെ വിശദമായ സാമ്പത്തിക വിലയിരുത്തലുകൾ നടത്തുക.
- വിവിധങ്ങളായ ദീർഘകാല വിളകൾ ഉൾക്കൊള്ളിച്ചുകൊണ്ടുള്ള സംയോജിത കൃഷി രീതികൾ : വിള-കന്നുകാലികൾ/ വിള - കോഴി/ വിള - കന്നുകാലി- മത്സ്യം എന്നിവ ഉൾപ്പെടുന്ന സംയോജിത കൃഷി രീതിക്ക് അനുശ്രിതമായി സാങ്കേതിക വിദ്യകൾ വികസിപ്പിച്ചടുക്കുക.
- പുരയിടത്തിൽ കാണപ്പെടുന്ന പ്രധാന കളയിനങ്ങളെ തിരിച്ചറിയുകയും അവയെ നിയന്ത്രിക്കുന്നതിനാവശ്യമായ ഗവേഷണങ്ങൾ നടത്തുക.
- കർഷകരുടെ വരുമാനം വർദ്ധിപ്പിക്കുന്നതിന് കൃഷി അനുബന്ധ സംരഭങ്ങൾ തിരിച്ചറിയുക.
- പുരയിട കൃഷിക്ക് അനുയോജ്യമായ മണ്ണ്-ജല സംരക്ഷണ പദ്ധതികൾ വികസിപ്പിക്കുക.
- പച്ചക്കറി, കിഴങ്ങുവർഗ്ഗങ്ങൾ, ഫലവൃക്ഷങ്ങൾ, സുഗന്ധവിളകൾ എന്നിവയുടെ വിള വർദ്ധനവിനായുള്ള ഗവേഷണ പ്രവർത്തനങ്ങൾ നടപ്പാക്കുക.
- ഗുണ നിലവാരമുള്ള വിത്തുകളും തൈകളും ഉല്പ്പാദിപ്പിക്കുക.

<u>ഇപ്പോൾ നടന്നുകൊണ്ടിരിക്കുന്ന ഗവേഷണ പദ്ധതികൾ</u>

1. തെക്കൻ ജില്ലകളിൽ കണ്ടുവരുന്ന നാടൻ മാവിനമായ കർപ്പൂരത്തിന്റെ വിവിധ ഇനങ്ങൾ കണ്ടെത്തുന്നതിനായി സർവ്വേയും വിവരശേഖരണവും നടത്തുകയും മുന്തിയ ഇനത്തിന്റെ ജനിതകശേഖരം ഉണ്ടാക്കുകയും ചെയ്യുക.
2. മികച്ച ഇനം വഴുതനങ്ങകൾ കണ്ടെത്തുന്നതിനായിട്ടുള്ള ഗവേഷണ പദ്ധതി.

3. മഞ്ഞൾ, കച്ചോലം എന്നിവയിലെ മികച്ച ഇനങ്ങൾ കണ്ടെത്തുന്നതിനായിട്ടുള്ള ഗവേഷണ പദ്ധതി.
4. നെല്പാടത്തെ ചൊവ്വരി പുല്ലിന്റെ (വഞ്ചി) നിയന്ത്രണം.
5. പപ്പായയുടെ ജൈവവള പ്രയോഗം
6. ഗ്രാമീണ കാർഷിക സാങ്കേതിക പരിശീലന പാർക്ക് സ്ഥാപിക്കുന്ന പദ്ധതി

പരിശീലനങ്ങൾ

29 ഏകദിന പരിശീലന പരിപാടികൾ 8 തൊഴിൽ അധിഷ്ഠിത പരിപാടികൾ വൊക്കേഷണൽ ഹയർസെക്കന്ററി വിദ്യാർത്ഥികൾക്കായി 12 ദിവസം നീണ്ടു നിൽക്കുന്ന 6 പരിശീലന പരിപാടികൾ എന്നിവ നടത്തുകയുണ്ടായി.

വിജ്ഞാന വ്യാപന പ്രവർത്തനങ്ങൾ

റേഡിയോ പ്രഭാഷണങ്ങൾ, ടെലിവിഷൻ പരിപാടി, ഗവേഷണ കേന്ദ്രത്തിന്റെ പ്രധാനപ്പെട്ട പ്രവർത്തനങ്ങളും ഗവേഷണ ഫലങ്ങളും പത്രമാധ്യമങ്ങളിലൂടെ പ്രചരിപ്പിക്കുക തുടങ്ങിയ പ്രവർത്തനങ്ങൾ നടത്തി.

റിവോൾവിംഗ് ഫണ്ട് ഉപയോഗിച്ചുള്ള പ്രവർത്തനങ്ങൾ

ജീവാണു കീടനാശിനികൾ, ദ്വിതീയ സൂക്ഷ്മ മൂലകവളം, ജീവാണുവളങ്ങൾ, കമ്പോസ്റ്റ്, ഫലവർഗ്ഗങ്ങളിൽ നിന്നുള്ള മൂല്യവർദ്ധിത ഉൽപ്പന്നങ്ങൾ, കൂൺ, കൂൺ വിത്ത്, തെങ്ങിൻ തൈകൾ, നഴ്സറി ചെടികൾ വിവിധ ഫലവിളകളുടെ ഒട്ടു തൈകൾ എന്നിവ ഉൽപ്പാദിപ്പിച്ചു വിതരണം ചെയ്തുവരുന്നു.

ബന്ധപ്പെടുക - **9447595912**

കൃഷി വിജ്ഞാൻ കേന്ദ്രം, കൊല്ലം കർഷകർക്ക് ലഭ്യമാക്കുന്ന സേവനങ്ങൾ

1. **പരിശീലനങ്ങൾ**

കൊല്ലം ജില്ലയിലെ കർഷകരുടെയും കാർഷിക മേഖലയിൽ പ്രവർത്തിക്കുന്ന വിജ്ഞാന വ്യാപന പ്രവർത്തകരുടെയും പരിശീലകരുടെയും ആവശ്യാനുസൃതം കെ.വി.കെ. കൊല്ലം സാങ്കേതികവിദ്യ കൈമാറുന്നതിനുള്ള പ്രധാന പരിപാടിയായി ഓൺ ക്യാമ്പസ് ഓഫ് ക്യാമ്പസ് രീതികളിൽ പരിശീലനം സംഘടിപ്പിക്കുന്നു. കൂടാതെ, കൃഷി വകുപ്പ്, റബ്ബർ ബോർഡ്, നാഷണൽ ബാങ്ക് ഫോർ അഗ്രികൾച്ചർ ആന്റ് റൂറൽ ഡെവലപ്പ്മെന്റ്, മറ്റ് കാർഷിക അനുബന്ധ സംഘടനകൾ എന്നിവ സംഘടിപ്പിക്കുന്ന നിരവധി പരിശീലനപരിപാടികളിൽ കെ.വി.കെയുടെ വിഷയ വിദഗ്ദ്ധർ റിസോഴ്സ് പേഴ്സണായി പ്രവർത്തിക്കുന്നു. 1 മുതൽ 20 ദിവസം വരെ ദൈർഘ്യമുള്ള വിവിധ തൊഴിലധിഷ്ഠിത പരിശീലന പരിപാടികൾ നടത്തി വരുന്നു.

