Regional Agricultural Research Station (Southern Zone) Vellayani Kerala Agricultural University

2021-22

ZONAL RESEARCH REPORT

39th ZONAL RESEARCH AND EXTENSION ADVISORY COUNCIL MEETING AND FARMER INTERFACE - 20th DECEMBER 2022

XXXIX ZREAC MEETING AND FARMER INTERFACE

20 December, 2022

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2021-22

KERALA AGRICULTURAL UNIVERSITY

Regional Agricultural Research Station (Southern Zone),
Vellayani,Thiruvananthapuram, Kerala – 695522

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KAU PLAN PROJECTS

1. **Artificial intelligence and predictive analysis for the development of decision support system for crop pest surveillance for rice farmers of selected agro ecological units**

(P.I. Smt Linitha Nair, Assistant Professor, Agricultural Meterology)

Objectives

1. Influence of weather on major pests of rice to be analyzed
2. Forewarning of pests incidence based on block level weather forecast issued
3. Development of an android app for issuing forewarnings to rice farmers

Major Research Highlights:

1. Analysed the relation between rice pests and weather from the data and arrived at a thumb rule indicating the influence of weather on pests occurrence
2. Development of mobile application entitled '*Ente Vaya*l' using Artificial Intelligence and predictive analysis by an external agency is completed and awaiting to be uploaded in Google play store

2. **Network project on Soil loss estimation and monitoring in the highland ecosystems of Kerala for effective conservation planning**

(PI: Dr. R.Gladis, Associate Professor(SS&AC), ARS,Thiruvalla)

Objectives:

- Quantification of soil loss from the selected highland ecosystems of Thiruvananthapuram district of Kerala and identification of vulnerable land use classes.
- To develop suitable soil management protocol for the high land ecosystems.

Major Research Highlights :

The study area in AEU 12 and 14 was delineated and maps were prepared using Arc GIS software. The study area include Neyyar (Mullayar, Neyyar and Chittar sub basins) Vamanapuram (Upper chittar, Kallar & Manjaprayar sub basins) and Karamana (Killiyar, Kaviyar and Attingal Thodu) river basins. Field survey was conducted in the entire study area , ground truth data were collected .Soil samples were also collected and analysed for soil texture - sand, silt & clay percentage and soil organic carbon percentage . The data required for quantification of soil loss viz., monthly rainfall data (10 years), land use and land cover

maps and watershed maps were collected. . Digital Elevation model of the study area was delineated, NDVI calculated and aspect map was prepared using Arc GIS. The slope length and steepness (LS factor), crop cover and management (C factor), rainfall erosivity (R factor), conservation practice (C factor) and soil erodibility (K factor) required for quantification of soil loss were worked out and related maps were prepared. The soil loss from each area was quantified and soil erosion map was prepared using Arc GIS .

3. **Strengthening of Lead Centre for Organic Farming at College of Agriculture, Vellayani**

(PI: Dr.B.Aparna, Professor & Head, Department of Organic Agriculture)

Objectives:

- Upgrade the existing Lead Centre for Organic Farming in the Department of Soil Science andAgricultural Chemistry, College of Agriculture, Vellayani to promote teaching and extensionactivities in the field of organic farming, organic certification and good agricultural practices.
- To manage the bio wastes and production of quality organic manure from farm wastes and aquaticweeds for meeting the nutritional requirements of various crops and sustain soil quality and health
- To highlight the significance of green nano fertilizer technology for major crops of Kerala and to study the influence on soil health.

Major Research Highlights:

An Organic museum was set up in the organic farm with models (vermicompost unit model, Vermiwash collection model etc) and various organic inputs like Vermicompost,Coirpithcompost,Mineral compost, Panchagavya,Dashagavya, Fish Amino Acid, Egg Amino Acid biofertilizersetc which benefits the student and farming community.About300 visitors had visited this museum during the period 2022-2023which includes farmers and students from various institutions.

Strengthened the model production units viz. Vermicompost unit, coir pith unit, NADEP Unit, Biogas units, Azolla unit for demonstration purposes .Also strengthened the students demonstration plots – vegetable plots, medicinal crop plots etc for demonstration purpose

An experiment on the effect of Organic nano NPK formulation for on the growth,

yield and quality in banana cv. Nendran (*Musa* AAB) is being carried out at the Model Organic Farm, Vellayani.Intially,,the characterization of TAG Nano fertilizer was carried out and it was reported that the Organic Carbon and humic acid contents were 2.85 per cent and 17.19 per cent respectively.While the N, P and K contents in the formulation were 1.87 per cent, 1.52 per cent and 2.36 per cent respectively. Of all the eight treatments imposed, Treatment T_7-1/5 dose of KAU POP as organic Nano fertilizer reported the highest yield - weight of bunch, fingers per bunch and weight of fingers.Analysis of post experimental soil samples is in progress.

4. **Potential impact of climate change and flood on Kerala soils: AEU wise mitigation and adaptive strategies - AEU1 & AEU 2**

(PI: Dr.Biju Joseph, Assistant Professor, ARS, Moncombu)

Objectives:

1. Generation of AEU wise soil resource inventory and mapping using GIS
2. To assess the actual and potential productivity of soil and derivation of related indices
3. To assess the impact of climate change and flood on soil characteristics and soil health in relation to crop productivity and prediction using suitable models
4. Development of AEU wise management plans to reduce the gap between actual and potential productivity
5. To carry out awareness programmes and demonstrations related to the restoration of soil productivity
6. To conduct of participatory research in the farmers' field for optimizing targeted yields in major crops of the AEU's

Major Research Highlights:

Geo-referenced surface (0-15 cm) and subsurface (15-30 cm) and core soil samples were collected from AEU 1 and 2. In AEU 1 soil samples were collected from Kadinamkulam, Mangalapuram, Anchuthengu, Kadakavoor, Andoorkonam, Varkala and Attingal panchayaths of Thiruvananthapuram district and Ittikara, Mukhathala, Kollam, Chittumala, Perayam, Thrikkaruva and Panayam panchayaths of Kollam district. For AEU 2, samples were collected from Vallikunnu, Parapanangadi, Nennambra, Thanoor, Ozhoor, Thanaloor, Niramaruthoor, Thiroor, Vettom, Thalakkadu, Mangalam, Thripragodu, Purathoor, Ponnani and Maranchripanchayaths of Malappuram district, Pumnnayurkulam, Punnayur, Chavakkadu, Kadappuram, Orumanayur, Engandiyur, Vatanapalli, Thalikkulam, Nattika, Valappadu, Chendappini, Kaipamangalam, Perinjanam, Koolimuttam,

Padinjareevemballoor, Ala, Edavilangu, Eriyadu and Azhikodepanchayaths of Thrissur district and Azhiyu, Eranmala, Onchium, Chorode, Varakara, Villiappally, Payyoli, Maniyar, Thikkodi, Thurayar, Moodadi, Elathur, Baypoor, Cheruvannur, Nallalam, Feroke and Kadalundipanchayaths of Kozhikode district. The analysis of soil samples for physical and chemical properties are in progress.

5. **Development and evaluation of organic nutrient formulations as pellets / tablets for better nutrient delivery in organic farming.**

(PI: Dr.Biju Joseph, Assistant Professor, ARS, Moncombu)

Objectives:

- To develop multi nutrient formulations enriched with critical nutrients in the form of pellets / tablets for organic farming.
- To study the nutrient release pattern of the organic nutrient formulations.
- To evaluate the efficiency of these formulations in terms of nutrient delivery, and maintenance of soil health.
- To assess the suitability of these formulations for organic production of fruits (banana) and vegetables (brinjal and bhindi).

Major Research Highlights:

Nutrient formulations have been prepared using various nutrient sources permitted under National Programme for Organic Production (NPOP). The nutrient sources selected were blood meal, soybean meal, corn gluten, rock phosphate, steamed bone meal, borax, epsom salt, langbeinite, sulphate of potash, kainite, sylvinite, patentkali, glauconite etc. Using the nutrient formulations, organic nutrient pellets were prepared after mixing nutrient sources with biodegradable binding agents starch and bentonite. The compatibility of different combinations of nutrient sources with binding agents were studied and the organic nutrient pellets were prepared with compatible sources. The pellets were characterized for content of major and secondary nutrients. Evaluation of the pellets is being done in tissue culture Nendran banana. The crop is at harvest stage. Analysis of soil and plant samples for nutrient content and fruit samples for quality parameters is in progress.

6. **Network project on fruit development and planting material propagation protocols and cataloguing of minor fruits**

Sub project 3:Characterisation of mango genotypes grown in southern Kerala and

development of field gene bank of superior types'

(PI: Dr. S. Simi, Assistant Professor& Head, Department of Fruit Science)

Objectives:

1. Survey and characterization of mango types under *in situ* condition
2. Collection of mango germplasm
3. Establishment of field gene bank of mango

Major Research Highlights :

Conducted survey in different parts of southern Kerala.Located around 80 mango accessions in parts of Thiuvananthapuram, Kollam, Pathanamthitta and Alappuzha districts. Vegetative and floral characters and fruit morphological characters of some of these could be recorded. Surveys are being continued. Characterization of these accessions is in progress. Physico chemical characters of thirty accessions have been carried out. TSS, titrable acidity, ascorbic acid, total carotenoids, total sugar and reducing sugar contents were estimated. Scions of around thirty accessions were collected. Stones of wild mango varieties were collected and rootstocks raised. Grafts of thirty accessions were prepared. Establishment of field gene bank has been initiated. Planted grafts of fifteen accessions.

Mango trees of two accessions in bearing stage

Rootstoocks

Field planted grafts

7. **Chitosan mediated elicitation of plant growth and alleviation of biotic stress in black pepper (*Piper nigrum*L.)**

(PI: Dr. Deepa S. Nair, Associate Professor &Head, Dept. of Plantation, Spices, Medicinal and Aromatic Crops)

Objectives:

1. To study the effect of chitosan on alleviation of biotic stress under *in vitro* and *in vivo* conditions
2. To study the effect of different modes of application of chitosan on plant growth and yield of bush pepper (*P. nigrum*) plants
3. To study the effect of different modes of application of chitosan on yield parameters of standing pepper plants

Major Research Highlights :

1. Effect of Chitosan application on inhibition of *Phytophthoracapsici in vitro*

Concentrations of chitosan (0, 0.2, 0.3, 0.4, 0.5, 1,2,3 mg ml^{-1}) was tried to observe the inhibition effect on *Phytophthoracapsici.*The mycelial growth of *Phytophthoracapsici*was inhibited by chitosan, and its growth rate showed a dose-dependent effect on the concentration of chitosan. 0.2 mg ml^{-1}showed least inhibition whereas 0.5 mg ml^{-1}showed the highest inhibition. *Phytophthoracapsici*was almost completely inhibited by chitosan at the concentration of 1mg ml^{-1} onwards.

2. Effect of Chitosan application on inhibition of *Phytophthoracapsici in vivo*

Artificial inoculation of *Phytophthoracapsici*were done on the leaves of black pepper layers. Foliar spraying and soil drenching ofchitosan (@0.4, 0.5mg ml^{-1}) was tried to observe the inhibition effect on *Phytophthoracapsici along with Trichoderma @ 20 g /l and Control.* Though infection was observed in all the treatments, significantly better suppression was observed with chitosan @ 0.5 mg ml^{-1} foliar spray and soil drenching treatments

8. **Strengthening tissue culture unit for commercial and medicinal plants**

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

Objectives:

To strengthen the existing tissue culture unit of the department of Plant Physiology as an advanced tissue culture and training unit for commercial and medicinal plants

Major Research Highlights :

Purchased incubator shaker for in vitro culture studies .Mother plants of few medicinal plants and commercial crop species have been purchased and maintained for further *in vitro* culturing.

Upgradation of existing tissue culture lab with most essential facilities and standardizing invitro culture protocols of few important medicinal plants and commercial crop species of Kerala were carried out .Also hands on training in tissue culture techniques were givento students and research scholars.

9. **Characterization, *in vitro* culturing and *in vitro* manipulation for enhanced production of secondary metabolites of medicinal orchids and *Aloe vera* (*A. barbadensis* Mill.)**

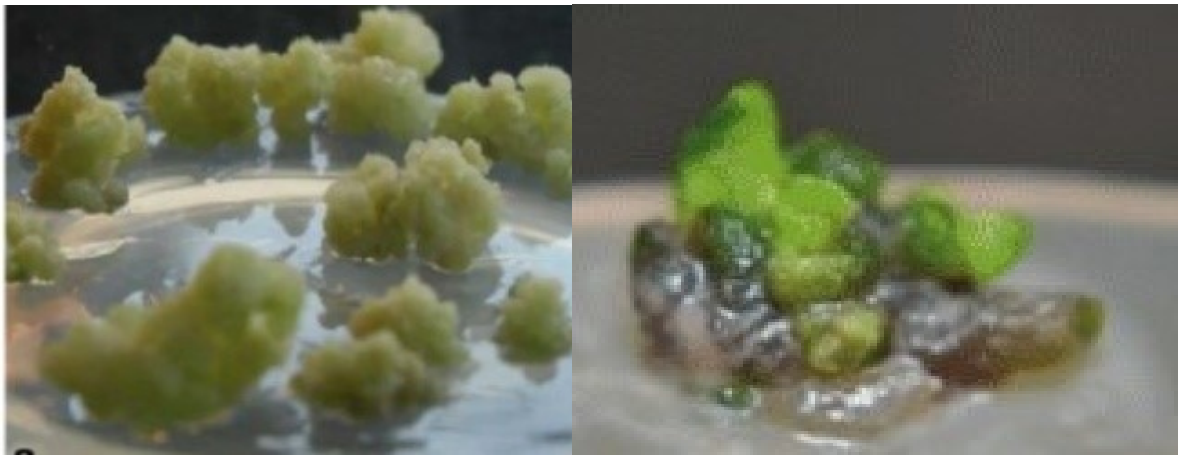
(PI: Dr.M.M.Viji, Professor, Department of Plant Physiology)

Objectives:

To set up an *in vitro* secondary metabolite production unit and to standardize *in vitro* culture techniques for enhancing the production of anticancer and other therapeutic compounds in medicinal orchids and Aloe vera (*Aloe vera* L. (*barbadensis* Mill.) .

Major Research Highlights :

- Basic infrastructure and facilities in the existing tissue culture lab has been upgraded by way of providing more culture room light and temperature control facilities.
- Characterization studies of medicinal orchid and *Aloe vera* collected from available sources were done and the best one ecotype from each of them were selected for the *in vitro* studies.
- *In vitro* culturing protocols and callus induction medium of medicinal orchid and *Aloe vera* have been standardized
- Standardization of protocols for elicitation of secondary metabolites and estimation of secondary metabolites in callus cultures in both medicinal orchid(*Dendrobium nobile)* and *Aloe vera* were carried out.



10. **Development of nanoparticle incorporated edible coating for extending shelf life of nendran banana**

(PI: Athulya S. Kumar, Assistant Professor, Department of Post harvest Technology)

Objectives:

- To explore the possibility of incorporation of nanoparticles in edible film coating
- To study the effect of incorporation of nanoparticles on enhancing antimicrobial properties
- To develop an environment friendly method for enhancing shelf life of Nendran banana

Major Research Highlights:

Synthesized silver nanoparticles and its characterization was done using DLS and zeta potential. Extracted aloe gel from fresh aloe vera leaves and different concentrations of aloe gel (25%, 50% & 100%) were incorporated with different concentrations of Ag NPs (20, 40, 60, 80 & 100 ppm). Freshly harvested banana fruits were used for treatments and treated fruits were kept for storage studies. Based on PLW, shelf life and flesh firmness values of different treatments, banana fruits dipped in 25% aloe gel incorporated with 60 ppm Ag nanoparticles (T3) showed least PLW values (1.8018), increased shelf life (12 days) and flesh firmness (67.53) compared to other treatments.Treatment, T3 was selected as best treatment and will be used for further storage studies.

11. **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., Professor (Plant Pathology) and Head, CRS, Balaramapuram)

Objectives:

- Standardization of the protocol for the co-cultivation of *P. indica* (root endophytes) with major tropical fruit and vegetable crops
- Determining the stage of fruits and vegetable seedlings for *P. indica* (root endophytes) colonisation
- 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
- Evaluation of the *P. indica*-colonised fruit and vegetable seedlings against various biotic stress
- Development an ideal and efficient methodology and medium for the mass multiplication and commercial formulation of *P. indica*

Major Research Highlights:

The co-cultivation of *P. indica* with major tropical fruit viz., banana and papaya; and vegetable crops viz., vegetable cowpea, tomato, chilli, bhindi, bitter gourd and other

cucurbits were standardized for both pot culture and field studies. The co-cultivation of *P. indica* with tissue cultured banana plantlets & suckers and papaya; and vegetables viz. vegetable cowpea, tomato, okra, chilli and cucurbits enhanced germination, establishment in the field, growth, yield *etc.* under field conditions in addition to different quality parameters and shelf-life of fruits. Ready to use *P. indica*-mass multiplied medium were also standardized for co-cultivation with fruits and vegetable crops. *In vitro*antagonistic activities of *P. indica* against different foliar and root fungal pathogens viz., *Fusarium* / *Rhizoctonia* / *Colletotrichum* were established through antibiosis, lysis, coiling and overgrowth. *In vivo* evaluation of *P. indica*-colonized seedlings/plantlets of vegetable and fruit crops against fungal, bacterial and viral diseases through pot culture and field experiments revealed that the colonized-plants could reduce the fungal, bacterial, and virus diseases incidence by more than 60 per cent and the disease severity by more than 72 per cent in addition to more than 50 per cent growth promotion. *P. indica*-colonized (both pre-colonized and post-colonized) plants could significantly reduce the viral diseases caused by ssRNA (Poty-viruses, Cucumo-viruses etc.), ssDNA (Geminiviruses) and dsDNA (Badna) viruses both under pre- and post-infection. Natural incidence of fungal, bacterial and viral diseases was recorded at different intervals *viz.,* 45, 60, 75 and 90 days after transplanting in vegetables and monthly intervals in banana and papaya. It was recorded that *P. indica* significantly reduced natural incidence of fungal, bacterial and viral diseases upto 90 per cent and severity upto 78 per cent. *P. indica*-colonized plants recorded increased root plant growth, early flowering and fruit set, enhanced yield and quality parameters of fruits and vegetables, shelf-life of harvested produce etc. compared to the non-colonized plants. The confirmation studies are progressing. Further, the physiological, biochemical and molecular mechanisms involved on the enhanced traits are being validated.

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

(PI: Dr. Joy M., Professor (Plant Pathology) and Head, Coconut Research Station, Balaramapuram)

Objectives:

- 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)

- to assess the yield loss due to root (wilt) and yellowing diseases in coconut
- to identify the cause / etiology of root (wilt) and yellowing disease in coconut
- to develop suitable diagnosis tools (serological and molecular) for the early and quick detection and identification of these diseases.

Major Research Highlights:

Random and purposive surveys were done to assess the incidence and intensity of root (wilt) and mid whorl yellowing diseases of coconut and yield loss due to these diseases in southern districts of Kerala (Thiruvananthapuram, Kollam, Alappuzha, Kottayam and Pathanamthitta). Additionally, five panchayaths of Wayanad districts were also purposively surveyed for the incidence of these diseases. Incidences of these two diseases in coconut were seen in all surveyed districts and most of the popular varieties especially West Coast Tall was infected in the scattered manner. There were partial yield loss in root (wilt) affected coconut palms; and complete yield loss in mid whorl yellowing affected coconut palms. Roots of the mid whorl affected palms did not show any discoloration in roots unlike root (wilt). Leaf (outer, mid and inner whorls; and spindle leaf), stem, root and unopened inflorescence of the infected and healthy palms are used to study the histopathological changes associated with the diseases and molecular detection of the pathogen. Preliminary study with DAPI and Diene's staining indicated the presence of phytoplasma in root (wilt) and mid whorl yellowing affected palms. The confirmation studies are progressing. DNA isolation from different tissues of the infected palms had been standardized. Molecular detection of the pathogen using universal primers for phytoplasma resulted the amplification of the expected amplicon in the infected palms in nested PCR. Nevertheless, the detection of the phytoplasma in all the tissues used for the study viz., leaves, stem, roots and inflorescence were not confirmed. The confirmation of the pathogen with molecular probes and the sequencing of the amplicon are progressing.

13. **Performance evaluation of promising fodder varieties in different AEUs in Kerala**

(PI: Dr.Usha C. Thomas, Professor &Head, Instructional Farm, Vellayani)

Objectives:

To identify suitable fodder crops/varieties for different AEUs in Kerala

Major Research Highlights:

Crops- BN hybrid , Guinea grass, Fodder cowpea, Fodder Sorghum, Fodder oats

BN Hybrid Varieties- Suguna, Susthira, CO-3 & CO-5

Guinea grass varieties- Harithasree, Culture-2, CO(GG)-3

Fodder cowpea varieties- Aiswarya, CO FC-8,COFC-9, EC4216

Fodder Sorghum:- COFS-29, COFS-31

Fodder oats:- Kent, JHO-810, JHO-822,RO-19 (High Range)

Locations- Vellayani, Thrissur, Kasargode and Ambalavayal

All the crops and varieties were planted at all the four locations in February-March 2021. Observations have been recorded and tabulation of data is under progress.

The project will be concluded by March 2023.

14. **Breeding yard long bean (*Vigna unguiculata* subsp.*sesquipedalis* (L.) Verdcourt) for yield and anthracnose resistance**

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

Objectives:

To breed for high yield and resistance to anthracnose disease in yard long bean through artificial inoculation and natural incidence in the main field.

Major Research Highlights:

Fifty cowpea genotypes were screened against anthracnose disease through artificial inoculation on 15 days old seedlings.VU 53 with semi-trailing growth habit was found to be highly resistant with disease severity of 3.67% followed by Arimbra local at 9.58% disease severity.Three susceptible high yielding pole types as female parents *viz.*, KAU Deepika, VellayaniJyothika and Githika were crossed with VU 53 as male parent to produce three F_1 hybrids, which were selfed to produce F_2 progenies.Field evaluation of the three F_1 hybrids along with the parents revealed thatamong the hybrids, the highest number of pods plant^{-1} and pod weight was recorded in KAU Deepika x VU 53 (79.33 and 19.22 g respectively). KAU Deepika x VU 53 recorded the highest yield plant^{-1} of 1416.00 g and was on par with Githika x VU 53 (1343.33 g). Evaluation of parents, F_1 hybrids and F_2 progenies was done for resistance to natural incidence of *C. gloeosporoides* in the main field, as unreplicated trial and without any plant protection measures. VU 53 plants were free from symptoms whereas other parents studied *ie.,* KAU Deepika, VellayaniJyothika and Githika were found susceptible under natural field conditions. All the three F_1 hybrids were found to have field tolerance. Out of 175 F_2 plants of the cross KAU Deepika x VU 53 observed, 164 plants were

susceptible and 11 resistant.A superior cross of yard long bean KAU Deepika x VU 53, with high yield and field tolerance to anthracnose disease has been identified, which could be used as a base material for developing a yard long bean variety with high yield and anthracnose resistance, from the segregating generations, through further experiments.

Artificial inoculation

Field view of experimental plot

15. **Standardization of grafting techniques and mass production of grafts in solanaceous and cucurbitaceous vegetables for biotic and abiotic stress resistance**

(PI: Smt. Shruthy. O. N., Assistant Professor, Department of Vegetable Science)

Objectives:

To standardize the grafting rootstock and grafting method suitable for solanaceous and cucurbitaceous vegetables like tomato, bell pepper, bitter gourd and cucumber.

Major Research Highlights:

An experiment for standardizing the grafting techniques in solanaceous (tomato and bell pepper) and cucurbitaceous vegetables (bitter gourd and cucumber) was conducted in Department of Vegetable Science, College of Agriculture, Vellayani during 2020-22. In the standardization experiment, brinjal varietiesHaritha, Ponny and Surya the best rootstocks and cleft grafting the best grafting method for grafting tomato scions -VellayaniVijai, Anagha and Manulekshmi. For bell pepperscions - Orobelle, ArkaAthulya and Arka Gaurav, the best rootstock was chilli variety Ujjwala and the best grafting method was cleft grafting.In bittergourd, the study identified bottlegourd and pumpkin as the best rootstocks and hole insertion grafting as the best grafting method for grafting bittergourd scions - Preethi, Priyanka and Maya. In cucumber, bottlegourd and pumpkin were identified as the best rootstocks and hole insertion grafting as the best grafting method for grafting cucumber

scions - KPCH-1, Heera and Subhra.

Field evaluation of the tomato grafts revealed that graft combinations of VellayaniVijai, Anagha and Manulekshmi using brinjal varieties Haritha, Ponny and Surya as rootstock were better than the non grafted control for flowering, fruit and yield characters and incidence of bacterial wilt. The highest number of fruits per plant was for VellayaniVijaigrafted on Ponny (37.97) which was on par with thatgrafted on Haritha (38.00) and Surya (37.70). The highest yield was observed in the grafts of Vellayani Vijai on Ponny (968.64 g).

Field evaluation of the cucumber grafts revealed that graft combinations of KPCH-1, Heera and Subhra using pumpkin, bottlegourd and ashgourd as rootstock were better than the non grafted control for vegetative, flowering, fruit and yield characters and incidence of fusarium wilt. Fruits per vine were the highest for Heera grafted on bottlegourd (19.17). The highest fruit weight and yield was observed in the grafts of Subhra grafted on bottlegourd (313.27 g and 5.65 Kg respectively).

Fig 1: Tomato grafts

Fig 2:Cucumber grafts

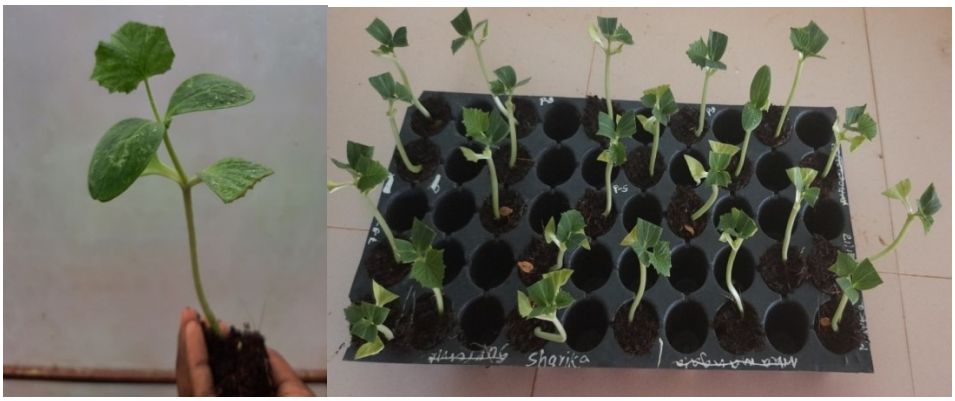


Fig 3: Tomato field

Fig 4: Cucumber field

16. **Technological interventions for productivity enhancement in wet land rice**

(PI: Dr. Ameena M, Professor, AICRP on Forage Crops & Utilization)

Objectives:

Standardization of priming techniques for healthier and quicker establishment of seedlings under adverse situations, development of a 'Ready to lay seed tape' for reducing the establishment cost of rice, development of multi nutrient cum growth regulator mixture to enhance productive tillers, spikelets and grain filling for enhancing rice production

Major Research Highlights:

Vigour enhancement for quicker establishment of rice seedlings was evaluated using various priming techniques *viz.*, osmopriming, nutripriming, hormopriming and vermipriming.

Confirmatory experiment on speed of germination was completed and the results revealed that nutripriming with Boron at 0.1per cent and hormopriming with Salicylic acid at 20 ppm were found to have significant influence on enhancing speed of germination. The best priming treatment was selected for making seed tape for quick germination of seeds. Accordingly, a seed tape was developed manually using primed seeds with the highest speed of germination. To lay the seed tape, prototype of a seed tape dispensing machine was fabricated and tested for its germination under field condition. In the third experiment a multi nutrient cum growth regulator mixture was tested for enhancing grain filling in rice. The nutrient mixture used was one per cent 13:0:45 and 0.1 per cent boron and the growth regulator used was benzyl adenine at 20 ppm which were sprayed at heading and flowering stages. The results showed that foliar spray of one per cent 13:0:45 + 0.1% B at headingstage followed by spraying of one per cent 13:0:45 + 0.1% B + 20 ppm BA at flowering along with the application of a recommended dose of fertilizer increased the number of filled grains per panicle and decreased the sterility percentage. Further, the treatment recorded a higher grain yield and straw yield. The result of the study revealed that foliar application of a nutrient mixture of (13:0:45 at 1% + boron at 0.1%) at heading and the same nutrient mixture along with the plant growth regulator benzyl adenine at 20 ppm applied at flowering along with the recommended dose of fertilizer enhanced the grain yield in Uma rice variety during rabi season in screen house. The performance of the nutrient growth regulator mixture needs to be confirmed under field conditions.

17. **Identification of *Stylosanthes*species for yield and quality suited for cultivation in Kerala**

(PI: Dr.Gayathri G, Assistant Professor, AICRP on Forage Crops& Utilization)

Objectives:

Collection and genotypic evaluation to study the variability and performance of different *Stylosanthes* species suited to be used as perennial fodder legume; Identification of *Stylosanthes* genotypes amenable to shade to be used as intercrop in coconut gardens; Seed production of superior genotypes identified and distribution to farmers

Major Research Highlights:

Collected seeds of four species of *Stylosanthes*- viz. *S.hamata* (3 accessions), *S.guianensis* (2 accessions), *S.seabrana* (9 accessions), *S.scabra* (5 accessions) from IGFRI,

Jhansi and KLD Board.Crop was sown in April 2021 and is in the field. All the accessions have flowered. As it is a perennial crop, yield data of next year too will be recorded. Biochemical characterization of the accessions also will be attempted.

Based on the yield parameters and divergence studies at the molecular level using 45 SSR primers, the nineteen accessions were divided into five sub populations. Plant height of the accessions ranged from 45cm in *S.hamata*to 120 cm in *S.scabra*. Green fodder yield was observed maximum for *S.guianensis* which was a shy flowering and seeding type while it was minimum in *S. hamata.*

18. **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:

Setting up of a Techno-Incubation Centre at College of Agriculture, Vellayani

Major Research Highlights:

A Techno-Incubation centre with the essential facilities required for the manufacture of value added products is established at COA, Vellayani to help the prospective entrepreneurs and SHG groups to utilize the facility ensuring sustainable income.

Technical support, transfer of technology (Training programmes), quality analysis and consultancy services are provided to the entrepreneurs and SHG s on marginal payment basis

19. **Network Project on Potential impact of climate change and flood on Kerala Soils: AEU wise mitigation and adaptive strategies**

(PIs: Dr. Rani B, Dr. Aparna B., Dr. Gladis R., Dr. Naveen Leno, Dr. S. Visveswaran and Dr. Biju Joseph)

Objectives :

- Collection and 22haracterization of soil samples from different AEUs,generation of AEU wise soil resource inventory and preparation of thematicmaps using GIS
- Collection of climate/ soil data and prediction of changes using modelingtechniques
- Development of AEU wise management plans to reduce the gap between actual and potential productivity

- To carry out awareness programmes and participatory research in farmers' fields for restoration of soil productivity and for optimizing targeted yields in major crops of the AEU

Major Research Highlights:

- Soil sample collection from geo-referenced locations covering all the 8 AEUs has been completed. From each location surface (0- 15), subsurface (15- 30) and core samples were collected. Altogether, nearly 3000 samples were collected.
- Field data of the sampling areas were also collected (Location details like Panchayat, Block, latitude and longitude, elevation, land characteristics like slope, drainage etc., details about farmer, major crops grown, area, production and the management practices followed)
- Analysis of collected soil samples (physical, chemical and biological properties) is in progress

20. **Product formulation and standardization of secondary and micronutrient fertilizer mixtures for Southern Kerala**

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

Objectives:

1. Survey of farmers fields with crops like ginger and turmeric, collection and characterisation of soil and plant samples from the five AEUs of Thiruvananthapuram district and analysis of samples
2. Preparation of user friendly secondary and micronutrient fertilizer formulations and their popularization for ginger and turmeric.

Major Research Highlights:

Five AEUs viz., 1, 8, 9, 12 and 14 were selected for the study. Soil and plant sample collection from all the 5 AEUs of Thiruvananthapuram district has been completed.

Field data of the sampling areas were also collected (Location details like Panchayat, Block, latitude and longitude, elevation, details about farmer, crop area, production and the management practices followed)

Analysis of collected soil and plant samples completed and nutrient mixture for ginger and turmeric were formulated.

The ginger and turmeric crops were planted and has reached the rhizome development

stage.

21. **Development of value chain in banana and pineapple for postharvest loss reduction and enhanced farmer income (Banana)**

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

Objectives:

- Assessment of postharvest loss and value chain analysis of banana (Thiruvananthapuram dist)
- Postharvest handling studies to extend the shelf life and value addition through product diversification

Major Research Highlights:

- Valuechain mapping was done and identified different marketing channels
- Standardised the postharvest treatments with salicylic acid for extending the shelf life of Nendran and Red banana
- Standardised the dehydration technique of Nendran and Red banana through osmodehydration for the development of value added products



22. **Development and evaluation of polyploids and superior genotypes in ginger (*Zingiber officinale* Rosc) for yield and resistance to rhizome rot.**

(PI: Dr. Sreekala G.S., Assistant Professor, Department of Plantation, Spices, Medicinal and Aromatic Crops)

Objectives :

1. To develop autotetraploids in ginger
2. To evaluate autotetraploids and superior genotypes maintained in the Department

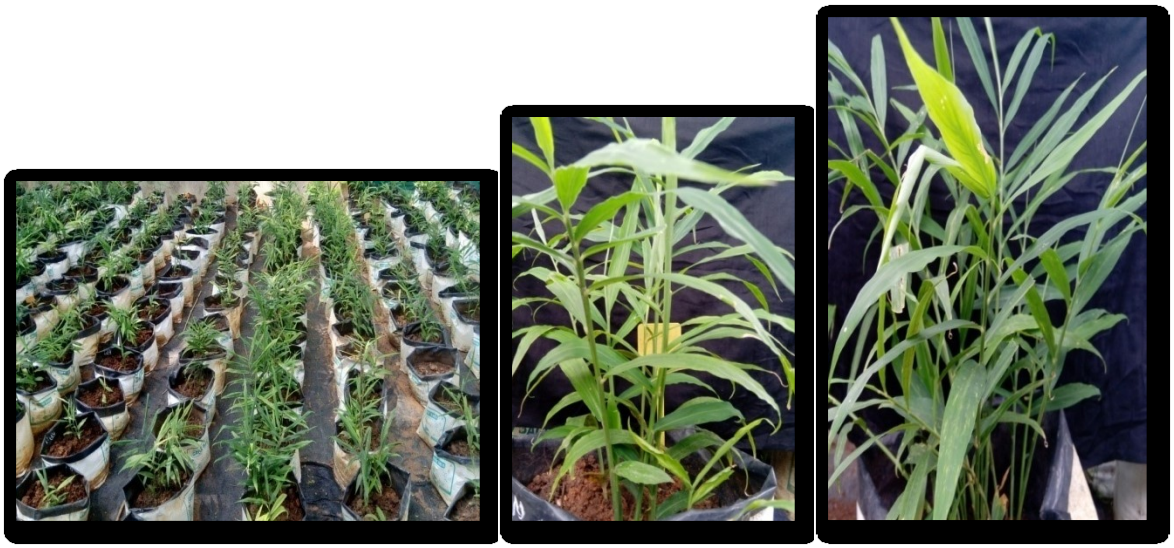
of Plantation Crops and Spices for yield and quality

3. To screen the genotypes against pythium and bacterial rhizome rot

Major Research Highlights:

Development of autotetraploids in ginger cultivars using colchicine

Standardised colchicine treatment method for induction of polyploidy. Two concentration of colchicine 0.05% and 0.1% colchicine were tried for 2 consecutive days @ 1ml per day applied from 6.00 am to 9.00 am. The treated sprouted rhizome bits were washed and then allowed to shade dry and planted in portrays.Colchicine treated single sprouted ginger rhizome bits after 75 days were planted in polybags .The sprouting percentage was 32% and the survival percentage was 5% for 0.1 % colchicine and 40 % sproutingpercentage and 6 % survival rate for 0.05 % colchicines treated sprouted rhizome bits. The polyploids obtained are maintained in the ginger germplasm of the Department of Plantation Crops and Spices. Apart from these twenty genotypes of ginger is also maintained in the germplasm maintained in the Department of Plantation Crops and Spices and were evaluated for two years. Four genotypes were superior in yield and twenty genotypes were screened for Pythium rhizome rot.



Athira Polyploidy 2 **Athira Polyploid 27**

Varada polyploidy 2 Varada polyploid 14

23. **Establishment of mother plant blocks of spice plants**

(PI: Dr. Sreekala G.S., Assistant Professor, Department of Plantation, Spices, Medicinal and Aromatic Crops)

Objectives :

1. To collect elite genotypes of clove, nutmeg, garcinia and black pepper from the farmers field
2. To evaluate the genotypes of clove, nutmeg, garcinia and black pepper collected.
3. To establish mother blocks of elite cultivars of clove, nutmeg, garcinia and black pepper

Major Research Highlights:

Collected elite genotypes of nutmeg, clove and black pepper and planted elite clove genotypes and evaluated for two years. Established column structure and planted black pepper varieties Panniyur 1 to 10 for planting material production. Released varieties of nutmeg KAU Mundathanam, Kochukudy, Pullan and Punnathanam has been collected from Model Nursery on Spices, College of Horticulture for the establishment of mother blocks of spice plants. Established mother blocks of black pepper, nutmeg and clove. Facilities for the production of planting material was created by repairing the rainshelter. Repaired the store house and made it suitable for storing inputs for planting material production. Made leaflets on inchi, mangal , kasthurimangal ennivayilae protray thai utpadanam for distribution to

farmers. Conducted one training and supplied planting materials of spices to Tribal farmers of Aryanad

24. **Standardization of precision farming technologies for mango under high density planting (HDP)**

(PI: Dr. Rafeekher M, Assistant Professor & Head, Dept. of Floriculture and Landscape Architecture)

Objectives:

a) To standardize spacing and planting geometry for cultivation of different varieties of mango under high density planting system

b) To standardize drip irrigation regimes and fertigation schedules for cultivation of mango
under high density planting system

c) To standardize application of liquid bio fertilizer through fertigation for cultivation ofmango under high density planting system

d) To explore the possibility of utilization of dwarfing potential of mango cultivars asrootstocks and interstocks for production of dwarf plants for high density planting system

e) To create a precision farm research unit of mango under high density planting system inCollege of Agriculture Vellayani in order to create a platform for further research

andstandardization of various technologies like canopy management through physical andchemical methods, pest management, postharvest management and impact as mitigationmeasure against climate change with an ultimate aim to develop a package of practices forprecision farming of mango under high density planting system

f) The precision farming unit will serve as a demonstration unit for education and extensionof precision farming and HDP Technologies

Major Research Highlights:

To create a unit of mango under high density planting system in College ofAgriculture Vellayani, one hectare land from the instructional farm was allottedand land development works were undertaken by clearing the weeds and remnantsof old plants. The land was terraced using the JCB and drip and fertigation unitswere installed. Planting of mango grafts were done in different plantinggeometries and first experiment of the project is initiated

25. **Network project on development of high yielding short duration rice varieties tolerant to abiotic stress through marker assisted breeding and mutagenesis**

(PI: Dr. Beena R., Assistant Professor, Department of Plant Physiology)

Objectives:

Marker assisted stacking of drought and heat tolerant QTLs into the popular rice variety Uma (MO-16).

Major Research Highlights:

Uma (MO-16) is a medium duration, *indica* rice popularly cultivated in Kerala due to its high yield potential. CR Dhan 801 is a variety developed at ICAR-NRRI, Cuttack, which harbors major effect QTLs *viz*., *qDTY1.1*, *qDTY2.1* controlling grain yield under stress. Developed BC_1 F_1 populations of Uma and CR Dhan801. Parental polymorphism survey between Uma and CR Dhan 801 was carried out. Nagina-22 is an ideal donor of high temperature tolerance in crop improvement program. It is short duration variety with QTLs viz, *.qHTSF4.1* controlling spikelet fertility under high temperature condition. Developed BC_1 F_1 populations of Uma and Nagina-22. Parental polymorphism survey between Uma and Nagina-22 was carried out. Evaluation of both sets of BC_1F_1 population were in progress.

26. **Development of hybrid rice technology for the state of Kerala**

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

Objectives:

Development of hybrid rice technologyfor the state of Kerala

Major Research Highlights:

I.Standardization of hybrid seed production technique for Kerala

In this study the doze of 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. More seasons and locations have to be tested to identify the best season and location for hybrid rice seed production in Kerala.

2.Comparative yield trial of the promising hybrids developed for Kerala

Hybrid seeds of CRMS 31A xRemya was evaluated in Moncompu done during late kharif 2020 and kharif 2021along with the commercially accepted varieties Uma,Jyothy,Prathyasa,Manuratna,Shreyas and Pournami. In the the first trial during late kharif 2020 the hybrid reported higher yield than Jyothy and Manuratna but the yield was less than the other varieties. In the second trial during kaharif 2021 the hybrid yielded higher than Jyothy and Prathyasa. But the yield of hybrid was lesser than the other commercial varieties.

In both evaluations days to first flowering of the hybrid was on par with Jyothy and Prathyasa confirming that the hybrid is short duration. Plant height was also on par with Prathyasa. Number of productive tillers was less than Uma and Sreyas but similar to Jyothy and Prathyasa. It was better than Jyothy and Manuratna but less yield than the other varieties.

It can be concluded that the hybrid CRMS 31A x Remya has short duration and more suited to the first crop season. In the first crop season it gave 25-30% more yield than the other short duration varieties Prathyasa and Jyothy. But in both seasons it yielded less than the most popular variety Uma. The yield gap may be due to the advantage of more duration. However due to the technicalities in hybrid seed production a hybrid can be released only if it has 25% more yield than the most popular variety.

27. **Comparative yield trial of the promising tomato and cherry tomato hybrids**

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

Objectives:

Comparative yield trial of the promising hybrids

Major Research Highlights:

An experiment was laid out for comparative yield trial of tomato with 3 tomato hybrids , one cherry tomato hybrid, Angha the popular variety and LA2805 normal cherry tomato variety. The experiment was laid out in RBD with 3 replications and with 30 plants per plot during January to April 2021. Among the three hybrids AxVaibhav,AxIIHR2200,

AxIIHR 2896 the hybrid AxIIHR 2896 reported higher value for all the yield contributing traits. The weight of single fruit was 55.962 g as against 34.641g in Anagha. Yield/plant was 2504g in hybrid IIHR 2896 where as it is only 979g in Anagha so about 1.5 times more yield was realised in this hybrid. So Anagha x IIHR 2896 is a promising hybrid with big fruit and can be recommended for further trials.

Cherry tomato hybrid AxLA 2805 also yielded better than the parent LA2805. Yield per plant was 849 g where as normal cherry tomato yielded only574g . There was an increase by 47.9%. The weight of single fruit in the hybrid was 3.649g and for the variety only 2.513 g here also an increase by 45.2%. But the number of fruits per plant was on par with that of the variety. Plant height of the hybrid was about 20cm less than the normal variety and this is highly advantageous that it becomes more compact for homesteads. Cherry tomato with high vitamin C ,lycopene and other nutritional factors has good demand in the market as salad vegetable and fruit. This hybrid can be recommended for release as cherry tomato for Kerala suitable for homegardens.

28. **Development and evaluation of bio-organic ready-to-use composite manure mix and pellets for organic cultivation of vegetables**

(PI: Dr.Nishan.M.A., Assistant Professor, Department of Agronomy)

Objectives :

- To develop customized bio-organic composite ready-to-use manure mix and pellets for major vegetable crops
- To characterize the properties and storability of bio-organic composite manure mix and pellets
- To assess the nutrient release pattern of bio-organic composite manure mix and pellets
- To evaluate the effect of customized bio-organic composite manure mix and pellets on growth and yield of major vegetable crops

Major Research Highlights:

Organic raw materials collected from different parts of the Thiruvananthapuram district were analyzed and the best sources were selected for the preparation of composite organic manure mix. Cowdung powder, Poultry manure, Vermicompost, Neem cake, Groundnut cake,Blood meal, Fish meal, Bone meal,Rock phosphate ,Sulphate of potash,Rock dust, Humic Acid, Sea weed powder were the different sources used for the study. Different organic sources were mixed in different proportion and the nutrient analysis were done. Best combinationssuited to different vegetables were selected depending upon the nutrient ratios of different vegetable crops.The developed ready to use bioorganic manure mix for different

crops are pelletized and nutrient release pattern was studied. Field evaluation of bio-organic ready-to-use composite manure mix are under progress.

29. **Network Project on Breeding vegetable crops for yield and resistance to diseases**

(PI: Dr. Sindura K. P., Assistant Professor, Department of Plant Biotechnology)

Objectives :

To develop doubled haploids in salad cucumber KPCH1 and Kian

Major Research Highlights

Salad cucumber seeds were purchased from Department of Vegetable Science, College of Agriculture, Vellanikara and Kian seeds, Bangalore. Plantlets were raised in a mixture of soil and farm yard manure. Flower buds of different stages were collected and incubated at 4^0C for 12 hours. The size of buds were measured and subjected to staining by carmine for identification of the state of nuclei. The late uninucleate stage was suitable for inoculation. MS medium with a combination of 2,4 D, BAP and kinetin was suitable for initiation of callus from anther.

30. **"Multidisciplinary diagnostic support to address the field problems of farmers in the southern district of Kerala-KarshakaSanthwanam"**

(PI: Dr.Santhosh Kumar T, Assistant Professor, Department of Entomology)

Objectives:

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

Major Research Highlights:

Multidisciplinary advisory support to farmers of Kerala. 'KarshakaSanthwanam'operating at College of Agriculture, Vellayani has provided

agriculture-based advisories to farmers and agricultural officers through phone and WhatsApp platforms.. Majority of the enquires were related to crop protection issues *ie*., pest and disease problems in vegetable crops, banana, other fruit trees, coconut as well as nutrient imbalances in these crops. Around 250 enquiries were attended. MDDT visited and addressed various field problems of various districts of Kerala., especially various AKCs of Kerala.. So far more than 125 fields were visited and remedies given in addition to the telephonic advicesduring2021-22. Three major problems identified in Thiruvananthapuram and Kollam districtswere tapioca wilt, banana rhizome rot and nutrient management problems in coconut. Fruit borer*(Glyphodescaesalis)*problems in Vietnam early jack and*Spodoptera litura* infestation in Dragon fruit were also reported from Kerala. Bacterial /fungal disease complex in Dragon fruit and defoliation in Oodh were also addressed. Besides to farmers field problems various institutional field problems were also addressed.

31. **Demonstration unit of Rosarium and hydroponics**

(PI: Dr. Rafeekher M, Asst. Professor & Head, Dept. of Floriculture and Landscape Architecture)

Objectives:

To create a demonstration unit of Rosarium and Hydroponic system

Major Research Highlights:

Rosarium at college garden was made comprising 30 varieties collected from RARS Ambalavayal and Local collections. Small hydroponic models for ornamentals are installed in the Floriculture Lab of the Department.

32. **Network Project on Utilization of beneficial endophytes for plant growth promotion and management for plant diseases in important crops of Kerala**

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

Objectives:

- To Evaluate the role of endophytic bacteria in plant growth promotion and management of *fusarium*wilt of vegetable cowpea
- To evaluate the biochemical and molecular mechanisms of endophytic mediated tolerance to *F. oxysporum*.
- Development of formulated products of *Piriformospora indica.*
- Plant growth promotion studies in black pepper, cardamom and ginger.

- Evaluation of stress mitigation imparted by endophytic fungus and its formulated products.

Major Research Highlights

- Isolated new endophytic bacteria from cow peaplants.
- Conducted *in vitro* evaluationagainst pathogenic fungi in artificial media.
- The yield potential of the newly isolated bacteria was assessed.
- Molecular identification of isolated bacteria was carried out.
- The persistence and survival of *Piriformospora indica*in talc was investigated.
- The yield potential of *Piriformospora indica* is being investigated.
- It was found that *Piriformospora indica*colonizes Cardamom plants and accelerates its growth.

33. **Centre of Excellence in Microbial Technology**

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

Objectives:

- Act as a nodal center for catering the technological requirement of the State by supplying mother cultures of biocontrol and biofertilizer organisms.
- Development of Liquid formulations of Biocontrol agents and Biofertilizers.
- Evaluation of shelf life of the liquid and bead formulations.
- Technology dissemination,
- Quality analysis of microbial products marketed in Kerala.
- Search for new organisms of agricultural importance

Major Research Highlights

- The Centre is functioning as a nodal center of the State providing mother cultures of Biocontrol agents and biofertilizers and catering the technological requirement of all the production centers in Kerala
- Developed liquid formulations of Nitrogen fixers viz., *Azospirillum lipoferum*&*Azotobacter chroococcum*and PGPR Mix- I.Liquid formulation of - PGPR Mix- I was developed and the shelf life studies revealed significant population even after twenty three monthsof storage. The efficiency of the liquid formulation was evaluated under field conditions in Amaranthus at College of Agriculture, Vellayani and in Paddy at

CSRC, Karamana.

- Bead formulation of PGPR MIX I was prepared and survival studies showed that the cultures of PGPR MIX I could survive upto 7 months in beads. Different filler materials such as starch, talc and wheat flour were tested .
- The technology of household waste management using composting inoculum was further tested in different types of bins. Different service providers are continuing the use of Composting Inoculum for biowaste management across the State.
- 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.
- 27 isolates of silicate solubilizing bacteria obtained from Paddy ecosystem. P and K solubilization of these isolates were studied.
- A consortium of 20 spore-forming *Bacillus* isolates is developed and is being tested for plant growth promotion and bacterial wilt tolerance in tomato

34. **CIB & RC Registration of two biocontrol agents: Bioefficacy studies and molecular characterization of biocontrol agents**

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

Objectives:

- Bioefficacy studies of the two biocontrol agents in various crop-pathogen systems at different agro ecological zones of Kerala
- *In vitro* studies with the two biocontrol agents
- Toxicological studies
- Molecular characterization of the biocontrol agents.

Major Research Highlights

- Molecular identification of the biocontrol agents was done.
- Tenders for toxicological data being evaluated
- Bioefficacy studies are progressing

35. **Development and quality assessment of blended beverages from fruits and vegetables (Observational Trial)**

(PI: Athulya S. Kumar, Assistant Professor, Department of Post Harvest Technology)

Objectives:

Development of quality blended beverages from fruits and vegetables

Major Research Highlights :

Different combinations of cucumber based blended Ready To Serve beverages were prepared from pineapple, watermelon, lemon, grapes and papaya. Best acceptable combinations of cucumber based blended RTS beverages from each fruits were selected on the basis of organoleptic scoring of samples using 9 point hedonic scale. Biochemical, nutritional and sensory quality parameters of the selected blended RTS beverages were analysed as per the standard procedures.

36. **Development and Quality Analysis of Beverages Fortified with Botanicals**

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

Objectives:

1.To standardize healthy and consumer acceptable beverages with botanicals with therapeutic value.

2. To ascertain their therapeutic value with respect to anti oxidant status.

Major Research Highlights :

Six Beverages fortified with botanicals where standardized

1. Hibiscus flower based RTS – with Hibiscus extract, limejuice, sugar and water.
2. Aloevera based RTS – with Aloevera gel, chilly, salt and water.
3. Curry leaf based RTS – with curry leaf extract, chilly, salt and water
4. Tulasi based RTS – with Tulasi extract, ginger extract, jaggery and water
5. Mint based RTS – with mint extract, ginger extract, sugar and water
6. Ginger based RTS – with ginger extract, cardamom, jaggery and water
7. The level of antioxidants of the standardized beverages were in the range of 41.02% and 129.03%.
8. Microbial analysis of the products revealed a safe period of 25 days with respect to bacterial count, fungal count and coliform count.

37 **Development and evaluation of anthurium hybrids**

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

Objectives:

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

Major Research Highlights:

Morphological characterization of anthurium hybrids was carried out,Studies on 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.For the micropropagation of anthurium hybrids, tissue culture studies were conducted as a part of PG research.Of the various regeneration treatments, half strength MS medium supplemented with 0.5 mgL^{-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.

Commercially important valuable anthurium mother plants were collected and maintained in the anthurium collection and observations on vegetative and floral characters were taken and statistically analyzed. PCV, GCV, heretability and genetic advance were computed.The highest PCV value was recorded in the observation number of suckers/plantfollowed by number of leaves/ spadices. PCV was found to be greater than GCV which indicates that environment has significant role in expression of these characters. High heritabilitycoupled with high genetic advance was observed in number of flowers/ spadix and spadix size. This suggests that selection can be carried out based on phenotypic performance of these characters**.**

Net house with sprinkler irrigation system

38. **Impact assessment of developmental interventions in integrated farming systems in marginal households of Agro Ecological Unit 1: Southern Coastal Plain of Thiruvananthapuram**

(PI : Dr. Jacob D., Assistant Professor, OFR, Kayamkulam)

Objectives:

a) To access impact of the targeted interventions in Integrated Farming System (IFS)

b) To upscale the IFS modules in cluster approach in each block in the study area.

Major Research Highlights :

- Farmers were found continuing the developmental interventions in IFS in their fields and are benefitted by improved soil fertility and increased yield and income.
- Stakeholder meetings were held in each block of AEU 1 and farm households having integrated farming system (IFS) were organized into IFS farmer clusters. Upscaling of developmental interventions in IFS modules were undertaken in these farmer clusters
- The project resulted in registration of three IFS farmer cluster groups with The District Registrar and Registrar of Societies, Kollam.

39. **Development of Smart Nursery Management System Using IoT and ML Techniques**

(PI :Dr. Geetha Radhakrishnan, Assistant Professor, RARS(SZ), Vellayani)

Objectives:

- Sensing soil moisture and nutrients and determining custom fertilizer profiles based on soil chemistry
- Controlling water usage for optimal plant growth
- Determining the optimal time to plant

Major Research Highlights :

1. Technology for IoT-based fertigation in a small environment
2. Harnessing IoT for the reduction of manual labor
3. Provide IoT based advisory system for water and nutrient management

40. **Strengthening of Advanced Research Centre for plant diseasediagnosis andmanagement**

(PI : Dr. Ayisha R, Assistant Professor,Department of Plant Pathology)

Objectives:

1. Consultancy/ Advisory services to farmers
2. Detection of Plant viruses (immunological and Molecular procedures) for major crops of Kerala
3. Referral Lab for the State for detection and diagnosis of plant pathogens for the benefit of farmers

Major Research Highlights :

1. Consultancy and advisory services are being provided to farmers
2. The Advanced Research Centre for plant disease diagnosis and management, was strengthened further for the detection of plant pathogens
3. Facilities were enhanced for the detection of phytoplasma
4. Pineapple samples suspected to be caused by phytoplasma received from Pineapple Research Station, Vazhakkulam, was analysed with sufficient replications and was found that the etiology is not phytoplasma. The samples were analysed with a positive control, phytoplasma in brinjal. The lab now has facilities to diagnose phytoplasma as we have purchased all the necessary reagents and specific primers for its detection from the project and the protocol has been standardized

5. *Tomato leaf curl virus* infecting tomatoes in vellayani was characterized as *Tomato leaf curl Palampur virus* and its partial DNA A genome was cloned and deposited in NCBI
6. Diseased plant materials received from farmers, different Departments of CoA and various Govt. Institutions for disease diagnosis. After analysis specificrecommendation were given for the management of the disease
7. Field visits, trainings and seminars were attended as part of KarshakaSanthwanamprogramme.
8. PG and Ph.D. students are utilizing the facility for their research projects and course work

41. **Development of pesticide decontamination protocol in vegetables**

(PI :Dr. Malini Nilamudeen, Assistant Professor, RARS(CZ), Pattambi)

Objectives:

To assess the efficacy of various household washing solutions and practices in removing pesticide residues from vegetables.

Major Research Highlights :

A mixture of pesticides of groups *viz.,* Organophosphorus, synthetic pyrethroid, neonicotinoid, diamide, carbamate was applied at 50 to 60 % fruiting stage of tomato and chilli. Fruit samples were collected after48 hours of spraying. Samples were prepared and quantified as per the Pesticide Residue Analysis Manual of ICAR (Sharma, 2013).Treatments were soaking whole vegetables in 5% NaCl solution,dipping in 0.5% mild liquid soap solution, coconut shell charcoal powder 20 g/l, rice bran @100g/1,veggie wash @10 ml/l, tap water and no washing (control).

In tomato matrix, soaking in 5% NaCl for 10 minutes followed by washing in tap water for 2 minutes resulted in 19.14%, 29.04%, 27.12% and 97.2% reduction in residue over control for Chlorpyriphos(OP), Lambda cyhalothrin (SP), Imidacloprid (Neonicotinoid), and carbendazim (carbamate), respectively. Simple washing in tap water was the nexteffective treatment. All other treatments were not effective in removing residues from tomato. For the removal of neonicotinoid insecticide, simple washing in tap water (24.32%) gave statistically on par result with5% NaCl for 10 minutes. All treatments were equally effective in removing carbamate insecticide residue.

In chilli matrix,soaking in 5% $NaHCO_3$+0.5% liquid soap solution and 5% NaCl +

0.5% liquid soap solution were found effective in removing residues of chlorpyriphos (24.50%, 24.84%), Imidacloprid (17.11%, 21.37%) and carbamate insecticides (90.70%, 93.13%).Lambda cyhalothrin residues were removed to the tune of 52.57 and 45.71% in treatments *viz.,*5% NaCl + 0.5% liquid soap solution andcoconut shell charcoal powder 20 g/l, respectively. Diamide residues were removed by 82.55% on treating with 5% NaCl + 0.5% liquid soap solution.

42. **Strengthening Research at RARS (SZ), Vellayani– Characterisation and categorisation of Indian Bee Honeys in Kerala based on their origin**

(PI : Dr. Amritha V.S., Professor and Principal Investigator AICRP on Honey Bees and Pollinators, Vellayani Centre)

Objectives:

Collection of honey samples from geographically located point, analysis of physiochemical properties of collected samples and mapping of quality parameters of honey producing areas using GPS.

Major Research Highlights :

Collection of honey samples from the various agroecological zones and its analysis is in progress

43. **Development of biologically intensified disease management strategy for leaf rot of coconut**

(PI:, Dr. Susha S. Thara Assistant Professor, Department of Plant Pathology)

Objectives :

To develop a user friendly, biologically intensified disease management strategy for the leaf rot disease of coconut

Major Research Highlights:

Coconut leaf rot samples were collected from heavily infected palms in different agro-ecological zones of Kerala *viz.* Thiruvananthapuram (Balaramapuram, Moolakkonam, Vellayani, Nandancode, Kowdiar), Kollam, Idukki, Palakkad and Kasargod.

Balaramapu

Moolakkon

Kasarg

Plate 1 Leaf rot symptoms collected from fifferent locations

Cultural and spore characters of the isolated fungi were studied and thus identified the genus. *Colletotrichum* sp. and *Fusarium* sp. were isolated from all the locations surveyed. *Exserohilum* sp. was obtained from Vellayani (Thiruvananthapuram) and Palakkad. *Diplodia* sp. was isolated from Idukki and Palakkad. The samples from Palakkad were also infected with *Pestalotia* sp.

Young coconut leaflets were collected from healthy palms and were inoculated with the isolated fungi. The virulent pathogens started exhibiting leaf symptoms after three days of inoculation. The most virulent pathogen isolated from diseased specimen was *Colletotrichum* sp. and *Fusarium* sp. The culture was subjected to molecular characterization to identify the species of these fungus through ITS (Internal Transcribed Space) sequencing. They were identified as *Colletotrichum gloeosporioides* and *Fusarium solani*.

The fungi isolated from the phyllosphere of healthy coconut leaves were tested against the major pathogens by dual culture technique and the results revealed that the maximum percentage of inhibition was recorded with *Aspergillus niger*. (44.4%) which differed significantly from *Penicillium* sp. and showed 30% inhibition. The five bioagents viz., *Piriformospora indica*, *T. harzianum*, *B. subtilis*, *P. fluorescens* and *A. niger* were evaluated against *Colletotrichum gloeosporioides* and *Fusarium solani* by dual culture technique under *in vitro* conditions. The results revealed that the highest percentage of inhibition was recorded with *T. harzianum* and*P. indica* (80%).The percentage of inhibition recorded with *B. subtilis* was 64.4%. The percentage inhibition by phyllosphere isolated microbes were less

compared to others.

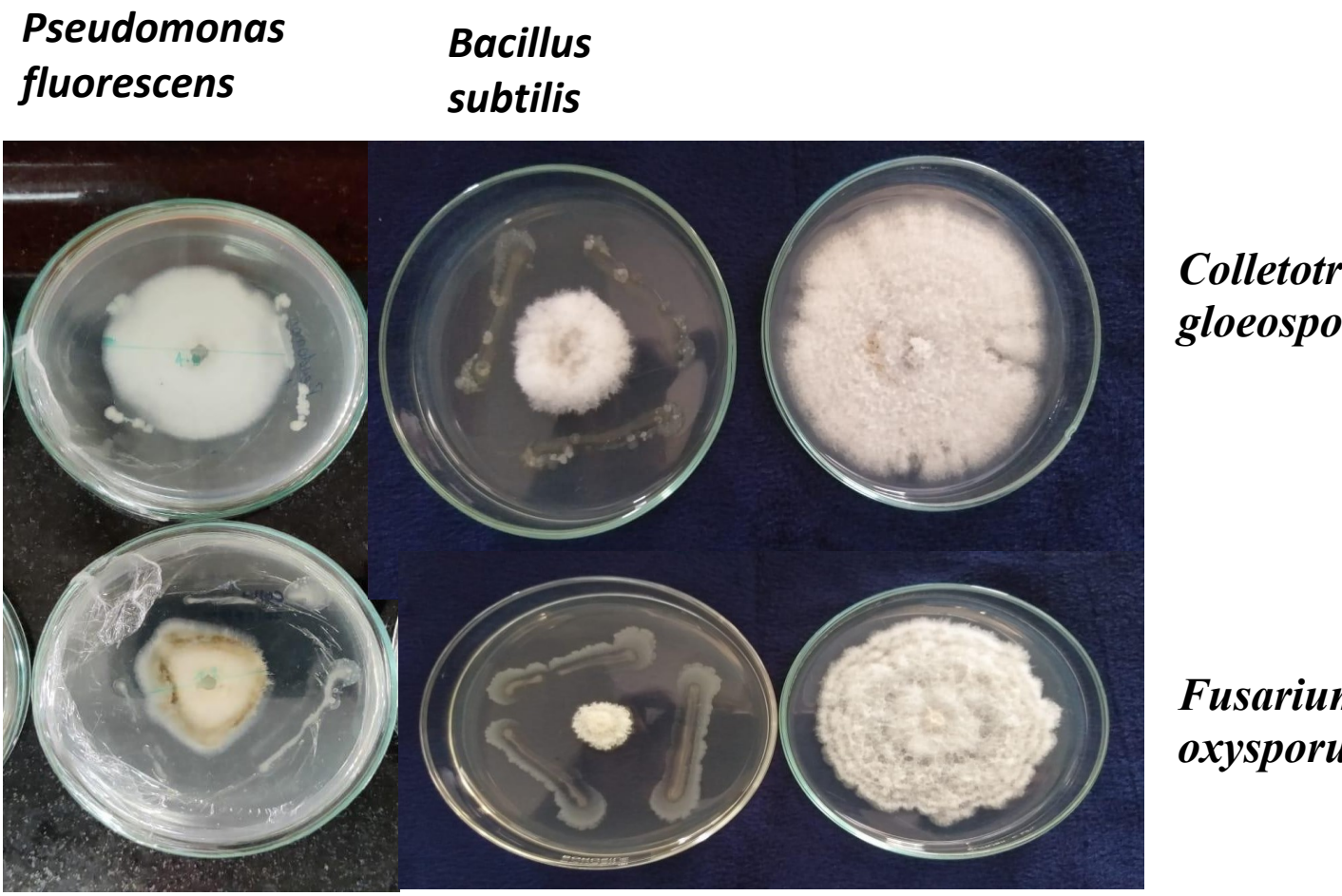


Plate 2 Evaluation of the bacterial biocontrol agents against the major pathogens

The efficacy of seven fungicides were evaluated against *Colletotrichum gloeosporioides* and *Fusarium solani* by poisoned food technique at three different concentrations viz., 250, 500 and 1000 ppm. Among seven fungicides and five bioagents tested against the pathogen, the fungicides carbendazim + mancozeb, Tebuconazole + Trifloxystrobin and Copper oxychloride and Hexaconazole exhibit 100 % inhibition at 250, 500 and 1000 ppm and bioagents *T. harzianum* and *P. indica* found to be effective against the pathogen. The compatibility of selected fungicides and bioagents were tested based on their *in vitro* sensitivity.

The compatibility of *P. indica* and *T. harzianum* were tested with above four fungicides by poisoned food technique. The results showed that the fungicides viz., carbendazim +

mancozeb, Tebuconazole + Trifloxystrobin and Hexaconazole completely inhibited the growth of two bioagents viz., *P. indica* and *T. harzianum* at all the three concentrations. The percentage of inhibition of *T. harzianum* with copper oxychloride was 41.4, 34.4 and 20 % and with *P. indica* was 100.0, 100.0 and 45.5 % at 0.1%, 0.05% and 0.025% concentrations respectively.

The present study highlighted the importance of integrating copper oxychloride with bioagent *T. harzianum* for effective management of Leaf rot of coconut as it prevents the detrimental effects like development of resistance against a particular fungicide by the continuous use of the same fungicide under field conditions. Under severe infection also integrated use will give a sudden relief of the disease by the action of the chemical fungicide and the biocontrol agent will give a long lasting management.

44. **State plan project 2021-22 (Station wise funding) "Strengthening Research at RARS(SZ),Vellayani"-Strengthening the breeder seed production of newly released varieties of vegetables"**

(PI: Smt.Rakhi R, Assistant Professor, Department of Vegetable Science)

Objectives :

To scale up the breeder seed production of released varieties of cluster bean bhindi and vegetable cowpea.

Major Research Highlights:

26.50 kg of breeder seed of newly released vegetable cowpea variety KAU Deepika was produced.

45 **Nano bio-formulations using allelopathy-based bio-synthesized nanoparticles for the management of aquatic weeds**

(PI: Dr.Susha V.S., Assistant Professor, Department of Agronomy)

Objectives:

To develop nano bio-formulations using allelopathy-based bio-synthesized nanoparticles for the management of water hyacinth.

Major Research Highlights:

- Allelopathic weeds like *Parthenium hysterophorus*, *Coleus aromaticus* and *Lantana camara* based bio-synthesized silver nanoparticles have been synthesized and it was treated on water hyacinth.
- On application of *Parthenium hysterophorus* mediated silver nanoparticles at 1 %, scorching and necrosis of water hyacinth was observed in two days.
- Characterisation studies of *Parthenium hysterophorus* mediated silver nanoparticles showed the zeta potential as -32.7 mV, the particle size 213.8 nm and the absorption as 320 nm.
- The morphological as well as the physiological parameters of water hyacinth also showed higher efficacy of the treatment ie., *Parthenium hysterophorus* mediated silver nanoparticles at 1 %.

ALL INDIA CO-ORDINATED RESEARCH PROJECTS (AICRP)

1. AICRP on Honey Bees and Pollinators, Vellayani Centre

(PI : Dr. Amritha V.S., Professor and Principal Investigator AICRP onHoney Bees and Pollinators, Vellayani Centre)

Objectives

- To undertake apiculture research for standardization of advanced scientific technologies for bee management, better hondy production and other hive products, bee health management, bee pollination, prodiction of value added products of honey and wax etc.
- To import training to beekeepers on high tech management in apiculture
- To generate employment potential to women and unemployed youth
- Conservation of germplasm of different bee species and other insect pollinators for pollinatin and to enhance crop productivity

Major Research Highlights:

I. Hive designing –*Apis cerana*

Evaluation of the Indian bee hives based on the brood parameters during dearth season revealed that all the brood parameters except bee strength showed significant variation after the second fortnight. While the brood parameters, egg laying area and honey stores exhibited significant variation after the first and third fortnight respectively. ISI type A hives with 8 frames and ISI type A hives with 6 frames performed well in terms of the brood parameters.

With regard to the brood rearing season, significant variation was observed in the egg laying area during the first fortnight, with maximum egg laying area recorded from the ISI type A hives with 8 frames (55.800 $cm^{2)}$ followed by ISI type A hives with 6 frames (48.110 cm^2). While the parameter, brood area showed significant variation during the second fortnight where ISI type A hives with 8 frames (141.913 cm^2) had maximum brood area (141.913 cm^2). A different trend was observed during the third fortnight where significant variation was observed in the egg laying area, brood area and honey stores where maximum brood area was recorded from the modified ISI type A hive with brood chamber and frames reduced by 2 inches with 6 frames (51.750 cm^2).

All the parameters varied significantly during the first fortnight of honey flow season. No

significant variation was observed among the brood parameter during the second fortnight. All the parameters except honey and pollen stores exhibited significant variation during the third fortnight. Maximum bee strength was recorded by the ISI type A hive with 8 frames (4.333) whereas hives maintained in the AICRP and modified ISI type A hives with brood chamber and frames reduced by 2 inches with 6 frames recorded maximum egg laying area (75.900cm^2) and brood area (134.944cm^2) respectively. Thus, ISI type A hive with 8 frame was efficient in terms of the brood parameter.

II. Bee disease management by non-chemical methods:

The diseased Indian bee colonies in the AICRP apiaries with symptoms of bacterial infection (unsealed pupae) were selected for the study. Eight treatments (: Ganoderma mycelia extracts 1 ml/250 ml of sugar solution, Ganoderma mycelia extracts 3 ml/250 ml of sugar solution, *Phyllanthus niruri* extract 2g/250 ml sugar solution, Turmeric rhizome extract 2ml/250 ml sugar solution, Propolis 3ml/250 ml sugar solution, Propolis 5ml/250 ml sugar solution, Ganoderma 3 ml+ Propolis 3 ml/250 ml sugar solution and Control-250 ml sugar solution alone) were evaluated during the experiment. Three replications were maintained. The treatments were provided along with the sugar solution (50 %) and observations on the number of unsealed pupae and the brood parameters were recorded at weekly intervals for a month.Significant variation in the number of uncapped cells was observed in the precount as well as in the second fortnight after treatment. Maximum reduction in the number of uncapped cells was observed in the colonies treated with Propolis 5ml/250 ml sugar solution.

III. Evaluation of bee venom collectors in *Apis cerana*

Prior to the evaluation of bee venom collectors, studies were conducted to identify the peak hour of the day, duration of venom collection and season variation, if any, during the optimum duration. Observations on the venom collection at hourly intervals of a day revealed that maximum quantity of venom was collected at 2 pm to 3 pm (52.00 mg per hive) and least venom was collected at 7 am to 8 am.

Statistical analysis of the data on optimum duration for venom collection showed that highest quantity of venom was collected at 60 minutes duration (55.34 mg per hive), but the mean mortality was high (5.20 bees per hive). Venom collected at 40 minutes and 30 minutes were 34.14 mg and 25.12 mg per hive which were on par. The optimum duration

for placing the bee venom collector was selected as 30 minutes considering the low mortality of bees (0.80 per hive) as compared to 40 minutes (2.00 per hive).

Studies on the seasonal variation in bee venom collected revealed that maximum quantity of venom was collected at honey flow season (55.16 mg per high) followed by dearth season (41.00 mg) and brood rearing season (25.12 mg). Maximum mortality was also recorded at honey flow season followed by dearth season and brood rearing season. Brood parameters as well as the foraging activity of the bees did not vary significantly among the seasons. The quantity of bee venom collected had a non-significant positive correlation with temperature and negative correlation with humidity.

The characterisation of bee venom samples collected during the three seasons were carried out at SAIF, IIT Bombay by HR LC-MS (High Resolution Liquid Chromatography-Mass Spectrometry) with database (Plant extract Impurity Profiling and Metabolite Identification). Melittin and apamin were identified as the major components, with melittin showing maximum abundance on all the three seasons. No significant difference was recorded in the abundance of both melittin and apamin among the three seasons.

2. AICRP onMushrooms

(PI : Dr. Heera. G., Assistant Professorand Principal Investigator, AICRP on Mushrooms)

Objectives

- To conduct survey of naturally occurring wild mushrooms, cataloguing of the edible / medicinal species
- To evaluate the promising and high yielding strains for regional adaptability
- Standardization of cultivation techniques of edible mushrooms
- Exploring the possibility of using locally available materials as substrates
- Supply good spawn to the mushroom growers
- Popularization of mushroom cultivation in different agro ecosystems
- Studies on the important biomolecules associated with the medicinal mushrooms.
- Development of mushroom nutraceuticals with medicinal amendments
- Developed a hybrid between Calocybe indica and C.gambosa
- Social empowerment of weaker sections of the society

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 seventeen specimens were obtained. Isolations were done , pure culture was sent to DMR and accession numbers obtained for sixteen. These include Tricholoma, Marasmius, *Lentinus sajor caju, Ganoderma,Pleurotus eous, Auricularia, Calvatia celata,Xylaria Omphalotus,* Microporus xanthocarpus, Auricularia and *P. eous* etc. The promising edible species of mushrooms were evaluated for the suitability of the cultivation.

Expt. 2: Advance Varietal trial -1 for strains of Paddy Straw Mushroom, Volvariella volvacea (Vv-21-201 to Vv-21-206)

The advanced varietal trial for VV-21-201 to 206 was carried out in April 2022. The strain VV-21-203 was identified as potential strain with with minimum days for spawn run , first harvest and good yield attributes was identified as a promising strain.

Exp3: Initial Varietal trial of sporeless strains of Oyster Mushroom (*Pleurotus ostreatus var. florida*) on paddy straw.

The experiment was conducted in RBD with 4 treatments and 5replication . Among the four different strains Pl-21-01 and Pl-21-03 gave higher yield when compared to the other strains. With a maximum yield of 74.02 kg/ 100kg substrate followed Pl-21-03 (69.67kg). The minimum time for first harvest was exhibited by strains Pl-21-03, PL-21-02 and PL-21-01 (21.7, 22.28 and 22.4 respectively). The strain Pl-21-04 produced smaller sporocarps when compared to other strains. PL-21-01 was a sporeless strain when compared to others.

Expt 4.Initial Varietal trial of high yielding v PL-21-01 **s of Oyster Mushroom (*Pleurotus pulmonarius).on paddy straw***

The experiment was conducted with 10 treatments (PL-21-01 to PL-21-10) with three replication. The yield was maximum in PL-

21-03 (86.43kg) followed by 83.56kg in Pl-21-08. The lowest yield was recorded in PL-21-06 (58.94kg). The time taken for harvest ranged from 23.56 days to 28.55. The minimum period for the first harvest was recorded in Pl-21-03 (23.56) followed by PL-21-02 (24.67). The maximum sporocarp weight was observed in PL-21-08(16.51g) followed by PL-21-03 (14.36g). on paddy straw

PL-21-03

Expt 5. Initial varietal trial of *Schizophyllum commune* on paddy straw

The experiment was conducted with 10 treatments (IVTS21-01 to TVTS-21-10). The strain IVTS-21-01 and 05 were the high yielders awith an yield ranging from 0.45 to 0.70 kg/ 100kg substrate . The strain IVTS-21-09, and IVTS-21-10 did not produce any fruiting body. The strains IVTS-21-01 and 06 took minimum days for first harvest(14.60 and 14.86 days respectively). The maximum fruit body weight of 1.20 g was observed in

IVTS-21-01

Expt. 6 Initial varietal trial for high yielding strains of Milky mushroom (Calocybe indica)- The experiment was laid out in RBD with 7 treatments (CI-21-01 to CI-21-07). The maximum yield of 121.05 kg/ 100kg substrate was produced by CI-21- 103 followed by CI-21-102,CI-107 and CI-105 which were on par. (81.45, 77.27 and 76.78 respectively). The minimum period for first harvest was shown by CI-21-105(36.6) . CI 21-103,CI-21-107 and CI-102 took 36.86, 36.93 and 37.93 days for the first harvest. T The maximum fruiting body weight was in CI-21-103 (113.46g) followed by CI-21-105, CI-21-107,CI-21- 101 , CI-21-102 and CI-21-104.

Expt 7 Extension activities – Awareness and Training programmes.

Eight 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 20 participants. A total of 423 participants has been benefitted from mushroom training. A documentary on Mushroom cultivation was telecasted in Krishidarshan on 24.5.2021 associated with AICRP on Mushrooms. The problems of the mushroom growers were addressed directly or over telephone and email.

Experiential learning programme was conducted for BSc (Ag) students. Published three

research papers in NAAS rated journals.

Sales

1826 pkt spawn; 35.65kg mushroom and 4 mushroom bed were sold from the centre.

3. 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. Multi-locational on-farm testing of nematode management options for root-knot, cyst and burrowing nematodes
7. Special drive to impart training to farmers on nematode damage symptoms, dissemination and management technology

Major Research Highlights:

A.I. Diversity and distribution mapping of plant parasitic nematodes in Kerala.

Nematode-fungal and bacterial disease complexes viz. vascular wilt in banana, cow pea, rotting ofginger, slow wilt disease in pepper, rotting of tubers of amorphophallus, coleus and yam, azhukal disease of cardamom are emerging problems in the state. Survey was conducted in Trivandrum, Kollam and Idukki districts of Kerala to document plant parasitic nematodes associated with banana, vegetables, ginger, pepper and cardamom. Presence of *Meloidogyne incognita, Pratylenchus coffeae, Rotylenchulus reniformis,*

Radopholus similis, Helicotylenchus dihystera and *Hoplolaimus indicus* was observed in soil samples collected from rhizhosphere of banana in Trivandrum and Kollam districts. Occurrence of *P coffeae, Helicotylenchus* sp*, R. similis* and *R. reniformis* were also observed in samples collected from rhizhosphere of pepper, ginger and cardamom in Kollam, Trivandrum and Idukki districts.

B.1. Screening, confirmation and evaluation of rice genotypes for resistance against *M. graminicola*

Fifty rice genotypes were tested to assess their reaction against rice root knot nematode *M. graminicola* . All found susceptible.