പരിശീലന വിഷയങ്ങൾ

- പച്ചക്കറികൾ, വാഴ, നാളികേരം, നെൽകൃഷി എന്നിവയുടെ സംയോജിത പോഷക പരിപാലനം.
- സംയോജിത കീടനിയന്ത്രണം
- ജൈവ ഉപാധികളുടെ ഉത്പാദനവും പ്രയോഗരീതികളും
- ചെടിയുടെ കായിക പ്രവർത്തന രീതികൾ
- പച്ചക്കറി തൈ ഉത്പാദനം
- കൂൺ കൃഷി
- മട്ടുപ്പാവ് കൃഷി
- പോഷക ഉദ്യാനത്തോട്ടം
- പഴങ്ങളുടെയും പച്ചക്കറികളുടെയും മൂല്യവർദ്ധനവ്

- സംരംഭകത്വ വികസന പരിശീലനങ്ങൾ
- കാർഷിക യന്ത്രവത്കരണം
- മൃഗപരിപാലനം
- കോഴി വളർത്തൽ
- ആടു വളർത്തൽ
- ഉദ്യാന കൃഷി തുടങ്ങിയവ

2. കാർഷിക ഉപദേശക സേവനങ്ങൾ

ജില്ലയിലെ കാർഷിക സമൂഹത്തിന്റെ ഉന്നമനത്തിനായി വിവിധ മേഖലകളിലെ ശാസ്ത്ര ജ്ഞർ ഒരുമിച്ച് പ്രവർത്തിക്കുന്നു. കൃഷിക്കാർക്കും കാർഷിക സംരംഭകർക്കും അനുബന്ധ ഡിപ്പാർട്ട്മെന്റിലെ ഉദ്യോഗസ്ഥർക്കും അവരുടെ കാർഷിക മേഖലയിലെ പ്രശ്നപരിഹാരത്തി നായി ഫോണിലൂടെയോ വ്യക്തിഗത സന്ദർശനത്തിലൂടെയോ കേന്ദ്രത്തെ സമീപിക്കാം.

3. വിൽപ്പനയ്ക്ക് ലഭ്യമായ ഉൽപ്പന്നങ്ങൾ ഇവയാണ്

കൊല്ലം ജില്ലയിലെ കർഷകർക്ക് ഗുണനിലവാരമുളള നടീൽ വസ്തുക്കൾ, ജൈവ ഉപാധികൾ, വളങ്ങൾ, മറ്റ് കാർഷിക ഇൻപുട്ടുകൾ എന്നിവ ന്യായമായ നിരക്കിൽ നൽകാൻ കേന്ദ്രം ശ്രമിക്കുന്നു. മെഥൈൽ യൂജെനോൾ കെണികൾ, ക്യൂലെയർ കെണികൾ, ടിസി വാഴ, സ്യൂഡോമോണസ്, ട്രൈക്കോഡെർമ, പാസെലോമൈസിസ്, ബിവേറിയ, വേപ്പെണ്ണ സോപ്പ്, പൊങ്കാമിയ സോപ്പ്, കൂൺ വിത്ത്, പച്ചക്കറി തൈകൾ, അലങ്കാര സസ്യങ്ങൾ, അസോള, മണ്ണിര കമ്പോസ്റ്റ്, മണ്ണിര, ആട്, ഗ്രാഫ്റ്റുകൾ, കെ.എ.യു പ്രസിദ്ധീകരണങ്ങൾ, സമ്പുഷ്ടമാക്കിയ വളം, ഗ്രോ ബാഗ് തുടങ്ങിയവ കോഴിക്കുഞ്ഞുങ്ങൾ, സമ്പൂർണ്ണ സമ്പൂർണ്ണ, നന്മ, മേന്മ, ശ്രേയ, പഴങ്ങളുടെയും പച്ചക്കറികളുടെയും മൂല്യവർദ്ധിത ഉൽപ്പന്നങ്ങൾ.

4. ഇതര സേവനങ്ങൾ

1. യന്ത്രസാമഗ്രികളും ഉപകരണങ്ങളും
2. മണ്ണ്, ജല പരിശോധന ലാബ്
3. പ്ലാന്റ് ഹെൽത്ത് ക്ലിനിക്
4. അഗ്രോപ്രൊസസ്സിംഗ് ലാബ്

ബന്ധപ്പെടുക - **9745643733**

ആർബസ്കുലാർ മൈക്കോറൈസൽ ഫംഗസിന്റെ കൃഷിയിടത്തിലെ ഉൽപാദനത്തിന് ചെലവ് കുറഞ്ഞ വളർച്ചാമാധ്യമം

കേരളത്തിലെ മണ്ണുകൾക്ക് വളരെ അനുയോജ്യമായ ഒരു ജീവാണു വളമാണ് എ.എം. എഫ് (ആർബസ്കുലാർ മൈക്കോറൈസൽ ഫംഗസ്) കൊല്ലം ജില്ലയിലെ കർഷകർക്കിടയിൽ അടുത്ത കാലത്തായി പ്രചാരം ലഭിച്ചുകൊണ്ടിരിക്കുന്ന ഈ ജീവാണു സസ്യവേരുകളുമായി ബന്ധപ്പെട്ടു കാണുന്നു. സാധാരണയായി ഈ ജീവാണു വളത്തിന്റെ ഉൽപാദനത്തിനായി വില കൂടിയതും ലഭ്യത കുറവുള്ളതുമായ വളർച്ചാ മാധ്യമങ്ങളായ വെർമികുലേറ്റ്, പെർലൈറ്റ് തുടങ്ങിയവയാണ് ഉപയോഗിക്കുന്നത്. കർഷകരുടെ കൃഷിയിടത്തിൽ മണ്ണ് ഉപയോഗിച്ച് ഈ ഫംഗസിനെ ചോളചെടിയുടെ വേരുകളിൽ സന്നിവേശിപ്പിക്കുകയാണ് ചെയ്യുന്നത്. എന്നാൽ കൊല്ലം കെ.വി.കെയിൽ ഇത്തരം രീതിയിൽ എ.എം.എഫ് നെ ഉൽപാദിപ്പിച്ചപ്പോൾ ചോളചെടിയുടെ വേരുകളിലെ ഫണസിന്റെ സന്നിവേശം കുറവായിരുന്നു. മാത്രമല്ല സ്പോറുകളുടെ അളവ് വളരെ കുറവായി കണ്ടു. ഇതിനെ തുടർന്ന് 2017 മെയ് മുതൽ 3 സീസൺ നീണ്ടു നിൽക്കുന്ന ഒരു പരീക്ഷണം നിരീക്ഷണം കെ.വി.കെ യിൽ ആരംഭിച്ചു. അതിന്റെ രത്ന ചുരുക്കമാണ് ചുവടെ ചേർക്കുന്നത്.