B7- Management of *Meloidogyne graminicola* in rice through chemicals

Result of the trial on effect different chemicals on management of*M. graminicola*in ricerevealed that soil application of fluensulfone 2%GR @1kg a.i/ha found to be statistically on par with cartap hydrochloride 4G @1kg a.i/ha in reducing nematode population in soil (66.68 to 71.90 per cent) and increasing yield (70.69 to 77.54 per cent).

C.1 Screening, confirmation and field evaluation of promising resistant germplasm ofvegetablecrops against root-knot nematode

Fifty germplasm of tomato were screened to assess their reaction against root-knot nematode. Of these EC631411, EC632936, EC688302, EC631415, EC631351 were moderately resistant. Fifty germplasm of brinjal were screened to assess their reaction against root-knot nematode. Of these IC112950, EC467272, EC322508 were highly resistant and IC383103, IC354676 were resistant.

C4. Management of *Meloidogyne* spp. in cucumber using new nematicides

Result of the trial on efficacy of different nematicides in managing *M. incognita* in cucumber revealed that soil drenching of fluopyram 400 SC @ 0.625L/ha (0-10 days before sowing) is equally effective to silver nitrate (Oxipure 11%)@ 3l (in 200 l water)/acre in reducing nematode population in soil (81.59 to 88.28 per cent reduction over untreated). Regarding root-knot index, lowest was recorded in fluopyram 400 SC @ 0.625L/ha (0-10 days before sowing) (0.75) followed by fluensulfone @ 4L/ha(0-7 days before sowing)(1.25) while in untreated it was 5.00. Regarding yield, effect of soil drenching of fluopyram 400 SC @ 0.625L/ha (0-10 days before sowing), fluensulfone @ 4L/ha (0-7 days before sowing) and silver nitrate (Oxipure11%)@ 3.0L(in 200L

water)/acre was statistically on par giving 50.72 to 63.77 percentage increase over untreated.

D.1 Screening, confirmation and field evaluation of promising resistant germplasm of pulse crops against important nematodes

Among five varieties and two local collections of cow pea, Local collection Kadakkal local found resistant to *M. incognita* . Regarding number of eggs and eggs per egg mass also significant reduction was observed in Kadakkal local in comparison with other varieties.

F.1 Screening of genotypes/ varieties/accessions/ root stocks/ wild species of different fruit crops against major plant parasitic nematodes

Among commonly cultivated varieties of banana (5 no's), Nendran, Red banana and Robusta found to be susceptible to root-knot nematode, while Poovan and Njali Poovan found to be moderately resistant.

F2- Management of nematode – wilt disease complex in banana

Sucker treatment with *P . chlamydosporium* + *T. asperellum* (2.5 g each) + pit application of both the bio agents (10g) at 45 days along with FYM (100g) reduced nematode population (89.20 percent decrease over control) and increased yield in banana (60.83 per cent increase over control)

F.7. Management of root-knot nematode, *Meloidogyne incognita* in ginger

Soil application of *P. chlamydosporia* + *T. asperellum*@ 2.5 kg along with 2.5 t FYM/ha resulted maximum reduction in nematode population in soil (80.56 per cent over untreated) and increase yield (62.50 per cent over untreated) in ginger.

F8- Documentation of nematode infested horticultural nurseries in the state

For documentation of nematode incidence in horticultural nurseries, soil and root samples were collected from nursery plants from both government and private sector. Guava, pomegranate and pepper seedlings showed root-knot nematode infection. Nematode population was below damaging level, hence less severe.

G1. Management of *Meloidogyne incognita* infecting cucumber under protected cultivation

Spot application of *Bacillus amyloliquefaciens* enriched farm yard manure @ 100kg (1000 m^2 polyhouse) at the time of planting and 45 days after planting showed

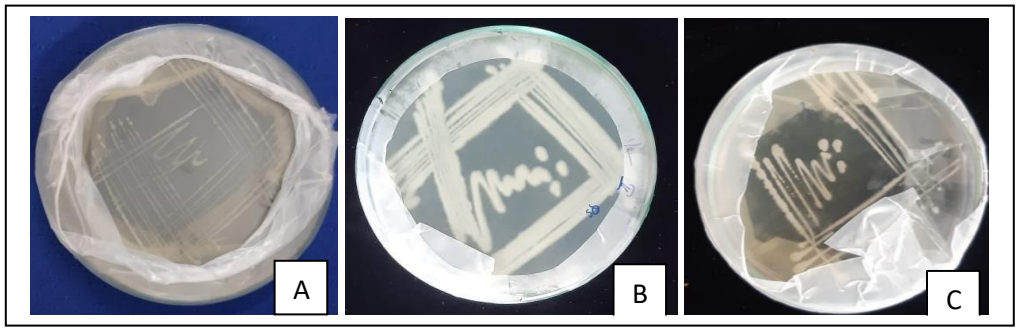
statistically significant superiority over all other treatments in reducing population of *M. incognita* in soil and root of salad cucumber under polyhouse condition (73.72 to 83.00 per cent reduction over untreated) . Lowest root-knot index (1.00) and maximum increase in yield (63.56 per cent over untreated) was observed in plants treated with *B.amyloliquefaciens* enriched farm yard manure @ 100kg (1000 m^2 polyhouse) at the time of planting and 45 days after planting

G.2.Efficiency of mycorrhiza in the management of *Meloidogyne incognita* in cucumber under protected cultivation

Spot application of *Glomus fasciculatum/G.mossae* @1kg/1000m^2polyhouse before planting + spot application of *P. chlamydosporia* @ 1kg /polyhouse (1000m^2) at 45 DAP can be recommended for management of *M. incognita* in polyhouse cucumber.

H. Isolation, evaluation and mass multiplication of nematode antagonistic microbes

Indigenous bacteria (20 no‟s) were isolated from soil samples by serial dilution. Three bacterial isolates selected after preliminary screening were tested under *in vitro* and *in vivo* condition against *M.incognita*. Isolate B-5 which exhibited maximum egg hatch inhibition and juvenile mortality under *in vitro* condition. It suppressed the nematode population in soil and root of tomato plants under *in vivo* condition. Molecular characterization of the most effective bacteria (Isolate –B-5) was done for the identification. The BLAST result of amplified DNA of 16SrRNA (barcoding was done at RGCB, Thiruvananthapuram) of bacterial isolate against NCBI Gene Bank data base revealed the identity of bacterial isolate. The isolate showed 100% sequence identity with *Bacillus cereus* strain.



A- B-5 isolate **B-B-2 isolate** **C-B-3 isolate**

A. Plants treated with B-5 isolate C. Plants treated with B-3 isolate

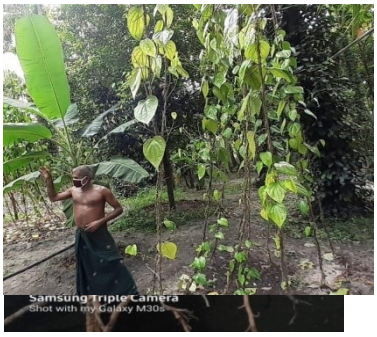
B. Plants treated with B-2 isolate D. Control plants

Seven technologies evolved as part of the AICRP trials were approved for inclusion in POP. Field visits (20 no's), nematode awareness programs (7 no's) and demonstration trials (5 no's) were conducted to make farmers and extension personnel aware of plant parasitic nematode, symptoms and management practices.

Emerging nematode problems

Burrowing nematode infected black pepper field at Paliyodu

Root-knot nematode infected betelvine root



Lesion nematode infection in banana

Reniform nematode infection in cowpea

***Meloidogyne enerolobii* infection in guava seedlings in nurseries**

F.2. Management of nematode-wilt disease complex in banana

Field view

T3R1- Sucker treatment with *P.chlamydosporium*+ *T. asperellum* (2.5 g each) + pit application of both the bio agents (10g) at 45 days along with FYM (100g)

T7R1-Untreated

F.7. Management of root-knot nematode, *Meloidogyne incognita* in ginger

T3- FYM enriched with *P. chlamydosporia* and *T. asperellum*

T3- FYM enriched with *P. chlamydospori*T6- Untreated and *T. asperellum*

4. AICRP on Forage Crops & Utilization

(PI : Dr. Ameena M, Professor & Officer i/c, AICRP on Forage Crops& Utilization)

Ongoing Forage Crop Production Trials

1. ***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 vermi compost, T_4-75% RDN through FYM + 25% RDN through bio-compost, T_5-50% RDN through FYM + 50% RDN through vermi 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 of T_5 (both source), T_{11}-75% RDN of T_6 (both source) and T_{12}-50% RDN through FYM+ 25% RDN through vermi compost + 25% RDN through poultry. The trial was laid out in Randomized block design replicated thrice.

The data revealed that among organic nutrient sources, application of 50% RDN through farm yard manure and remaining 50% RDN through vermi-compost was better than 100% RDN through inorganic fertilizer. The study will be concluded in 2022.

2. 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. The experiment was laid out in split plot design with 15 treatment combinations in 3 replications. Main plot treatments were different shade levels (open, 25 per cent shade, 50 per cent shade) and subplot treatments were different Fodder grass varieties (Suguna, Susthira, CO-3, CO-5 and CO GG-3).Two-year data shows that CO-5 is best suited for cultivation under open and 50 per cent shade and Suguna for 25 per cent shaded fields. The study will be concluded in 2023.

3. 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 treatment comprised of two factors, namely $MgSO_4$ levels (M) and frequency of application (F). The treatment combinations included three levels of magnesium [m_1 - 80 kg ha^{-1} , m_2- 100 kg ha^{-1} and m_3- 120 kg ha^{-1}] and three frequency of application [f_1- split application once in 3 months, f_2- split application once in 4 months and f_3- split application once in 6 months]. Analysis of two-year data shows 100 kg $MgSO_4$ ha^{-1} given as split application once in 6 months as the best treatment. The study will be concluded in 2023.

CROP IMPROVEMENT

Fodder Breeding Trials (2021-22)

Kharif Trials 2021-22

- Initial Varietal Trial in Fodder Cowpea.
- Among eleven accessions, IVTC-3(352q/ha) recorded highest green fodder yield followed by IVTC-6 (324q/ha) and IVTC-9 (320q/ha)
- Advanced Varietal Trial-1 in Fodder Cowpea.
- Among five accessions, AVTC-1-3 (225 q/ha) recorded highest green fodder yield followed by AVTC-1-1 (200 q/ha) and AVTC-1-2 (194 q/ha).
- Initial Varietal Trial in Fodder Ricebean
- Among six accessions, IVTRB-3 (278 q/ha) recorded highest green fodder yield followed by IVTRB-1 (274 q/ha) and IVTRB-6 (243 q/ha) .

Rabi Trials 2021-2022

- IVT Oat (SC) Initial Varietal Trial in Oat (Single Cut).
- Among fifteen accessions, IVTO (SC)-12 (39 q/ha) recorded highest green fodder yield followed by IVTO (SC)-5 (34 q/ha) and IVTO (SC)-15 (21 q/ha) .
- Combined AVTO -1 and AVTO-2 Fodder Oats-Advanced Varietal Trial in Oat (Single Cut)
- Among fourteen accessions, AVTO-1-10 (129q/ha) recorded highest green fodder yield followed by AVTO-1-11 (128q/ha) and AVTO-1-2 (127q/ha).

Summer Trials 2020-21

- IVT Bajra (Multicut): Initial Varietal Trial in fodder bajra (multicut) in summer
- Among thirteen accessions, IVT-BJ-MC-10 (281 q/ha) recorded highest green fodder yield followed by IVT-BJ-MC-8 (267 q/ha) and IVT-BJ-MC-6 (257 q/ha)
- AVT Bajra (Multicut): Advanced Varietal Trial in fodder bajra (multicut) in summer
- Among five accessions, AVTBJ-MC-1 (231 q/ha) recorded highest green fodder yield followed by AVT-BJ-MC-3 (206 q/ha) and AVT-BJ-MC-4 (198q/ha)

Perennial Trial

- VT BxN Bajra Napier Hybrid
- Started in 2019. Sixteen accessions planted and are being evaluated. The cumulative highest green fodder yield was recorded for VT BxN-3 (1976q/ha) followed by VT BxN-11(1764q/ha) and VT BxN-15 (1755 q/ha).

EXTENSION ACTIVITIES

1. Fodder Technology Demonstration (FTD)

To popularize the fodder production technologies and to make the farmers aware about new fodder crop varieties, a total of 50 FTD's were allotted to Vellayani centre during 2021-22 for the crop- BN hybrid variety Suguna and Susthira and fodder cowpea variety Aiswarya.

2. Tribal Sub Plan activities in Wayanad (2021- 2022)

Description of activity	ST population benefitted (Number)
Training on Fodder cultivation- 3 no.s	60
Fodder cuttings supplied	15
Distribution of layer hen (420 numbers)	60
Kid goats	17
Spades	30
Sprayers	7

3. Scheduled caste sub plan (SCSP)

SCSP was sanctioned in October 2021, for Parakkode block in Kollam district.Twenty-

five livestock farmers belonging to SC category in the area were identified and fodder cuttings for use as planting material were distributed to each of the beneficiary identified.

4. TV live Programme

One phone-in Live Programme on Fodder production as part ofKrishidarshan Programme in Doordarshan was conducted on 29.10.2021

5. Radiotalk

One radaiotalk on thetopic: Fodder crops for soil and water conservation was delivered through All India Radio on 5.09.2021

6. Training conducted for Farmer/ Students/ Government Officials

Conducted 3 sets of online trainings in the month of March 2021, on topic- Scientific fodder cultivation and preservation methods and balanced animal nutrition and covered dairy farmers in all AKCs in Trivandrum district.

5. **AICRP on Biological Control of Crop Pests**

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

Objectives:

- To evaluate the efficacy of chitin enriched formulation of *Lecanicllium lecanii* (Vl8 – NBAIR) and *L. saksenae* (ITCC 7714 – KAU) in managing pea aphid and other sucking pests in vegetable cowpea
- To evaluate the efficacy of capsule formulation of B. bassiana Bb5 (NBAIR isolate) to amaranthus leaf webber *Hymenia recurvalis*
- To validate the field efficacy of biocontrol agents in managing pest complex in Paddy
- To evaluate the efficacy of microbial agents such as *Trichoderma viride* and *Pseudomonas fluorescence* as prophylactic treatments against *Fusarium* wilt in vegetable cowpea
- To monitor the population build up of Rugose white fly in coconut and to study the biotic and abiotic factors associated with it.

Major Research Highlights :

Experiment I Evaluation of oil formulation of *Lecanicillium spp* against sucking pests of cowpea

Analysis of data reveales that there wassignificant reduction in population,two weeks after treatment, wherein maximum redution in aphids was noted in thiamethoxam treated plots (235aphids per plant. Among the bioagent treatments, lowest population was noted in plots treated with chitin enriched oil formulations of *L.saksenae* and *L.lecanii*(570-680) per plant. The spore suspensions of both the fungi performed equally with a mean population of 760 to 810 aphids per plot, while the corresponding population in control was 940. At the late reproductive stage of the crop, ie after third spraying, *L.saksenae* oil formulation was found to be superior than thiamethoxam and *L.lecanii*. Population of pod bug noted seven days after frist spraying, revealed that lowest population was in plots sprayed with oil formulation of *L.saksenae*, but was on par with the efficacy of *L.lecanii* oil formulation. Natural enemy population assessed after first spraying revelaed that at the end of the experimental period none of the treatments were found to be inhibitory when compared to untreated control. There was significant increase in yield in the the plots treated with oil formulation of *L. saksenae*and spore suspensions of *L.lecanii* and *L.saksenae* compared to untreated and chemical control.

Experiment II : Efficacy of capsule formulations of *Beauveria bassiana* in managing amaranthus leaf webber *Hymenia recurvalis*

Seven days after second spraying all the treatments were effective in reducing the pest. Spraying Bb(KAU) capsules @ 3/ L or its spore suspension 20 ml /L was the best treatment which was closely followed by the effect of capsules and spore suspension of Bb5 (NBAIR) where the mean population was 0.46 to 0.53 per plant. Talc formulation @ 20 g / L of both the strains were inferior (1.06 to 1.2 caterpillars per plant) to capsules and spore suspensions. The corresponding population in control was 1.4 caterpillars per plant. The mean population of natural enemies was found to be unaffected after the first spraying. After second spraying, the population was slightly lower in all the treatments except in Bb spore suspension. There was a significant increase in yield in plots treated with capsulses of *B.bassiana* compared to the talc formulations and spore suspensions. KAU isolate 6063 was superior yielding 27.66 kg per plot (3x5m ^{2}), closely followed by Bb 5 (NBAIR) were the yield was 23.83 kg. Spore suspension of Bb5 NBAIR was superior (18.33 kg) to the talc formulations .Talc formulations recorded 15.83 to 16.33 kg while in control plot the yield was 15 kg

Experiment III : Biointensive pest management in rice

Assessment of leaf roller population, revealed that the BIPM treatments are effective in managing the pest. One week after treatment, BIPM and farmers practice (Quinalphos) were on par. During the second and third weeks, population was significantly low in chemical treatment with quinalphos 25 EC @ 2 mL/L. However after month population in BIPM and framers practice were on par. The crop is nearing the reproductive phase, and the experiment is ongoing. The experiment was delayed due to heavy monsoon . The population of adult moths of stem borer, *Scirpophaga incertulas*, among the BIPM plots and insecticide treated plots, through out the experiment. The percentage of control obtained through BIPM was 58.4, while in Farmers practice it was 45.54. Population of natural enemies in BIPM plots was always significantly high when compared to their poppuation in farmers practice.

Experiment IV : Management of *Fusarium* wilt in vegetable cowpea using microbial agents

Results revealed that seed treatment with *P.flourescence* (KAU strain) followed by fortnightly soil drenchimg and foliar spraying with *P.flourescence* (T1) AND Combined application of P. flourescence (fortnightly) + *Trichoderma* sp as basal (T3) as well as need based CoC (T4) are equally good in managing fusarium wilt in cowpea. None of the plants show wilting symptom in these plots. Treatment with trichoderma alone and treatment with trichoderma + pseudomonas + need based CoC was inferior, wherein the average number of plants wilted was 2-5.The yield recorded was highest in *P .flourescence* treated plots and lowest in untreated plots. The yield recorded from other treatments did not vary among themselves

Experiment V: Surveillance of Rugose white fly in coconut and population of natural biocontrol agents

Population studies of RSW in three different spots of Vellayani, revelaed that all the three locations followed a similar trend in the population patter, although the mean population recorded from the hot spot area near vellayani lake was high. The heavy rainfall received during May and then during Sept to November almost wiped out the population with a reoccurence in December which reached the peak during January to March. The parasatism level noted varied from 66.08 to 76.94 in Location 1; 61.47 to

71.66 in Location 2 and 60.7 to 69.3 in Location 3. Highest parasitism was noted during the month of May 221 and March 2022. Percentage of RSW infested leaves in a palm was on an average of 71.3 to 88.62 in Location, 71.52 to 75.6 in Location II and 66.76 to 70.78.

Experiment VI Survey on Cassava mealy bug

P.manihoti was observed in only in one or two locations in Kottarakkara block of , Kollam district, during Sept- Oct 2020 and 20-21. However its presence could not be located in non eof the tapioca fileds of Trivandrum district.

Establishment of New Trichogramma production unit: A production unit of Trichogramma has been established in 20-21. Due to the covid pandemic, mass production was delayed. Production during six months Oct 21- March 22 was 300 cc eggs.

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

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

Objectives:

- 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.
- Field trials at different locations of Attappady to demonstrate the beneficial effects of microbial inoculants.
- Training to create awareness on beneficial aspects and method of application of biofertilizers to tribal farmers, SHG's and Extension officials.
- Publication of bulletins in vernacular language for dissemination of biofertilizer technology among tribal farmers.
- 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 2021-22, a total quantity of 100 kg of PGPR Mix -I and 25 kg of AMF was distributed to tribal farmers engaged in the cultivation of vegetables, pulses, banana, sorghum, groundnut, ragi etc. One kg each of 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 ofAttappady hill tract to demonstrate the effect of PGPR Mix-I. Local varieties of vegetable crops popular among tribal farmers were selected. In the trials all solanaceous crops showed increase in number of fruits and yield due to application ofPGPR Mix-I compared to control. The incidence of pest and disease were also found to be less in plants treated with PGPR Mix-I. The field trials conducted till date in different areas of Attappady showed that PGPR Mix-I is capable of increasing the yield by 20 to 30 % in different crops when integrated with the farming practices of tribal farmers.

- **Isolation and evaluation of native efficient strains of biofertilizer organisms such as *Azospirillum*, *Azotobacter* and *Rhizobium* from Attappady hill tract.**

Nitrogen fixers were isolated from soil samples collected from different locations in Attappady in different N-free medium.Fifteen nitrogen fixing bacteria, eight in NFB media and seven Jensen's agar were obtained. The plant growth promotion potential of these isolates was studied by pot culture experiment in Amaranthus. The treatments were given as seedling root dip to twenty days old Amaranthus at the time of transplanting and growth parameters were observed at the time of harvest (30 DAT). All treated plants showed increase in growth in terms of plant height, number of leaves and shoot and root dry weight. Among the NFB isolates ASPA3 and ASPA4 showed maximum growth with shoot fresh weight of 18.69 and 17.53 g plant^{-1} respectively. Among the Jenson agar isolates AZT3 and AZA4 were the best with 14.55 and 14.10 g plant^{-1} fresh weight of shoot. As a result of the study a collection of efficient nitrogen fixing bacteria with plant growth promoting potential was obtained from the virgin soils of Attappady.

7 All India Net work Project on Pesticide Residues

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

Objectives:

(a) To devise simple, sensitive and cost effective analytical methodology for

quantification of pesticide residues and their degradation products in different components of the environment.

b) 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

Name of laboratory on the NABL certificate	Certificate No.	Certificate valid upto	Scope of laboratory		
			Commodity	No. of pesticides	LOQ (Range in ppb)
All India Network Project on Pesticide Residues, College of Agriculture	TC-5721	2024	Vegetables	97	10-50
			Fruits	98	10-50
			Cereals	98	10-50
			Pulses	98	10-50
			Spices	92	50
			Milk	24	25
			Meat	24	25
			Water	21	0.10
			Herbs (Curry Leaf)	78	100
			Pepper	36	100
			Fish	29	50

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

It is mandatory for ISO 17025 :2017 accredited laboratories to take part in proficiency testing (PT) programs to demonstrate its performance, competence and excellence. Accordingly PRRAL has participated in two PT programmes and secured satisfactory Z-scores.

Sl.No.	PT programme conducted by	Commodity	Pesticide Detected	Z Score
1	Proficiency Testing Centre, NIPHM, Hyderabad	Cabbage	Acetamiprid	-0.72
			Chlorantraniliprole	-0.46
			Emmamectin Benzoate	0.72

			Ethion	0.12
			Fenvalerate	1.48
			Methomyl	-0.37
2	Proficiency Testing Centre, NIPHM, Hyderabad	Rice Powder	Bifenthrin	1.40
			Fenpropathrin	-0.38
			Malathion	1.81
			Monocrotophos	-0.12
			Tricyclazole	0.13

3. Trainings conducted:

S. No.	Training Title	Number of Participants	Duration
1	Safe use of pesticides-conducted at Krishi Bhavan, Chenkal on 9/6/2021	31	One day
2	Safe use of pesticides-conducted at Krishi Bhavan, Koottukal on 30/6/2021	32	One day
3	Safe use of pesticides-conducted at Krishi Bhavan, Tholikodu	20	One day (14/12/2021)
4	Safe use of pesticides-conducted at ADA, Vamanapuram	24	One day (4/2/2022)
5	Pesticide residue analysis of food commodities for scientists of CPCRI and analyst in State Diary Laboratory	5	4 days (22-25th feb-2022)
6	Safe production of cardamom-conducted at CRS, Pampadumpara	30	One day (15/3/2022)

4. Laboratory is maintaining up-to-date data bank on presence of pesticide residues in food commodities
5. Publications

S. No.	Name of authors	Title	Name of Journal	Volume & issue	Year	NAAS rating
1	EbimolNadeetharaLohithaswan, Thomas George &Visal Kumar Subhachandrakumar	Effect of differential addition of water on mobility of fluopyram in two different soils of Kerala	International Journal of Environmental Analytical Chemistry	Published online, 18 Apr 2022.	2022	8.83
2	AmbilyPaul and Thomas George	Dissipation kinetics and harvest time residues of pyrazosulfuron-ethyl+pretilachlor in rice.	Indian journal of weed science.	53:67-72	2021	5.84
3	Banka Kanda Kishore Reddy, AmbilyPaul and Thomas George	Dissipation kinetics and risk assessment of Thiamethoxam 25% WG residues in vegetable cowpea	Indian Journal of Entomology	83 online published Ref. No. e20296	2021	5.08
4	Thomas George, Ambily Paul, Santhoshkumar T, Visal Kumar S, George Xavier, Suryamol S and Emile Zojiya TP	Dissipation Kinetics of Trifloxystrobin - Tebuconazole mixture in Brinjal and Cowpea and their Risk Assessment.	Pesticide Research Journal	33(2): 90-98	2021	5.49
5	Viresh MH, Mini C, Soni KB and Thomas George	Encapsulation of jackfruit extracts by spray, freeze drying and utilization of encapsulates for enrichment of mango RTS beverage	The Pharma Innovation Journal	10(12): 1928-1933	2021	5.23

6.Book chapters

1.Aparna Joseph, AmbilyPaul and Thomas George. 2021. Pesticide Residues in Cardamom. In. Asok Kumar, K., Murugan, M., and Dhanya M.K. (eds.), Cardamom (Eletteria cardamomum (L.)Maton.,Production, Breeding, management, Phytochemistry and Health benefits. Nova Science publishers, New York, pp. 193-207.

B. Title of the Project : Supervised field trials

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

Objectives:

- To study the dissipation of residues of newer molecules for data generation and registration.
- 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.

Major Research Highlights :

Sl. No	Crop	Pesticide	Days taken to reach LOQ		Half life (days)	
			Recommended(X)	Double the recommended(2X)	Recommended (X)	Double the recommended(2X)
1	Paddy	Flupyrimin 2% GR [ME 5382 2%GR]	< LOQ	<LOQ	-	-
			Harvest time residue in grain, straw, husk, soil			
2	Paddy	Flupyrimin 10% SC [ME 5382 10%SC]	< LOQ	<LOQ	-	-
			Harvest time residue in grain, straw, husk, soil			
3	Brinjal	Tetraniliprole120 g/L + Thiacloprid 360 g/L SC (Vayego Quantum) Dose Rate (ga.i. ha^{-1})- X-45+135 2X-90+270				
		1.Tetraniliprole	5	7	1.39	1.28
		2. Thiacloprid	7	14	1.77	1.78

4	Cucumber	Fluoxapiprolin Dose Rate(ga.i. ha^{-1})- X- 25 2X- 50				
		Fluoxapiprolin	3	7	0.568	1.147
5	Tomato	Fluoxapiprolin Dose Rate(ga.i. ha^{-1})- X- 25 2X- 50				
		Fluoxapiprolin	28	28	4.58	5.28
6	Chilli	Spirotetramat 30G/L + Diafenthiuron 120G/L SC Dose Rate (ga.i. ha^{-1})- X- 75+300 2X- 150+600				
		Spirotetramat	14	28	1.11	2.30
		Diafenthiuron	5	5	1.68	3.70

PROJECTS FUNDED BY OTHER AGENCIES

KERALA SOCIAL SECURITY MISSION, GOVT OF KERALA

1. Providing Horticultural Therapy and Establishing Community Horticultural Therapy Garden for Differently Abled

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

Objectives:

Creating the opportunity for differently abled students and other special need population to become self-reliant through horticultural therapy. The study also aims to assess the impact of the Horticultural therapy training on psychomotor development.

MAJOR HIGHLIGHTS

Community Horticultural therapy garden

1. Developed a community horticultural therapy garden in the College of Agriculture, Vellayani.
2. Bamboo look like hut or resting has been completed .
3. Disability friendly toilet work completed.
4. Paving of interlock in the garden has been completed.

Horticultural therapy training

1. Thirty students with disability certificate had enrolled for the Horticultural therapy training program. However on a daily basis 18 students attended the program.
2. Demographic profile ,pre assessment and post assessment has been carried out.
3. One year Horticultural therapy training was successfully conducted
4. Autism awareness day programme was been conducted on April 2.
5. On the International Day for persons with disability the training Certificate was distributed to the participants in an event organized by the Department of Community Science.
6. Steps has been taken to Collaborate with Physiotherapy centers and Rehabilitation centers in order to provide consultation on horticultural therapy to differently abled students.
7. Final report and documentation work is ongoing.

Pre –Post Horticultural therapy training results

Pre Horticultural therapy : In this session, an orientation classes for students were

conducted. This included sessions through which students can develop an emotional attachment to the plants and thus streamline them towards self-confidence and esteem. Practical and theory classes related to health, nutrition and agriculture was given. Workbook was prepared to introduce students to activities relating to horticultural therapy.

Psychometric Assessments : The personal and socio-economic status of participantss were collected. The selected students were subjected to the standardised tests and tools to collect the initial social and motor status and of the subjects

Post Therapy evaluation : After imparting the horticultural therapy training evaluation was conducted using the stnadardised psychomotor scales . The scores were tabulated and was subjected to statistical analysis. Pre and post horticulture therapy psychometric scores were statistically analyzed using SPSS software to evaluate the impact of Horticulture therapy in challenged students.

Results

The scores on the Vineland Scale for the first assessment at the beginning of the study ranged from 44 to 87 (M = 75.25, SD = 8.33) for all the 32 selected participants. However due to lock down only 18 students were consistent and regularly participated in the Horticultural therapy session, therefore the participants were categorised as experimental group (horticultural therapy group) and control group . The eighteen students who regularly participated were considered as the experimental or horticultural therapy group and the irregular and drop outs were considered as the control group. However the control group were also subjected to psychomotor assessments.

The normality of the data was examined focusing on whether and the extent to which non normality might influence the ANOVA results. Cutoffs were adopted for normality recommended by (West, Finch, & Curran, 1995) for violation of normality (skew >2 or <-2, and kurtosis >7 or <-7). The skew and kurtosis of the data were within the normality ranges across the therapy groups at different times. However there were a few cases where the normality assumption was violated in which we applied the Greenhouse-Geisser correction (West et al., 1995). The data analysis was conducted in which the data was compared on these measures for the intervention and control groups at three time points. A repeated measures ANOVA was performed to examined the

difference between the groups in their improvement on the adaptive behavior composite (the overall adaptive behavior score) at 3 and 6 months. There was a significant group × time effect over the course of 6 months, indicating that the intervention group improved significantly more than the control group ($F = 5.0$, $p < .05$). Adaptive behavior at the beginning of the program was based on the composite score of adaptive behavior of the Vineland Scale. The only variables that significantly predicted the adaptive behavior at six months were adaptive behavior at the beginning of the program and intervention status. A hierarchical analysis was conducted with adaptive behavior composite scores on Vineland at 6 months as a dependent variable to examine whether the intervention status might have predicted the adaptive outcome beyond the initial adaptive status. The adaptive functioning at 0 month alone accounted for 54% of the variance in adaptive behavior at 6 months ($F = 75.05$, $p < .001$, standardized β for intervention status $=-.26$, $p < .001$). The adaptive functioning at 0 month was the most significant predictor: Students who performed better than the others at the beginning of the program also did better at 6 months. While other personal variables did not significantly predict the performance at 6 months, the students who received the intervention gained significantly more than those in the control group when the initial adaptive level was controlled. The horticultural therapy effects of the study was examined by computing the effect sizes for all horticultural therapy × time interactions as well as effect sizes for group mean differences at the last follow-up (6 months) . The effect sizes of 20 domains (particle eta squared) for horticultural therapy × time interaction ranged from .00 to .11 with the effect sizes of four domains above the medium effect ($\geq .06$) and 15 above the small effect ($\geq .01$) (Cohen, 1988, 2013). As for the between-group mean differences at 6 months, the effect sizes of 20 domains (Cohen's d) ranged from .0 to .10.

Fig 1 : Harvest by the differently abled students

Variable	Intervention group (n= 18)						Control group (n=14)						F	Partial eta 2	d's at 0 month	d's at 3 month	d's at 6 month
Domain	0 Month		3 months		6 months		0 months		3 months		6 months						
	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD	Mean	SD					
Adaptive Behavior Composite Communicati On	75.7	8.4	80.2	13.1	82.9	11.7	74.6	8.3	76.8	8.3	76.5	6.1	5.0	0.08	0.1	0.3	
Sum	32.0	6.4	36.4	7.9	37.4	7.2	31.4	4.8	32.9	5.4	34.4	5.1	2.8	0.04	0.1	0.5	0.5
Standard	73.9	12.2	81.7	15.8	83.8	14.3	72.2	10.1	75.0	10.4	78.2	10.0	2.3	0.04	0.2	0.5	0.5
Receptive	23.8	8.1	29.0	6.9	30.9	7.0	24.6	7.7	26.6	5.6	30.5	5.9	1.7	0.03	−0.1	0.4	0.1
Expressive	54.5	24.1	64.8	20.3	68.7	16.9	52.4	17.4	59.4	16.1	62.8	13.6	0.7	0.01	0.1	0.3	0.4
Written	2.8	3.6	4.4	5.6	5.3	4.9	2.1	2.8	3.6	3.8	4.0	4.0	0.3	0.01	0.2	0.2	0.3
Daily living Skills																	
Sum	37.4	6.1	38.1	7.0	38.2	6.0	3□.0	5.9	37.3	5.8	36.0	3.8	0.9	0.02	0.1	0.1	0.4
Standard	83.2	12.0	84.9	14.4	85.2	12.5	82.7	12.3	83.6	11.4	81.2	7.5	1.1	0.02	0.0	0.1	0.4
Personal	43.6	12.1	46.9	12.8	50.3	10.9	45.4	11.4	46.7	11.1	46.3	14.8	2.1	0.03	−0.2	0.0	0.3
Domestic	6.2	4.3	6.7	3.5	7□4	3.3	7.5	5.6	8.7	6.2	7.4	4.3	1.2	0.02	−0.3	−0.4	0.0
Community	14.3	7.2	16.9	9.3	18.4	8.1	13.6	6.9	15.0	6.3	16.7	6.0	0.2	0.00	0.1	0.2	0.2
Social Skills																	
Sum	31.6	4.9	34.4	5.3	35.2	5.4	30.0	5.0	30.2	4.2	31.6	4.0	2.7	0.04	0.3	0.9	0.8
Sta□dard	74.7	8.9	79.9	9.9	81.4	10.0	71.6	9.0	71.9	7.6	72.6	7.3	2.7	0.04	0.3	0.9	1.0
Interpersonal Relationships	34.6	10.7	40.0	10.6	41.9	9.5	30.3	12.2	32.0	10.8	36.8	10.2	1.1	0.02	0.4	0.8	0.5
Play and leisure time	23.5	9.6	28.8	8.7	32.5	7.1	26.1	7.0	27.5	7.5	30.4	9.0	3.3	0.05	−0.3	0.2	0.3
Coping skills	8.6	4.5	10.5	5.7	11.0	5.2	6.6	4.4	6.7	4.2	7.4	2.9	0.8	0.01	0.4	0.8	0.9
Motor Skills																	
Sum	24.8	3.9	24.9	5.2	27.1	4.7	25.0	4.0	26.4	3.6	25.0	3.8	7.6	0.11	−0.1	−0.3	0.5
Standard	83.9	11.9	84.5	15.5	91.3	14.5	84.7	12.4	88.9	10.9	84.8	11.4	7.8	0.11	−0.1	−0.3	0.5
Gross	68.4	7.8	68.7	8.8	74.0	6.7	69.9	7.7	72.4	8.0	72.5	6.6	3.8	0.06	−0.2	−0.4	0.2
Fine	33.8	8.4	37.3	11.6	42.1	10.8	36.2	10.0	39.3	9.9	40.2	12.2	2.7	0.04	−0.3	−0.2	0.2

DEPARTMENT OF AGRICULTURE DEVELOPMENT AND FARMERS WELFARE

1. **Horticultural therapy –a tool to rehabilitate the differently abled children at schools**

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

Objectives

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

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

Results

Table 1 reports Mean and Standard Deviations for both groups .The result showed a significant difference that the emotional intelligence of the experimental group was significantly improved after the horticultural therapy programme. The children showed significant improvement in the six subscales of the emotional intelligence scale, including the utilization of emotions, recognition and consideration of others' emotions, recognition and expression of their own emotions, emotional regulation and impulse control, and relationships with teachers and peers after the horticultural therapy

program. The results of this study also revealed that there is a significant effect for Time, evidencing that all children improved their performance in these areas from test to re-test. For each of these four variables, a significant interaction of the Time x Group was found demonstrating that the improvement was statistically higher for the Treatment group than for the Control group. The results of this study suggests that the horticultural activities program is effective in terms of emotional intelligence for school going children with Autism.

Several research studies have also reported the positive effects of horticultural activities on emotional intelligence (Park and Huh, 2010; Kwon ,2012 Ryu et al., 2013; Hwang et al 2004). Study conducted by Jeong et al. (2011) showed that 6-year-old children showed significant improvements in their emotional intelligence in terms of self-awareness, recognizing emotions in others, self-regulation, and emotional regulation of others after a 14-session horticultural activity program. Park and Huh (2010), in a study on 5- to 7-year-old kindergarteners showed significantly improved in self-awareness and emotional regulation of others in emotional intelligence through a 32-session horticultural activity program. Kim et.,al (2014) also stated that children's experiences in gardens or in observing the plant growth process in cooperation with their peers provide opportunities for emotional development .

It can be concluded that horticultural therapy program improved the emotional intelligence, of school going students with autism of 10 to 15 years of age, who participated in this study. Horticultural Therapy program was effective in improving utilization of emotions, recognitions and expression of own emotions, emotional regulations and impulse control, recognitions and consideration of others emotions, relationship with teachers and relationship with Peers. This is mainly because horticultural activity stimulates diverse emotions and triggers sincere communications with other participants. It enables children to naturally express emotion and develop creativity. Horticultural therapy activities largely reduces discursive behavior, social withdrawal, and frightened behavior that cause difficulty in interpersonal relationship, through experiences of touching and identifying vegetation. Therefore, this research

suggests requiring horticultural activity program for children with autism.

FIGURE 1 ; INAGURATION OF THE HORTICULTURAL THERAPY GARDEN AT VIMALA HRIDAYA SCHOOL KOLLAM

FIGURE 2 : A DIFFRENTLY ABLED CHILD AT GOVT SCHOOL ARNATUKKARA TRISSUR WATERING THE PLANTS USING SPONGE IN THE ROTATING POTS WHICH IS COMPLIMENTING PHYSIOTHERAPY

FIGURE 3 CHILD WITH AUTISM USING HANGING POTS WITH PULLEY WHICH ENHANCES THE FINE MOTOR SKILLS

Table 1: Horticultural therapy programme and its impact on Emotional Intelligence

Emotional Abilities	Experimental Group (n= 22)				Control Group (n=22)				ANOVA					
	Pre HT		Post HT		Pre HT		Post HT		Time (df 1, 30)		Group (df 1, 30)		Group X Time (df 1, 30)	
Utilization of emotions	M	SD	M	SD	M	SD	M	SD	F	P	F	P	F	p
Recognitions and consideration of others emotions	6.06	1.12	8.88	0.500	6.88	1.20	6.81	1.28	43.87	<.05	3.89	=.06	47.95	<.05
Recognitions and expression of own emotions	3.22	0.66	5.91	0.37	3.28	0.51	3.44	0.57	126.88	<.05	70.42	<.05	100.53	<.05
Emotional Regulations and impulse control	1.87	1.26	5.88	0.500	3.06	1.436	3.12	1.71	113.37	<.05	3.46	>.05	106.50	<.05
Relationship with teachers	2.50	1.26	5.81	0.750	3.44	1.09	3.62	1.20	77.62	<.05	3.52	>.05	61.88	<.05
Relationship with Peers	5.55	1.29	6.32	1.46	6.59	2.01	6.59	1.65	4.94	<.05	2.06	>.05	4.94	<.05

2. **Pesticide residue monitoring and promotion of "Safe to eat" food commodities in Kerala**

(PI : Dr. Ambily Paul, Associate 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

The target of this project wasto monitor pesticide residues in vegetables, fruits and other food commodities collected from public market, organic shops, eco shops and directly from farmers field and to provide the results in public domain (www.

kerala.gov.in) periodically so as to make the consumers to create strong public awareness on pesticide residues in vegetables, fruits and other food commodities and 56 reports have been published till now. The general public is made aware of edible commodities which are most contaminated and least contaminated based on the published results and hence they have the option for the selection of commodities which are safe to use. In addition, the commodities frequently contaminated with pesticides are grown to ensure availability of safest commodities at house hold level. It is also established that the awareness about presence of pesticide residues on vegetables/fruits/spices has sensitized people of Kerala to turn back to organic agriculture and to promote cultivation in backyard, schools, offices and even in fallow lands through various projects *viz.,*SubhikshaKeralam, one of the prestigious projects of Govt. of Kerala.

During 2021-2022, 1136 samples from open market, farm gate, eco shop and organic shop were analyzed for the presence of pesticide residues. Out of the total samples, 344 was contaminated with pesticide residues (30.28 %). Among vegetables the lower contamination was repported in samples collected from both ecoshops (21.11%) and organic shops (21.05%). The highest detection of pesticide residues was reported in samples collected from open market (32.87%). Among vegetables, chilli, capsicum, amaranthus, curry leaves, fenugreek leaves, mint leaves were the most contaminated. Out of the 77 fruit samples analysed, 14 samples (18.18 %) were contaminated, apple and grapes were the most contaminated fruits.

ICAR-IIFSR

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

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

Objectives:

a) To assess the response of major crops to nutrients in pre-dominant cropping systems in different agro-climatic regions/ecosystems

b) To estimate the impact of nutrient application levels on deficiency in crop-livestock-human food chain continuum

Major Research Highlights :

- In rice-rice-fallow cropping system with medium duration rice (var. Uma), application of the recommended dose of fertilizer (RDF) NPK+Zn ($N:P_2O_5:K_2O$ @ 90:45:45 kg/ha + $ZnSO_4$ @ 20 kg/ha) in Kharif and NPK alone in Rabi recorded higher grain yield (11,017 kg/ha/year) and was comparable with grain yield (10,618 kg/ha/year) in farmers' practice, where NPK+Zn ($N:P_2O_5:K_2O$ @ 97:47:42 kg/ha + $ZnSO_4$ @ 20 kg/ha) in Kharif and NPK alone ($N:P_2O_5:K_2O$ @ 96:46:41 kg/ha) in Rabi were applied.
- Nutrient response (21.56 kg grain/kg nutrient applied) recorded in RDF was higher than nutrient response (20.22 kg grain/kg nutrient applied) in farmers' practice.
- The use of RDF generated larger net return (1.70 lakh/ha/year) than farmers' practice (1.64 lakh/ha/year), though the benefit:cost ratios in RDF (1.85) and farmers' practice (1.86) were comparable.

2. Diversification of existing Farming Systems under marginal household conditions

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

Objectives :

a) To enhance the productivity and profitability of marginal farmers households through IFS approach

b) To improve the livelihood and nutritional security through diversification approach

c) To estimate the impact of capacity building in diversification of crop + livestock system

Major Research Highlights :

- Hort + crop + dairy (0.49 ha), hort + poultry (0.34 ha) and hort + dairy (0.35 ha) were the three farming systems identified among marginal households at Varkala and Chirayinkeezhu blocks of Thiruvananthapuram district.
- Farm households in each farming system were provided with a total of Rs 0.10 lakh in interventions, which were undertaken in crop module (fertilization for balanced nutrition, intercropping coconut with banana var. nendran, and introduction of high yielding rice var. Uma), livestock module (mineral mixture for dairy cattle, and introduction of improved poultry breed Gramalakshmi), product diversification module (nutritional kitchen garden with grow bags and knapsack sprayer), and capacity building module (training for interventions).
- Improvement in net income per annum during fifth year 2021-22 was maximum in hort + dairy (Rs. 1.98 lakh) which was 138 percent increase over benchmark year 2016-17. Net income in hort + crop + dairy (Rs. 1.70 lakh) and hort + poultry (Rs. 1.63 lakh) also increased by 191 and 163 percent respectively over benchmark due to interventions.

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)

Objectives :

a) To address critical constraints of small and marginal farm holders for overall improvement of productivity

b) To increase the profitability of small and marginal households and ensure livelihood security

Major Research Highlights :

- Hort + crop + dairy (1.00 ha), and hort + poultry (0.95 ha) were the two farming systems identified among small and marginal households at Varkala and Chirayinkeezhu blocks of Thiruvananthapuram district.

- Farm households in each farming system were provided with a total of Rs 0.10 lakh in interventions, which were undertaken in crop module (fertilization for balanced nutrition, intercropping coconut with banana var. nendran, and introduction of high yielding rice var. Uma), livestock module (mineral mixture for dairy cattle, and introduction of improved poultry breed Gramalakshmi), value addition module (provision of coconut dehusker for dehusking, grading of coconut, and provision of milk can for hygienic storage, local marketing of milk), and optional module (nutritional kitchen garden with grow bags and knapsack sprayer).
- Improvement in net income per annum during fifth year 2021-22 was maximum in hort + poultry (Rs. 3.71 lakh), which was 383 percent increase over benchmark year 2016-17. Net income in hort + crop + dairy (Rs. 3.37 lakh) also increased by 305 percent over benchmark due to interventions.

ICAR- NBB

4. Exploration of gut microbiome for sustainablebeekeeping in India

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

Objectives:

- Collection of Indian Honey Bee and Stingless Bee for barcoding and metagenomic characterisation.

Major Research Highlights:

Collected the Indian bee samplesfrom three zones of Kerala (Thiruvananthapuram, Kottayam and Kannur districts) and the samples were sent for metagenomic analysis to Centre for Plant Molecular Biology and Biotechnology, TNAU, CCPI as per the standard protcols.

RASHTRIYA KRISHI VIKAS YOJANA (RKVY)

1. Establishment of National Level Quality Control Laboratory for Honey

(PI :Dr. Amritha V.S., Professor, Department of 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 National level quality control laboratory for honey was inaugurated on 25.01.2022. The laboratory is also well equipped with modern sophisticated equipments like HPLC,LC-MS/MS and FTIR. The method development and validation of protocols for quality analysis of the honey is completed and thus, the laboratory is equipped for rendering analytical services to beekeepers, institutions and entrepreneurs on payment basis.

2. Development of technologies including alternatives for banned pesticides for the management of pests and diseases of major crops in Kerala Subproject- 9 Registration of bio pesticides

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

Objectives:

To register potential bioagents as per the Insecticide Act 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 scrutenised 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.

3. Establishment of "Centre for formulation of convenient foods"

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

Objectives:

Establishment of a Centre for formulation of convenient foods

Major Research Highlights:

A Centre for formulation of convenient foods which could serve as a model minimal processing unit is established at College of Agriculture, Vellayani. The proposed centre could be utilized for technology dissemination and consultancy service with the intention of strengthening small scale processing units for undertaking commercial production and marketing of convenience foods and the centre could be utilized by the commercial entrepreneurs on payment basis.

INDIA METEOROLOGICAL DEPARTMENT (IMD)

1. Gramin Krishi Mausam Sewa (GKMS)

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

Objectives:

(1) Preparation and dissemination of Agromet Advisory bulletins to farmers using medium range weather forecasts received from IMD

(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

- 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 2021-22 it was conducted at three blocks of Thiruvananthapuramdistrict *viz*., Kattakada, Edava, Andoorkonam.

NATIONAL BAMBOO MISSION

1. Establishment of a small bamboo nursery for quality planting material production at Instructional Farm, College of Agriculture Vellayani

(PI: Dr.Biju Joseph, Assistant Professor, ARS Moncombu)

Objectives:

- To establish small bamboo nursery for quality planting material production and distribution.

Major Research Highlights:

Established a small bamboo nursery at Instructional Farm, College of Agriculture Vellayani. Mother plants were established for 33 species of commercially important and ornamental bamboo after obtaining mother plants from JNTBGRI Palode and KFRI Peechi. Infrastructure was developed for the nursery by repairing 500 sq m naturally ventilated polyhouse and inputs like manure, grow bags, weed mat, shade net etc were purchased for use in the nursery. Nursery work on production of bamboo planting material is in progress. 5250 Nos. of planting materials of bamboo have been produced.

DIRECTORATE OF ENVIRONMENT & CLIMATE CHANGE

GOVERNMENT OF KERALA

1. Development of drought tolerant cardamom hybrids through pollen selection and selective fertilization

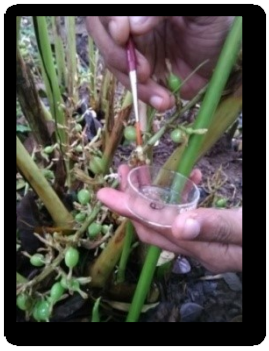
(PI: Dr. Roy Stephen, Professor, Department of Plant Physiology)

Objectives :

1. To explore the genetic variability in cardamom for water stress and high temperature status tolerance.
2. To identify the critical stress level for pollen selection and selective fertilization.
3. To evaluate the selectively fertilized hybrids for water stress and high temperature stress tolerance.

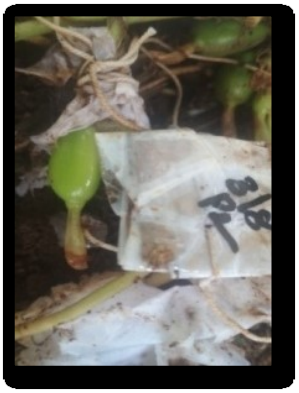
Major Research Highlights :

- The genetic variability was assessed and identified a most tolerant variety (PV3)
- Media for pollen germination was identified
- Critical temperature and critical water potential identified(35^0c and -2 bar)
- Selective fertilization was done
- Stress mitigation technique was standardized (Application of1% KCland 1%$CaCl_2$were proven the best treatments)

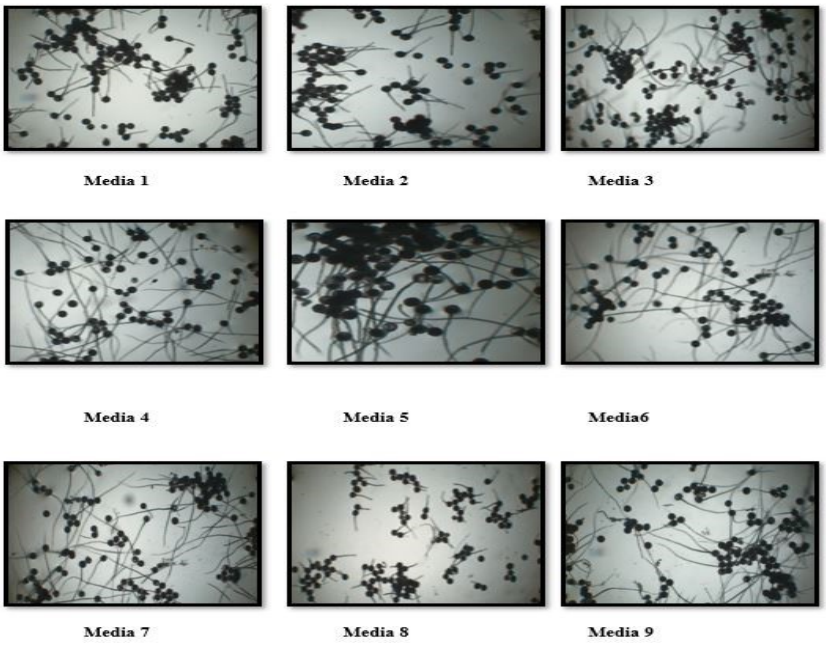


Pollination

Hybrid seeds



Pollen germination at different media



STATE HORTICULTURAL MISSION

1. Establishment of Advanced referral plant health clinic at College of Agriculture, Vellayani for diagnosing pests, diseases and nutritional problems of crops of Kerala

(PI: Dr.Radhika N.S., Assistant Professor, Plant Pathology)

Objectives:

To improve the facilities of the Advanced Research Centre of Plant Disease Diagnosis under the Dept.of plant Pathology, College of Agriculture , Vellayani as an efficient system in the state for timely identification and management of plant diseases, pests, and nutrient based problems, Consultancy and advisory services for farmers of the state, training centre for extension personnels and research scientists and advanced research facilities for the students and faculties.

Major Research Highlights :

Funding of Rs. 25 lakhs was received which was utilized for the purchase of essential laboratory equipments *viz*., double distillation units, vertical autoclave, orbital shaker, laminar air flow, deep freezer, precision balance, BOD , hot air oven, ice flaking machine, refrigerators. An insect free net house is under construction .Consumables for detection and diagnosis of pathogens were also procured.

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

1. Development of postharvest biocontrol technology for the management of postharvest crown rot of banana

(PI: Dr. Susha S Thara, Asst. Professor, Department of Plant Pathology)

Objectives

i. To isolate and identify the fungal pathogens associated with crown rot of banana fruits
ii. To take up the qualitative study of the naturally occurring mycoflora on banana fruit
iii. To evaluate the antagonistic potential of the natural mycoflora and biocontrol agentsdeveloped by KAU against crown rot causing pathogen..
iv. To understand the mechanism of action of antagonist
v. To study the effect of selected mycoparasite against important crown rot pathogens onfruit
vi. To evaluate the physical changes and organo leptic properties of the treated fruits bythe action of antagonist
vii. To study the survival of biocontrol agent on the fruit.
viii. To examine the shelf life of the fruits treated with biocontrol agents

Major Research Highlights

As part of the study, survey was conducted at three locations each in five districts of Kerala viz., Thiruvananthapuram, Alappuzha, Pathanamthitta, Palakkad and Wayanad and 32 isolates of different pathogens were isolated from variety Robusta (Musa AAA). Morphological studies of the 32 isolates obtained from the diseased specimens were carried out and ten were identified as *Lasiodiplodia* sp., eight as *Colletotrichum* sp., five as *Fusarium* sp., three as *Aspergillus* sp., two as *Cunninghamella* sp., two as *Verticillium* sp., one as *Penicillium* sp. and one as *Rhizopus* sp. Morphological and molecular identification confirmed the major pathogens as *Lasiodiplodia theobromea* and *Colletotichum musae*.

Lasiodiplodiatheobromea *Colletotichum musae* *Fusarium sp.*

Plate 1 Fruits with crown rot symptoms infected by different pathogens

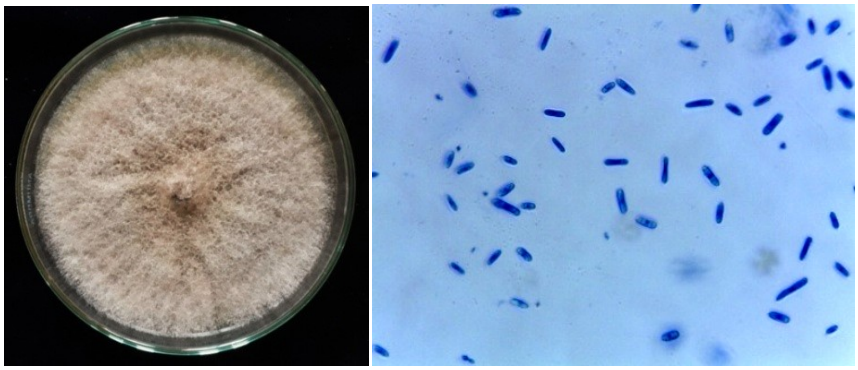


Plate: 2 Culture plate and conidia of *Colletotichum musae*

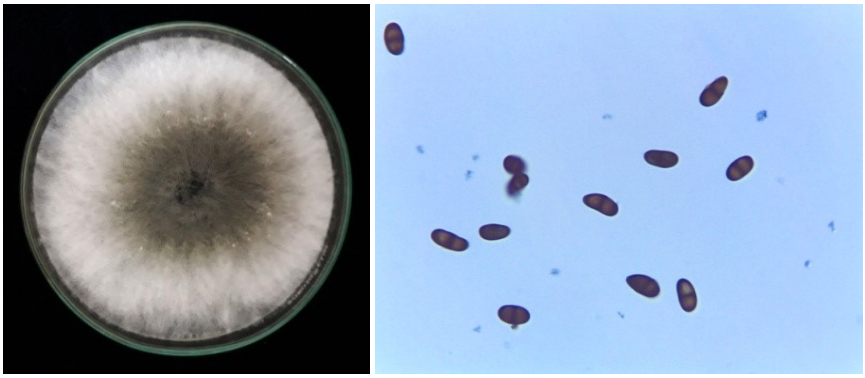


Plate: 3 Culture plate and conidia of *Lasiodiplodiatheobromea*

Variations were noticed in symptoms of diseased fruit samples from different locations such as restricted rot at crown region, rot at crown region with irregular spots on fruit and complete fruit rot extending from crown region to distal end with

mycelial growth. Based on the pathogenicity test, lesion coverage and scoring results, isolate from Kazhakkuttam of Thiruvananthapuram district was found to be most virulent with 100 % PDI (Percent Disease Index). Based on the morphological studies, the isolate was identified as *Lasiodiplodia* sp.

Morphological studies of T2C were carried out based on the cultural characters and microscopic observations. The mycelial colour was initially white and later became grey to black with irregular margins and flat topography. Microscopic studies revealed that mycelia and spores were initially hyaline and later turned to dark brown in colour and were ovoid with single septa and produced within fruiting body.

Effect of temperature on growth of these pathogens were evaluated by growing at different temperatures viz., 15°C, 20°C, 25°C, 30°C and 35°C. In the case of *Lasiodiplodia theobromea*at 30 °C growth of mycelium completely covered the petri plate in two days after inoculation. Maximum radial growth of mycelium of *Lasiodiplodia theobromea* was observed at 30°C (4.5 cm) followed by 35°C (4.2 cm). The mycelial growth reduced with reduction in temperature and complete inhibition of growth was recorded at 15°C (0 cm). Where as in *Colletotichum musae* the optimum temperature was recorded as 25^0C and reduction in growth was observed at further increase in temperature and growth was completely reduced at 15°C. Present study revealed that at higher temperatures disease severity (%) may be increased due to the increased growth of the pathogen and the shelf life of banana can be increased by storage and transit at lower temperature.

Fructosphere microflora was isolated from healthy banana fruits. 22 fungal isolates and 7 bacterial isolates were obtained from 15 different locations of Kerala. Fungal isolates namely W3B-BC (*Aspergillus* sp. from Vaduvanchal, Wayanad) and A3B-BC (*Aspergillus* sp. from Kayamkulam, Alappuzha) were observed to have the highest inhibitory effect among the fructosphere isolates on growth of the pathogen with 44.44 and 40.00 % of inhibition respectively. Among KAU isolates viz., *Trichoderma harzianum* (KAU T_2), *Trichoderma viride* (KAU T_6), *Bacillus subtilis* and *Pseudomonas fluorescens* (PN 026)*, T. harzianum* recorded maximum inhibition (55.60 %). *T. harzianum*, W3B-BC and A3B-BC were then selected for *in vivo* studies due to promising antagonistic action. Based on molecular studies, the

virulent pathogen was identified as *Lasiodiplodia theobromae*(MN046365) and effective biocontrol agents W3B-BC and A3B-BC as *Aspergillus aculeatus* (MN046330) and *Aspergillus niger* (MN04 6326) respectively with universal Inter Transcriptional Sequencing (ITS) primers

The best three biocontrol agents were used for *in vivo* studies. Among the biocontrol agents, *T. harzianum* showed maximum inhibition of disease development (66.67 % PDI) with increased shelf life and better organoleptic properties. An increase in shelf life was noticed in case of fruits treated with *T. harzianum* (3.25 days).

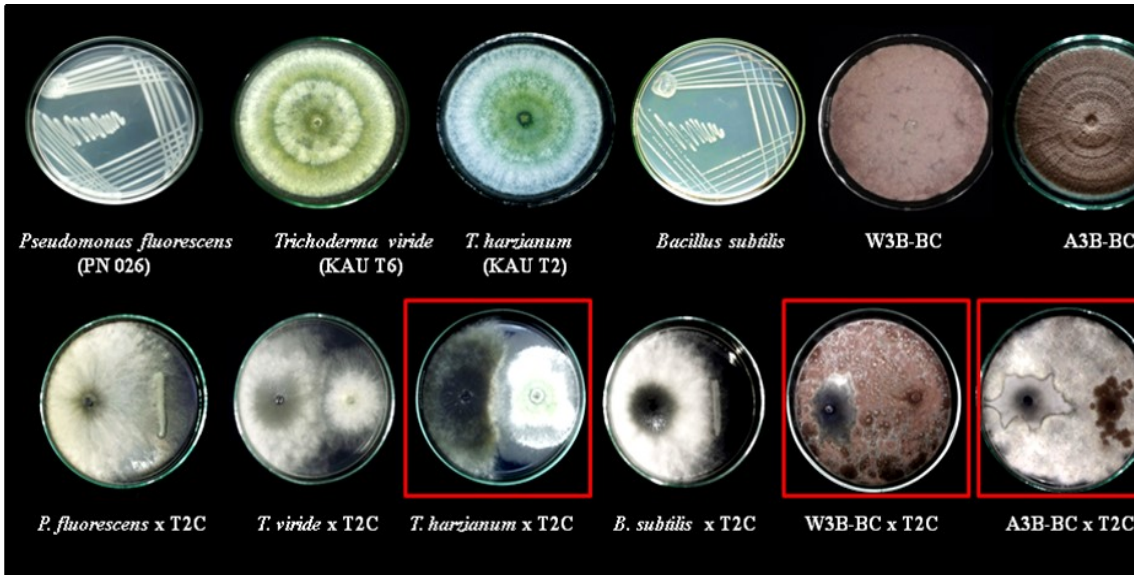


Plate : 3 Antagonistic effect of biocontrol agents against the pathogen

Organoleptic evaluation was done on fifth day after inoculation of the pathogen in healthy banana hands. Based on the scores given for each parameter for each treatment Kruskal Wallis test was done using the online software SciStatCalc. Mean of ranks and mean score value for overall acceptability was analysed for all the treatments. Among the treatments selected from *in vitro* studies, maximum mean of ranks were obtained for *T. harzianum* (80.75) among biocontrol agents at 0.05 %. Out of the 32 pathogenic isolates, *Lasiodiplodia theobromae*. was the major as well as the virulent pathogen associated with crown rot of banana in Kerala. Since *T. harzianum* inhibited the growth of pathogen and also enhanced shelf life and organoleptic properties of the fruits, it can be used as an effective biocontrol strategy for managing postharvest crown rot of banana caused by *Lasiodiplodia theobromae.*

REVOLVING FUND

1. AICRP on (HB&P) - Revolving Fund for production of bee hives, Bee colonies and other Beekeeping equipments

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

Objectives:

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

Income generated during 2021-22:Through sales of honey and bee colonies

Rubber Honey(101.5 Kg)	-	Rs. 36540.00
Indian Bee colonies (80 Nos.)	-	Rs. 112000.00
Stingless Bee colonies (85 Nos.)	-	Rs. 187000.00
Refunded amount	-	Rs. 360.00

Total	-	Rs. 335900.00/-

Total Expenditure 2021-22 - Rs. 2,89,319.00

Total receipt for the year 2021-22 - Rs. 335900.00/-

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

(PI : Dr. B. Aparna, Professor & Head, Department of Organic Agricutlure)

Objectives:

1.To carry out the analysis of soil, plant, water,compost and manure samples received fromfarmers,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.

8.Major Research Highlights:

Sl. No	Samples Details	No. of samples analyzed	Income Generated during 2021-22 (Rs)	Total Expenditure
1.	Soil	982	**5,05,772/-**	**2,36,432/-**

2.	Plant	74	**(Rupees Five lakh five thousand seven hundred and seventy two only)**	**(Rupees Two lakh thirty six thousand four hundred and thirty two only)**
3.	Manure/ Compost	10		
4.	Water	32		
5	Rental charges-10000			
Soil Health Cards distributed to the farmers – **157 Nos** Advisory services-**204**				

3. Solid Waste Management - Revolving Fund

(PI: Dr. Naveen Leno, Assistant Professor, Dept. of Soil Science and Agricultural Chemistry)

Objectives:

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 processing technology (Patent 321857). The organic fertilizer thus produced is fortified and sold through KAU outlets.

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

The details of income and expenditure for the year 2020-21 are furnished below.

Income & Expenditure 2021-22

Period	Income for 2021-22	Total Income including previous years balance	Expenditure	Balance
2021-22	96,294	**2,51,900**	91,170	**1,60,730**

4. Revolving Fund – Biotech Keralam - for Mass multiplication and supply of Microbial Inoculants

(PI: Dr. Chitra N, Assistant Professor, Dept. of Microbiology)

Production details from 01-04-2021 to 31-3-2022

Sl. No.	**Item**	**Quantity (kg)**	**Unit price (Rs)**	**Amount (Rs.)**	**Remarks* ****
1.	Pseudomonas	1777	75	132534	Rs.52 /- (1/2 kg pkt) Rs.792.50/**
2.	Trichoderma	2100	100	205580	Rs. 4420/-**
3.	Trichoderma(½ kg)	82	55	4510	
4.	AMF	81	85	6885	
4.	Azotobacter	3	85	255	
5.	Azospirillum	15	85	1275	
6.	P- Solubilizer	8	85	680	
7.	K- Solubilizer	3	85	255	
8.	Rhizobium	16	85	1360	
9.	PGPR MIX -I	4292	80	342064	Rs. 1276/-** Rs. 20/-*
10.	PGPR MIX –II	3224	80	257004	Rs. 896/-** Rs.20/-*
11.	Composting Inoculum	1106	90	99329	Rs. 189/-** Rs. 22/-*
12.	Quality Analysis	34	1000	34000	
13.	**Mother cultures**		The sale price of AMFmother cultureis Rs.1000/500g under KAU and Rs. 4000/ 500g under the State Dept.of		
	AMF	200 g		400	
14.	*Pseudomonas*	8		14625	
15.	*Trichoderma*	8		14625	
16.	*Azospirillum*	5		7910	
17.	P- Solubilizer	2		1130	

18.	K- Solubilizer	2	Agriculture.The sale price of mother cultures of all organisms is Rs.500/2 slants under KAU andRs. 2000/ 2 slants underthe State Dept.of Agriculture.	1130	
19.	*Azotobacter*	1		565	
Total (B)		**12,707**		**11,26,116**	**7688/-**

*Handling charge @ 5 % givento the Centres under KAU

**10 % deduction inproductcost given to the Ecoshops.

Gross income: Rs. 11,26,116/-

Expenditure : Rs. 11,79,553.25/-

5. Revolving fund- Sustenance programme of concluded RKVY Project "Participatory Integrated Management of Fruits Flies Infesting Fruits & Vegetable Crops

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

Objectives:

Mass production and sale of biopesticides, trichocards and pheromone traps

Major research highlights:

Produced and sold biopesticides such as *Beauveria bassiana, Metarhiziumanisopliae* and *Lecanicillium lecanii which could cover an area of – ha and* and --- no.of pheromone traps such as cue lure traps and methyl eugenol traps with a coverage of – ha. A new trichogramma production unit was established ustilizing the facilities established under AICRP on Biological Control and sales of trichocards of *Trichogramma chilonis* and *T. japonicum*to farmershas been inititated .Total biopestcide production during 2021-22 was 1.5 tonne,pheromone traps1200 no. and trichocards 50 cc. The annual outrurn wasRs. 2.80 lakhs.

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

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

Objectives:

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

Major research highlights:

The leaf / tissue analytical laboratory established in August 2008 under the State Horticulture Mission (Kerala) funded project for a total outlay of Rs.20 lakhs (completed in June 2011), is being maintained functional by instituting a revolving fund with a corpus of Rs.1.250 lakhs The lab is undertaking analysis of plant and soil samples received from farmers, research scholars, scientists, R and D institutions, etc. to ascertain the nutrient status so as to provide suitable fertilizer recommendations. During 2021-'22, a total of 3272 samples (including soil, plant and extracts) were tested and an amount of Rs.5,38,500/- was received as analytical charges

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 **236.40 kg** of breeder seed and truthfully labeled seeds, **35254** protray seedlings and 1**658** polybag seedlings worth Rs**. 5.49 lakhs** were distributed among the farmers during **2020-2021**.

8. Revolving Fund - Commercialization of value added products

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

Objectives:

- To utilize locally available farm produce for value addition
- To generate employment for rural women

The details of income and expenditure during the year 2021 – 22 is furnished below

Period	Income for 2021-22	Expenditure(Rs)	Profit(Rs)
2021-22	**1,09,750**	**25,948.49**	**83801.51**

9. RF scheme on Planting material production in Fodder crops

(PI : Dr. Ameena M, Professor &Officer i/c AICRP on Forage Crops and Utilization,)

Objectives:

To establish a fodder seed production unit at College of Agriculture, Vellayani

Major research highlights:

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 2020-21 is furnished below

Period	10. Total income 11. (Rs)	12. iture upto31.03.2021 13. (Rs)	14. Balance (Profit) 15. (Rs)
2020-21	16. 79,221.0	17. 55,216.0	18. 24,105.0

SATELLITE STATIONS

I INTEGRATED FARMING SYSTEMS RESEARCH STATION (IFSRS), KARAMANA

1. AICRP on Integrated Farming Systems [On Station Research]

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

(PI : Dr. Jacob John, Professor & Head, IFSRS, Karamana)

Objectives:

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

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

Major research highlights:

- Rice based IFS model generated the highest gross returns (Rs.218416 per 0.20 ha); followed by homestead (Rs.214877 per 0.20 ha), banana (Rs 189594 per 0.20 ha) and coconut based (Rs.161307 per 0.20 ha) IFS models.
- Energy output was the highest for coconut based (2210537 MJ) IFS model, followed by homestead based IFS model (2150104 MJ), on account of the energy of standing tree stocks in these models.
- All the four IFS models had Sustainable Value Index (based on seven year data) greater than 0.60. The highest SVI was for the coconut-based IFS model (0.72).
- Net GHG emission was the lowest for homestead based IFS model (-67978.8 kg

CO_2- equivalent), followed by coconut (-19510.6), banana (-2524) and rice (-729.2) based IFS models. Hence, in terms of carbon sequestration and net GHG emission, all the four IFS models are climate smart.

2. Rice based cropping sequences to supplement integrated farming systems

(PI : Dr. Jacob John, Professor & Head, IFSRS, Karamana)

Objectives:

To identify performance of different rice based croppingsequences to supplement integrated farming systems in lowlands

Major research highlights:

Among the different cropping sequences, rice-sweet potato-cucumber sequence was the most profitable with net returns of Rs.369705 ha^{-1} followed by rice-okra-amaranthus (Rs.267081 ha^{-1}) and was found to be on par with rice-bush cowpea- sweet potato (Rs.220032 ha^{-1}). B:C ratio was the highest for rice-sweet potato-cucumber (2.20) sequence, followed by rice-okra-amaranthus (1.90) and rice-bush cowpea-sweet potato (1.71).

Rice-bush cowpea-sweet potato sequence was superior in terms of family nutrition while rice- (guinea grass+fodder cowpea)- [guinea grass (cuts of earlier planting) + fodder cowpea], in terms of meeting livestock nutritional requirement.

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

(PI : Dr. Jacob John, Professor & Head, IFSRS, Karamana)

Objectives:

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

Major Research Highlights:

Develop and scale up region specific IFS models/restructure existing homestead farms to serve as replicable models in progress.

4. Yield gap analysis of major crops and impact analysis of *JaivaGriham* (IFS) project in different agroecological units of Kerala

(PI : Dr. Jacob John, Professor & Head, IFSRS, Karamana)

Objectives:

- To identify the yield gap, present level of technology adoption and related constraints in improving crop productivity in major crops in different AEUs of Kerala
- Analyse and assess the impact of the integrated farming system units established under *JaivaGriham* project of the State in the different AEUs
- Identify successful, time tested, integrated farming systems in the different AEUs
- Status: Data collection from farmers in progress.

5. Identifying coir pith based nutrient rich growing media suitable for vegetable cultivation in terraces

(PI : Dr. Sudha. B, Assistant Professor, IFSRS, Karamana)

Objectives :

- Develop a light weight, nutrient rich growing medium suitable for terrace cultivation by substituting the sand and soil fractions of conventional potting media with lignin rich crop residues like coir pith and rice husk.
- Assess the growth, yield and quality of vegetable crops grown on the medium
- Work out the economics of cultivation with different growth media.

Major Research Highlights :

- Different potting media generated and experimented in the study could significantly influence the weight of filled grow bags as recorded with the six main field trials. The conventional medium (Soil , rock dust and cow dung in the ratio 1:1:1 on volume basis) registered the highest weight per bag (13.82-13.96 kg). Maximum weight reduction was achieved with the medium comprising of

rice husk and coir pith compost in the ratio 2:2 on volume basis (3.72- 3.96 kg). Other treatments (media) recorded weight reduction to the tune of 23-45 per cent compared to conventional media.

- The efficacy of media in enhancing production of vegetables was evaluated through pot culture studies. With regard to yield of different vegetable crops, among different treatments, the medium comprising of soil , vermicompost and coir pith in thé ratio 1:1:2 (volume basis) performed significantly better and was closely followed by or comparable to soil , rock dust, vermicompost and coir pith in the ratio 1: 0.5 :1 :1.5.
- Farm trials (pot culture) carried out for two vegetable crops bhindi and amaranthus at 5 different locations (Nemom, Kudappanakkunnu, Nedumangad, Vamanapuram and Parassala) of Thiruvananthapuram district confirmed the superiority of the above media.
- The medium comprising of soil ,, vermicompost and coir pith in thé ratio 1:1:2 (volume basis) registered crop yields to the tune of 3.45 kg fruits per plant (bitter gourd) 2.06 kg (bhindi), 1.05 kg (vegetable cowpea), 2.22 kg (tomato), 0.814 kg (chilli) and 2.99 kg (brinjal) per plant grown in containers. One crop of amaranthus was successfully raised utilizing the residual soil nutrients of the media, after the harvest of these main crops.

6. Developing climate smart banana based farming systems in AEU 1,8,9 and 12 of Thiruvananthapuram district

(PI : Dr. Meera, A. V., Assistant Professor, IFSRS, Karamana)

Objectives :

- Identify the major banana based cropping systems prevalent in AEUs 1, 8, 9 and 12 of Thiruvananthapuram district
- Exploration of all recommended management practices to improve soil carbon sequestration potential of banana based farming system in the selected farms
- Development of location specific climate smart integrated farming system models ensuring food security and economic sustainability

Major Research Highlights :

- Survey carried along Nedumangad taluk of Thiruvananthapuram district, AEU 9, to identify major banana based cropping systems prevalent.
- Selected two farmers's plot per village in the taluk to impose all scientific management practices viz., organic manure application, soil test based fertilizer recommendation, KAU micronutrient mixtures and pest and disease management using bio control agents.
- Trial is in progress in the farmers' fields.

7. Biofumigation for the development of integratedpest management strategy for vegetable cowpea

(PI : Dr. Sajeena A., Assistant Professor (Pl. Pathology), IFSRS, Karamana)

Objectives:

- Evaluating the biofumigation potential of garlic bulbs against *F. oxysporum* and black aphid of vegetable cowpea
- Developing an integrated pest management strategy incorporating the biofumigant as a component

Major Research Highlights :

- *Fusarium oxysporum* was isolated from vascular wilt affected vegetable cowpea plants
- Biofumigation using 0.5g, 1.0g and 1.5g of garlic bulbs completely (100%) inhibited the fungus *in vitro* compared to only 72 per cent inhibition by *Trichoderma* sp (KAU isolate)
- *Trichoderma* sp (KAU isolate) was compatible with the biofumigant. However, an interval of one week is desirable between their soil application as indicated by an initial suppression of growth of *Trichoderma* when the bioagent and biofumigant were placed together
- Bioagents *viz*., *Trichoderma harzianum* and *Trichoderma viride* were completely compatible, *Pochonia chlamydosporium, Paecilomyces lilacinus, Metarhizium anisoplea* were partially compatible and *Pseudomonas fluorescens* as well as

Beauveria bassiana were incompatible with the biofumigant

- The major compounds in garlic essential oil were identified as tri sulfide di-2-propenyl (50.30%), trisulphide, methyl 2-propenyl (17.67%), diallyl disulphide (15.71 %) and tetra sulfide di-2-propenyl (4.38%) and their structures also were arrived at
- The biofumigant at 1g completely inhibited the mycelial growth of other soil borne pathogens of vegetable cowpea *viz*., *Sclerotium rolfsii* and *Rhizoctonia solani in vitro*
- Fumigant toxicity of garlic essential oil against Callosobruchus chinensis (LC50) was identified as 0.239 mg/L air
- Contact toxicity of garlic essential oil against Callosobruchus chinensis (LC50) was identified as 0.066 mg/cm2

8. Farmer participatory technology demonstration of IDM package

(PI : Dr. Sajeena A., Assistant Professor (Pl. Pathology), IFSRS, Karamana)

Objectives :

Demonstration of IDM package for vascular wilt of vegetable cowpea in farmers fields of Thiruvananthapuram, Kollam and Pathanamthitta districts

Major Research Highlights :

- The trial was undertaken in Thiruvananthapuram, Kollam and Pathanamthitta districts in 3 farmer's fields respectively
- Farmers practise, package of practice and an integrated disease management package were compared
- Analysis of soil from all the farmers fields were undertaken at Radio tracer Laboratory, Vellanikkara, Thrissur and soil health cards have been prepared with recommendations for each farmer's field
- Compared to other two districts, the incidence was very high in Kollam district and the vascular wilt disease could not be completely controlled by the IDM package
- However, the highest yield was observed in plots applied with the IDM package in all the 3 districts

COCONUT RESEARCH STATION (CRS), BALARAMAPURAM

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

(PI : Professor and Head, CRS, Balaramapuram)

Objectives:

Five station-wise funding sub-projects are i. providing infrastructural facilities at CRS Balaramapuram. ii. Effect of secondary and micronutrients on yield, pest and disease incidence in coconut. iii. Performance evaluation of new and improved varieties of pepper as an intercrop in coconut in the red loam soil tracts of southern Kerala. iv. Establishment and standardization of agro-techniques for dwarf coconut palms suitable to southern Kerala under rainfed conditions. viz. 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 Achievements:

a. Laying out and planting 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 for higher yield and to standardize the nutrient requirement for maximum yield from seedling stage. The seedlings were planted at four different spacing viz., 6m x 6m, 6.5m x 6.5m, 7m x 7m and 7.5m x 7.5m with two schedules of NPK fertilizer application. The experiment is in progress. The plants put forth about 8 to 14 leaves in a year with maximum stem girth of 110 cm at this stage. 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 dwarf coconut palms start yielding after 5 years, stable yield could be obtained only by 10-15 years.

b. Black pepper rooted cuttings of new and improved varieties (PN I to VIII) 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 were laid out in Randomized

Block Design with 3 replications. The pepper vines put forth 3-5 branches, with vine length of up to 550 cm. The pepper vines of varieties I to VIII were planted in coconut garden. Action is being taken to get Panniyur 9 and 10 pepper varieties. 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 organic manure and fertilizers, plant protection chemicals and related research & farm developmental activities were carried out. Planting & maintenance of coconut germplasm. Maintenance and repairs of farm machineries /implements. Purchased Honda Power tiller.Maintenance of green house.Electrical accessories, Repair of pump, brush cutter, wheel barrow, spade etc. Plumbing works to strengthen the irrigation line.

d. 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 micronutrient, boron on the yield of coconut palm and to study the effect of secondary nutrients *viz*., calcium and magnesium and micronutrient, boron 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. Application of 1 kg lime + 0.5 kg Mg SO4 + 0.15 % solubor @ 3.5 litre/palm (two times application: first during May - June and second during September-October) along with KAU POP recommendations for coconut is found to decrease the incidence/infestation of eriophid mite and enhanced the nut yield. The treatments were found to be non-significant in the case of coreid bug infestation in coconut. There were infestation of beetle and incidences of leaf rot disease in few experimental palms.

e. Trainings on transfer of improved technologies of scientific coconut cultivation, hybridization in coconut, coconut production and plant protection practices, IFS, Value addition in coconut, banana and tapioca were conducted to rural youths, farmers, B.Sc. (Ag.) students.