രണ്ടു രീതിയിൽ അണുവിമുക്തമാക്കിയ (വറുത്തെടുത്തതും, പ്രഷർകുക്കർ ഉപയോഗിച്ചതും) 3 മാധ്യമങ്ങളാണ് (viz., ചകിരിചോറ് കമ്പോസ്റ്റ് (50%) + ചകിരിനാര് (25%) + മണ്ണ്(15%) ഉണക്ക ചാണകപ്പൊടി (10%); 1:1:1 (v/v) അനുപാതത്തിൽ മണ്ണ് ചകിരിചോറ് ചാണക പ്പൊടി മണ്ണ് മാത്രം ഉപയോഗിച്ചത്. ആദ്യത്തെ രണ്ടു മാധ്യമങ്ങളിൽ ചകിരിചോറ് കമ്പോസ്റ്റ്

(50%) + ചകിരിനാര് (25%) + മണ്ണ് (15%) ഉണക്ക ചാണകപ്പൊടി (10%); 1:1:1 (v/v) അനുപാതത്തചന്റ മണ്ണ് ചകിരിചോറ്, ചാണകപ്പൊടി എന്നിവ കൂട്ടികലർത്തിയത് വളർത്തിയ മൈക്കോറൈസ ചോളചെടിയുടെ വേരുകളിലാണ് പരമാവധി എ.എം.ഫംഗസിന്റെ സന്നിവേശം കണ്ടത്. ഈ മാധ്യമങ്ങളിൽ സ്പോറുകളുടെ ഉയർന്ന സാന്നിധ്യം കണ്ടു ആയതിനാൽ ഈ രണ്ടു മാധ്യമങ്ങളും കർഷകരുടെ കൃഷിയിടത്തിലെ എ.എം ഫംഗസിന്റെ ഉൽപാദനത്തിനായി ഉപയോഗിക്കാവുന്നതാണ്.

ബന്ധപ്പെടുക - **9744645706**

കുരുമുളകിലെ സംയോജിത നിമവിര നിയന്ത്രണം

കുരുമുളകിനെ ആക്രമിക്കുന്ന വേരുബന്ധക നിമവിരകളെ നിയന്ത്രിക്കുന്നതിനായി മേയ്യ് മാസത്തിലോ ജൂൺ മാസത്തിലോ 200 ഗ്രാം വേപ്പിൻ പിണ്ണാക്കും 15 ഗ്രാം ടാൽക്കിൽ കലർത്തിയ സ്യൂഡോമോണാസ് ഫ്ളൂറസൻസ് എന്ന മിത്രകുമിളും യോജിപ്പിച്ച മിശ്രിതം ഓരോ ചുവട്ടിലും മണ്ണിളക്കി നൽകേണ്ടതാണ്.

ബന്ധപ്പെടുക - **8129036787**

പ്രകൃതി ദത്തമായ ചായങ്ങൾ

പ്രകൃതി ദത്തമായ ചായങ്ങൾ 12 വിവിധയിനം സസ്യങ്ങളിൽ നിന്ന് ഉരുത്തിരിച്ചെടുത്ത് അവയുപയോഗിച്ച് പരുത്തി തുണിയിലും സിൽക്ക് തുണിയിലും നിറം കൊടുക്കുന്ന സാങ്കേതിക വിദ്യ.

ബന്ധപ്പെടുക - **9847202919**

ഓസ്മാ ഡീഹൈഡ്രേറ്റഡ് പപ്പായ

കൃത്യമായി ക്രമപ്പെടുത്തിയ സാന്ദ്രത കൂടിയ സൂക്രോസ് ലായനിയിൽ പപ്പായ കഷണങ്ങൾ നിശ്ചിത സമയം മുക്കിവച്ചശേഷം ഗുണമേന്മ നഷ്ടപ്പെടാതെ കൃത്യമായ ഊഷ്മാവിൽ ഉണക്കിയെടുക്കുന്ന സാങ്കേതിക വിദ്യ.

ചക്കയുടെ പോർഷൻ പാക്കേജിങ്ങ്

മൂപ്പെത്തിയ വരിക്ക (പച്ചയും പഴുത്തതും) കൂഴ (പച്ച) ചക്ക ഇനങ്ങൾ, മൂള്ള് കളഞ്ഞ് കഷ്ണങ്ങളാക്കി മുറിച്ചതിനുശേഷം കൃത്യമായ പരിചഇം മുറകൾ നൽകി, പ്രത്യേകമായി പാക്ക് ചെയ്ത് 1321 ദിവസം വരെ സംഭരിച്ചു വയ്ക്കാനാവുന്ന സാങ്കേതിക വിദ്യ.

പഴം - പച്ചക്കറി ജാം

വിവിധങ്ങളായ പഴം - പച്ചക്കറികൾ കൃത്യമായ അനുപാതത്തിൽ ഉപയോഗിച്ച് രാസസം രക്ഷക വസ്തുക്കളോ നിറങ്ങളോ ചേർക്കാതെ ഉണ്ടാക്കിയെടുക്കുന്ന രുചികര പോഷക ഗുണ മേറിയതുമായ ജാം.

ബന്ധപ്പെടുക - **9447281300**

KERALA AGRICULTURALUNIVERSITY
REGIONAL AGRICULTURAL RESEARCH STATION (SZ), VELLAYANI

MINUTES OF THE XXXVI ZONAL RESEARCH EXTENSION ADVISORY COUNCIL MEETING & INTERFACE

The meeting commenced with the invocation song by the College Choir. The welcome speech was delivered by Dr.P.Indira Devi, Director of Research, Kerala Agricultural University. In her welcome address, she stressed the importance of geographical zone wise POP which the University has already initiated. This was followed by the Presidential address by Sri.M.Vincent, MLA and general Council Member, KAU. He pointed out that this is a platform for interaction with Farmers, Scientists and Agricultural Officers. This will also help in disseminating the research findings to the farmers and the scientist will get a direction in which the future research has to be oriented.

Hon'ble Minister of Agriculture Development and Farmers Welfare, Advocate V.S.Sunilkumar inaugurated the function. In his inaugural address, he opined that measures have to be strengthened to disseminate the research findings and farmers experience has to be considered while formulating new projects. He elaborated the need for popularization of newly released varieties among farmers. He also pointed out that Kerala Agricultural University should focus on research which address current problems due to climate change.