2. Strengthening production of quality planting materials and bio-inputs in KAU

(PI : Professor and Head, CRS, Balaramapuram)

Objectives:

To produce elite seeds and quality planting materials

Major Achievements:Production of seeds and planting materials are being carried out. (List attached- Annexure 1)

3. 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))

Objectives:

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 was done. License for Neera tapping from Excise Department was obtained. Instruments for tapping Neera from coconut and collection boxes were made ready and trial run for tapping inflorescence sap was carried out. We could able to collect very small quantities of sap from these palms in February-April 2022 period. The samples were analyzed for Vitamin C, Acidity, T.S.S., Protein, Total and reducing sugars, Alcohol content, pH and minerals such as Na, P, K, Fe, Zn and Cu. The study has to be continued in this year 2022-23. Need training on Neera tapping (KAU methodology).

4. 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, Plant Pathology)

Objectives:

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:

The foliar diseases, mainly leaf spot and anthracnose were observed in the trial plants. The Fusarial wilt and cowpea mosaic were also observed, but in a negligible number. These affected plants were uprooted and destroyed. The foliar application of *Pseudomonas fluorescens* @ 2% checked the *Cercospora* leaf spot and anthracnose diseases in a significant way apart from chemical check i.e. copper oxy chloride @ 0.2%. The organic preparations such as papaya leaf extract (100g/l), coconut milk & curd preparation (1:1) (@50ml/l)), butter milk (3 times dilution) and Egg-lemon jaggery extract were found to be effective in controlling *Cercospora* leaf spot and anthracnose foliar diseases in a significant manner, from two leaf stage to flowering stage (50%) at 10 days interval.

5. ICAR-NAHEP-CAAST-KAU Project on, "Knowledge and Skill development on Coconut based Secondary Agriculture"

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

Objectives:

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 purchased under CAAST-KAU Project like copra dryer, wet pulverizer, coconut milk extractor, coconut chips slicer and roaster were installed and trial run was done and are being utilized for regular production cum training in the case of Virgin coconut oil and coconut chips since April 2021.

- Virgin oil processed from the pure coconut milk adds good revenue for the coconut research station. A quantity analysis was carried out to find the volume difference from both the conventional and mechanized methods. It was observed that from 100 medium sized fresh coconuts, we could get 6.4 Liters of virgin oil where as in conventional method it was only 4.5 Liters.

- Training on coconut nursery propagation and management for 10 SC/ST trainees of Agro Service Centre, Nedumangad was conducted on 21st ,23rd

and 25th of February 2022

- Twenty-five trainees from Aryanad as a part of ATMA exposure visited on 22/02/2022 and capacity building sessions was delivered on coconut cultivation, management and value addition

- Two-day training cum work shop on value addition in coconut, banana and tapioca was conducted on March 3-4 & March 9-10 the training was inaugurated by Block panchayath president Shri. Manomohan, M.V on 3rd March and about 53 trainees attended the programme. One full day session consisting of opportunities and challenges in the value addition sector and second day was organized with production of value-added products from coconut, banana and tapioca. The trainees were given hands on training on the production of value-added products from coconut kernel at the facilitating centre. Dr. Sajeev, M.S., Principal Scientist, CTCRI, Sreekaryam and Dr. Geetha Lakshmi, P. R., Assistant Professor, College of Agriculture Vellayani handled the sessions.

- Shri S. S. Nagesh, Chief of Agriculture Division visited the facilities available in the lab on 16/03/2022

- One day training session on various value-added products from coconut was conducted for BSc. Agricultural students PDM University, Bahadurgarh, Haryana state as part of their RAWE programme. Lectures, demonstrations and practical classes were also included in the session.

- Our Athiyanoor block panchayath president and Agriculture Department officials has visited the Coconut Value Addition Facilitating Centre underCAAST Project and they were given an orientation on the production of value-added products and the working of machineries.

- A tube well is erected and pumping and distribution is pending at station

- A Video coverage regarding the operation of the machineries of the project and also the preparation of two value added products from coconut, that is virgin coconut oil and coconut chips were presented during International conference on the World Coconut Day, 02/09/2022.

- Eighty students attended online training organized along with SEED, Mathrubhumi as a part of world coconut day on 02/09/2022

- A video coverage on the value addition of coconut was taken by the Farm Information Bureau on 03/10/2022 and the programme was telecasted in

KissanKrishideepam, Asiantet.

- One day training session on value addition of coconut was provided for students undertaking Diploma in Agricultural Extension Services for Input Dealers (DAESI) on 15/10/2022.

- Training on value addition of coconut was provided for 15 SC/ST trainees of Vanasree, under Kerala Forest Department on 07/11/2022.

Research and Value addition activities carried out at CRS, Balaramapuram

- Different types of laddu from coconut such as desiccated coconut laddu, coconut jaggery laddu, defatted coconut flour laddu and coconut rava laddu were prepared and shelf life studies were conducted.

- **Preparation of Coconut Milk Curd** - A healthy vegan food which is coming under the category of super food, called coconut milk curd was prepared. The starter culture used was normal milk curd and the fermentation was done at ambient temperature.

- **Coconut Apple Juice** -Coconut apple / Coconut sprout is a natural isotonic food and excellent source of essential nutrients like proteins, vitamins and minerals which are powerful energy riser. The other ingredients used for preparing this drink were frozen milk, milk powder, sugar and cardamom as natural flavoring substance

- **Defatted coconut flour-**Defatted coconut flour, which can be used in the preparation of cookies and cakes was prepared from the coconut residue after coconut milk extraction. The residue was dried (50°C ,4 hr), powdered to produce defatted coconut flour and then aseptically packed into standing pouches. Coconut meat flour is high in dietary fibre that aids in lowering cholesterol and provides other health benefits to the human body. Defatted coconut flour Laddu and cookies were prepared from the flour. Cookies were prepared by replacing maida/all-purpose flour with different proportion of millet flour and defatted coconut flour. Bio chemical and sensory attributes were analysed.

- Quality analysis and shelf life estimation of coconut milk fudge, coconut burfi, coconut halwa, coconut laddu, coconut candy, coconut peda and coconut nutri-balls were done. Signs of onset of rancidity and spoilage were not observed for almost one month for these products. All the sensory characteristics were in the acceptable range. The products were stored in polyethylene bags at ambient temperature. The shelf life recorded was calculated to be one month.

- Standardization of processing method for a novel product- '**Coconut water Halwa**' was done. Product is kept for further qualitative and storage studies.
- **Coconut water vinegar** was developed.
- **Flavored coconut milk was developed with pineapple, apple, banana and mango** Coconut milk is versatile ingredient and excellent milk alternative which contains medium- chain triglycerides. Flavored milk score high score for sensory parameters.
- **Tender coconut jam** was developed and is kept for storage study under refrigerated and ambient conditions.
- **Matured coconut water pudding** was developed and is stored for further qualitative analysis.
- **Coconut water RTS** was developed and is kept for estimating the shelf life.

(NB: SRF post was lying vacant from March 8, 2021 to March 13th, 2022 and Project Assistant from October 22, 2021 to March 10, 2022)

ANNEXURE I

Seed and Nursery Programme 2021-2022

GoK Plan schemes on Seeds and nursery programme			
Sl No.	***Details / name***	***Variety***	***Quantity produced during 2021-2022 Nos./Kg***
	Plantations & Spices:		
1.	Coconut seednuts	WCT	15350 no.
2.	Coconut seedlings	WCT	19197 no.
3	Coconut seednuts Dwarf	Dwarf	651 no.
4.	Coconut Dwarf seedlings	Dwarf	359 no.
5.	Arecanut seedlings	Saigun	612 no.
6.	Blackpepper rooted cuttings	Karimunda,	1459 no.

		panniyoor	
Fruits			
1	Banana suckers	Nendra, Red banana, Banana ordinary	13 no.
Vegetables:			
1	Amaranthus	Arun	2.5kg
2	Bhindi	Salkeerthi	2.2 kg
3	Cowpea Yard long bean	Vellayanijyothika	5.2kg
4	Clovebean	Local	15.1kg
5	Cucumber	Local	1.33kg
6	Bush Cowpea	Bhagyalekshmi	2.2kg
7	Snakegourd	Koumudi	600 grams
8	Vegetable seed packets	------	1332 packets

b. <u>Physical achievements under RF scheme for 2021-2022</u>

Sl. No.	Crop	Variety	Production / sale during 2021-22
I	**Revolving Fund scheme**		
a.	**Seeds & Planting materials**		
1	Coconut seedlings (Bare Rooted)	WCT	6204 no.
2	Coconut seedlings (PolyBag)	T X D	597 no.
3	Coconut seedlings (bare root)	T X D	7369 no.
4.	Coconut seednuts	T X D	9421 no.
b.	**Value added products**		

1.	Coconut chutney powder		5.1 kg
2.	UrukkuVelichenna		317.6 litre
3	Theeyalkoottu		3 kg
4	Turmeric powder		11.75 kg
5	Coconut Oil		169.5 litre
6	Ginger chutney powder		5 kg
c.	**Livestock unit**		
1	Cow's milk		16492 litres
2	Egg		3690 no.
3	Chicks		958 no.
4	Goat Kids	Female	1 no.
		Male	3 no.
5	Culled chicken		354.7 kg
6	Culled Beef		401 kg
7	Cattle feed bag		368 no.
8	Curd		80.5 litres
9	Butter milk		66 cups

Coconut seedlings distributed to Coconut Development Council 2021-2022:

West Coast Tall Seedlings : 20586 no.

Hybrid Seedlings (T X D) : 5200 no.

Annexure II

Receipts during the year 2021-22:

Revolving fund : Rs. 21,37,768/-

Station : Rs. 29,35,339/-

Total : Rs. 50,73,107/-

Publications

" Thenginumvenamkaruthal " published in Karshikarangam of Mathrubhoomi newspaper, April 30, 2022

" Thenginterogangalumchikilsayum" published in Karshikarangam of Mathrubhoomi newspaper, May 31, 2022

" Susthiravarumanammoolyavardhanayiloode" published in Mathrubhoomi newspaper, September 2, 2022

Training programmes organized

WEBINARS CONDUCTED (Period January 2021 to March 2022)

Sl. No.	Topic of Webinar	Date
	Webinar Series- 2021 enitled **"Nalikerakrishi Ariyendathellam"** (Coconut Cultivation) from 07/06/2012 to 11/06/2021	
1	Nalikerathinte moolya vardhana sadhyathakal - Value addition in Coconut	07/06/2021
2	Nadilvasthukkal thiranjedukkalum, nadilum - Selection of planting materials, planting	08/06/2021
3	ShasthriyaValaprayogam - Scientific Nutrient management	09/06/2021
4	Idavilakrishiyum, mishrakrishiyum- Intercropping and mixed cropping	10/06/2021
5	Rogakeedaniyandranam- Pest and Disease management	11/06/2021
6	Karshikavila insurance- Karshakarariyendathellam - Agricultural crop insurance	08/07/2021
7	ThenginthoppukalileOushadhasasyakrishi-avasarangalum, sadhyathakalum- Medicinal plant cultivation in coconut gardens - Scope and opportunities	22/07/2021
8	Thenginthoppukalilesasthriyavazhakrishi- Banana cultivation in Coconut gardens	29/07/2021
9	Everything to know about Coconut - webinar to students in collaboration with Mathrubhoomi SEED Programme	02/09/2021
10	Virtual tour to Agriculture Diploma students	15/09/2021

Training programmes organized

1	RAWE Programme to 6 B.Sc (Agri) students from College of Agriculture, Vellayani	01/01/2021 to 07/01/2021
2	25 B.Voc. (Agri) students from KVK, Mitraniketan	27/03/2021
3	2 B.Sc. (Agri.) students from PDM University , Haryana	15/07/2021
4	RAWE Programme to 5 B.Sc. (Agri.) students from College of Agriculture, Vellayani	08/10/2021 to 13/10/2021
5	One day training to final year B.Sc. (Agri.) student of Karunya Institute of Science and Technology	18/10/2021
6	17 trainees from Friends of Coconut- CDB and KottukalKrishi Bhavan	19/11/2021
7	9 B.Sc. (Agri.) students from College of Agriculture, Padanakkad as part of RAWE	26/11/2021
8	20 trainees from Friends of Coconut – ICAR, KVK, Mitraniketan	10/12/2021
9	38 trainees of MNREGS, 10 panchayath representatives and 6 officials Hands- on – training on Coconut nursery bed preparation	21/12/2021
10	15 farmers, 10 students – NjangalumKrishiyilekku- Vegetable cultivation	01/01/2022
11	Chirayinkeezhu FPO- Coconut seedling production and nursery management	15/01/2022
12	Training on Coconut Nursery Preparation and nursery management- 3 day training programme to farmers of Nedumangad block	21/02/2022 23/02/2022 25/02/2022
13	Training on scientific coconut cultivation, pest and disease management – 19 farmers under ATMA	22/02/2022

14	Soil test-based crop management and fertilizer application – 58 trainees	26/02/2022
15	Training to trainees from Finishing School, Vellayani	07/03/2022 to 23/03/2022
16	Two-day training cum workshop on Value addition in Coconut, Banana and Tapioca (Two spells)	03/03/2022 & 04/03/2022 and 09/03/2022 & 10/03/2022

FARMING SYSTEMS RESEARCH STATION (FSRS), SADANANDAPURAM

1. Conservation of Gene pool of Traditional Mango(*Mangiferaindica* L.)Varieties of South Kerala for Climate Resilient Farming

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

Objectives:

- To Conduct survey in South Kerala for locating traditional mango varieties
- To identify traditional cultivars/varieties which are giving higher yield, fruit quality, pest and disease resistance under changing climatic scenario of Kerala
- To study the effect of changed climate on the performance of traditional mango varieties of South Kerala
- To categorize the identified traditional varieties
- To evaluate and characterize the trees using morphological markers
- Conservation of gene pool of selected traditional cultivars/varieties *in situ* and *ex situ* in farms of Farming System Research Station, Sadanandapuram
- Multiplication and popularization of selected traditional mango varieties through budding /grafting

Major Research Highlights:

- Survey conducted in 69 panchayats in 11 blocks of Kollam district, 53 panchayats in 9 blocks of Pathanamthitta district, 78 panchayats in 12 blocks of Thiruvananthapuram district and 72 panchayats in 12 blocks of Alapuzha district. Farmers having traditional mango varieties has been inventoried. This database formed the basis for further detailed studies.

- Data collection and field visits of farmers having traditional mango varieties in Kollam, Alapuzzha and Thiruvananthapuram and Pathanamthittadistrict were completed.

- Surveyed a total of 2212 farmers having traditional mango varieties in Kollam, Pathanamthitta, Alapuzha and Thiruvananthapuram districts. From this 81 numbers of elite traditional mango trees which are superior with respect to important economic characters like yield, fruit size, organoleptic qualities, regularity in bearing , offseason bearing, pest and disease resistance even under changed climatic scenario of Kerala were identified for future research works. The short listed trees are 39 fromKollam , 3 from Pathanamthitta, 12 from Thiruvananthapuram and 27 from Alapuzha district.

- Morphological characterization and fruit quality analysis works of selected 81 traditional mango varieties completed
- Completed physiological study in selected 81 traditional mangoes in the second year.

2. **Drought mitigation strategy in banana cv. Nendran (Musa AAB) (**FR-14-00-01-2020-KTR (I5)- KAU Plan**)**

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

Objectives :

Development of drought mitigation strategy in banana

Major Research Highlights:

- Banana plants were planted with drip irrigation system
- Soil and foliar treatments for mitigating the drought were imposed
- Drought induction studies were conducted
- Regular biometric, yield and physiological parameters were taken
- Lab studies conducted includes fruit quality analysis, physiological studies like epicuticular wax content, proline content, cell membrane stability index, total soluble protein, chlorophyll stability index, Soil N , P and K , soil moisture content and relative water content

3.Network project on Collection and conservation of indigenous jack (*Artocarpusheterophyllus*) varieties and identification of high yielding variety for the homesteads of Kerala

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

Objectives:

- To conduct survey in homesteads of high ranges, South and Central Kerala for locating indigenous varieties of jack
- To evaluate and characterize the indigenous jack germplasm using markers like early bearing ,extended cropping period , high yield , marketable size, acceptable quality , suitability to value addition , attractive flakes etc
- Conservation of gene pool of selected traditional varieties in the farms of

Farming System Research Station, Sadanandapuram

- Identification of high yielding jack varieties suited to the homesteads of Kerala.

Major Research Highlights:

- Survey works for the identification of elite jack varieties started in South Kerala (Kollam, Thiruvananthapuram, Pathanamthitta districts)
- Data collection and field visits of farmers having traditional jack varieties is going on
- Based on the survey details of 148 farmers having traditional jack varieties were collected and among this best performing 20 elite accessions were selected for detailed study
- Data collection of off season jack is going on

4. Establishment of Plant Health clinic at FSRS Sadanandapuram

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

Objectives:

- To provide consultancy service in diagnosing crop health related problems
- To provide remedial measuresin the management of crop health related problems
- To conduct diagnostic field visits related to cop health problems

Major Research Highlights:

- Purchased all chemicals , glass wares and plastic wares proposed in the project
- Purchased all equipments proposed in the proposal , installed these equipments and they are working successfully (Equipments purchased include : Binocular fluorescent microscope with image analyser and branded PC with printer, Hot air oven side heated digital, Muffle furnace, Refrigerator , Incubator-BOD, Water bath, Split AC - 2 ton with voltage stabilizer, Single distillation unit with auto cut-off, Analytical balance -4 digit, Centrifuge with digital display, Digital Refractometer, Micro controller based Conductivity Meter with cells and Temp. probe, Knapsack Sprayer (16 l) and Magnifying lens).
- Renovation of existing building-(60.0 m^2) for the Establishment of Plant Health Clinic is going on
- Provided technical support and advisory services to 650 numbers of farmers and Agricultural Department Officials of Kollam District
- Conducted Multi Disciplinary Diagnostic Team visits to 26 farmer's field, having

problems including disease, pests and nutrient deficiencies of various horticultural crops.

5. 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), FSRS Sadanandapuram)

Objectives :

- To conduct survey in Sothern Kerala to locate traditional mango variety **'Karpooram'**
- To identify superior lines of the traditional mango variety **'Karpooram'** for future studies
- 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 third year and started taking observations of fourth year. Selected superior germplasm of best performing accessions were conserved in the Farming Systems Research Station , Sadanandapuram.

- Genetic variability study of selected superior germplasm of best performing 20 accessions (using ISSR markers) were conducted and showed signifance difference among the accessions collected

- Among the best performing 20 accessions, accessions KLM-32 and TVM-8 are found to be superior in yield and fruit quality characters

6. Technology backstopping for rejuvenating agriculture in different Agro Ecological Units of Kollam district

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

Objectives:

- Providing extension support for rejuvenating agriculture in different Agro Ecological Units of Kollam district

- Development of ICT based communication system

- Enhancemebt of technological adoption among farmers

Major Research Highlights:

- The project was implemented in Pathanapuram, Vettikavala, AnchalSasthamcottaandIthikkara blocks

- Conducted twelveone day trainings, three agroclinics, thirty MDDT visits, three Front Line demonstrations on Exotic fruit plants, traditional banana cultivars and high yielding pepper varieties

7. Conservation of germplasm and developing climate resilient black pepper varieties for sustainable farming

(PI: Dr. BinduM.R.(Professor, Plant Breeding and Genetics)FSRS Sadanandapuram)

Objectives :

- Survey and collection of local and released varieties of black pepper in South Kerala.

- Establishment and maintenance of germplasm at FSRS, Kottarakara.

- Screening of germplasm for drought and flood under artificial and *in vitro* condition.

- Identification of resistant genotypes in the germplasm.

- Collected germplasm will be deposited at NBPGR.

Major Research Highlights :

- Details of pepper farmers were collected by contacting 226 krishibhavans of Thiruvananthapuram,Kollam and Pathanamthitta districts and contacted 146 farmers in Kollam,32 in Thiruvananthapuram and 16 in Pathanamthitta districts respectively.Three flood tolerant varieties were collected from Kuttanad
- Thirty six cultivars varieties and 3 wild types of black pepper were collected from Southern districts and established at FSRS for further evaluation
- Rooted cuttings were produced for further drought and flood screening studies in pot culture experiment.
- Conservation of germplasm was done by growing in column method in polyhouses
- Six released varieties of black pepper viz. Panniyur 1, Panniyur 2, Panniyur 5, Panniyur6, Panniyur 8 and Sakthi and four local typesviz. karuvilanchi, narayakodi, murithothanandmalamahar are raised in progeny orchard.
- Evaluation of genotypes for drought and flood tolerance under artificial and *in vitro* conditions are progressing

8. Development of high yielding short duration and climate resilient varieties of greater yam (*Dioscoreaalata*) and Tania (*Xanthosomasagittifolia*) for strengthening food and nutritional security of homegardens

(PI: Dr. BinduM.R.(Professor, Plant Breeding and Genetics) FSRS Sadanandapuram)

Objectives:

- Collection, characterisation and conservation of traditional varieties of greater yams *(Dioscoreaalata)* and Tania (*Xanthosomasagittifolia)* in Southern Kerala
- Identification and development of high yielding short duration varieties with tolerance to drought

Major Research Highlights :

- Twenty five genotypes of greater yam and nineteen genotypes of tannia were planted at FSRS, Sadanandapuram for characterisation and recording of yield.
- Among the greater yam genotypes, Dali local (3.20kg/plant) recorded highest yield followed by Ayur local 1 (Vellakachil) (3.12kg/plant) and the released variety SreeKeerthi (2.87kg/plant).

- Among Tania varieties Alayamon Local recorded highest yield (5.2kg/plant) followed by Pandithitta local (4.74kg/plant).
- Screening for drought tolerance are progressing.

9. Establishment of Millet Hubs and Empowerment of women of Kollam District

(PI: Dr. BinduM.R.(Professor, Plant Breeding and Genetics) FSRSSadanandapuram)

Objectives:

- Conducting demonstration of millet cultivation at FSRS, Sadanandapuram
- Establishment of one demonstration unit of cultivated millets at FSRS, Sadanandapuram and demonstration units of cultivated millets at farmers plot
- Creation of awareness among farmers through trainings/seminars

Major Research Highlights :

- Conducted front line demonstration at farmers' plots at Sasthamcottablock .The crop raised are bajra,sorghum,ragi and thenai
- Millets-bajra, tenai ,kuthiravalli, varagu and sorghum were raised in the station and the seeds were collected.
- Farmers were selected for FLD during 2022-23 and seeds were distributed for frontline demonstration.

10.Evaluation of brinjal lines suited to the homesteads

(PI: Dr. BinduM.R.(Professor, Plant Breeding and Genetics) FSRS Sadanandapuram)

Objectives :

To identify high yielding variety of brinjal

Major Research Highlights :

- Farmers were selected from different AEUs of Kollam district for conducting farm trial.
- Seedlings of brinjal variety Ponni, Vengeri Local and KAU-FSRS-SM-1 were distributed.

11. Evaluation of turmeric and kacholam accessions in the homesteads

(PI: Dr. BinduM.R.(Professor, Plant Breeding and Genetics) FSRS Sadanandapuram)

Objectives:

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.
- Highest yield was recorded for Sadanandapuram local in turmeric (506g per plant) followed by Renga (438g).
- Palode local recorded the highest yield in kacholam and it was followed by Kannur local.

12. Establishment of a small bamboo nursery for quality planting material production at FSRS, Sadanandapuram

(PI: Dr. BinduM.R.(Professor, Plant Breeding and Genetics) FSRS Sadanandapuram)

Objectives:

To establish small bamboo nursery for quality planting material production and distribution.

Major Research Highlights :

- Mother plants of 19 species of bamboo were purchased from Kerala Forest Research Institute, Peechi.
- The initial activities for establishment of bamboo nursery are progressing.

13. Centre of Excellence on Integrated Farming Systems and Urban Agriculture

(PI: Dr.Renjan B (Assistant Professor, Agronomy, FSRS Sadanandapuram)

Objectives:

- Develop and scale up region specific IFS models/restructure existing homestead farms to serve as replicable models, especially in the natural calamity hit areas ofKerala
- Investigate and monitor details on various facets (multidisciplinary) of IFS and urban agricultureneedtoowingtothe
- structuralandfunctionaldynamicsinherenttothesystem
- Scaling up of the IFS models already developed and terrace garden and vertical farming models suited to urbanagriculture

- Provide technical support to the different government agencies implementing projects relatedtoIFS/urbanagricultureatfarm/fieldlevelandrelatedbeneficiaryfarmers.

Major Research Highlights:

- IFS model at FSRS strengthened by adding buffalo unit (3 buffaloes),
- Pisiculture unit added (*Anabas* and Snakehead (*varal* or *Ophiocephalus*sp.) included.
- Tuber crop planting materials from CTCRI purchased and planted at FSRS field and farmers field for evaluation at different AEUs
- Initiated new IFS model for 25 cents at FSRS
- Provided technical support to the different government agencies implementing projects relatedtoIFS/urbanagricultureatfarm/fieldlevelandrelatedbeneficiaryfarmers at KrishiBhavan level and Padasekharam levels.
- Extended service to Kollam District administration for developing Munroth Package as part of Provide technical support to the different government agencies implementing projects relatedtoIFS especially in the natural calamity hit areas ofKollam district.

14. Network project for enhancing millet cultivation in Kerala through technological interventions

(PI: Dr.Renjan B (Assistant Professor, Agronomy, FSRS Sadanandapuram)

Objectives:

- Collection and conservation of various millet crops indigenously cultivated at different parts of Kerala.
- Collection of improved varieties of these millets from other part of the country
- Evaluation of these millet varieties for it suitability under zones of Kerala
- Development of low input package of practices including pest and disease management for productivity enhancement
- Seed multiplication for area expansion

- Post-harvest utilization and value addition

Major Research Highlights:

- Conducted survey and present millet cultivation of Kollam district were documented
- Collected different varieties of Sorghum, Bajra, Ragi, Barn yard millet, Fox tail millet and Little millet.
- Field experiment laid out at FSRS Sadanandapuram (AEU 9) and farmers field at Kulathoopuzha (AEU 14) and crop observation is taking

15. Establishment of Leaf/ Tissue Analysis Lab at FSRS

(PI: Dr.Renjan B (Assistant Professor, Agronomy, FSRS Sadanandapuram)

Objectives:

- Diagnosis primary, secondary and micronutrient deficiency in fruits and vegetable fields based on leaf / tissue analysis
- Assess the impact of soil test based nutrient management and responses of crops in farmer's field
- Monitoring the hidden hunger of nutrients in crop plants and giving proper recommendations
- Imparting knowledge to farmers for bridging the gap in the adoption of technology
- Undertake extension awareness programme on soil and plant health
- To establish leaf/tissue and water testing lab with micro nutrient testing facilities and advice farmers for soil test based nutrient recommendation

Major Research Highlights:

- Awareness to farmers are providing through trainings
- Procedure Purchase of laboratory equipment areinitiated

15. Graft production of fruit plants-

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

The project is run under RF mode with Rs. 5.0 lakh outlay.Produced 6000 numbers of jack budded plants

17. MIDH –Planting material production of spices

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

Total budget outlay- Rs. 3.05 lakhs

Produced 20000 numbers of black pepper rooted cuttings, 5000 numbers of curry leaf seedlings,turmeric 0.65 tones and 2000 numbers of tamarind /garcinia graft

KRISHI VIGYAN KENDRA (KVK), KOLLAM

Technologies assessed/refined:

During 2021-22 KVK has conducted eight On Farm Trials in the thematic areas of varietal evaluation, IPDM, Value addition etc. In all 44 trials were conducted in the farmer's field, the following technologies were tested/ refined during the period 2021-22:

1. Assessment of high yielding black gram varieties in Kollam District
   Technology optionsassessed
   TO1- Local
   TO2- VBN8
   TO3- DBGV
   TO4-TBG104
   TO5- KKM1
   Outcome: The highest yield (0.824 t/ha), net return (Rs 21925/ha) and BCR (1.55) was recorded by the variety DBGV 5 with 80.42 days. When comparing the crop duration, TBG-104 recorded a short duration of 75.8 days with a yield of 0.715t/ha and BCR 1.53. Due to its shiny black colour in appearance the farmers acceptance was more for TBG-104. Hence it can be concluded that the variety TBG -104 can be recommended in the late sowing areas and DBGV-5 can be recommended for sowing in January February for widespread adoption in the district.

2. Assessment of onion varieties for Kollam district
   Technology options assessed
   TO1-Nil
   TO2 -Agrifound dark red
   TO3 -ArkaBheem
   TO4-ArkaNiketan
   Outcome: Agrifound Dark Red is found superior in the case of higher yield

(BCR-2.49), early maturity (120.56 days) and less incidence of pest and diseases. ArkaBheem matures at an average of 130.86 days to mature with BCR-2.24. ArkaNiketan took 150.97 days to mature with BCR -1.94

3. Assessment of African Marigold (*Tageteserecta Linn*) varieties in Kollam district

   Technology options assessed

   TO1 - Nil

   TO2- PusaBahar

   TO3- PusaBasanti

   TO4- PusaNarangi

   Outcome: PusaBahar yield (21.13 t/ha) and BCR (2.24) followed by Pusabasanti (18.72 t/ha) and Pusanarangi(16.44 t/ha). The early flower opening was recorded in Pusanarangi (47.41) days) followed by PusaBahar (49.32 days) and Pusabasanti (50.49 days) after transplanting.The crop duration was observed highest in Pusabahar (95 days) followed by Pusabasanti (90 days) and Pusanarangi (80 days).Pusabahar (Yellow) can be recommended for widespread adoption in the Kollam district aiming for Christmas and sabarimala.

4. Assessment of Cashew Nut Shell Liquid based botanical pesticide for pest management of cowpea in Kollam District

   Technology options assessed

   TO1- KAU POP for plant protection

   TO2- Cashew nut shell liquid 20% EC formulation @ 0.3 %

   TO3-Assessment of different poultry varieties for backyard rearing in Kollam

   Outcome: Application of cashew nut shell liquid (CNSL) 20% EC formulation gave a BCR of 1.88 with a yield of 11.10 t/ha among botanicals tried, while the highest yield (12.72 t/ha) was recorded in KAU POP with chemical thiamethoxam 25WG with a BCR of 2.17. Since the technology CNSL based botanical pesticide formulation 20 EC @ 0.3%, gave good management of pest along with environment conservation and better yield, it can be recommended for wide scale adoption in the district. CNSL based formulation is a botanical pesticide prepared out of the major agriculture waste from the cashew processing

industry in Kollam district with an aim of “waste to value” .

5. Assessment of quality parameters of different varieties of jack fruit for a high valueOsmo dehydrated product

   Technology optionsassessed

   TO1: Local variety

   TO2: Muttanvarika

   TO3: Sindoor

   TO4: Khoozha

   Outcome: Overall acceptability of the osmodehydrated jack fruit from different 4 varieties like Local variety from farmers field, Muttanvarikka, Sindoor and Koozha were 25.2,31.8,44.87and30.2 respectively. Sindoor scored high. High consumer acceptance and scope for scaling up. Market value and acceptability of osmo dehydrated fruits are increasing. Technology can be popularized among upcoming agrientrupreneurs. Shelf life- 6 months (Highly acceptable for 6 months)

6. Assessment of Different Broiler duck varieties for meat production

   Technology optionsassessed

   TO1: Vigova Super -M

   TO2: White Peckin

   TO3:Desi(Kuttand)

   Outcome: Broiler duck breed Vigova-Super M- observed with better feed conversion efficiency and low mortality rate while brooding and showed a highest weight gain of 2.75 kg within a period of two months compared to NadanKuttanad variety and White Peckin variety

7. Assessment of Azolla as a economic feed supplement in Ducks for increasing egg production: Technology assessed

   TO1: Layer feed mixed with Azolla

   TO2: Layer feed

   Outcome: Daily intake of 50gm of Azolla in fresh form and thereby reducing the

amount in concentrate feed by 25% in NadanKuttanad Duck (Chara variety) .Average increase of 5 eggs within a month compared to normal concentrate feed ones. Azolla can be concluded as an economic feed supplement where 25% of concentrate feed cost is reduced

Ongoing On Farm trails:

1. Assessment of high yielding short duration red gram varieties as intercrop in youngBanana gardens of Kollam District

   Technology options assessed

   TO1: Nil

   TO 2:VBN (Rg)-3

   TO 3:APK1

   TO4: ICPL-87

2. Assessment of high yielding white yam bushy varieties for Kollam District

   Technology options assessed

   TO1: Local

   TO 2: SreeSwetha

   TO3: SD15

3. Assessment of endophytic fungus Piriformosporaindica for improving growth and yield of black pepper, Piper nigrum L

   Technology options assessed

   TO1:Farmer practice

   TO2: KAU POP

   TO3: KAU POP+ Root zone application of 50 gm of endophytic fungus *Piriformosporaindica*

4. Assessment of cassava mosaic disease resistant varieties in Kollam District

   Technology optionsassessed

   TO1: Farmer practice – local variety

   TO2: SreeRaksha

   TO3: SreeSuvarna

   TO4: SreeSakthi

5. Assessment of EM composted Goat manure in Green Chilli

Technology assessed:

TO1: EM Composted Goat manure

TO2: Normal Manure

6. Assessment of hybrid ornamental banana in Kollam district

   Technology assessed:

   TO1: Nil

   TO2: O x R

   TO3: OX Z

   TO 4: R X Z

7. Varietal assessment for yellow vein mosaic Disease Resistance in Bhindi

   Technology assessed:

   TO1: ArkhaAnamika

   TO2: ArkhaNikitha

   TO3: Anchita

   TO4: Phulevimukte

Frontline demonstrations:

Under Frontline demonstrations, proven technologies were demonstrated in the farmers field. In 2021-22 KVK Kollam has conducted 192demonstrations. The technologies demonstrated were:

S.No	Crop	Technology demonstrated	No. of demo.
1	Cassava	Demonstration on nutrient use efficient (NUE) cassava genotype Sreepavitra for reducing chemical NPK fertilizers in Kollam district	15
2	Rice	Demonstration on integrated management practices of weedy rice in Kollam district	15
3	Rice	Demonstration on integrated management practices of weedy rice in Kollam district	15
4	Bhindi	Demonstration on Nano organic NPK formulation in Bhindi in Kollam District	15
5	Marigold	Demonstration of Marigold variety PusaBahar	6

6.	Onion	Demonstration of Onion variety Agri found dark red	7
7.	Yard Long Bean	Demonstration of Yard long bean variety KAU Deepika	10
8.	Amaranthus	Demonstration of Amaranthus variety KAU Vaika	10
9.	Amorphophallus	Integrated management of collar rot of elephant foot yam in Kollam district	10
10.	Coconut	Compact area group approach for the management of coconut black beetle, Oryctus rhinoceros L. in Kollam district	2
11.	Cucumber	Demonstration of organic management practice for red pumpkin beetles in cucurbits	7
12.	Cassava	Demonstration on integrated management of Cassava root rot in Kollam district	7
13.	Mushroom	Demonstration of oyster mushroom , Pleurotusflorida in Kollam district	15
14.	Enterprise	Modified brining technology for shelf life enhancement of raw Jack fruit	4
15.	Prawns	ICAR CIFT modified drying technology for shelf life enhancement of prawns	3
16.	Jack	Demonstration of ready to cook dehydrated Jack	3
17.	Poultry	Demonstration of production of low cholesterol eggs in Kollam District	5
18.	Poultry	Demonstration of Scientific Management of Japanese Quail (Egg Production) among Rural Women farmers in Kollam District	5
19.	Dairy cattle	Demonstration of prostaglandin hormone(PGF2α) treatment in Dairy cattle showing prolonged oestrus for improvement in fertility	6
20.	Poultry	Demonstration of Designer eggs in Kollam district by lowering the egg cholesterol level	6
21.	Pearl spot	Demonstration on Pearlspot farming in brackish □ater ponds	2
22.	Pearl spot	Demonstration on Pearlspot farming in fresh water ponds	5
23.	Fish	Demonstration on ICAR CIFA improved Catla for freshwater farming	3

		in Kollam district	
24.	Fish	Demonstration on formulated feed for *Channastriata*(Varaal)	3
25.	Duck	Demonstration of Vigova Broiler duck variety for meatproduction in coastal areas of Kollam District	4
26.	Bajra Napier	Demonstration of Bajra Napier variety Susthirain Dairy cattle for improved milk production	5
27.	Azolla	Demonstration of Azolla as an economic feed supplement in ducks for increasing egg production	4

Trainings:

Type of training	No.of trainees (No. of trainings)	Category
Training (On and off campus)	3120(104)	Farmers
Training (On and Off campus)	2400(80)	Rural Youths
Training including sponsored training programmes	620 (36)	Farmers
Vocational training programmes carried out by KVKs	48 (6)	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, World pulses day conducted programmes under CFLD pulses and oil seeds.

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. 4757831/- for the reporting period. The major share was contributed bybio control agents, botanicals, organic inputs, vegetable seedlings, grow bags, value added productsand pheromone traps

Externally Aided Projects:

Completed Projects

1. Title of Project : Capacity Building of Farmers through Training Programmes on Profitable Dairy

Farming and Livestock Management

Funding Agency :ICAR

Principal Investigator : Dr. Parvathy S. , Assistant Professor(Animal Husbandry)

Date of Start : 12.01.2021

Date of Completion : 31.03.2021

Total Outlay : Rs. 2 lakhs

Objectives

1)Capacity Building of Farmers in Animal Husbandry through Training Programmes.

2) 3 day training programme for 40farmers in 5 relevant topics for profitable farming in Livestock sector.

Major Highlights:

• 200 number of farmers got benefited through 5 different training programmes.

• Skill enhancement training for one batch of 40 women's in 3 days for the vaccination procedure practiced in poultry rearing.

2. Title of project: Diploma in Agricultural Extension Services for Input Dealers (DAESI)

Funding Agency : MANAGE-SAMETI-ATMA

Principal Investigator: Dr. BinduPodikunju , Associate Professor(Agricultural Extension)

Date of Start : 01.04.2021

Date of Completion : 31.03.2022

Total Outlay : Rs. 7.40 lakhs

Objectives : Equip input dealers with sufficient knowledge to transform

them into para-extension professionals so as to enable them to address the day-to-day problems being faced by the farmers at field level.

Major Highlights:

40 input dealers trained in the following aspects

1. Agro Ecological Situations.
2. Soil Health Management.
3. Rainfed Farming.
4. Seed & Seed Production.
5. Irrigation Techniques and their Management.
6. Weed Management.
7. Farm Implements and Machinery.
8. Pest and disease Control in Agriculture.
9. Crop Production Technology of major local crops.
10. Acts, Rules and Regulations related to Agricultural Inputs.
11. Schemes related to Agricultural Sector.
12. Extension Approaches and Methods.
13. Other Optional Areas based on requirement.

3. Title of Project **:Technology hub for safe and sustainable food production in Kollam**

district

Funding Agency : GoK

Principal Investigator : Dr. Poornima Yadav P I, Assistant Professor (Agronomy)

Date of Start: 18/12/2020

Date of Completion: Completed

Total Outlay: Rs. 5 lakhs

Objectives:

1) Construction of Laboratory building for mass production of biocontrol agents to ensure the availability of biocontrol agents

2) Creating awareness on the importance of beneficial insects, conservation of natural enemies, ecological engineering and AESA

Physical targets accomplished

- Constructed a laboratory building
- Established Apiculture units (10 units)
- Established floral sources for increased population of natural enemies, predators and parasites like marigold, ornamental passion fruit, honey suckle plants
- Collected the culture of EPN
- Started the mass production of PGPR Mix I and Azospirillum
- Ecological engineering using various flowering plants in cowpea cultivated plots
- Started AESA (rice and pulses) model plot in KVK
- Conducted trainings *viz* AESA in rice and pulse (Mylom and Chavara), Ecological Engineering, biocontrol of pests and diseases, use of EPN (Sooranadu north and Perinad). Total number of participants -62

Salient Achievements

- Completion of AESA Model
- Commercial Production of EPN
- Production of *Azospirillum*, PGPR Mix I and Mix II - Most needed bio control agents, biofertilizers and EPN can be made available to the farmers of the district which eventually reduce pesticide load, pesticide contamination and chemical fertilizers

- Trainings done on AESA at Kareepra, Vettikavala, Mylom, Poothakkulam
- Laboratory building for the mass production of bio control agents (bioagents, biofertilizers and EPN etc) which have a key role in IPM will be established which is presently not available in Kollam district

- Awareness on the importance of beneficial insects, conservation of natural enemies, ecological engineering and AESA.
- A model AESA unit, Apiculture unit, Ecological engineering unit were established

4. Title of Project : 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

Funding Agency : DoA
Principal Investigator : Dr. PoornimaYadav. P.I
Date of Start : Nov 2019
Date of Completion : June 2022
Total Outlay : Rs. 2.lakhs
Objectives :

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

Highlights and Activities:

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

- Trenches bottom lined with coconut husk and planting vetiver filled with rooting media coir pith and poultry manure gave significantly higher growth (plant height, number of tillers, root length and root weight) than trenches without lining
- There was no significant difference in soil loss from different planting methods while different rooting media significantly reduced the soil loss with lowest quantity of soil collected was from the treatments involving coir pith and poultry manure due to the increased growth characters (August and September 2021)
- There was no significant retention of soil moisture during the observation period (January 2021 to March 2021) using ICAR soil moisture indicator

Experiment 2: Efficient utilization of natural resources and waste management through vertical farming

- Fabricated a vertical farming structure for mediculture and standardized the rooting medium
- Two crops were selected for these structures viz chethikoduveli for the vertical pipes and Betelvine for horizontal pipes. The growing medium was standardized and the best growing media was T_3 (vermi compost,

coirpith compost, cowdung(1:1:1) which was followed by T_4 (soil+coirpith compost+ cowdung), T_2 (soil+cowdung+ sand), T_1 (soil+sand)

Other achievements

- Training on vertical farming mediculture for Agro service members
- World water day celebration 2021
- 3 leaflets published (Vettiver, vertical farming for mediculture and thippali)
- Planting material production vetiver (variety Bhoomika) – 10724 No worth Rs 32172/-

Ongoing projects:

1. Title of Project :Empowering rural women and youth through agro technologies.

Funding Agency : GoK

Principal Investigator: Dr. BinduPodikunju , Associate Professor(Agricultural Extension)

Date of Start : 01.01.2022

Date of Completion : 31.03.2023

Total Outlay : Rs. 2.39 lakhs

Objectives : To empower rural women and youth through agro technologies

Major Highlights:

- Vocational training on Coconut palm climbing, Mushroom, Value addition of fruits and vegetables and Nursery management of 5- 10 days duration for rural women and youth.
- Forty five trainees were trained.
- Coconut palm climber were distributed to the participants of Coconut palm climbing training.

2. Title of Project: **CollaborativeTraining cum demonstration on post-harvest fisheries for the benefit of SC fishing community for the year 2022-2023**.

Funding Agency: ICAR-CIFT

Principal Investigator: Shamsiya.AH, Assistant Professor (Community Science)

Date of Start: 20/05/2022

Date of Completion:

Total Outlay: 2.00 lakhs

Objectives:

1) To Empower vulnerable groups through value addition in fisheries sector-
2) To conductpost-harvest training cum demonstration programmesfor40 rural SC participants..

Highlights and Activities:

1. Completed Capacity building programmes on fish processing and value addition(post-harvest training cum demonstration programmes) for 40 rural SC populations by utilising the facilities ofMini fish processing unit cum Custom Hiring Centre (CHC)established at KVK Kollam with the financial support of ICAR-CIFT-Kochi

3. Title of Project : Strengthening of Agro Processing Unit as Training and Facilitation Centre

for Kollam District -2020-2022

Funding Agency: DoA

Principal Investigator: Shamsiya.AH, Assistant Professor(Community Science)

Date of Start: 15/01/2021

Date of Completion: Ongoing

Total Outlay: Rs. 22.5 lakhs

Objectives:

1) Strengthening theexisting Agro processing unitofKVK'swith equipment's, machineries and

infra-structure (extension of existing building-APU)

2) Capacity building programmes in value addition and food processing for 5 days, for 50participants (5 batches-10 participants in each group) including rural youth, farmer, farm women and entrepreneurs.

Highlights and Activities:

- Construction of infrastructure is completed.
- PurchasedVisi cooler, Grinder, Mixer juicer, gas stove, Mannual liquid packing machine, Sealing and labelling equipment's, Hot air gun, Cling film wrapper, Freezer, Refrigerator, Fruit concentrator,Cold juice dispenser, Clarifier, Vacuum packing machine ,Pasta extruder, and data processing equipment.
- Conducted 4 batch training for 40 participants in value addition and food processing for 5 days.

4. Title of Project **:** Establishment of productivity of rice-rice pulse cropping system through scientific interventions of Agriculture knowledge Centre Vettikkavala support to Government mission subhikshaKeralam - replication of protein park-I

Total Outlay: Rs. 4 lakhs

5. Title of Project **:** Establishment of productivity of rice-rice pulse cropping system through scientific interventions of Agriculture knowledge Centre Vettikkavala support to Government mission subhikshaKeralam - replication of protein park-II

Total Outlay: Rs. 4 lakhs

Funding Agency : GoK

Principal Investigator : Dr. Poornima Yadav P I, Assistant Professor (Agronomy)

Date of Start: 21/10/2021

Date of Completion: Ongoing

Objectives:

1)To popularize the high yielding varieties of important pulses and traditional pulses in the selected panchayaths of Kollam district viz grain cow pea ,green gram, black gram and horse gram

(2) Continuous production of pulses as intercrop in coconut, banana and tuber crops in uplands ie Area expansion

(3) Enhancement of productivity of rice and pulses through FLDs and trainings -

Cultivation of pulses in rice fallows – involves the integrated management of rice and pulses ie scientific management of crop rotations following AESA

(4) To introduce and familiarize the scientific agronomic practices and IPM practices in rice and pulses.

(5) Establishment of a post harvest processing unit at KVK Kollam for efficient post harvest handling and processing of pulses for a better market price

6) Enhancement of production and productivity of the cropping system

7) Upgradation of the post harvest processing unit at KVK, Kollam for better market price

Salient achievements

- Demonstrated high yielding green gram, black gram, red gram and cowpea varieties in different panchayath of Vettikkavala block
- Identified a promising local black seeded cow pea variety poothakkulampanchayath of Kollam district
- Assessment of local promising black seeded varieties Poothakkulam1, Poothakkulam 2 and poothakkulam 3 from poothakkulampanchayath of Kollam district

6. Title of Project **:** Development of plant health tonic for boosting the yield of vegetables by suppressing the biotic stresses

Funding Agency : GoK

Principal Investigator :Dr. Lekha M, Assistant Professor (Entomology)

Date of Start: 06/01/2022

Date of Completion: Ongoing

Total Outlay: Rs. 3 lakhs

Objectives:

- ❖ Screening of botanical oils for sucking pest management of chilli
- ❖ Screening of secondary and micronutrients for improving the overall health of chilli crop
- ❖ Formulation development
- ❖ Testing the efficacy of formulation including its phytotoxicity

Salient achievements

1. The screening test for evaluating the efficacy of different botanicals was done at KVK, Kollam using different botanicals was done.
2. Screening of different emulsifiers and solvents for the development of neem based EC formulation
3. Developed neem based EC formulation.

7. Title of the Project : Promotion of Integrated Farming Systems through skill upgradation
of Master farmers

Name of PI : Dr. Bini Sam, Professor and Head

Funding Agency : NABARD

Date of Start : 01.07.2022

Date of Completion : Ongoing

Total Outlay : 4.8 lakhs

Objectives :

1. Build capacity of farmers to establish and maintain Integrated Farming System units in homesteads

2. Train rural youth on the major technologies that can be employed in IFS based production systems

3. Establish specialised workforce with skills in managing IFS by organising trained youth

4. Establish beacon IFS models in selected gramapanchayats

5. Provide technical support to farmer and women collectives to establish IFS through functional linkages among various development agencies

Major Research Highlights :

1. Identified IFS master farmers from 2 blocks in panchayatsKareepra, Ezhukone, Vettikkavala, Kottarakkara and Edamulakkal.
2. Set up model IFS plot and conducted documentation of IFS plot

8. District Agrometeorological Unit (DAMU) Under GraminKrishiMousamseva (GKMS) scheme, KVK Kollam

Nodal Officer:Dr.Bini Sam, Professor and Head

GraminKrishiMousamseva (GKMS) is the flagship programme of Govt of India for weather related services to the farmers aiding in decision making on day-to-day agricultural operations. The scheme is extended to block level through District Agromet Unit (DAMU) with a joint effort of IMD and ICAR with multi-organizational collaborations. District Agromet Unit have been initiated in KVK Kollam in 2018.

The major service of this unit includes issuing of district and block level Agromet Advisory bulletins in every Tuesdays and Fridays which are disseminated to the farmers, Krishi Bhavans, Agricultural and IMD officials etc. along with feedback collection for the improvisations. Farmers Awareness Programmes, promotion of various weather based mobile applications, soil moisture analysis through gravimetric method etc. are being done in this unit. DAMU is also providing assistance to the Installation of Agro-AWS by IMD in KVK Kollam.

Consolidated report of DAMU upto 15th November 2022

KVK	Agro advisories			Farmers awareness programmes		Videos developed	Articles Published
	No of Agro advisories generated upto November 15.11.2022	No of farmers registered for agro advisories	No of farmers benefitted	No of programmes	No of farmers benefitted	No of videos developed	No of Articles Published
KVK KOLLAM	1.District level AAS Bulletin-303 nos 2.Block level AAS Bulletin – 3333 nos	16506	16506	32	3293	3	5

Report of the Agricultural Knowledge Centres under RARS (SZ), Vellayani

Agricultural Knowledge Centres of Thiruvananthapuram District

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

Name of the Nodal Officer: Smt.Smija P.K.Assistant Professor, RARS(SZ), Vellayani

Date of start : 17.08.2020

Major activities:

- Participated in working group meeting of Nedumanagad Block Panchayat and provided technical guidance in preparation of projects of Block Panchayat, 'Kera Gramam padhathi' and 'Krishi Darshan Programme' of Dept of Agriculture and Farmers' welfare .
- Major field problems reported as part of MDDT Team Karshakasanthwanam visits are
    - Lakshmi Disease in Rice at Vembayam
    - Immature fruit drop of Salad Cucumber at Polyhouse in Nedumanagad
    - Crown Gall Disease in Cowpea at Kudappanakkunnu.
    - Pink Disease in Mango
- Organised mass awareness generation campaigns with flash mobs, skits and panel discussions for GoK's "Njangalum Krishiyilekku' programme at Nedumanagad Block and various other centres in the district.Conducted 'Participatory Rural Appraisal' of Kanjani ward of Karakulam Grama Panchayat along with students of CoA Vellayani.
- Facilitated a training camp on Plant Parasitic Nematode Management and aseminar on 'Vegetable Grafting.'
- Facilitated field trial on 'Management of *Meloidogyne incognita* infecting cucumber under protected cultivation'
- Handled training sessions and conducted field visits for ' Krishi Padashala Scheme' and conducted interview for interns recruited for the project titled 'Support to farm Mechanisation.', Nedumanagad Block.
- Attended training for master trainers on ' Implementation of Farm Plan Based Production Programme' at SAMETI and PAO office ,Thiruvananthapuram,

participated in Farm plan formulation in various Krishi bhavans in the block and provided training for field extension functionaries on the new approach and its implementation.

- Organised capacity development programmes for extension officers in Agriculture Department in Nedumanagad Block 'on 'Participatory Guarantee Scheme' and handled two training sessions for "AEU Based training for Extension Functionaries in Nedumanagad and Vamanapuram block.'

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

Nodal Officer : Dr.Nishan.M.A.,Assistant Professor,Dept. of Agronomy, College of Agriculutre, Vellayani

Date of start: 17.8.2020

Major activities :

- Provided technical guidance and support for establishing a Plant health clinic and soil health clinic . Distribution of soil health cards and composting inoculum were done.
- Facilitated two training programme on 'Bee KeepingTraining and 'Organic vegetable cultivation'
- Organised distribution of seed kits 'Vithukudam' on the occasion of 'Njattuvela' celebration.
- Establishment of a 'VFPCK cut vegetable outlet-Thalir' at College of Agriculture,Vellayani.
- Attended training for master trainers on ' Implementation of Farm Plan Based Production Programme' at SAMETI and PAO office ,Thiruvananthapuram , participated in Farm plan formulation in various Krishi bhavans in the block.

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

Major activities:

- Established rapport with the officials of the State Department of Agricultural Development and Farmers welfare and farmers of the block.

- Handled and arranged trainings for farmers, conducted field visits and helped solving of field problems.
- As part of trainings, expert talks were arranged on topics including tree fodder cultivation, animal husbandry, apiculture, integrated farming, integrated disease management, nutrition garden, vegetable seed production etc.
- Identified Sri. Rajendra Prasad, Chenkal panchayat of the block as a successful IFS practitioner. His success story was published as a popular article and documented as a short video so as to encourage more of farmers to IFS.
- Vegetable panchayat - Chenkal of the block was selected as one of the sites for a farm trial for the NCRMI - KAU collaborative project - "Identifying coir pith based nutrient rich growing media suitable for vegetable cultivation in terraces" carried out by IFSRS Karamana and field experiments conducted and technology demonstrated for farmers.
- Agricultural information (e -posters, brochures etc) were made available to farmer groups of the block.
- Answered the various queries on agriculture through Farmer Whatsapp groups
- Assisted in setting up of a model nutrition garden at Chenkal Krishi Bhavan and provided technical guidance especially on azolla rearing and vermicompost production.

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

Major activities:

- Initiated Farmer participatory seed production programme for Cow Pea, Cluster bean and winged bean is being undertaken at Nanniyode grama panchayat in collaboration with the Department of Olericulture, College of Agriculture, Vellayani
- A bacterial wilt disease was observed in yard long bean in Nanniyode Panchayat was taken up as the topic of research of my M.Sc.student, Miss.Talla Sushmitha. The pathogen has been identified as a new bacterium, not previously reported in the crop and studies on standardizing the management strategies are at the final stage.
- As part of a DoE State Plan project on "Farmer participatory demonstration of IDM package for vascular wilt of yardlong bean", field trials were undertaken in the fields of three farmers of Nanniyode panchayat.

- Trichocards for managing leaf roller and stem borer ad Pheromone traps for management of fruit fly.
- have been arranged from Department of Entomology, CoA, Vellayani for various Krishi Bhavans in the Block.
- A book entitled “Kaarshika Munnettam Samyojitha Krishiyilude” emphasizing the “success stories of 16 IFS farmers of Vamanapuram block” was published and two videos on success stories of two farmers on dragon fruit cultivation and integrated farming were documented.
- An “agroclinic” was organized at Kallara panchayat as part of “Njangalum Krishiyileeku programme” along with the scientists of IFSRS and final year B. Sc (Ag.) students of CoA,Vellayani.
- Arranged a class by Dr. Jacob John, Professor and Head to all the Agricultural Officers of the block on “Agro Ecological Zones and Units”. A hands-on training was provided on the preparation of crop calender by providing a model calender prepared on Rice crop.
- Handled classes on IPM in vegetables, terrace cultivation, mushroom cultivation, scientific vegetable cultivation etc. as per request and arranged resource persons for handling classes on new technologies for the officials of the Department of Agriculture as well as farmers.
- Technical support to the officials of Department of Agriculture and Local Self Government institutions on formulation of projects.
- Monthly meeting of all Agricultural Officers of the block .
- Supply of planting materials of rice and vegetable as per requirement.
- Consultancy services are being provided to the farmers of the block as part of the “Plant Health Clinic” functioning at IFSRS, Karamana on different problems faced by them in consultation with other scientists of KAU.
- Diagnostic field visits to provide technical support to solve the problems faced by farmers, as per the requests of Agricultural Officers or farmers.

5. Name of the AKC : Athiyanoor Block, Thiruvananthapuram

Name of the Nodal Officer : Dr.N.V.Radhakrishnan, Professor

Date of start : 17-08-2020

Major activities :

- Intercropping in coconut garden with tapioca, banana, other tuber crops and vegetables are being recommended wherever it is possible.
- Monthly meeting of Agricultural Officers and Contact farmers at Office of Assistant Director of Agriculture, Neyyattinkara are carried out and discussed the current field problems then and there.
- Conducted Krishi Padasala at Krishi Bhavans of Athiyanoor, Kottukkal, Kanjirankulam and Thiruvallam in Athyanoor BLAKC on various topics viz., Plant health management, Coconut based Integrated farming System, biological control agents and crop protection, challenges and opportunities in value addition of coconut for enhanced income and livelihood.
- Soil health cards were distributed to farmers who has given soil sample during the one day seminar on Soil health and crop production conducted under State Plan scheme By Dr.SheebaRebacc, Professor (Agronomy).
- Conducted trainings for 2 batches under Training cum Workshop on Value addition in Coconut, Banana and tapioca to farmers/entrepreneurs/youth in Athiyanoor BLAKC at CRS, Balaramapuram during March 2022.
- Field Visits to farmers plot for identifying their field problems were conducted whenever it is necessary. Identifying the problems in field, plantation crops and vegetables and giving solutions to overcome the problem.
- Utilization of already formed WhatsApp group for disseminating knowledge on meteorological weather information and giving solutions to their field problems then and there.
- Dissemination of the Agromet Advisory Bulletins (both in Malayalam and English) published by RARS (Southern zone), Vellayani and giving forecast related to Weather and crop conditions by every five days for Athiyanoor BLAKC.
- During Onam, Onachanda was conducted at Krishi Bhavans by procuring the produces from farmers and distributed to needy people.
- Under ‘NjangalumKrishilekku’programme, we have conducted mass awarenesss generation programmes along with distribution of seeds & seedlings
- We have given training to farmers including SC/ST on Capacity building on scientific cultivation of coconut and banana and the opportunities in value addition.

- Attended meeting of Director of Extension, KAU in connection with implementation of new Farm Plan based production approach programme and attended the Master Trainer trainingat SAMETI, Thiruvananthapuram for three days and one special training at Collectorate, Thiruvananthapuram.

6. Name of the AKC :Pothenkode, 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

Major activities

- Conducted Krishipadasala at Krishibhavan and handled sessions such as 'soil less cultivation' and provided technical support to project planning and implementation.
- Conducted two field visits per monthon need basis and provided technical support to farmers
- Identified the barren land suitable for cultivation in each panchayat and necessary steps were taken for initiating cultivation. Special importance given to terrace cultivation in urban areas and integrated farming system
- Conducted regular monthly meetings .
- Special attention given to Keragramam programme, consultancy and advisory services are being extended to coconut farmersof the block for the problems addressed by them.
- Attended training for master trainers on ' Implementation of Farm Plan Based Production Programme' at SAMETI and PAO office ,Thiruvananthapuram , participated in Farm plan formulation in various Krishi bhavans in the block
- Participated in the preparation of Field Diary and handed over to the Department of agriculture and farmers welfare. It was done as a part of implementation of farm plan development approach.

7. Name of AKC : Varkala Block, Thiruvananthapuram

Name of Nodal Officer : Dr Smitha Bhasi, Assistant Professor, Department of Plant Biotechnology

Date of start : 17-8-2020

Major activities :

<u>Activities under AKC, Varkala Block</u>

- Attended training for master trainers on ' Implementation of Farm Plan Based Production Programme' at SAMETI and PAO office ,Thiruvananthapuram , participated in Farm plan formulation in various Krishi bhavans in the block .
- Five interactive seminars on 'Integrated pest and disease management of major crops of Kerala' were organised as part of ' Kisan Ghosthi' Proramme , 'Njangalum Krishiyilekk 'and 'Chingam 1' celebration.
- Timely advisories on pest and disease problems in the block were given
- Technical support to preparation of action plan of Keragramam Padhadhi -2022-23 was given.
- Facilitated the data collection for various research projects from Kerala Agricultural University and forwarded to FSRS, Karamana.
- Attended online meetings by Director (Extension) on AKC regarding future plan of actions .
- Conducted interview to recruit interns for the project titled 'Support to farm Mechanisation' in Varkala Block.

8. Name of AKC : Chirayankeezhu Block, Thiruvananthapuram District

Name of Nodal Officer : Mr Safeer M M, Assistant Professor, IF Vellayani

Date of start : 17.08.2020

Major activities :

i. Field visits : 5

ii. No of trainings organized ; 7

iii. No. of trainings facilitated : 22

iv. Weather based advisories given : 64

v. Field problems addressed : 25

vi. Soil Health campaign : 1

vii. Agritips as eposters : 11

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

Name of Nodal Officer : Dr Rajimol R P, Assistant Professor, Department of Soil Science and Agrl. Chemistry

Date of start : 17.08.2020

Major activities :

- Conducted regular field visits as field visit s as part of Krishi Padashala'.
- Facilitated Training programme on Soil Health Management mushroom cultivation and indoor gardening , processing of fruits and vegetables for selected groups of farmers in the Bock.
- Initiated participatory seed production programme ,
- Collected 100 representative soil samples of AKC Perumakadavila
- Provided one day Training programme on organic farming and soil health management at Dept. of Soil Science and Agrl. Chemistry, COA Vellayani in association with World Soil Day Celebrations- 2022 for selected farmers from the Block and training materials and organic inputs were distributed.
- Conducted interview to recruit interns for the project titled 'Support to farm Mechanisation'

10. Name of AKC : Vellanadu Block, Thiruvananthapuram

Name of the Nodal Officer : Dr. Malini NilamudeenAsst. Professor (Entomology)

Date of Start : 17/8/2020

Major activities:

- Organised one day training on "Innovative Floriculture Techniques'
- Distributed "Cue lure" traps to vegetable farmers and created awareness on the using such traps for fruit fly management.
- Farmers visited Instructional farm, College of Agriculture, Disease diagnosis unit, AICRP on mushroom

11. Name of the AKC : Pulimath Block, Thiruvananthapuram

Name of the Nodal Officer : Dr. Esakkimuthu M, Assistant Professor,

Dept. of Agrl. Extension, Vellayani

Date of Start : 17/08/2020

Major activities

- Conducted interview to recruit interns for the project titled 'Support to farm Mechanisation' as the chairman of the interview board .
- Prepared technical Display boards for important pests and diseases for the crop health management center of Pulimath block.
- Data regarding network projects on enhancing millet production were collected from all AOs of the block.
- Field photos of identified problems were shared with subject matter specialists at Kerala Agricultural University and remedial measures were communicated to Agricultural Officers of respective Krishi Bhavans. Arranged visits by MDDT team 'Karshaka Santhwanam' to the farmer plots whenever needed.
- Attended training for master trainers on ' Implementation of Farm Plan Based Production Programme' at SAMETI and PAO office ,Thiruvananthapuram , participated in Farm plan formulation in various Krishi bhavans in the block and provided training for field extension functionaries on the new approach and its implementation.
- Conducted interview for interns to the project titled 'Support to farm Mechanisation'
- Conducted filed visit under ATMA-Krishipadasala of Pazayakunndumael Panchayat on 27/9/2022
- Attended training for Agricultural machineries in the Kilimanoor block Panchayat with PG research scholars of College of Agriculture Vellayani on 27/9/22 .

<u>Major problems identified</u>

- ✓ Die back in Mango
- ✓ Leaf curl Virus in Chilly
- ✓ Leaf sucking pests in Citrus
- ✓ Stemborer in Turmeric

- ✓ Fruit Borer in banana and Bhindi
- ✓ Calcium Deficiency in Banana

AGRICULTURAL KNOWLEDGE CENTRES OF KOLLAM DISTRICT

12. Name of AKC : Anchal Block, Kollam

Name of Nodal Officer : Dr. Sarojkumar V, Assistant Professor, KVK, Kollam

Date of start : 17. 08. 2020

Major Activities:

- Organised MDDT visits to address various field problems in the block.
- Conducted training session on cultivation aspects of Cassava and greater Yam
- Distributed marigold seeds variety PusaBahar to farm superintendent towards starting marigold cultivation to target Onam market and ecological engineering in the farm.
- Organised training on ' Vegetable and Banana cultivation'as a part of 'NjangalumKrishilyilekku' programme.
- Training on 'Agro techniques of tuber cultivation' as part of 'Tuber Hub project"
- Training on Mushroom cultivation to women entrepreneurs and training on cool season vegetable cultivation and vegetable farming for selected farmers were organised .
- Conducted." Block level training for extension functionarieson ' Plantation management and spices cultivation.'
- Organised KisanGosthti -ATMA Field day.

13. Name of AKC : Chadayamangalam Block, Kollam

Name of the Nodal Officer : Dr.Santhosh Kumar. T, Assistant Professor,

Dept. of Entomology, CoA, Vellayani

Date of Start : 17-08-2020

Major Activities:

- Conducted several field visits in 8 Krishi bhavans of Chadayamangalam Block and given immediate solutions/management practices to the various problems identified by the MDDT.

Major problems identified

- ✓ Wilt in Tapioca
- ✓ Rhizome rot, Rhizome weevil and Pseudo stem weevil in Banana
- ✓ Rhinoceros beetle, Red palm weevil and Leaf rot in Coconut
- ✓ Sucking pests in vegetables,
- ✓ Bacterial-fungal complex infection in betel vine

- .Undertaken various field level demonstrations using biocontrol agent and botanicals for managing pests and diseases in vegetables.
- Demonstrations were conducted for managing the fungal-bacterial complex infection in betel vine which is the most serious problem faced by betel vine farmers of Kadakkal Krishibhavan .
- A state plan project titled 'Participatory seed village for Tubercrops' has been started in all 8 Krishi bhavans of Chadayamangalam AKC.Planting materials for the same were purchased from Central Tuber Crops Research InstituteThiruvananthapuram. A seminar titled "Tuber crops cultivation" was also conducted in connection with the inaugural function .

14. Name of AKC : Chavara Block, Kollam

Name of Nodal officer: Dr. Lekha M, Assistant Professor, (Entomology)
Krishi Vigyan Kendra, Kollam

Date of start : 17.08.2020

Major Activities:

- Established mini tuber hub at Chavara block as a part of the innovative programme of KVK, Kollam " TUBER HUB"
- Capacity building programme on Mushroom cultivation, scientific tuber production technology , organic pest management , Scientific Vegetable cultivation , Coconut pest and disease management were organised.
- Conducted awareness programme on 'Giant African snail management in Chavara Panchayathand Block level training programme for extension functionaries on 'New Generation pesticides.'

- Awareness classes on cultivation of 'tuber crops,coconut, vegetables, mushroom ,coconut as part of 'Krishi Padashala' scheme.
- Visits by MDDT on different field problems were organised.

15. Name of the AKC : Chittumala, Kollam District

Name of the officer : Dr. Renjan B, Assistant Professor, FSRS Sadanadapuram

Date of Start : 17.08.2020

Major activities:

- Five block level meetings were conducted for technology dissemination and training to extension functionaries.
- Conducted 2 ' Farmer field school/ Krishi Padasala '
- Field demonstration on "weed management in Rice' was conducted.
- Interacted with farmers and conducted field visit in connection to Munroth Package
- Conducted diagnostic field visits
- Attended training for master trainers on " Implementation of Farm Plan Based Production Programme' at SAMETI and facilitated Farm plan preparations for variousKrishiBhavan
- Conduced interview as board member for selection of field apprentice trainees for Chittumala Block.

16. Name of the AKC : IthikkaraChathannur Block, Kollam

Name of the nodal officer : Dr Asha S, Assistant Professor

Date of start : 17.08.2020

Major activities:

- Organized training programme on 'Integrated Pest and Disease Management of Vegetables' for the Farmers at Ithikkara block, Kollam on 22-03-2022 and distributed farming inputs
- Organized field visit and Expert's interaction with the farmer's of Kalluvathukkal Panchayat as part of Agricultural Knowledge Centre on July 4th 2022.

- Procured inputs for the field demonstration by Karshakakarmasena, Kalluvathukkal Panchayat at Ithikkara Block.
- Attendedtraining programme on Farm planbased production programme funded by the Kerala State Government at SAMETIon 10-10-2022

17. **Name of AKC : Kottarakara Block, Kollam**

Name of the Nodal Officer : Dr. R Narayana, Assistant Professor,

Dept. of Entomology, CoA, Vellayani

Date of Start : 17.08.2020

Major activities:

- Field Demonstration on 'Management of Giant African snail (Ezhukone and Veliyam panchayats) and 'Use of insecticidal soaps developed by KAU against sucking pests of vegetables' were conducte
- Provided advisories for 'management of foot rot complex of cassava', use of pheromone traps for management of fruit flies in vegetables and 'management of Nematodes using biocontrol agents'.
- Conducted awareness programmes promoting paddy cultivation in fallow lands.
- Marketing intervention during glut of vegetables in local markets with help of Department officials.
- Popularization of use of 'Trichocards' in vegetable plots for pest management
- Awareness program for the use of microbial inoculants for plant disease management and nutrient enrichment.

18. Name of the AKC : Ochira Block, Kollam

Name of the Nodal Officer : Dr. Shanas.S, Assistant Professor

Date of Start : 17/08/2020

Major activities:

- Established rapport with the officials of the State Department of Agricultural Development and Farmers welfare and farmers of the block.

- Handled and arranged trainings for farmers, conducted field visits and helped solving of field problems.
- As part of trainings, expert talks were arranged on topics including control of invasive pest Giant African Snail, Stingless bee farming, integrated pest management etc.
- Answered the various queries on agriculture through Farmer Whats app groups
- Assisted in setting up of a bee hives at two farmers fields.

19. Name of the AKC : Pathanapuram Block, Kollam

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

FSRS, Sadanandapuram

Date of start : 17.08.2021

Major Activities:

- Eight block level meetings were conducted and
- As a part of Krishipadasala10 training programmes such as trainings on vegetable cultivation, rice weed management , organic farming ,INM in coconut, IPDM in vegetables, and banana were conducted
- Nine field visits were conducted for solving different crop and pest management problems in farmers' field.

20. Name of AKC : Sasthamcotta Block, Kollam

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

Date of start : 17.08.2021

- As a part of Krishipadasala programmes six training programmes on cultivation of rice, coconut ,vegetables, sesame , organic farming ,preparation of botanical pesticides in different Panchayats of Sasthamcottablock.
- Organized demonstration of newly released vegetable and Dioscorea and supplied seeds.
- Supplied seeds and planting materials of vegetables, fruit plants and spices to local bodies and farmers.
- Productionplans were prepared for different Panchayats of Sasthamcotta block.

- Farmers were selected forfrontlinedemonstration of millets;
- Fifteenfield visits were conducted covering all the five panchayats of Sasthamcotta block.
- In the visits, recommendations for crop management, pest and disease control in vegetables, rice, coconutetc. were given.
- Project for SCSP programme in rice with an outlay of 6.5 lakhs has been prepared and submitted to ICAR for funding and it will be implemented immediately after getting approval.

21. Name of AKC : Vettikavala Block, Kollam District

Name of nodal officer : Ms. Neeraja C.R, Assistant Professor, KVK, Kollam

Date of start : 17.08.2020

Major Activities:

- Conducted training at Krishi bhavan levels
- Selected farmers were given training under SAP 21-22, on Vermicomposting and Vermi beds supplied
- Protein park replication carried out in block
- FLD of KVK conducted in selected panchayats in Vettikkavala block
- Attended training for master trainers on ' Implementation of Farm Plan Based Production Programme' at SAMETI and participated in Farm plan formulation in various Krishi bhavans in the block .

22. Name of AKC : Eravipuram Block, Kollam District

Name of Nodal Officer :Ms. Shamsiaya A.H, Assistant Professor, KVK, Kollam

Major Activities:

- Capacity building programme on New generation pesticides for extension functionaries of Eravipuram Block.Exhibition of New generation pesticides and Bio control agents was also organized.
- Supporting "SubhikshaKeralam" programme-Distributed Bio inputs for scientific

  Vegetable cultivation and associated with field visits as part of Krishi Padashala programme.

- Established "Tuber Hub project" in two Panchayats.
- Established Nutri-garden at one Panchayat for sustainable nutrition securit
- EDP.Programme on ' Value addition in coconut' , Capacity building on 'Agrobased food industry' and 'post harvest fish processing' were conducted.
- Attended training for master trainers on ' Implementation of Farm Plan Based Production Programme' at SAMETI and participated in Farm plan formulation in various Krishi bhavans in the block .

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

Major activities:

- Demonstration plots on integrated pest management in vegetables
- Demonstration plots on micronutrient mixture – Ayar in banana.
- Vegetable cultivation in tribal hamlet of Avanipara.
- MDDT visits were arranged for giving solutions for various field problems.
- Conducted Capacity development programme on 'Scientific pepper cultivation.'

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

Major Activities:

- An innovative programme on "Establishment of Tuber Hub" with a view of popularising new and high yielding varieties of tuber crops was launched in Parakode block.
- Organized training programmes on scientific production technology of tuber crops and integrated pest and diseases management and supplied planting material of the identified tubers and bio inputs for ensuring the pest and disease tolerance by prophylactic application of bioagents and botanicals to farmers.

- A Capacity Development Programme on “Commercial mediculture“ was conducted and supplied medicinal plants and bio inputs to farmers.
- Inputs were also distributed for demonstration of vegetable cultivation.
- Krishipadasala on “Farm Mechanisation” was conducted for Karmesena technicians in Kodumon Krishi Bhavan.
- Selected candidates for Agri internship- ‘Support to Farm Mechanisation ‘ in Parakode block.
- Four block level meetings with members of AKC and three field visits were conducted for problem identification and management.
- Provided technical guidance for front line demonstrations
- Attended Farm plan-based production programme training (3 days) for master trainers of Pathanamthitta dist.

STATION TRIAL RESULTS

Results of station trial (Dr.Ameena M, Professor,)

A station trial was conducted to identify shade tolerant black gram varieties for intercropping in coconut garden in continuation to the PhD work conducted at Department of Agronomy. Two black gram varieties identified from the study were further evaluated for shade tolerance under two shade levels. The trial was conducted during the late kharif season of 2022 under shade levels of 25 and 50 per cent along with open condition using two black gram varieties DBGV-5 and Sumanjana. The results of the study confirmed the shade tolerance nature of both the varieties and were found suitable for partial shade in coconut garden. DBGV 5 and Sumanjana recorded seed yield of 4.93 and 4.30 g per plant respectively under 25 per cent shade and 4.11 and 4.02 g per plant under 50 per cent shade compared to 5.26 and 4.83 g per plant under open condition.