Dr.A.Anilkumar, Dean (Faculty of Agriculture) and Executive Committee Member of KAU delivered the keynote address. He opined that a follow up programme on the recommendations of the previous ZREAC workshop has to be conducted. He also pointed the need of frequent farmer-scientist interface and the inclusion of scientists working in the field of environment and climatic aspects.

Special Secretary & Director (Agriculture), Dr.Rathan U Kelkar, IAS in his special address highlighted the need for conducting farmer-scientist interface at fortnightly intervals and requested the Department officials for timely action based on the interface and its documentation.

Dr.R.Ramakumar, Member, Planning Board, Kerala in his special address called upon the body to move towards e-governance and to develop suitable models and Apps to address the farmer's problem for providing immediate solutions.

Dr.Thomas George, Professor & Head (PRRAL) and General Council Member of KAU, Dr.M.Joy, Associate Professor and Head (Plant Pathology) and Academic Council member of KAU and Dr.B.Seema, Associate Director of Extension and HOD, Agricultural Extension felicitated the workshop.

The report of the 35th ZREAC meetings and interface held on 3rd October, 2018 was presented by Dr.ShaliniPillai, Professor (Agronomy).

Dr.A.S.Anilkumar, Associate Director of Research, RARS(SZ) proposed the vote of thanks.

In the inaugural session, Dr.Meenakumari K.S., Professor and Head, Department of Agricultural Microbiology was honoured for generating the highest income of Rs.17 lakhs in Revolving Fund scheme "Mass multiplication and supply of Microbial inoculants" through the sale of microbial inoculants and biofertilizers.

One booklet on 'Pests of cabbage and cauliflower ' by Dr.O.P.Reji Rani, Assistant Professor, Department of Agricultural Entomology and one leaflet on 'Salient Achievements of AICRP on Honey Bees and Pollinators" by Dr.Amritha V.S. Assistant Professor, Department of Agricultural Entomology was released during the inaugural session. A new product "KakkanLaddoo" from Coconut Research Station, Balaramapuram was also launched.

Technical session I : Farmer-scientist-extension personnel interface

Chair person : Dr.P.Indira Devi, Director of Research, KAU

Co-chair person : Dr.Asha Shankar, ADR (FARMS).

Selected farmers (Sri.Rajamony, KarodeSri.Vijayan, Kalliyoor, Sri.Anilkumar, Eravipuram, Sri.SonaPanicker, Kalluppara), extension personnel (Agricultural Officer, Kadakkavoor) and Principal Agricultural Officer, Thiruvananthapuram presented the field problems of Thiruvananthapuram, Kollam, Pathanamthitta and Alappuzha districts.

The scientists of KAU suggested solutions of field problems. The major field problems were

Rice	Iron toxicity, weed infestation, root damage in the flooded areas, bacterial leaf blight
Coconut	Incidence of nut fall and bunch necrosis, leaf rot, rhinocerous beetle, red palm weevil, bud rot
Banana	Pseudostem weevil, Rhizome weevil, poor growth and nutrient deficiency, poor filling of banana finger in the variety swarnamukhi
Vegetables	Sucking pests, fruit fly, mealy bug attack, poor fruit set, mosaic in bhindi, tomato curl (virus)
Cassava	Mealy bug attack
Miscellaneous	African snail, wild boar

The solutions for problems were presented by Dr.M.Joy, Dr.AshaSankar, Dr.N.Anitha, Dr.Ameena M, Dr.Reena Mathew, Dr.N.V. Radhakrishnan and Dr. Reji Rani O.P.

1	**Coconut**	
	Root wilt and yellowing, nut fall and bunch necrosis	Planting of DXT coconut seedling which is more resistant to pest and disease attack. Better nutrition to be provided based on the annual nut yield.
	Leaf rot	Application of Samarth @ 5 ml/500 ml on the inner five leaf axils @ 10 ml/leaf axil
	Rhinoceros beetle and red palm weevil infestation	Pheromone traps should be installed on community basis. Care should be taken to avoid the drying of killing agents. Use of Ferterra 20 g along with 200 g sand per plant was also found to be effective
2	**Banana**	
	Pseudostem weevil	Application of chlorpyriphos 2 ml/litre in leaf axil immediately after the observation of ooze due to egg laying puncture
	Rhizome weevil	Paring of sucker (rhizome) during the time of planting , Use of Beavaria trap
	Fruit fly in banana	Further research has to be conducted for its management since it is infesting banana at ready to eat stage
	Ca deficiency in banana	0.3 to 0.5 % of Calcium nitrate spray at monthly intervals for two times
	Poor finger filling	Application of potassium sulphate
3	**Rice**	
	Bacterial leaf blight	*Pseudomonas fluorescense* 20 g/l + cowdung decant (20 g/ litre) or streptcyclin 250 to 300 ppm 6 g/12 l of water
	Fe toxicity	Lime application Proper water management Correction of K deficiency
	Root decay in rice during flooded condition and nutrient deficiency	Foliar application of 19:19:19 @ 1.5 %, use of multinutrient mix @ 10 g/ l during booting stage / whenever it is observed
4	**Vegetables**	
	Leaf curl virus in tomato	Phylanthusneruri 5 g/ l of water
	Bhindi yellow vein mosaic	It was advised to take seeds from healthy plant
5	**Grapes**	
	Infestation of grape bunches by mites/thrips / nutritional deficiency	Use of *Lecanicilliumlecani* 20 g/ l or NSKE 50 g.l. For nutritional problem, soil testing is to be done

6	Weed infestation in rice	Application of glufosinate ammonium available as 'sweep Power' @ 6 to 8 ml / l based on the weed intensity. Care should be taken so as to sow the seeds 3 days after application
7	Snail – African giant snail	Spray Cu oxychloride @ 4 g / l. Control measures has to be adopted in a campaign mode
8	Wild boar attack	Use boarup as repellent, requested to take project on influence of LED light for distracting the wild boars

Technical session II : Farm trial

Chair person : Dr.Ashasankar, ADR (FARMS)

Co-chairperson : Dr.Seema B, Associate Director of Extension and HOD, Agrl Extn.

The results of two farm trials were presented by Dr.Narayana R, Assistant Professor, Department Agricultural Entomology, one each by Dr.Reji Rani O.P., Assistant Professor (Agricultural Entomology) and Dr.Sheeja K Raj, Assistant Professor (Agronomy). The results were approved and recommend for mini POP.

Two farm trial proposals were presented by Dr.Narayana R, Assistant Professor (Agricultural Entomology) and one each by Dr.Sheeja K Raj, Assistant Professor (Agronomy), Dr.Susha S Thara, Assistant Professor (Plant Pathology) and Dr.K.Ushakumari, Professor & Head (Soil Science & Agricultural Chemistry).