FARM TRIAL RESULTS

1. Title of the project: Development of high yielding varieties of chilli (*Capsicum annuum* L.)
2. Name of the PI & Official address : Dr. S. Sarada

   Asst. Professor and Head

   Dep. of Vegetable Science

Farm Trial Results - 1			
1.	Station	:	RARS (SZ), Vellayani
2.	Season	:	Summer 2022
3.	Crop	:	chilli
4.	Objective	:	To test the performance of a high yielding dark green fruited chilli culture CA 32
5.	Location	:	Thiruvananthapuram district
6.	Plot size	:	40 m^2/ treatment/ location
7.	Name of farmer & Address	:	15 farmers in Thiruvananthapuram district
8.	Treatments	:	CA 32 and Anugraha
9.	AEUs for which the recommendations are valid		AEUs 1,8,9,12 and 14
10.	Results		Significant superiority in yield was recorded for the culture CA 32 in all locations

FARM TRIAL PROPOSAL - 1			
1.	Station	:	RARS (SZ), CoA, Vellayani
2.	Season	:	Rabi 2023
3.	Crop	:	Black gram
4.	Name of the trial		Black gram varieties suited for intercropping in coconut garden under partial shade
5.	Officer proposing & Official address	:	Dr. Ameena M., Professor, AICRP on FCU, RARS (SZ), CoA, Vellayani
6.	Objective		To identify black gram varieties suited for intercropping in coconut garden under partial shade
7.	Justification	:	The trial is proposed based on the results of three season (PhD) work and station trial conducted at CoA, Vellayni
8.	Location	:	12 Locations Thiruvananthapuram- 4 Kollam- 4 Pathanamthitta- 4
9.	Number of trails	:	1
10.	Plot size	:	40 m^2
11.	Treatments	:	Number of Treatments- 3 1. DBGV 5in coconut gardens under partial shade 2. Sumanjana in coconut gardens under partial shade 3. Farmer's practice
12.	Instructions for conducting the	:	Management practices as per KAU

	trail		PoP recommendation
13.	Observations to be recorded	:	Pod Yield and Seed yield
14.	Budget estimate	:	12000
15.	Information required to be furnished	:	--

FARM TRIAL PROPOSAL - 2			
1.	Name of the Station	:	Coconut Research Station, Balaramapuram, Thiruvananthapuram
2.	Name of the trial	:	Field performance of *Piriformospora. indica*-colonized vegetable cowpea and tomato against natural incidence of fungal, bacterialand viral diseases
3.	Officer proposing & Official address	:	Dr. Joy M., Professor (Plant Pathology) and Head, Coconut Research Station, Balaramapuram, Thiruvananthapuram
4.	Test material/recommendation and check	:	T1: *P. indica*-colonized plants T2: Seed treatment with carbendazim @ 0.1% and spraying of carbendazim @ 0.05% at 20 and 40 days after sowing T3: Soil drenching and spraying of streptocycline @ 250 ppm at 20 and 40 days after sowing T4: Spraying of imidaclorpid @ 300 ppm at 20 and 40 days after sowing T5: Absolute control Two crops: Vegetable cowpea and Tomato Variety: KAU or Popular variety used by the farmers
5.	Objective	:	Evaluation of *P. indica*-colonized vegetable cowpea and tomato against the natural incidence of fungal, bacterial and viral diseases
6	Plot size	:	5 cents per experiment / farmer
7	Season	:	Summer / Rabi 2023
8.	Observations	:	Biometric observations including number of leaves, leaf area, plant height, time for flowering, number of fruits per plant, fruit weight and yield. Incidence and intensity of fungal, bacterial and viral diseases
9	A minimum of 3 locations should be selected from each district. Total 12 trials are to be conducted for each trial.	:	2 crops x 12 farmer's field per crop in Thiruvananthapuram and Kollam districts
10.	Budget estimate		Rs. 98,000/- (@ Rs. 4000/- per trial; 2 crops; 12 trials per crop)

11	Information required to be furnished		The crops will be raised in farmer's field in 2023 and 12 farmers will be selected. *P. indica*-colonized vegetable seedlings of vegetable cowpea and tomato will be raised. Other treatments will be imposed on the non-colonized plants (T2, T3 and T4) along with the absolute control plants. All field operations will be done as per POP 2016 of KAU. - 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" (Started in 2019-20 and continuing) - Management of *Blackeye cowpea mosaic virus* using natural products from botanicals and the fungal root endophyte *Piriformospora indica* (PG; completed in 2019) - Evaluation of beneficial fungal root endophyte, *Piriformospora indica* for the management of *Tomato leaf curl virus* (PG; completed in 2021) - *Piriformospora indica* and new generation fungicides for themanagement of anthracnose incited by *Colletotrichumgloeosporioides*(Penz.) Sacc. in vegetable cowpea. (PhD; will be completed in 2022-23; Field studies in two seasons are over). In the 37th and 38th ZRAEC, the house has informed that once the field studies are over and show positive results on crop production and protection, then the technology can be further tested in the farmer's field. Multi-location trials were also conducted.

	Information required to be furnished		- 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" (Started in 2019-20 and continuing) - 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) - Evaluation of beneficial fungal root endophyte, *Piriformospora indica* for the management of *Tomato leaf curl virus* (PG; completed in 2021) - *Piriformospora indica* and new generation fungicides for the management of anthracnose incited by *Colletotrichum gloeosporioides* (Penz.) Sacc. in vegetable cowpea. (PhD; will be completed in 2022-23; Field studies in two seasons are over). - *Piriformospora indica* and its water diffusible exudates for the management of chilli anthracnose incited by *Colletotrichum capsici* (Syd.) Butler and Bisby. (PhD; will be completed in 2022-23; Field studies in two seasons are over). Technology: Efficacy of *P. indica* on production and protection of vegetable crops *viz.*, tomato, chilli, bhindi and vegetable cowpea. In the 37th ZRAEC, the house has informed that once the field studies are over and show positive results on crop production and protection, then the technology can be further tested in the farmer's field.

കർഷകർക്ക്/ സംരംഭകർക്ക് പ്രാവർത്തികമാക്കാവുന്ന സാങ്കേതിക വിദ്യ

വീൽ ഹോവീടർ

ഒരു ചക്രവും ബ്ലേഡും ഉപയോഗിച്ചു വിളകളുടെ ഇടയിൽ നടന്നു നീങ്ങി കളകളെ നിയന്ത്രിക്കാൻ സഹായിക്കുന്ന ഈ യന്ത്രം സ്ത്രീകൾക്കും അനായാസം പ്രവർത്തിക്കാവുന്നതരത്തിലാണു രൂപ കല്പന ചെയ്തിട്ടുള്ളത് (ഡിസൈൻ പേറ്റന്റ് : 100961. വിളകളിലെ ഇടയകലത്തിനു അനുസൃതമായി വിവിധ വലുപ്പത്തിലുള്ള 15 മുതൽ 30 സെ.മീ.) ബ്ലേഡുകൾ ഘടിപ്പിക്കാവുന്നതാണ്. ഒരു മണിക്കൂറിൽ 0.015 ഹെക്ടർ (3.75 സെന്റ്) സ്ഥലത്തെകളകൾ ഈ യന്ത്രം ഉപയോഗിച്ച് സാധിക്കും. ബ്ലേഡു മണ്ണിൽ 1.5 സെ.മീ. തുളച്ചു കയറുന്നതുവഴി കളകളെ വേരൊടുകൂടി ചെത്തി മാറ്റുന്നതാണ് ഇതിന്റെ പ്രവർത്തന രീതി. ബ്ലേഡു തിരശ്ചീനമായി 15 ഡിഗ്രി കോണിൽ ചരിഞ്ഞിരിക്കുന്നതിനാൽ ബ്ലേഡിന് അനായാസം മണ്ണിലേക്കു തുളച്ചുകയറാൻ സാധിക്കുന്നു. സ്കയർ ട്യൂബ് ആകൃതിയിലുള്ള ചട്ടക്കൂട് ആണ് ഈ യന്ത്രത്തിന്റെ സവിശേഷമായ ഘടകം. ഇതിൽ യന്ത്രത്തിന്റെ മൂന്ന് പ്രധാന ഭാഗങ്ങളായ ഹാൻഡിൽ ബാർ, വീൽ, ബ്ലേഡ് എന്നിവ ഘടിപ്പിച്ചിരിക്കുന്നു.

പൂമ്പൊടി ശേഖരണി

അഖിലേന്ത്യാ സംയോജിത തേനീച്ച പരാഗണ ഗവേഷണ പദ്ധതിയുടെ ഭാഗമായി തേനീച്ചകളുടെ പിൻകാലുകളിൽ നിന്നും പൂമ്പൊടി ശേഖരിക്കുന്നതിനായി തേനീച്ചപ്പെട്ടി യുടെ പ്രവേശന കവാടത്തിൽ എളുപ്പത്തിൽ സ്ഥാപിക്കാൻ കഴിയുന്നതും കൂടുതൽ കൃത്യതയുള്ളതു മായ പൂമ്പൊടി ശേഖരണി പുതുതായി രൂപകൽപ്പന ചെയ്തു. അക്രിലിക് ഷീറ്റ് ഉപയോഗിച്ച് നിർമ്മിച്ചി രിക്കുന്ന പൂമ്പൊടി ശേഖരണിയിൽ പ്രധാനമായും ര ു ഭാഗങ്ങളാണ് ഉള്ളത്; പ്രവേശന കവാടവും ശേഖരണ അറയും. പ്രവേശനകവാടത്തിലുള്ള ചെറു ദ്വാരങ്ങളിലൂടെ തേനീച്ച കടന്നുപോകുമ്പോൾ അവയുടെ പിൻകാലുകളിൽ ശേഖരിക്കപ്പെടുന്ന പൂമ്പൊടി നീക്കം ചെയ്യപ്പെടുകയും തൊട്ടു താഴെ യുള്ള ശേഖരണ അറയിൽ നിക്ഷേപിക്കപ്പെടുകയും ചെയ്യുന്നു. ഇപ്രകാരം 50 – 60 ശതമാനം വരെ പൂമ്പൊടി ശേഖരിക്കാം. ഉത്തരേന്ത്യയിൽ രൂപകൽപ്പന ചെയ്തു ഇന്ത്യൻ തേനീച്ച കോളനികളിൽ ഉപ യോഗിച്ച് വരുന്ന പൂമ്പൊടി ശേഖരണിയേക്കാൾ താരതമ്യേന കാര്യക്ഷമത കൂടിയതും എളുപ്പത്തിൽ കൈകാര്യം ചെയ്യാൻ കഴിയുന്നതുമാണ് വെള്ളായണി അഖിലേന്ത്യാ സംയോജിത തേനീച്ച പരാഗണ ഗവേഷണ
കേന്ദ്രത്തിൽ രീപകൽപ്പന ചെയ്ത പുതിയ പൂമ്പൊടി ശേഖരണി.

അക്വാകൾച്ചർ യൂണിറ്റ്

പുരയിടകൃഷി അധിഷ്ഠിത സംയോജിത കൃഷി സമ്പ്രദായ മാതൃകയിൽ തീവ്ര മത്സ്യ കൃഷിക്ക് അനു യോജ്യമായ റീസർക്കുലേറ്ററി അക്വാകൾച്ചർ യൂണിറ്റ് സ്ഥാപിക്കാനുള്ള സാങ്കേതിക വിദ്യ നൽകുന്നതാ ണ്.

മിത്രകുമിളിന്റെ കയറ്റിൻ സമ്പുഷ്ടിത ദ്രവ രൂപിക

നീരൂറ്റികുടിക്കുന്ന കീടങ്ങൾക്കെതിരെയുള്ള ലോകാനിസിലിയം എന്ന മിത്രകുമിളിന്റെ രൂപത്തിലുള്ള ഓയിൽ ഫോർമുലേഷൻ വളരെ ഫലപ്രദമാണെന്ന് 2013-2020വരെ നടന്നിട്ടുള്ള കൃഷിയിട പരീക്ഷണ ങ്ങൾ തെളിയിച്ചു. നിലവിലുപയോഗിച്ചു വരുന്ന പൊടി രൂപത്തിലുള്ള ഉൽപന്നത്തേക്കാൾ മേന്മയുള്ള താണ് ഈ പുതിയ രൂപിക. ചെടികളിലുള്ള മികച്ച പ്രവർത്തന ശേഷിയും ഉപയോഗിക്കാനുള്ള സൗക ര്യവും കീടങ്ങളിൽ രോഗം ഉളവാക്കുവാനുള്ള കഴിവും ഇതിനെ ഒരു മികച്ച ഉൽപന്നമാക്കുന്നു.

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 നിലനിന്നിട്ടു ്. ഈ സ്ഥാപനങ്ങളിൽ നിന്നും പുതുതായി ലഭ്യമാകുന്ന വിവിധ ഗവേഷണ ഫലങ്ങളുടേയും സേവനങ്ങളുടേയും വിവരണങ്ങൾ താഴെ നല്കിയിരിക്കുന്നു. ഇവ പരമാവധി പ്രയോജനപ്പെടത്തുവാൻ കർഷക സുഹൃത്തുക്കൾ ശ്രദ്ധിക്കുക.

കർഷക സാന്ത്വനം

കാർഷിക പ്രശ്നങ്ങൾക്ക് പരിഹാരം കെ ത്തുവാൻ 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 കുമനസ്സിലാക്കി പ്രാവർത്തികമാക്കുന്നതിന് ഒരു മാതൃക ജൈവ കൃഷിത്തോട്ടം നിലവിലു ്.

ദ്രാവക ജൈവവളങ്ങളായ പഞ്ചഗവ്യം, ദശഗവ്യം, ഫിഷ് അമിനോ ആസിഡ് (മത്തി – ശർക്കര മിശ്രിതം), ജീവാമൃതം, വെർമിവാഷ് തുടങ്ങിയവയുടെ നിർമാണത്തിനും ഉപയോഗത്തിനുമുള്ള സാങ്കേതിക പരിശീലനവും കർഷകർക്ക് നൽകുന്നു്. ഗുണമേന്മയേറിയ ജൈവവളങ്ങളും സൂക്ഷ്മമൂലക മിശ്രിതവും സെയിൽസ് കൗ റിൽ കൂടി വിതരണം ചെയ്യുന്നു ്.

മണ്ണിന്റെ ആരോഗ്യത്തിനും സുസ്ഥിരതയ്ക്കും പരിപ്പോഷിപ്പിച്ച ജൈവവളങ്ങൾ

മണ്ണിന്റെ ആരോഗ്യം വർദ്ധിപ്പിക്കുന്നതിനും സ്ഥായിയായി നിലനിർത്തുന്നതിനും വേ ി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.

ഡിപ്ലോമ ഇൻ ഓർഗാനിക് അഗ്രികൾച്ചർ

ഡിപ്ലോമ ഇൻ ഓർഗാനിക് അഗ്രികൾച്ചർ എന്ന 2 വർഷത്തെ കോഴ്സ് വഴി കുട്ടികൾക്ക് കൃഷിയെ കൂടുതൽ അറിയാനും അതുവഴി കൃഷിയുടെ നൂതന ആശയങ്ങൾ സമൂഹത്തിൽ പ്രചരിപ്പിക്കുവാനും കഴിയുന്നു. ഡിപ്ലോമ ഇൻ ഓർഗാനിക് അഗ്രികൾച്ചർ കോഴ്സ് പഠിച്ചിറങ്ങുന്നവർക്ക് ബി എസ് സി അഗ്രികൾച്ചർ കോഴ്സിന് 6 സീറ്റുകളിലേക്ക് നീറ്റുവഴി മുൻഗണന ലഭിക്കുന്നു.ഡിപ്ലോമ കോഴ്സ് പഠിച്ചിറങ്ങുന്നവർക്ക് അസിസ്റ്റന്റ് അഗ്രികൾച്ചർ ഓഫീസർ എന്ന തസ്തികയിലേക്ക് കേരള പി എസ് സി വഴി നിയമന സാദ്ധ്യതയും ഉ ്.

ജൈവ കൃഷിയും നല്ലമുറ കൃഷിയും

ജൈവ കൃഷിയിലും നല്ലമുറ കൃഷിയിലുംപരിശീലനവും സാങ്കേതിക സഹായവും കർഷ കർക്ക് 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, കാഴ്ച്ച പരിമിതിയുളളവർ, സംസാരകേൾവി പരിമിതിയുളളവർ, ബുദ്ധിപരമായ വെല്ലുവിളികൾ നേരിടുന്നവർ) ഉന്നമനം ലക്ഷ്യമാക്കിയുളളതാണ്. സ്പെഷ്യൽസ്കൂളുകളിലും പുനരധിവാസകേന്ദ്രങ്ങളിലുമാണ് ഈ ഹോർട്ടികൾച്ചർ തെറാപ്പി നടപ്പിലാക്കാൻ സാധിക്കുന്നത്.

ബന്ധപ്പെടുക 9846103127

മാലിന്യസംസ്കരണ സാങ്കേതിക വിദ്യകളും ജൈവവളനിർമ്മാണവും

ഖര മാലിന്യങ്ങൾ സംസ്കരിച്ച് കൃഷിക്ക് ഉപയുക്തമാക്കുന്ന വിധം സംപുഷ്ടീകരിച്ച ജൈവവ ളമാക്കി കുറഞ്ഞ സമയം കൊ ് ലഭ്യമാക്കുന്ന സാങ്കേതിക വിദ്യകൾ വികസിപ്പിച്ചെടുത്തിട്ടു ് (PatentNo.321857).

അതിവേഗ മാലിന്യ സംസ്കരണത്തിലൂടെ ജൈവവള ഉൽപാദനത്തിനായി രൂപകൽപന ചെയ്ത് വികസിപ്പിച്ചെടുത്ത യന്ത്രമാണ് ''ശുചിത''. വൻതോതിൽ ജൈവ മാലിന്യം ഉറവിടത്തിൽതന്നെ ദ്രുതഗതിയിൽ സംസ്കരിച്ച് ജൈവവളമാക്കാൻ ഏറ്റവും ഉത്തമമായ മാർഗമാണിത്. കേരളത്തിൽ പല യിടത്തും മാലിന്യ സംസ്കരണത്തിനുവേ ി ശുചിത മിഷൻ സ്ഥാപിച്ചിട്ടു ്.

ബന്ധപ്പെടുക -9447501346

മണ്ണു പരിശോധനയും വളപ്രയോഗ നിർദ്ദേശങ്ങളും

മണ്ണുസാമ്പിളുകൾ. സസ്യസാമ്പിളുകൾ, രാസവളങ്ങൾ, ജൈവ വളങ്ങൾ, കുമ്മായ വസ്തു ക്കൾ, ജലസാമ്പിളുകൾ എന്നിവ പരിശോധിച്ച് കൊടുക്കുന്ന സൗകര്യം നിലവിലു ്.

കർഷകരുടെ മണ്ണുസാമ്പിളുകൾ പരിശോധിച്ച്, അതിലടങ്ങിയിരിക്കുന്ന പോഷകമൂലകങ്ങ ളുടെയും അമ്ള - ക്ഷാരവസ്ഥയുടെയും അടിസ്ഥാനത്തിൽ ഓരോ കൃഷിക്കും വേ കുമ്മായ വസ്തുക്കളുടെയും വളത്തിന്റെയും അളവ് ചുരുങ്ങിയ ചെലവിൽ നിർദ്ദേശിച്ച് കൊടുക്കുന്നു. സഞ്ചരി ക്കുന്ന മണ്ണുപരിശോധനശാല കർഷകരുടെ കൃഷിയിടത്തിലെത്തി മണ്ണു പരിശോധിച്ച് നൽകപ്പെടുന്നു. കർഷകർ ഉൽപാദിപ്പിക്കുന്ന ജൈവവളങ്ങളുടെയും വിപണിയിൽ ലഭ്യമാകുന്ന വിവിധയിനം ജൈവവ ളങ്ങളുടെയും കുമ്മായ വസ്തുക്കളുടേയും ഗുണമേന്മ ചുരുങ്ങിയ ചെലവിൽ നിർണ്ണയിച്ച് നൽകുന്നു.

ബന്ധപ്പെടുക 9633100344

സസ്യ /മണ്ണു പരിശോധന ലബോറട്ടറി

അഗ്രോണമി വിഭാഗത്തിന്റെ ആഭിമുഖ്യത്തിൽ കേരള കാർഷിക സർവ്വകലാശാല റിവോൾവിംഗ് ഫ ് പദ്ധതിയുടെ ഭാഗമായി സസ്യ / മണ്ണ് പരിശോധന ലബോറട്ടറി പ്രവർത്തിച്ചു വരുന്നു. മണ്ണു സാമ്പിളു

കളും സസ്യ സാമ്പിളുകളും നിശ്ചിത ഫീസ് ഈടാക്കി, പരിശോധിച്ച് പോഷക മൂലകങ്ങളുടെയും വള ങ്ങളുടെയും തോത് നൽകേ സമയം, രീതി തുടങ്ങിയവയെക്കുറിച്ചുള്ള ശുപാർശ നൽകി വരുന്നു.

ബന്ധപ്പെടുക 9495121213

ഇൻകുബേഷൻ സെന്റർ

വ്യാവസായികഅടിസ്ഥാനത്തിലുള്ള പഴം - പച്ചക്കറിസംസ്കരണവും മൂല്യവദ്ധനയും പ്രോത്സാഹിപ്പിക്കുന്നതിനും അതുവഴികേരളത്തിലെ പഴം - പച്ചക്കറിരംഗത്ത്വിളവെടുപ്പിന് ശേഷമുള്ള ഭീമമായ നഷ്ടംകുറയ്ക്കുന്നതിനും ലക്ഷ്യമിട്ടുകൊ്ഒരു ഇൻകുബേഷൻ കേന്ദ്രം കാർഷികസർവ്വകലാ ശാലയുടെവെള്ളായണികാർഷികകോളേജിലെ പോസ്റ്റ്ഹാർവെസ്റ്റ്ടെക്നോളജിവിഭാഗത്തിൽ പ്രവർത്ത നമാരംഭിച്ചിരിക്കുന്നു. കാർഷികവികസന കർഷകക്ഷേമവകുപ്പിന്റെ സാമ്പത്തികസഹായത്തോടെ നിർമ്മിച്ച കേന്ദ്രം കാർഷിക സർവ്വകലാശാലയുടെ തെക്കൻ കേരളത്തിലെ പഴം- പച്ചക്കറിസംസ്കരണ ത്തിനായുള്ളആദ്യ ഇൻകുബേഷൻ കേന്ദ്രമാണ്.

പഴം - പച്ചക്കറിസംസ്ക്കരണരംഗത്തെ നൂതന ശാസ്ത്ര സാങ്കേതികവിദ്യകൾ പ്രചരിപ്പിക്കുന്നതിനായുള്ളവിവിധ കാലദൈർഘ്യമുള്ള പരിശീലന പരിപാടികൾ ഈ കേന്ദ്രത്തിൽ നിന്നും നടപ്പാക്കിവരുന്നു. ഇതിനു പുറമെ പഴം - പച്ചക്കറിസംസ്കരണവും മൂല്യ വർദ്ധനയും, പാക്കേജിംഗും, ലേബലിങ്ങും, ഭക്ഷ്യ സുരക്ഷാവകുപ്പിന്റെഗുണനിലവാര നിയന്ത്രണങ്ങൾ തുടങ്ങിയവയിലുള്ളസാങ്കേതിക വിദഗ്ദ്ധോപദേശങ്ങളും ഉൽപ്പന്ന ഗുണനിലവാര പരിശോധനക്കുമുള്ളസൗകര്യവും ഈ കേന്ദ്രത്തിൽഒരുക്കിയിരിക്കുന്നു. സംസ്ക രണരംഗത്ത് പ്രവർത്തിക്കുന്നസംരഭകർ, സംശയസംഘങ്ങൾ, FPOകൾ, കുടുംബശ്രീയൂണിറ്റുകൾ എന്നിവർക്കെല്ലാംമിതമായ ഫീസ് നൽകി ഈ സൗകര്യങ്ങൾ ഉപയോഗപ്പെടുത്താവുന്നതാണ്.

ബന്ധപ്പെടുക 04712383573

നടീൽ വസ്തുക്കളുടെ ഉല്പാദനവും വിതരണവും

വെള്ളായണി കാർഷികകോളേജിലെ വിദ്യാർത്ഥികൾക്കും ഗവേഷകർക്കും പഠനത്തിനും ഗവേ ഷണത്തിനുമുള്ള സൗകര്യം നൽകുക എന്നതാണ് ഈ ഫാമിന്റെ പ്രധാന ചുമതല. ഇതോടൊപ്പം നടീൽവസ്തുക്കളുടെ ഉത്പാദനവും മറ്റു വിജ്ഞാനവ്യാപന പ്രവർത്തനങ്ങളും നടത്തി വരുന്നു. തദ്ദേ ശ സ്വയംഭരണ സ്ഥാപനങ്ങളും മറ്റ് സർക്കാർ സ്ഥാപനങ്ങളുമായി ചേർന്ന് കൃഷിക്കാർക്കുള്ള പരിശീ ലന പരിപാടികളും ഇവിടെ നടത്തി വരുന്നു.

അത്യുല്പാദന ശേഷിയുള്ള വിവിധയിനം പഴവർഗ്ഗങ്ങൾ, പച്ചക്കറികൾ, അലങ്കാരസസ്യങ്ങൾ, സുഗന്ധവ്യജ്ഞനങ്ങൾ, കിഴങ്ങ്വർഗ്ഗവിളകൾ എന്നിവയുടെ നടീൽവസ്തുക്കൾ ഉത്പാദിപ്പിച്ച് ഇവിടെ നിന്നും കർഷകർക്ക് വിതരണം ചെയ്യുന്നു. ജൈവകൃഷിയ്ക്ക് ആവശ്യമായ ജൈവവളങ്ങൾ, ജൈവ രോഗകീട നിയന്ത്രണത്തിനുള്ള ഉപാധികൾ എന്നിവയും ഇവിടെ നിർമ്മിക്കുന്നു. ഫാമിന്റെ ഭാഗമായി പ്രവർത്തിക്കുന്ന വാല്യൂ അഡിഷൻ സെന്ററിൽ വിവിധ മൂല്യവർദ്ധിത ഉത്പന്നങ്ങൾ തയ്യാ റാക്കിവരുന്നു. വാഴയ്ക്കും തെങ്ങിനും ഉപയോഗിക്കുന്ന ഉപസൂക്ഷമമൂലക മിശ്രിതങ്ങൾ ഇവിടെ തയ്യാ റാക്കുന്നു.

വിവിധയിനം കൂണുകൾ, കൂൺ വിത്ത്. കൂൺ കൃഷി പരിശീലനം എന്നിവ ഫാമിൽ നിന്ന് ലഭ്യ മാണ്. ഇൻസ്ട്രക്ഷണൽ ഫാമിൽ ഉത്പാദിപ്പിക്കുന്ന എല്ലാ നടീൽവസ്തുക്കളും കാർഷികഉത്പന്ന ങ്ങളും 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 04712383573

തീറ്റപ്പുൽഉല്പാദനം

ക്ഷീരകർഷകന്റെലാഭ നഷ്ട കണക്കിൽമുഖ്യപങ്കും ഗുണമേന്മയുള്ളകാലിത്തീറ്റയുടേതാണ്. വീട്ടാവശ്യത്തിനായാലുംവാണിജ്യാടിസ്ഥാനത്തിലായാലുംകന്നുകാലികളെവളർത്തുന്ന കർഷകർക്ക്തീറ്റപ്പുൽകൃഷിയെഒഴിവാക്കാൻ സാധ്യമല്ല.

ഭാരതീയകാർഷികഗവേഷണകൗൺസിലിന്റെ ധനസഹായത്തോടുകൂടിഅഖിലേന്ത്യസംയോജിതതീറ്റപ്പുൽഗവേഷണ പദ്ധതി കേരളകാർഷികസർവ്വകലാശാലയുടെവെള്ളായണികോളേജിൽ 1971 – ൽ പ്രവർത്തനം ആരംഭിച്ചു. ഈ പദ്ധതിയിൽ വിളപരിപാലനം, സസ്യപ്രജനനം എന്നീവിഭാഗങ്ങളിലുള്ളഗവേഷണ പ്രവർത്തനങ്ങളും പ്രധാനമായും നടന്നുവരുന്നു. ഈ പദ്ധതിയിലൂടെ ക്ഷീരകർഷകർക്ക്ആവശ്യമായസേവനങ്ങൾ താഴെ പറയുന്ന രീതിയിൽലഭ്യമാണ്.

വിത്തുൽപ്പാദനം

ദീർഘകാലഗവേഷണഫലമായിവികസിപ്പിച്ചെടുത്ത സങ്കരനേപ്പിയർ ഇനങ്ങളായസൂഗുണ, സുസ്ഥിരയുംതീറ്റപ്പയറിനമായഐശ്വര്യയും ഉൽപാദിപ്പിക്കുകയുംഇത്ആവശ്യാനുസരണംകർഷകർക്ക്ലഭ്യമാക്കുകയുംചെയ്തുവരുന്നു.

മിശ്രവിളകൾ

കുറച്ചുസ്ഥലത്തുനിന്നും പശുവിന് കൂടുതൽ പോഷകമൂല്യമുള്ളതീറ്റലഭ്യമാക്കുന്നതിനായി മിശ്രവിളകൾ കൃഷിചെയ്യാം. പുല്ലിനത്തിൽമാംസ്യത്തിന്റെഅളവ്കുറവും (8–9 %), നാരിന്റെഅളവുംകൂടുതലുമാണ്. (24-28%). എന്നാൽ പയറിനത്തിൽമാംസ്യത്തിന്റെഅളവ്കൂടുതലും (16-18%), നാരിന്റെഅളവ്കുറവുമാണ്. (20%) ആയതിനാൽഇവര ുംമിശ്ര രീതിയിൽകൃഷിചെയ്യുന്നത് നല്ലതാണ്. പശുവിന്റെതീറ്റയിൽ പുല്ലും പയറുംചേർത്ത് ഉൾപ്പെടുത്തിയാൽആവശ്യമായമാംസ്യവും, നാരുംലഭിക്കുന്നതിലൂടെ പോഷക സമൃദ്ധമായ പാലു നമുക്ക്ലഭിക്കും.

ഫോറേജ്ടെക്നോളജിഡെമോൺസ്ട്രേഷൻ

കേരളത്തിലെതിരഞ്ഞെടുത്ത ജില്ലകളിലെ നിന്നുംമികച്ച കർഷകരുടെകൃഷിയിടത്തിൽ നല്ല ഉദ്പാദന ശേഷിയുള്ളതീറ്റപ്പുല്ലിനങ്ങളായസുഗുണയും, സുസ്ഥിരയുംതീറ്റപ്പയറിനമായഐശ്വര്യയുംശാസ്ത്രജ്ഞരുടെമേൽനോട്ടത്തിൽകൃഷിചെയ്തുവരുന്നു.

സുവർണ്ണ ജൂബിലിതീറ്റപ്പുൽമ്യൂസിയം

അഖിലേന്ത്യസംയോജിതതീറ്റപ്പുൽഗവേഷണ പദ്ധതിയുടെ സുവർണ്ണജൂബിലിവർഷമായ 2020-21 - ൽ ഭാരതീയകാർഷികഗവേഷണകൗൺസിലിന്റെ (കഇഅഞ) നിർദ്ദേശപ്രകരാമാണ്സുവർണ്ണജൂബിലിതീറ്റപ്പുൽമ്യൂസിയംവെള്ളായണികാർഷികകോളേജിൽസ്ഥാപിച്ചിരിക്കുന്നത്. കേരളത്തിന്റെകാലാവസ്ഥയ്ക്ക് അനിയോജ്യമായ 50 വിവധ തരംകാലിത്തീറ്റവിളകളാണ്ഇവിടെ നട്ടുപിടിപ്പിച്ചിരിക്കുന്നത്.ക്ഷീരകർഷകർക്കുംകാർഷികവിദ്യാർത്ഥികൾക്കുംവിവിധയിനം തീറ്റവിളകളെ ക ് മനസ്സിലാക്കാൻ വേ ിഒരിക്കിയിരിക്കുന്ന ഈ തീറ്റപ്പുൽമ്യൂസിയംകേരളത്തിന്റെ ക്ഷീരമേഖലയ്ക്ക്ഒരുമുതൽകൂട്ടാകും.

തീറ്റപ്പുൽ നടീൽവസ്തുവിൽപ്പന

അത്യൽപാദന ശേഷിയുള്ള സങ്കരനേപ്പിയർ ഇനങ്ങളായസുഗുണ, സുസ്ഥിരഎന്നിവയുടെ 2 മൂട്ടോടുകൂടിയ നടീൽ കമ്പുകൾ കമ്പെന്നിന് 1 രൂപ നിരക്കിൽവില്പനയ്ക്ക്ലഭ്യമാണ്.

ബന്ധപ്പെടുക – 8547125233

തേൻഉല്പാദനം

- അഖിലേന്ത്യാ സംയോജിത തേനീച്ച പരാഗണ ഗവേഷണ കേന്ദ്രത്തിൽ വികസിപ്പിച്ചെടുത്ത ശാസ്ത്രീയമായ തേനീച്ച വളർത്തലിന്റെ നൂതന സാങ്കേതിക വിദ്യകൾ കർഷകരിൽ എത്തിക്കുന്നതിലേക്കായി പരിശീലന പരിപാടികൾ നടത്തുന്നു.
- തേനീച്ച കർഷകർക്ക് തേനീച്ച വളർത്തലിൽ ആവശ്യമായ മാർഗ്ഗ നിർദ്ദേശം നൽകി വരുന്നു.
- ശുദ്ധമായ തേനും രോഗവിമുക്തമായ തേനീച്ച കോളനികളും ഈ കേന്ദ്രത്തിൽ നിന്നും വിതരണം ചെയ്യുന്നു.
- ഒരു വീട്ടിൽ ഒരു ചെറു തേനീച്ച കോളനി എന്ന ലക്ഷ്യം കൈവരിക്കുന്നതിന്റെ ഭാഗമായി ചെറു തേനീച്ച വളർത്തൽ പ്രോത്സാഹിപ്പിക്കുവാനുള്ള പ്രവർത്തനങ്ങൾ നടത്തിവരുന്നു.

റബ്ബർ തേൻ - 1 കി.ഗ്രാം - 360/-രൂപ

ചെറുതേനീച്ച കോളനി - 2200/-

തേനീച്ച വളർത്തലിലെ സംശയങ്ങൾക്ക് ഫോണിലൂടെയും നേരിട്ടും സമീപിക്കുന്ന കർഷകർക്ക് ആവശ്യമായ സഹായം നൽകി വരുന്നു.

ബന്ധപ്പെടുക 9447428656

അഖിലേന്ത്യാ കൂൺ ഗവേഷണ പദ്ധതി

- കൂൺ വിത്തുൽപ്പാദനം കൃഷി രീതികളും
- അത്യുൽപ്പാദന ശേഷിയുള്ള ചിപ്പി കൂൺ, പാൽ കൂൺ ഇനങ്ങളെ കണ്ടെത്തി പ്രചരിപ്പിച്ചു വരുന്നു
- വിവിധ ഇനം ചിപ്പി കൂൺ ഇനങ്ങളായ പ്ലൂറോട്സ് ഫ്ലോറിഡ, പ്ലൂറോഡ്സ് ഈയോസ്, പ്ലൂറോഡ്സ് സജോർ സാജു, ഹൈപ്സീസയ്ഗ്സ് ആൽമരിയൂസ് എന്നിവയുടെ വിത്തും കൂണും ഉൽപ്പാദിപ്പിച്ചു വരുന്നു.
- കൂൺ വിത്ത് - ഒരു പാക്കറ്റിന് 45 രൂപ, മാതൃവിത്തിന്റെ വില - 225 രൂപ
- കൂൺ കൃഷിയിൽ കർഷകർക്കും വിദ്യർത്ഥികൾക്കും, അഭ്യസ്തവിദ്യരായ യുവതി യുവാക്കൾക്കും, സ്ത്രീകൾക്കും, താൽപ്പര്യമുള്ളവർക്കും പരിശീലനം നൽകി വരുന്നു.
- കൂൺ കൃഷിയിലെ സംസയങ്ങൾക്കു ഫോണിലൂടെയും നേരിട്ടും, ഇമെയിൽ വഴിയും സഹായം നൽകി വരുന്നു.
- ബന്ധപ്പെടുക 9895839660

അത്യുൽപ്പാദന ശേഷിയുള്ള പച്ചക്കറി ഇനങ്ങൾ

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

1. വള്ളിപ്പയർ- കെ.എ.യു. ദീപിക

   അത്യുല്പാദന ശേഷിയുള്ള ഇനം, നീ 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 ത ും ഇലയും, നീ കായിക വളർച്ചാ കാലം, താമസിച്ചു പൂക്കുന്ന ഇനം

വിളവ് - 35 ടൺ/ഹെ.

3. ചീനിയമര - കെ.എ.യു. സുരുചി

അത്യുല്പാദന ശേഷിയുള്ള ഒറ്റ ത ുള്ള ഇനം, നീ 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 സന്ദർശകരുടെ സംശയങ്ങൾക്ക് മറുപടിയും നൽകി വരുന്നു.

ബന്ധപ്പെടുക 9495974675

കീടനിയന്ത്രണം

അഖിലേന്ത്യ ജൈവ കീടനിയന്ത്രണ പദ്ധതി

വിവധയിനം ജൈവ കീടനിയന്ത്രണ ഉപാധികൾ കർഷകർക്ക് നൽകിവരുന്നു.

1. ട്രൈക്കോ കാർഡുകൾ (വില-60/- രൂപ /cc)

ട്രൈക്കോഗ്രാമ ജപ്പോണിക്കം, ട്രൈക്കോഗ്രാമ കീലോണിസ് അടങ്ങിയട്രൈക്കോ കാർഡുകൾ ഉപയോഗിച്ച് നെല്ലിന്റെ ത ുതുരപ്പൻ, ഓലചുരുട്ടി, പച്ചക്കറി, ഏലം എന്നിവയുടെ ത ുതുര പ്പൻ പുഴുക്കൾ എന്നിവയെ നിയന്ത്രിക്കാം

2. 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 ക ുതുടങ്ങുമ്പോൾ തളിക്കുക.
- തടപ്പുഴുവിനെ നിയന്ത്രിക്കാൻ ഇലക്കവിളിൽ ഒഴിക്കണം.

3. 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.

4. 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 വ ിനെതിരെയും ഫലപ്രദം: 30 ഗ്രാം ഒരു ലിറ്റർ വെള്ളത്തിൽ ചേർത്ത് വാഴക്കുഴിയിൽ ഒഴിച്ചു കൊടുക്കുക.

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

ശ്രദ്ധിക്കേ 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.

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

ശ്രദ്ധിക്കേ 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 9946477741

മണ്ണു പരിശോധന നിമവിരനിയന്ത്രണത്തിന്:

അഖിലേന്ത്യാ നിമവിര ഗവേഷം പദ്ധതിയുടെ ഭാഗമായി മണ്ണിലും ചെടികളുടെ വേരുപടലത്തിലും കാണപ്പെടുന്ന സൂക്ഷ്മ സസ്യപരാദങ്ങളായ നിമവിരകളെ തിരിച്ചറിയുന്നതിനും നിയന്ത്രിക്കുന്നതിനു മുള്ള പരിശീലന പരിപാടികൾ നൽകുന്നു. കർഷകരുടെ കൃഷിസ്ഥലത്തിലുള്ള മണ്ണ്, വേര് സാമ്പിളുകൾ പരിശോധിച്ച് നിമവിരകളുടെ സാന്ദ്രത തിട്ടപ്പെടുത്തുന്നു. പർപ്ൂറിയോസിലിയം ലൈലാസിനം, പോക്കോണിയ ക്ലാമിഡോസ്പോറിയ എന്നീ ജീവാണുക്കൾ ഉപയോഗിച്ച് സമ്പുഷ്ടീകരിച്ച ജീവാണുവളം, ജൈവ ധൂമീകരണം എന്നീ ശുപാർശകൾ നിമവിരകളെ നിയന്ത്രിക്കാൻ നൽകുന്നു. മിത്ര നിമവിരകൾ ഉപയോഗിച്ച് കീടനിയന്ത്രണത്തിനുള്ള പരിശീലനവും നൽകി വരുന്നു.

ബന്ധപ്പെടുക -9447026230

മിത്രസൂക്ഷാമാണു ഉത്പന്നങ്ങളും സേവനങ്ങളും

ക്രമ നമ്പർ	ഉത്പന്നങ്ങൾ	വില (രൂപ)
1.	സൂഡോമോണാസ് ഫ്ളൂറസെന്സ്	75
2.	ട്രൈക്കോഡർമ	105
3.	അസോസ്പൈറില്ലം	75
4.	അസ്റ്റോബാക്ടർ	50
5.	ഭാവക ലായക സൂക്ഷാമാണുക്കൾ (ബാസില്ലസ്സ് മെഗാതീരിയം)	75
6.	പി.ജി.പി.ആർ. മിക്സ് 1	70
7.	പി.ജി.പി.ആർ. മിക്സ് 2	70
8.	മൈക്കോറൈസ	75
9.	മാലിന്യ സംസ്ക്കരണത്തിന് (കമ്പോസ്റ്റിംഗ് ഇനോകുലം)	80

മിത്രസൂക്ഷാമാണു ഉത്പന്നങ്ങളെക്കുറിച്ചുള്ള സംശയങ്ങൾക്ക് നേരിട്ടോ ഫോൺ നമ്പറിലോ ബന്ധപ്പെടാവുന്നതാണ്.