Project proposal presented by Dr.Narayana was approved and was asked to meet the expenditure of the trial from AICRP on nematodes. Evaluation of best crop combinations under organic farming in coconut was not recommended but coconut + nendran + turmeric /ginger was recommended as adhoc recommendation for popularization. The farm trial proposed 'Screening of new variety Oyster mushroom' was approved but the number of varieties was limited to two. The farm trial proposal by Dr.K.Ushakumari was also approved.

Technical session III : Station Presentation

Chair-person : Dr.Reena Mathew, ADR, RARS, Kumarakom

Co-chairperson : Dr.ManoramaThampatti, Professor, Department of Soil Science & Agricultural Chemistry.

The activities and progress of the research projects being implemented at three satellite stations (IFSRS, Karamana, CRS, Balaramapuram and FSRS, Kottarakkara), on Farm Research Centre, Vellayani and KVK, Kollam were presented by the respective station heads.

Dr.M.R.Bindu, Assistant Professor, FSRS, Kottarakkara requested permission of the house for continuation of the project on Maintenance of superior lines of Mango variety – Karpooram. Permission was accorded to continue the project. Sanction was also granted to continue the project on brinjal lines.

In the case of the project "Evaluation of turmeric and Kacholam accessions in the homesteads" it was suggested to compare the performance of accessions with the released varieties.

Technical session IV : All India Co-ordinated Research Projects

Chair-person : Dr. Asha Sankar, ADR (FARMS)

Co-chairperson : Dr. Jayalekshmy V.G. , Research Co-ordinator and
Professor & Head, Seed Technology

Dr.Sreelathakumari.I, Professor & Head, Vegetable Science.

The achievements and progress of research work conducted as part of five AICRPs and two AINPs were presented in this session by the respective Principal Investigators.

The suggestions were:

AICRP on Nematodes

Nematode association in coconut, association of nematode with bacterial wilt disease in brinjal and compatibility between *P.lilacinum* and *Pseudomonas* for seed treatment has also to be looked into.

AICRP on forage

Chair enquired the feasibility of hydroponic system in fodder maize and P.I. explained it was not feasible under Kerala condition where ample biomass is available under conventional planting. It was also suggested to screen non-flowering type guinea grass.

AICRP on Honey bees

Chair suggested to conduct pollination studies in pumpkin also.

AICRP on Mushrooms

Toxicological studies of mushroom growing on medicinal plant waste must be conducted before popularization.

AICRP on Biological Control

Comparative studies on efficiency of trichocards and *B.bassiana* in controlling rice leaf roller have to be conducted.

AINP on Soil biodiversity – Biofertilizers

Anaerobic strains of AMF for rice field should be taken up considering the post flood scenario of the state.

AINP on Pesticide residues

PI of AINP pointed out that the pesticide residue in 'organically labeled' products is a matter of concern.

Sri.Rajamony, Karode presented the yield and quality traits of the local variety of okra and the body appreciated his efforts.

Technical session V : Crop Improvement

Chair-person : Dr.AshaSankar, ADR (FARMS)

Co-chairperson : Dr.Jayalekshmy V.G. , Research Co-ordinator and Professor & Head, Seed Technology

Dr.Beena Thomas, Assistant Professor (Plant Breeding), Dr.Jayalekshmy V.G. , Research Co-ordinator and Professor & Head, Seed Technology and Dr.Sreelathakumari.I Professor & Head, Vegetable Science presented the salient findings of their respective projects.

For the network project on hybrid vegetables the house suggested that ArkaSamrat and ArkaRakshak should be used as check.

Technical session VI : Crop Production

Chair-person : Dr.Swadja, Professor & Head, Department of Agronomy

Co-chairperson : Dr.K.Ushakumari, Professor & Head (SS & AC)
Dr.ShaliniPillai P, Professor, Department of Agronomy

The salient achievements and progress of five projects were presented in this session.

Dr.M.M. Viji was asked to continue the project on Seed and planting material production and research of *Tinosporacordifolia* and *Withaniasomnifera* so as to evolve an effective anti-cancer medicine.

Technical session VII : Crop Protection

Chair-person : Dr.AshaSankar, ADR (FARMS)

Co-chairperson : Dr.Anitha N, Professor & Head (Agrl. Entomology)

Dr.M.Joy, Professor & Head (Plant Pathology) presented the research report of the project, Synergism in defense and growth : Exploration of a root endophytic fungus *Piriformosporaindica*, for the management of *Fusarium* wilt in banana with enhanced crop production.

The Chair suggested to include studies on black pepper quick wilt management and to standardize the media for mass multiplication of the fungi.

Technical session VII : Social science

Chair-person : Dr.Prema, Professor & Head, Department of Agricultural Economics Co-chairperson : Dr.Sajitha Rani T, Professor & Head, Instructional Farm, Vellayani .

The research achievements and progress of work were presented by Dr.Bela G.K., Associate Professor and Dr.SumaDivakar, Professor and Head, Community Science. The House suggested Dr.SumaDivakar to present the technology transfer component of 'Dahashamini' before the technical committee and to work out the economic analysis of the project.

The plenary session

Chair-person : Dr.AshaSankar, ADR (FARMS)

Dr.AshaSankar, ADR (FARMS) delivered the presidential address. The Chair-person emphasized that results of PG projects can be taken as farm trials and those with field application should reach the farmers at the earliest. Dr.Amritha, V.S presented a brief of 36th ZREAC meeting and interface. Dr.Anilkumar A.S., Associate Director of Research, RARS(SZ), Vellayani welcomed the gathering and Dr.M.S.Hajilal, Professor (Agrl. Engineering) proposed the vote of thanks.

Meeting came to an end by 1.45 p.m.

ASSOCIATE DIRECTOR OF RESEARCH

ACTION TAKEN REPORT AS PER THE MINUTES OF THE XXXVI ZREAC WORKSHOP HELD ON 29th and 30th August 2019

FSRS SADANANDAPURAM:

Permission was accorded to continue the project "Evaluation of brinjal lines in AICVIP trial":

As per the sanction accorded, the experiments of the project have been carried out during 2019-2020.

Permission was accorded to continue the project "Survey, collection, establishment and maintenance of superior lines of traditional mango variety Karpooram in southern Kerala":

The project is in progress, second year observations of the experiment has already been taken and that of the third year is going on.

In the project entitled "Evaluation of turmeric and Kacholam accessions in the homesteads" it was suggested to compare the performance of accessions with the released varieties:

Released varieties of turmeric (Sobha and Kanthi) and Kacholam (Rajani and Kasturi) were included during 2020-21.

ALL INDIA CO-ORDINATED RESEARCH PROJECTS:

AICRP on Nematodes

Nematode association in coconut, association of nematode with bacterial wilt disease in brinjal and compatibility between *P.lilacinum* and *Pseudomonas* for seed treatment:

Occurrence of *Helicotylenchus dihystera, Hoplolaimus indicus* and *Creconemoides* were observed in soil samples collected from the rhizhosphere of coconut.

Results of pot culture study revealed that severity of wilt disease higher in plants infested with *M. incognita* juveniles. Shoot length, root length, shoot weight and root weight were significantly lower in plants inoculated with bacteria and root-knot nematode. Wilt percentage and root galling also increased with increase in levels of *M .incognita* and bacteria.

Experiment on compatibility of seed treatment with *Purpureocillium lilacinum* and *Pseudomonas fluorescens*is in progress.

AICRP on Forage Crops and Utilization

Screen non-flowering type guinea grass:

In the minutes of 36th ZREAC workshop, Chair had suggested to screen non-flowering type guinea grass. In this context, I would like to report that we had conducted an extensive study to screen non/shy flowering types in guinea grass and to develop mutants as a part of a PhD study undertaken during 2015-2018. Also we had conducted in-house breeding programme with this objective during 2014-2019 and we have identified two promising guinea grass cultures which are shy flowering and have high yield potential. We have completed the initial evaluation trial, comparative yield trial and multi-location trials for these cultures. Moreover, this year we have proposed a new research programme to ICAR for survey, collection and screening (morpho, agronomic and molecular) of guinea grass accessions from across the state of Kerala.

AICRP on Honey bees

Pollination studies in pumpkin also:

The technical programme of the pollination studies in pumpkin will be submitted in the next biennial workshop of AICRP on HB&P, so that the experiment can be conducted in the next biennium.

AICRP on Mushrooms

Toxicological studies of mushroom growing on medicinal plant waste must be conducted before popularization:

Study on the mushroom cultivation on medicinal plant waste has been given as MSc project during 2019-2020. The toxicological studies will be done as a part of the current study.

AICRP on Biological Control

Comparative studies on efficiency of trichocards and *B.bassiana* in controlling rice leaf roller have to be conducted:

Comparative studies will be conducted after the approval of the proposed study in the next biennial workshop of AICRP on Biological control.

AINP on Soil biodiversity – Biofertilizers

Anaerobic strains of AMF for rice field should be taken up considering the post flood scenario of the state:

Experiments were conducted at IFSRS, Karamana to evaluate the efficiency of isolates of AMF developed by the Department of Agrl. Microbiology under lowland conditions.

Promising results were obtained in terms of yield and yield attributes of paddy due to AMF application.

Crop Improvement

ArkaSamrat and ArkaRakshak should be used as check for the network project on hybrid vegetables:

An initial evaluation of tomato genotypes and F_1 hybrids was done by a PhD student in the Dept. of Vegetable Science during 2013-'14. The results indicated poor performance of both Arka Samratand Arka Rakshak at College of Agriculture, Vellayani, with a yield of 928.47 g plant^{-1} and 1093.42 g plant^{-1}respectively, whereas the F_1 hybrid Naveen recorded 1210.37 g plant^{-1}. Hence Naveen was used as the check hybrid for this experiment. The project has already been completed and the funds pertaining to Dept. of Vegetable Science, College of Agriculture, Vellayani has been fully utilised and the final report was presented by the PI.

Crop Protection

Black pepper quick wilt management and standardization of the media for mass multiplication of the fungi:

The best substrate for the growth of *P. indica* including potting mixture / portray mix has also been standardized. Efficient methodology for quick and rapid mass multiplication of *P. indica* in potting mixture / portray mix with a population of 4-12 x 10^8cfu / g of substrate in a week time has also been standardized. The experiment on assessing the shelf life of *P. indica* on different substrates indicated that *P. indica* is viable even after one and half year.

It is proposed to commercialize the technology **"***Rapid mass multiplication of Piriformospora indica in potting mixture / portray mix"*. Stakeholders: KAU, farming community, public/private industries, etc.

The work on *P. indica*-mediated management of foot rot or quick wilt of black pepper is initiated. Project on the exploration of endophytes including *P. indica* for the management of foot rot or quick wilt of black pepper has been submitted.

Social science

To present the technology transfer component of 'Dahashamini' before the technical committee and to work out the economic analysis of the project:

Submitted the proposal for TOT with economic analysis to Associate Director of Research and Director of Research, Kerala Agricultural University.

LIST OF ONGOING RESEARCH PROJECTS

Sl. No	Title of the Project	Principal Investigator	Total Outlay/ Budget Provision (Lakh)	Date of start
KAU PLAN PROJECTS				
1.	Horticulture therapy - A tool to rehabilitate differently abled children at schools	Dr. Beela. G.K., Dept. of Community Science	25.65	1-9-18
2.	Development and evaluation of Anthurium hybrids	Dr. Beena Thomas, Dept. of Plant Breeding & Genetics	1.50	12/2/2019
3.	Product development on functional ready to serve beverages: refinement and protocol development]	Dr. P.R. GeethaLekshmi, Dept. of Post Harvest Technology	1.50	2019
4.	Annual plan project 18-19: Refining technologies for by product utilization of major crops like jackfruit, banana, pineapple and nutmeg	Dr. P.R. GeethaLekshmi, Dept. of Post Harvest Technology	1.5	2019
5.	Development of hybrid rice technology for the State of Kerala	Dr. Jayalekshmi V.G., Dept. of Seed Science & Technology	3.00	2019
6.	Comparative yield trial of the promosing tomato and cherry tomato hybrids.	Dr. Jayalekshmi V.G., Dept. of Seed Science & Technology	1.0	9/8/2019
7.	Investigation on etiology of root (wilt) and mid whorl yellowing diseases in coconut	Dr. Joy. M., Dept. of Plant Pathology	12.50	2019-20
8.	Centre of excellence in Microbial Technology	Dr. Meenakumari K.S., Dept. of Microbiology	8.5	18/11/2015
9.	Establishment of centre for post harvest management and value addition for under exploited fruits and vegetables of Southern Kerala	Dr. Mini. C., Dept. of Post Harvest Technology	2.00	1/11/2019

Sl. No	Title of the Project	Principal Investigator	Total Outlay/ Budget Provision (Lakh)	Date of start
10.	Extraction and utilization of plant based natural colors for safe to eat food production	Dr. Mini. C., Dept. of Post Harvest Technology	2.00	1/11/2019
11.	Establishment of Techno-incubation centre for the commercialization of value added products from under exploited fruits and vegetables	Dr. Mini. C., Dept. of Post Harvest Technology	99.85	1/2/2018
12.	Multidisciplinary Diagnostic support to address field problems of farmers of Kerala **(Karshakasanthwanam)**	Dr. Santhoshkumar T Dept. of Plant Pathology	1.00	2010-11
13.	Nutrient management for maximizing productivity in minisett cassava cultivation	Dr. Rajasree. G., Dept. of Agronomy	2.00	7/03/2020
14.	Product formulation and standardization of secondary and micronutrient fertilizer mixtures for southern Kerala	Dr. Rani. B., Dept. of SS & AC	2.00	2019
15.	Monitoring soil health status (biochemical and microbiological) under organic management systems in Kerala	Dr. Gowri Priya, Department of Soil Science & Agricultural Chemistry	2.00	August 2019
16.	*Standardization of agrotechniques for protected cultivation of leafy vegetables*	Dr. Sheeba Rebecca Isaac, Department of Agronomy	2.00	January 2020
17.	Productivity enhancement of coconut based cropping system through vertical intensification	Dr. ShaliniPillai. P., Department of Agronomy	2.00	March 2020
18.	Elucidation of high temperature stress tolerance in rice and development of suitable management strategies	Dr. Beena R. Dept of Post Harvest Technology, College of Agriculture, Vellayani	2.50	2019
19.	Germplasm collection, evaluation and evolving management practices for regular bearing in clove (*Syzigiumaromaticum* (L) Merr. & Perry) accessions.	Dr. Sreekala G.S., Dept of Plantation Crops & Spices, College of Agriculture, Vellayani	2.00	7/8/2019

Sl. No	Title of the Project	Principal Investigator	Total Outlay/ Budget Provision (Lakh)	Date of start
20.	Role of nutrients in the management of viral diseases in vegetables	Dr. Radhika. N.S, Department of Plant Pathology, CoA, Padannakad	3.00	2019
21.	Feasibility of low cost Hydroponics fodder Production system in Kerala - Qualitative and Quantitative study	Dr. Usha C. Thomas, AICRP on Forage Crops & Utilization	2.00	2019
22.	Breeding vegetable crops for resistance to biotic and abiotic stress	Dr. S. Sarada Department of Vegetable Science	2.00	7/8/2019
23.	Evaluation of chilli hybrids for yield and leaf curl resistance	Dr. S. Sarada, Department of Vegetable Science		7/8/2019
24.	"Growth and Defense trade-off in unstable continuum: Exploration of root endophytes including Piriformosporaindica& their biomolecules for enhanced yield and management of biotic and abiotic stress in tropical fruit and vegetable crops"	Dr. Joy. M., Department of Plant Pathology	3.50	2019-20
25.	State Plan Project-Development of improved formulations of Biopesticides	Dr. Reji Rani O.P., Department of Agricultural Entomology	2.00	29/08/2019
26.	Initial evaluation trial of ginger genotypes for yield and quality"	Dr. Sreekala G.S., Dept of Plantation Crops & Spices, College of Agriculture, Vellayani	Rs.10,000/-	27/5/2019
AICRP and AINP RESEARCH PROJECTS				
27.	AICRP on Nematodes in Agriculture	Dr. Nisha M.S., Dept. of Nematology	14.74	1977
28.	AICRP on Forage Crops & Utilization	Dr. Usha C. Thomas, AICRP on Forage Crops	72.80	2003

Sl. No	Title of the Project	Principal Investigator	Total Outlay/ Budget Provision (Lakh)	Date of start
29.	AICRP on Honeybees and Pollinators	Dr. Amritha V.S., Dept. of Agrl. Entomology	50.00	1/3/1994
30.	AICRP on Mushrooms	Dr. Heera. G., Dept. of Plant Pathology	60.00	2001
31.	AICRP on Biological Control of Crop Pests	Dr. Reji Rani O.P., Dept. of Agrl. Entomology	12.90	03/09/2018
32.	AINP on Soil Biodiversity - Biofertilizers - Integration of biofertilizer technology with farming practices of tribal farmers of Attappady	Dr.K.N.Anith, Dept. of Microbiology	22.40	28/03/2015
PROJECTS FUNDED BY OTHER AGENCIES				
33.	Establishment of National level Quality control lab for Honey (RKVY)	Dr. Amritha V.S., Department of Agricultural Entomology	450.00	1/2/2015
34.	Development of technologies including alternatives for banned pesticides for the management of pest and diseases of major crops in Kerala. Subproject 2: Evaluation of selected Fungicides and bio pesticides for the management of pest and diseases of vegetables - Disease management (RKVY)	Dr. Joy. M., Department of Plant Pathology	23.22	2013
35.	Development of technologies including alternatives for banned pesticides for the management of pests and diseases of major crops in Kerala. Sub project - 9: Registration of Biopesticides (RKVY)	Dr. Reji Rani O.P., Department of Agricultural Entomology	75.00	2014-15

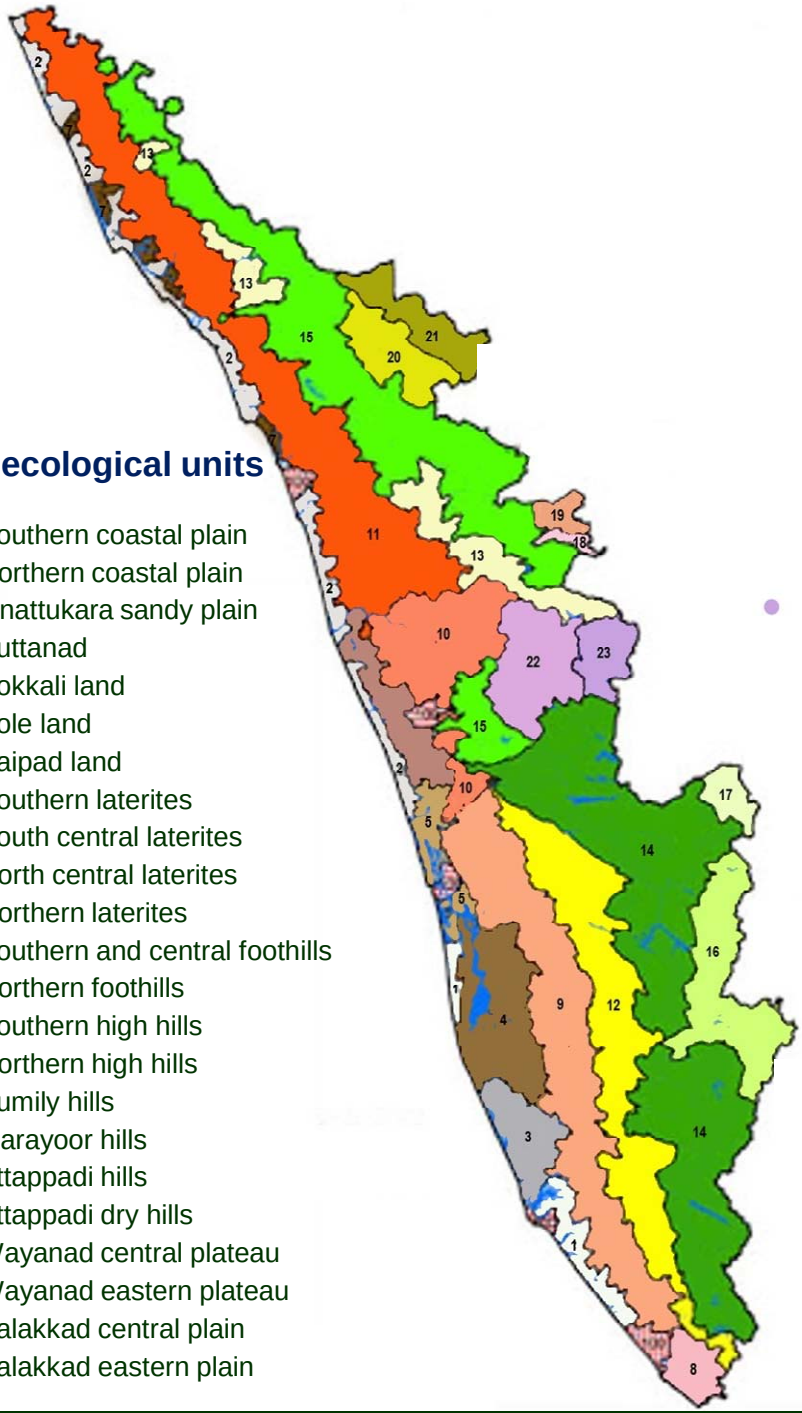
Sl. No	Title of the Project	Principal Investigator	Total Outlay/ Budget Provision (Lakh)	Date of start
36.	Synergism in Defense and Growth: Exploration of a root endophytic fungus *Piriformosporaindica* for the management of *Fusarium* wilt in banana with enhanced crop production (KSCSTE)	Dr. Joy. M., Dept. of Plant Pathology	25.89	September 2016
37.	GraminKrishiMausamSewa (IMD)	SmtLinitha Nair, Department of Agricultural Meteorology	11.28	1997
38.	Design of a Surface-Enhanced Spectroscopy based Device for the Rapid Detection of Organophosphate Pesticides and Pyrethroid Insecticides in Fruits and Vegetables (MHRD)	Dr. Thomas George, PRRAL	94.35	2017
39.	Production and marketing of "Safe to Eat" vegetables and fruits for sale through government outlets (Dept. of Agricultural Development and Farmers welfare)	Dr. Ambily Paul, PRRAL	38.71	2013
40.	All India Net work Project on Pesticide Residues (ICAR)	Dr. Thomas George, PRRAL	40.00	1987
41.	Barcoding and Biosystematic Studies of Eulphoid wasps (Chalcidoidea: Eulophidae) associated with the Agro-Ecosystems of Kerala [Department of Science and Technology - Project under Woman Scientist Scheme -A (WOS-A)]	Ms.Anju Krishnan. G, Department of Entomology	16.00	2018
REVOLVING FUND				
42.	AICRP on Honey Bees and Pollinators	Dr. Amritha V.S., Dept. of Agrl. Entomology	2.50	8/11/2006

Sl. No	Title of the Project	Principal Investigator	Total Outlay/ Budget Provision (Lakh)	Date of start
43.	Soil Testing (SSTL & MSTL)	Dr. R.Gladis, Department of Soil Science & Agricultural Chemistry	2.5	30/10/2012
44.	Solid Waste Management	Dr. K.C. ManoramaThampatti, Dept. of SS & AC	1.00	2015-16
45.	Mass multiplication and supply of Microbial Inoculants	Dr. Meenakumari K.S., Dept. of Microbiology	Zero corpus Fund	2005
46.	Integrated Management of Fruit Flies Infesting Fruits & Vegetable Crops - concluded project - Sustenance Programme	Dr. Reji Rani O.P., Department of Agricultural Entomology	3.15	30/3/2015
47.	Establishment of leaf/ tissue analytical laboratory at College of Agriculture, Vellayani	Dr. ShaliniPillai. P., Department of Agronomy	1.25	March 2012
48.	Vegetable seed production	Dr. S. Sarada Department of Vegetable Science	7.00	2012
49.	Commercialization of value added products	Dr. Suma Divakar, Department of Community Science	1.00	2016
50.	Planting material production in Fodder crops	Dr. Usha C. Thomas, AICRP on Forage Crops & Utilization	1.00	2019

LIST OF CONCLUDED RESEARCH PROJECTS

Sl. No	Title of the Project	Principal Investigator	Total Outlay/ Budget Provision (Lakh)	Date of start
1.	Development and standardization of nutrient capsules for vegetable cultivation	Dr. Biju Joseph, Instructional Farm, Vellayani	2.00	14/11/2017
2.	Development and evaluation of multinutrient tablets/ spikes for	Dr. R.Gladis, Department of Soil	2.00	14/11/2017

Sl. No	Title of the Project	Principal Investigator	Total Outlay/ Budget Provision (Lakh)	Date of start
	vegetables grown in home gardens	Science & Agricultural Chemistry		
3.	Evaluation of rapid organic fertilizer (Suchitha) as a potting medium for soil less culture	Dr. K.C. ManoramaThampatti, Dept. of SS & AC	1.05	2018
4.	Development of secondary and micronutrient fertilizer mixture formulations for different crops inSouthern Kerala	Dr. Rani. B., Dept. of SS & AC	2.00	2018
5.	Yield enhancement strategies for production of anticancer and other therapeutic comp ounds by cell and tissue culture of *Tinosporacordifolia*and *Withaniasomnifera*	Dr. M.M. Viji, Dept. of Plant Physiology	2.0	11/7/2018
6.	Standardization of hybrid production techniques using thermo sensitive genic male sterile system [GoK]	Dr. Roy Stephen, Dept. of Plant Physiology	4.0	2-7-18
7.	Strengthening and mainteneance of lead centers for organic farming	Dr. Aparna B, Department of Soil Science & Agricultural Chemistry	6.00	2019
8.	Establishment of fodder museum at College of Agriculture, Vellayani (KLDB)	Dr.Usha C. Thomas, AICRP on Forage Crops & Utilization, RARS(SZ), Vellayani)	Rs.90,000/-	2019
9.	Empowering Differently Abled Children through Horticulture Therapy and Social Farming (KSSM)	Dr. Beela G.K., Department of Community Science	6.5	2017
10.	Development of Rice varieties for Kerala with pyramided genes for resistance to BLB by marker assisted selection (DBT)	Dr. Jayalekshmy V.G., Department of Seed Science & Technology	42.87	2013



Agro-ecological units

1. Southern coastal plain
2. Northern coastal plain
3. Onattukara sandy plain
4. Kuttanad
5. Pokkali land
6. Kole land
7. Kaipad land
8. Southern laterites
9. South central laterites
10. North central laterites
11. Northern laterites
12. Southern and central foothills
13. Northern foothills
14. Southern high hills
15. Northern high hills
16. Kumily hills
17. Marayoor hills
18. Attappadi hills
19. Attappadi dry hills
20. Wayanad central plateau
21. Wayanad eastern plateau
22. Palakkad central plain
23. Palakkad eastern plain

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