ബന്ധപ്പെടുക 9400329295

ട്രയിനിംഗ് സർവ്വീസ് സ്കീം

കേരള കാർഷിക സർവ്വകലാശാലയുടെ മണ്ണുത്തിയിലുള്ള സെൻട്രൽ ട്രയിനിംഗ് ഇൻസ്റ്റിറ്റ്യൂട്ടിന്റെ കീഴിൽ പ്രവർത്തിക്കുന്ന ദക്ഷണ മേഖലയിലെ കർഷകർ, യുവാക്കൾ, വിജ്ഞാന വ്യാപന പ്രവർത്തകർ എന്നിവർക്കായുള്ള കാർഷിക അനുബന്ധ മേഖലകളിലെ പരിശീലന പരിപാടികൾ സംഘടിപ്പിക്കുന്നു. കൂടാതെ പൊതുമേഖലാ സ്ഥാപനങ്ങൾ, കുടുംബശ്രീ, കാർഷിക മേഖലയിലെ മറ്റു സ്ഥാപനങ്ങൾ, അവരുടെ ആവശ്യാനുസരണം താല്പര്യപ്പെടുന്ന വിഷയങ്ങളിലും വിദഗ്ധ പരിശീലനം നൽകുന്നു.

ബന്ധപ്പെടുക 9447495778

ഐ.എഫ്. എസ്.ആർ.എസ്. കരമനയിൽ നൽകിവരുന്ന സേവനങ്ങൾ

- സംയോജിതകൃഷി സംമ്പ്രദായം, മട്ടുപ്പാവ്കൃഷി, മാലിന്യ നിർമാർജനം, ജൈവകൃഷി, മണ്ണിര കമ്പോസ്റ്റ് നിർമ്മാണം, പരിസ്ഥിതിസൗഹൃദരോഗകീട നിയന്ത്രണം, മണ്ണിന്റെആരോഗ്യ പരിപാലനം, വിഷരഹിത പച്ചക്കറികൃഷി, എന്നീവിഷയങ്ങളിൽ പരിശീലനവും, വിദഗ്ദ്ധ സഹായവും.
- കർഷകർക്കുംകൃഷിയിൽ തൽപ്പരരായസ്കൂൾ/ കോളേജ്വിദ്യാർത്ഥികൾക്കും ഉദ്യോഗസ്ഥർക്കും ഫാം സന്ദർശിക്കുന്നതിനുള്ളസൗകര്യവും പരിശീലനവും.
- സസ്യആരോഗ്യ ക്ലീനിക്കിലൂടെകൃഷി സംബന്ധമായവിഷയങ്ങളിൽസംശയ നിവാരണവും വിദഗ്ദ്ധ ഉപദേശവുംകൂടാതെമണ്ണ്, ജലം എന്നിവയുടെ പരിശോധനയും സാധ്യമാണ്.

- അത്യുൽപ്പാദന ശേഷിയുള്ള'ഉമ'വിത്തിനത്തിന്റെവിപണനം.
- നെല്ല് (ഇനം- ഉമ), നെൽകതിർ, അയർ, പച്ചക്കറികൾ, കരിക്ക്, വാഴക്കുല, പാല്, മുട്ട (കോഴി, കാട, താറാവ്), മീൻ(ലഭ്യത അനുസരിച്ച്), കൂൺ, കൂൺവിത്ത്, വൈക്കോൽ, ഇറച്ചി (കോവി, താറാവ്-ലഭ്യതക്കനുസരിച്ച്) എന്നിവയുടെവിപണനം.

- ജൈവവളങ്ങളായചാണകം, ഗോമൂത്രം, മണ്ണിര കമ്പോസ്റ്റ്, ചകിരിച്ചോറ് കമ്പോസ്റ്റ്, അസോളഎന്നിവയുടെവിപണനം.
- മണ്ണിരയുടെവിപണനം.
- മൂല്യവർദ്ധിത ഉൽപ്പന്നങ്ങളായഅരിപ്പൊടി, ചമ്പാപച്ചരി, മഞ്ഞൾപ്പൊടി (ലഭ്യതക്കനുസരിച്ച്) തുടങ്ങിയവയുടെവിപണനം.
- ക്രോപ്പ് ബസാറിലൂടെ പച്ചക്കറിതൈകൾ, വളർച്ചാമാധ്യമം)എന്നിവയുടെവിപണനം.
- പുരയിടകൃഷിക്കുംമട്ടുപ്പാവ്കൃഷിക്കും അനുയോജ്യമായവിവിധതരം ലംബഘടനകൾ, തിരിനന സംവിധാനമുള്ള ഘടന എന്നിവയുടെമാതൃകകൾ ലഭ്യമാണ്.

ബന്ധപ്പെടുക: 0471 2343586 9847022979 9446104347

നാളികേരഗവേഷണകേന്ദ്രം, ബാലരാമപുരം

കേരളകാർഷികസർവ്വകലാശാലയുടെ പ്രാദേശികകാർഷികഗവേഖംകേന്ദ്രം (തെക്കൻ മേഖല)വെള്ളായ ണിയുടെകീഴിൽതെങ്ങ്കൃഷി പരിപോഷിപ്പിക്കുന്ന ദൗത്യംവിജയകരമായി നടത്തിവരുന്ന തെക്കൻ കേര ളത്തിലെ പ്രമുഖസ്ഥാപനമാണ് ബാലരാമപുരം നാളികേരഗവേഷണകേന്ദ്രം. തെങ്ങ് അധി ഷ്ഠിതസംയോജിതകൃഷി, വിവിധ ഇടവിളകൃഷികൾ, ജൈവകൃഷിഎന്നിവയുടെ നൂതന സാങ്കേതിക വിദ്യകളെക്കുറിച്ച് നിരവധി ഗവേഷണങ്ങൾ ഇവിടെ നടന്നുവരുന്നു.

അത്യുൽപ്പാദന ശേഷിയുള്ളതുംമൂന്നര നാല്വർഷംകൊ ്കായ്ഫലം നൽകുന്നതുമായകേര ശ്രീ, കേരസങ്കര, കേരഗംഗഎന്നീസങ്കരയിനം തെങ്ങിൻ തൈകളും നാടൻ (പശ്ചിമതീരനെടി യൻ/WCT) തെങ്ങിൻ തൈകളുംതികച്ചുംശാസ്ത്രീയമായരീതിയിൽഇവിടെഉൽപാദിപ്പിക്കുന്നു ്. പ്രതി വർഷം30000 തെങ്ങിൻ തൈകൾ ഉൽപാദിപ്പിച്ച്വിതരണംചെയ്തുവരുന്നു.

ആധുനികരീതിയിലുള്ളഒരുമണ്ണ് പരിശോധന ലാബുംതെങ്ങ് അധിഷ്ഠിതസംയോജിതകൃഷി യുടെഒരുയൂണിറ്റുംഇവിടെവിജയകരമായി പ്രവർത്തിച്ചുവരുന്നു. സംയോജിതകൃഷിയൂണിറ്റിന്റെ ഭാഗ മായിഒരുകന്നുകാലി പരിപാലന യൂണീറ്റും (പശു, ആട്), പൗൾട്രിയൂണിറ്റുംമാതൃകാപരമായി പ്രവർ ത്തിക്കുന്നു. ഗ്രാമപ്രിയ, ഗ്രാമലക്ഷ്മിഎന്നീ ഇനങ്ങളിലെകോഴിക്കുഞ്ഞുങ്ങളും, മലബാറി ഇനത്തിലെ ആട്ടിൻ കുട്ടികളും, മുട്ട, പാൽഎന്നീ ഉൽപ്പന്നങ്ങളുംവിതരണംചെയ്തുവരുന്നു. ഇവകൂടാതെഅത്യുൽപ്പാദനശേഷിയുംഉയർന്ന ഗുണ നിലവാരവുമുള്ളകുരുമുളക്, അടയ്ക്ക, വാഴഎന്നിവയുടെതൈകളും, പച്ചക്കറിവിത്തുകളുംഉൽപ്പാദിപ്പിച്ച്വിതരണംചെയ്യുന്നു.

നാളികേരംഅടിസ്ഥാനമാക്കിയുള്ള മൂല്യവർദ്ധിത ഉൽപ്പന്നങ്ങളുടെഒരു നിർമ്മാണ യൂണീറ്റുംഇവിടെ പ്രവർത്തിക്കുന്നു. ഗുണമേൻമയുള്ള ഉരുക്കുവെളിച്ചെണ്ണ, തേങ്ങാച്ചമ്മന്തിപ്പൊടി, തീയൽക്കൂട്ട്, ഇഞ്ചിച്ചമ്മന്തിപ്പൊടി, എന്നിവ ഉപഭോക്താക്കളുടെ പ്രശംസ പിടിച്ചു പറ്റിയ ഉൽപ്പന്നങ്ങളാ ണ്.

നാളികേരാധിഷ്ഠിതവിജ്ഞാന നൈപുണ്യവികസനം, നാളികേര ഉൽപന്നങ്ങളുടെവൈവിധ്യ വൽക്കരണം, നാളികേരകർഷകർക്ക്ഈ അറിവുകൾ പകരുക, കാർഷികമേഖലയിൽവിദ്യാർത്ഥി കൾക്ക്സംരഭകത്വവികസനത്തിനുള്ളസാങ്കേതികഅറിവുകൾ, കഴിവുകൾ എന്നിവആർജ്ജിപ്പിക്കുന്ന തിന് സഹായിക്കുക, തെങ്ങ്കർഷകരുടെ അഭിവൃദ്ധിക്കായിതെങ്ങ്മുഖ്യവിളയാക്കിസംയോ ജിതശാസ്ത്രീയകൃഷിരീതികൾ അവലംബിച്ച് നിരവധി മൂല്യവർദ്ധിത ഉത്പന്നങ്ങൾ ഉ ാക്കിവ്യാവസാ

യികയൂണിറ്റുകൾ സ്ഥാപിക്കുന്നതിനുള്ള നൂതന സാങ്കേതികവിദ്യകൾ, അറിവുകൾ പക രുകതുടങ്ങീലക്ഷ്യങ്ങളോട്കൂടിICAR-NAHEP-CAAST Projectഇവിടെ നടന്നുവരുന്നു.

കാർഷികസർവ്വകലാശാലയുടെ അവസാന വർഷ ബിരുദവിദ്യാർത്ഥികൾ ഗ്രാമീണകാർഷിക പ്രവൃത്തി പരിശീലന പരിപാടിയുടെ ഭാഗമായിഒരാഴ്ചവീതം നീ ് നിൽക്കുന്ന പരിശീലനം (ഗവേ ഷണകേന്ദ്രവുമായി ബന്ധപ്പെട്ടവ) നടത്തിവരുന്നു.

കാർഷിക ബിരുദാനന്തരബിരുദവിദ്യാർത്ഥികളുടെയും, ഗവേഷണവിദ്യാർത്ഥികളുടെയുംഗവേ ഷണ പഠനങ്ങൾ ഈ കേന്ദ്രത്തിൽ നടന്നുവരുന്നു.

കുള്ളൻ തെങ്ങുകളുടെ (ഡ്വാർഫ്) ഇടയകലംചിട്ടപ്പെടുത്തുന്നതിനും,രാസവളപ്രയോഗ ത്തിന്റെഅളവുതിട്ടപ്പെടുത്തുന്നതിനുള്ളഗവേഷണങ്ങളും പുരോഗമിക്കുന്നു.

നാളികേരാധിഷ്ഠിത ഇടവിളകൃഷിയായികരനെൽകൃഷി, ഭക്ഷ്യസുരക്ഷ, പോഷകസുരക്ഷ എന്നിവയെ മുൻനിർത്തിറാഗി (കൂവരക്) പോലുള്ളചെറുധാന്യകൃഷിഗവേഷണങ്ങളുംവിജയകരമായി നടപ്പിലാക്കിവരുന്നു.

തെങ്ങുകളുടെരോഗകീട നിയന്ത്രണം, സംയോജിതകൃഷിയുടെ നൂതന സങ്കേതങ്ങൾ, മൂല്യ വർദ്ധിത ഉൽപ്പന്ന നിർമ്മാണം, സങ്കരയിനം തെങ്ങിൻതൈകളുടെഉൽപ്പാദനം, യന്ത്രം ഉപയോഗി ച്ചുള്ളതെങ്ങുകയറ്റംഎന്നിവയിൽവിദ്യാർത്ഥികൾക്കും, കർഷകർക്കുംതൊഴിൽരഹിതരായയുവതീയുവാ ക്കൾക്കുംഇവിടെ പരിശീലനം നൽകിവരുന്നു. ഇതു കൂടാതെതൊഴിലധിഷ്ഠിതഹയർസെക്കന്ററി (OJT), കൃഷി ബിരുദവിദ്യാർത്ഥികൾക്ക്തൊഴിലധിഷ്ഠിത ഗ്രാമവാസ (RAWE) പരിശീലന പരിപാടികളും നൽകിവരുന്നു.

ബന്ധപ്പെടുക 04712400621

കൃഷി സമ്പ്രദായ ഗവേഷണ കേന്ദ്രം, സദാനന്ദപുരം

പ്രവർത്തന മേഖലകൾ

- പുരയിടങ്ങൾ കേന്ദ്രീകരിച്ച് സർവ്വേകളും വിലയിരുത്തലുകളും നടത്തുക.
- പുരയിടകൃഷിക്ക് അനുസൃതമായി വിവിധ മോഡലുകൾ വികസിപ്പിക്കുകയും അവയുടെ വിശ ദമായ സാമ്പത്തിക വിലയിരുത്തലുകൾ നടത്തുക.
- വിവിധങ്ങളായ ദീർഘകാല വിളകൾ ഉൾക്കൊള്ളിച്ചുകൊ ുള്ള 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 നിയന്ത്രിക്കു ന്നതിനാവശ്യമായ ഗവേഷണങ്ങൾ നടത്തുക.
- കർഷകരുടെ വരുമാനം വർദ്ദിപ്പിക്കുന്നതിന് കൃഷി അനുബന്ധ സംരഭങ്ങൾ തിരിച്ചറിയുക.
- പുരയിട കൃഷിക്ക് അനുയോജ്യമായ മണ്ണ്-ജല സംരക്ഷണ പദ്ധതികൾ വികസിപ്പിക്കുക.
- പച്ചക്കറി, കിഴങ്ങുവർഗ്ഗങ്ങൾ, ഫലവൃക്ഷങ്ങൾ, സുഗന്ധവിളകൾ എന്നിവയുടെ വിളവർദ്ധനവി നായുള്ള ഗവേഷണ പ്രവർത്തനങ്ങൾ നടപ്പാക്കുക.
- ഗുണ നിലവാരമുള്ള വിത്തുകളും തൈകളും ഉല്പ്പാദിപ്പിക്കുക.

ഇപ്പോൾ നടന്നുകൊ ിരിക്കുന്ന ഗവേഷണ പദ്ധതികൾ

1. തെക്കൻ ജില്ലകളിൽ ക ുവരുന്ന നാടൻ മാവിനമായ കർപ്പൂരത്തിന്റെ വിവിധ ഇനങ്ങൾ കെ ത്തുന്നനായി സർവ്വേയും വിവരശേഖരണവും നടത്തുകയും മുന്തിയ ഇനത്തിന്റെ ജനിതക ശേഖരം ഉ ാക്കുകയും ചെയ്യുക.
2. മികച്ച ഇനം വഴുതനകൾ കെ ത്തുന്നതിനായിട്ടുള്ള ഗവേഷണ പദ്ധതി.
3. മഞ്ഞൾ, കച്ചോലം എന്നിവയിലെ മികച്ച ഇനങ്ങൾ കെ ത്തുന്നതിനായിട്ടുള്ള 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 നീ ു നിൽക്കുന്ന 6 പരിശീലന പരിപാടികൾ എന്നിവ നടത്തുകയു ായി.

വിജ്ഞാന വ്യാപന പ്രവർത്തനങ്ങൾ

റേഡിയോ പ്രഭാഷണങ്ങൾ, ടെലിവിഷൻ പരിപാടി, ഗവേഷണ കേന്ദ്രത്തിന്റെ പ്രധാനപ്പെട്ട പ്രവർത്തനങ്ങളും ഗവേഷണ ഫലങ്ങളും പത്രമാധ്യമങ്ങളിലൂടെ പ്രചരിപ്പിക്കുക തുടങ്ങിയ പ്രവർത്തനങ്ങൾ നടത്തി.

റിവോൾവിംഗ് ഫ ് ഉപയോഗിച്ചുള്ള പ്രവർത്തനങ്ങൾ

ജീവാണു കീടനാശിനികൾ, ദ്വിതീയ സൂക്ഷ്മ മൂലകവളം, ജീവാണുവളങ്ങൾ, കമ്പോസ്റ്റ്, ഫല വർഗ്ഗങ്ങളിൽ നിന്നുള്ള മൂല്യവർദ്ധിത ഉൽപ്പന്നങ്ങൾ, കൂൺ, കൂൺ വിത്ത്, തെങ്ങിൻ തൈകൾ, നഴ്സറി ചെടികൾ, സിന്ദൂർ, വരിയ്ക്ക, മുട്ടം വരിയ്ക്ക എന്നീ പ്ലാവിനങ്ങളുടെ ഒട്ടുതൈകളും അത്യുൽപാദനശേഷിയുള്ള മാവ്, കശുമാവ്, സപ്പോട്ട മറ്റു ഫലവിളകളുടെ ഒട്ടു തൈകൾ ഉൽപ്പാദിപ്പിച്ചു വിതരണം ചെയ്തുവരുന്നു.

ബന്ധപ്പെടുക 9447595912

കൃഷിവിജ്ഞാന കേന്ദ്രം, കൊല്ലം കർഷകർക്ക് ലഭ്യമാക്കുന്ന സേവനങ്ങൾ

1. പരിശീലനങ്ങൾ

കൊല്ലംജില്ലയിലെകർഷകരുടെയുംകാർഷികമേഖലയിൽ പ്രവർത്തിക്കുന്ന വിജ്ഞാന വ്യാപന പ്രവർത്തകരുടെയും പരിശീലകരുടെയുംആവശ്യാനുസൃതംകെ.വി.കെ. കൊല്ലംസാങ്കേതിക വിദ്യകൈമാറുന്നതിനുള്ള പ്രധാന പരിപാടിയായിഓൺ ക്യാമ്പസ് ഓഫ് ക്യാമ്പസ് രീതികളിൽ പരിശീലനം സംഘടിപ്പിക്കുന്നു. കൂടാതെ, കൃഷിവകുപ്പ്, റബ്ബർബോർഡ്,വ്യവസായവകുപ്പ്, സാമൂഹ്യ നീതിവകുപ്പ്, നാഷണൽ ബാങ്ക്ഫോർ അഗ്രികൾച്ചർ ആന്റ്റൂറൽഡെവലപ്പ്മെന്റ്, മറ്റ്കാർഷിക അനുബന്ധ സംഘടനകൾ എന്നിവസംഘടിപ്പിക്കുന്ന നിരവധി പരിശീലനപരിപാടികളിൽകെ.വി.കെയുടെവിഷയ വിദഗ്ദ്ധർ റിസോഴ്സ് പേഴ്സണായി പ്രവർത്തിക്കുന്നു. 1 മുതൽ 20 ദിവസംവരെദൈർഘ്യമുളളവിവിധതൊഴിലധിഷ്ഠിത പരിശീലന പരിപാടികൾ നടത്തിവരുന്നു.

പരിശീലന വിഷയങ്ങൾ

- പച്ചക്കറികൾ, വാഴ, നാളികേരം, നെൽകൃഷിഎന്നിവയുടെസംയോജിത പോഷക പരിപാലനം.
- സംയോജിതകീടനിയന്ത്രണം
- ജൈവ ഉപാധികളുടെഉത്പാദനവും പ്രയോഗരീതികളും
- ചെടിയുടെകായിക പ്രവർത്തന രീതികൾ
- പച്ചക്കറി തൈഉത്പാദനം
- കൂൺ കൃഷി
- മട്ടുപ്പാവ്കൃഷി
- പോഷകഉദ്യാനത്തോട്ടം
- പഴങ്ങളുടെയും പച്ചക്കറികളുടെയും മൂല്യവർദ്ധനവ്
- സംരംഭകത്വവികസന പരിശീലനങ്ങൾ
- കാർഷിക യന്ത്രവത്കരണം
- മൃഗപരിപാലനം
- കോഴിവളർത്തൽ
- ആടു വളർത്തൽ
- ഉദ്യാന കൃഷിതുടങ്ങിയവ

2. കാർഷിക ഉപദേശകസേവനങ്ങൾ

ജില്ലയിലെകാർഷികസമൂഹത്തിന്റെ ഉന്നമനത്തിനായിവിവിധ മേഖലകളിലെശാസ്ത്രജ്ഞർ ഒരുമിച്ച് പ്രവർത്തിക്കുന്നു. കൃഷിക്കാർക്കുംകാർഷികസംരംഭകർക്കും അനുബന്ധ ഡിപ്പാർട്ട്മെന്റിലെഉദ്യോഗസ്ഥർക്കും അവരുടെകാർഷികമേഖലയിലെ പ്രശ്നപരിഹാരത്തിനായിഫോണിലൂടെയോവ്യക്തിഗത സന്ദർശനത്തിലൂടെയോകേന്ദ്രത്തെ സമീപിക്കാം.

3. വിൽപ്പനയ്ക്ക്ലഭ്യമായ ഉൽപ്പന്നങ്ങൾ ഇവയാണ്

കൊല്ലംജില്ലയിലെകർഷകർക്ക്ഗുണനിലവാരമുളള നടീൽവസ്തുക്കൾ, ജൈവ ഉപാധികൾ, വളങ്ങൾ, മറ്റ്കാർഷിക ഇൻപുട്ടുകൾ എന്നിവ ന്യായമായ നിരക്കിൽ നൽകാൻ കേന്ദ്രം ശ്രമിക്കുന്നു. സ്യൂഡൊമൊണാസ്,ട്രൈക്കോടെർമ,ബിവേറിയബാസിയാന,വെർട്ടിസീലിയം,പാസിലോമൈസിസ്,മെറ്റാറൈസിയംഅനൈസോപ്ളിയേ, പി.ജി.പി.ആർമിക്സ്I, പി.ജി.പി.ആർമിക്സ്II, പയർ, സമ്പൂർണ്ണ മൾട്ടിമിക്സ് നെല്ല്, സമ്പൂർണ്ണ മൾട്ടിമിക്സ്വാഴ, സമ്പൂർണ്ണ മൾട്ടിമിക്സ് പച്ചക്കറി, മാവ്, വേപ്പെണ്ണ സോപ്പ്, കെ.എ.യു രക്ഷ, നന്മ, ശ്രേയ, മാമ്പഴക്കെണി, പച്ചക്കറികെണി, ബയോകിറ്റ്,ഐ.സി.എംകിറ്റ്, മത്തികഷായം, കൂൺ വിത്ത്, ഗ്രോബാഗ്,അത്യുൽപാദന ശേഷിയുള്ള പച്ചക്കറിതൈകൾ, അസോള, മുട്ടക്കോഴികുഞ്ഞുങ്ങൾ,ആട്, പഴങ്ങളുടെയും പച്ചക്കറികളുടെയുംമൂല്യ വർദ്ധിത ഉൽപ്പന്നങ്ങൾ എന്നിവകൃഷിവിജ്ഞാനകേന്ദ്രത്തിൽ നിന്നുംവിപണനം ചെയ്യുന്നു.

4. ഇതരസേവനങ്ങൾ

1. യന്ത്രസാമഗ്രികളും ഉപകരണങ്ങളും
2. മണ്ണ്, ജല പരിശോധന ലാബ്
3. പ്ലാന്റ് ഹെൽത്ത് ക്ലിനിക്
4. അനിമൽഹെൽത്ത്സർവീസസ്
5. അഗ്രോപ്രൊസസ്സിംഗ്ലാബ്
6. കസ്റ്റംഹയറിംഗ്സെന്റർഫോർ ഫിഷ് പ്രോസസിംഗ്

7. എഗ്ഗർ നഴ്സറിയൂണിറ്റ്
8. ആട്വളർത്തൽയൂണിറ്റ്
9. ജൈവഉത്പാദനോപാധികൾക്ക് ഏകജാലകസംവിധാനം
10. ബയോകൺട്രോൾലാബ്
11. കൂൺ വിത്ത് നിർമ്മാണ യൂണിറ്റ്
12. തേനീച്ച വളർത്തൽയൂണിറ്റ്
13. ഹൈഡ്രോപോണിക്സ്ഡെമോൺസ്ട്രേഷൻ യൂണിറ്റ്
14. അക്വാപോണിക്സ്ഡെമോൺസ്ട്രേഷൻ യൂണിറ്റ്
15. പോളിഹൗസ്ഹാർഡനിംഗ്യൂണിറ്റ്
16. മണ്ണ്ജലസംരക്ഷണത്തിനായിസൂക്ഷ്മജലസേചന യൂണിറ്റും രാമച്ചം ഉപയോഗിച്ചുള്ളകയർ ഭൂവസ്ത്രവും
17. നെല്ല് പയറുവർഗ്ഗ വിളകൾക്ക്വേ ി മിനി റൈസ് പൾസ്മില്ലുകൾ
18. ഡിസ്ട്രിക്ട് അഗ്രോമെറ്റ്യൂണിറ്റ്

ബന്ധപ്പെടുക 9447525264

കൊമേഷ്യലൈസേഷൻ ഓഫ് വാല്യൂ ആൻഡ് ഫുഡ് പ്രൊഡക്ട്സ് എന്ന റിവോൾവിംഗ് ഫ ് സ്കീം 2016 മുതൽ നടപ്പിലാക്കി വരുന്നു.

കമ്മ്യൂണിറ്റി സയൻസ് ഡിപ്പാർട്ട്മന്റിൽ വികസിപ്പിച്ചെടുത്ത് മൂല്യ വർദ്ധിത ഉൽപ്പന്നങ്ങലെ വിതരണത്തിനായി ഈ പദ്ധതിയിൽ ഒരുക്കുന്നു കൂടാതെ ഫാമിൽ അധികമായി ഉൽപ്പാദിപ്പിക്കുന്ന വിളകളെ ഉൽപ്പന്നങ്ങളാക്കി മാറ്റാനും ഈ പദ്ധതിയിൽ ശ്രദ്ധിക്കുന്നു. ര ് വനിത കൾക്ക് ദിവസവേതനത്തിൽ വരുമാനം നൽകാനും ഇതിലൂടെ സാധിക്കുന്നു.

ബന്ധപ്പെടുക9446578578

MINUTES OF THE XXXVIII ZONAL RESEARCH EXTENSION ADVISORY COUNCIL MEETING & INTERFACE CONDUCTED ON 05.01.2022 & 06.01.2022 AT RARS (SZ), VELLAYANI IN ONLINE MODE

The38th ZREAC meeting commenced at 10.15 AM with the invocation song by College choir.

Dr. Roy Stephen, Associate Director of Research, RARS(SZ) welcomed the gathering. He briefed about the importance of conducting ZREAC meeting which is essentially a feedback mechanism for the research system to frame programmes for the benefit of farming community.

Dr. Madhu Subramanian, Director of Research, KAU in his introductory remarks, emphasised the bigger role of KAU research and extension system in south zone of Kerala which is abundant in human resources, fund availability with major administrative offices. All these resources need to be used wisely for the improvement of farming sector with focus on evolving solutions for problems faced by the farmers. The research findings and its demonstrations should not be restricted to a limited area, but should reach all stakeholders and beneficiaries throughout the state of Kerala. For this, research and extension should go hand in hand. ZREAC workshop gives a platform for discussion of farmer's problems and also seeking solutions for these problems from scientists. The opportunity is to be fully utilised by all stakeholders like farmers, Department officials and Scientists as it is expected that agriculture and allied sectors will solely determine the economic status of Kerala in the coming years, said Director of Research.

The Hon'ble Vice Chancellor of KAU, Dr. R. Chandrababu delivered the presidential address and emphasised the need to prioritise research, development and extension activities of the University with an element of human touch. The gaps in the research- extension system need to be identified and resolved for the purpose of serving farming community more effectively. Hon. Vice Chancellor urged the Scientist community to come up with technologies that would benefitthe farming sector. He also highlighted the need for developing new rice varieties resistant to bacterial leaf blight quoting the cases of varieties released successfully by other institutes in India and abroad. He emphasised the need to prioritise the research agenda focusing on major crops and the immediate needs of farming community in the context of pandemic and intricacies of climate change.

Sri. T V Subhash, IAS, Director of the Department of Agriculture Development and Farmers Welfare, Govt. of Kerala inaugurated the function. He emphasised that forums like this can address the issues of nutritional status and pesticide residues in food stuff which are the areas of major concern nowadays. He stated that farmers' income enhancement should be a major

priorityand must try to come up with climate resilient cropping pattern which is zone specific and need specific. He also mentioned that Government focus was to improve farmers income by input facilitation, development of agro based industries, training and capacity building of different stakeholders, ensure good and timely marketing facilities, involvement of farmers co-operatives, encourage agripreneurship ventures and farmer collectives and farmer-centre organisations. For this academic institution, research and extension systems and farmers should work together.

After inauguration, 29 publications including both books and leaf lets from different stations under the RARS (SZ) were released.

Dr.JayasreeKrishnankutty, Director of Extension, KAU delivered the Keynote Address where she emphasised the importance of farmer-scientist interaction for betterment of farming sector of our state. As there exists, a good diversity of agricultural systems practised in the different agro ecological units under the south zone, she mentioned that the indicators of development from this zone will show the overall impact of R&D initiatives in agriculture and allied sectors throughout the state. She added that farming has transcended gradually from a production oriented system to a market centred approach and presently it is a farmer income centred approach followed that is driven by the policies of both state and central government. Hence a holistic approach with true convergence of research and extension is the need of the hour.

Dr. A. Anilkumar, Faculty Dean, KAU in his special address mentioned that ZREAC meeting is a stage for imbibing the feedback of field level extension functionaries and farmers and also a venue for self-introspection which will help to identify our pitfalls and work for the overall improvement of farming community. He also added that we must ensure programmes to attract youth to farming. He highlighted that in agri- allied sectors, we face multifaceted issues which is zone specific and concerted efforts in research and extension should be pursued to help derive solutions tofarmer's problems.

Dr. Pradeep Kumar T., Director of Planning, KAU and General Council Member, KAU mentioned theimportance of farm trials. He appreciated the ventures like Karshakasanthwanam and Horticulture Therapy which are helping our society in a commendable manner. It was also suggested to come up with more projects in this line which will help the farming community. The issue of non-availability of quality seeds need to be addressed.

Dr. Thomas George, Professor & Head (PRRAL) & General Council Member, KAU highlighted the issue of reduced area under cultivation.He mentioned that our soil is not as productive as before.Research and extension efforts to tackle the menace of new weeds, pests and diseases as well as wild animal-man conflictshould be taken up.

Mr. Raju K. M., Principal Agricultural Officer of Thiruvananthapuram district, mentioned that agri-sector is having lots of problems which keep on changing. Interventions in making available quality inputs to marketing and value addition are required. Problems like drought, landslide, flood, attack of wild animals etc are faced by farmers. Problems from field should reach the lab and solutions should reach from lab to land for sustainable development of agricultural sector.

Smt.Sheeba K.S, Principal Agricultural Officer of Kollam District mentioned that climate change is causing lots of problems to farming sector. Availability of good quality seeds/planting material is a problem faced by many farmers across the state.Smt.Sara T John, ATMA PD, Pathanamthitta, informed the issues of flooding in crop production and the need for blast resistant short duration rice varieties for this area which has around 63 padasekharams.

Dr.Amritha V.S., Associate Professor, AICRP on Honey Bees and Pollinators presented the action taken report of 37th ZREAC workshop. The inauguration session ended with a formal vote of thanks proposed by Dr. B. Seema, Associate Director of Extension.

Technical Session I – Farmer Scientist Interface

Chairperson : Dr. Madhu Subramanian, Director of Research, KAU and Dr. JayasreeKrishnankutty, Director of Extension, KAU

Co-chairman : Sri. Suresh, Project Director, ATMA, Kollam

Rapporteurs : Dr. Ameena M, Dr.AswathyVijayan, Dr. Manu C.R., Dr.Ayisha R.,Dr.SushaV.S.andDr. Rekha V.R.Nair

Field level problems pertaining to pests, diseases and nutrient imbalance in major crops *viz*., coconut, rice, vegetables, banana, mango, jack fruit, cassava, arecanut and papaya were presented by the Agrl. Officers and selected farmers of three districts. Dr. Jomi Jacob, ADA,Nedumangad, Dr. Thushara T Chandran, A.O, KrishiBhavan, Vattiyoorkkavu of Thiruvananthapuram District, Mr. Shibu Kumar, ADA, Chathanoor of Kollam district and Ms. Soumya Sekhar A.O, KrishiBhavan, Pandalam of Pathanamthitta district summarized the various issues faced by the farmers at field level.

Mr. Vijayakumar Nair, Paracode from Pathanamthitta and Mrs. SeemaChandran from Chathannoor were the selected farmers.

The solutions for problems presented were detailed by Dr. Rani B., Dr. Aparna B., Dr. Naveen Leno. Dr. Shalini Pillai P., Dr. Jacob John, Dr. Sheeba Rebecca Isaac, Dr. Ameena M., Dr. Sheeja K Raj, Dr. Radhakrishnan N.V, Dr. M. Joy, Dr. Susha S Thara, Dr. Reji Rani O.P, Dr. Santhosh Kumar T., Dr. Mani Chellappan and Dr. Kunjamu.

Sl. No.	Particulars	Problems raised	Solutions Suggested
1	Carbon Neutral Agriculture	Various physical, chemical, biological critical indicators to be adopted for holistic soil health assessment	Physical parameters: Particle Density, Bulk Density, Soil texture, Aggregation, water holding capacity, pore space Chemical indicators: pH, EC, organic carbon, Macro and micro nutrients, heavy metals Biological indicators: soil microbial carbon, dehydrogenase activity, phosphatase activity. Following statistical method of principal component analysis, derive critical component and giving weightage for each component can compute soil quality index.
2	Organic farming	Novel technology for rapid method of composting so as to reduce time of composting compared to conventional methods	Addition of Biological agents like Trichoderma, Pseudomonas, PGPR mix can be adopted. Suchitha Composting: Thermochemical conversion by raising temperature to 100^0C and using two chemical reagents. It can be adopted as community approach at schools, flats, residential areas. Machine suitable for household use will be released soon. The cost of machine having 25 kg capacity is Rs. 2 lakhs.
3	Biowaste utilization	Possibility of utilization of rice husk at farm level	Biochar production from rice husk which also enhance carbon sequestration
4	Natural farming	Characterization, standardisation validation and recommendation of traditional preparations like jeevamritham, beejamritham, vrikshayurveda, herbal and non-herbal gunapajala etc	Various research activities were undertaken for standardisation, characterisation recommendation and application of all these botanicals for different crops by the Dept. SS&AC, COA Vellayani. Cow's urine can be diluted to 1:10 ratio and can be used for spraying.
5	Problem soils	Increased soil acidity, salinity	The issue of soil acidity and salinity was noticed and characterisation of these pockets should be

		problems in Kollam especially after flooding	undertaken
6	Agroforestry	Trees species suitable for carbon sequestration in home gardens	Carbon sequestration potential of trees is for a system and it is not for an individual tree. Both soil and biomass C sequestration occur in fast growing trees. C sequestration potential increases as the age and size of trees increases and also vary with species Trees having carbon sequestration potential are 1. *Ailanthus triphysa* (Perumaram, Matti) 2. *Acacia auriculiformis* (Acacia) 3. *Artocarpus heterophyllus* (Jack)- Potential of 35-40 % soil C sequestration 4. *Grevillea robutsa* (Silver oak) 5. *Cassuarina equisettifolia* (Kattadi) 6. *Macaranga peltata* (Poriyani) 7. All leguminous species
7	Growbag cultivation	Possible Pb, Cd toxicity in using newspaper in soil-less cultivation in growbags	No traces of Pb or Cd detected in soil and fruit samples in a study using a mixture of newspaper, vermicompost and coipith compost in the ratio 1:1:1.
8	IFS	IFS systems involving aquaculture	Recirculatory Aquaculture model suitable for each AEU has been developed at IFSRS, Karamana for homestead and commercial IFS systems.
9	Regenerative agriculture	Prospects of minimum tillage in Regenerative agriculture	Weed management is the major problem in minimum tillage. Herbicidal control of weeds is required, which is not advisable in carbon neutral farming. Also, machineries have to be developed for seed sowing over the crop residues. Studies on regenerative agriculture like Permaculture, Minimum tillage etc has to be conducted. Recommendations in natural farming can be adopted

10	Coconut	Boron deficiency	Soil test based nutrient recommendation is advised. Borax, 50 g/palm is recommended twice in a year. Solubor, 5g/L foliar spray is also suggested. INM in coconut is recommended. Rhinoceros beetle attack can produce B deficiency like symptoms in Coconut
		Rhinoceros beetle & red palm weevil	Apply *Metarhizium anisopliae* and *Clerodendron infortunatum* in manure pits. Phytosanitation, cleaning the crown of palms, hooking out beetles. Application of naphthalene balls 4numbers in the innermost 2 leaf axils & covering with fine sand, once in 45 days. Application of 10-20g chlorantraniliprole 0.4% G with 200g sand thrice a year-Jan, May, September. Traps with fermenting toddy/ pineapple/sugarcane activated yeast/ molasses along with an insecticide on coconut logs can attract and kill weevils. As a curative measure, apply 1ml imidacloprid 17.8 SL per litre of water per palm
		Whitefly	Whiteflies are sucking pests infesting coconut leaves, they produce copious amount of honeydew on which the sooty mould fungus grows making the leaves to appear as sooty black in colour. Lot of natural enemies especially parasitoids are controlling the pest naturally, hence no chemical management is advised. In severe cases, cut and destroy lower leaves harbouring maximum whiteflies and spray neem oil emulsion with diluted starch solution especially in summer; three sprayings per year is advisable.
		Mahali	Spray 1% Bordeaux mixture or Copper oxychloride 2g per litre on the crown of palms, once before the monsoon and once or twice later on at intervals of 40 days. Prophylactic spraying with 1% Bordeaux mixture should be carried out to all the trees around the infected palm in the 2-5 top most leaf axils of palms with the onset of monsoon.
		Yellowing of younger leaves	Yellowing of younger leaves is due to infection by phytoplasma. Unlike root wilt caused by

		in coconut	phytoplasma, this yellowing leads to the complete death of the palm within 2-3 years. The research is going on regarding this disease of coconut in College of Agriculture, Vellayani. CGD varieties of coconut is showing resistance to yellowing disease. Good management practices as per POP and application of micronutrients can reduce the symptoms and manage the general health of the palm
		Snails on coconut	Spraying Bordeaux mixture on crown repels snails metaldehyde based bait 20g per leaf axil wherever infestation seen
		Drying up of female flowers, terminal leaf is narrowed with necrosis on tip	Need field level inspection, may not be due to insect pests. This may be a leaf that is coming after the recovery of palm from pests like rhinoceros beetle
		Fronds are remaining only with midribs, whole lamina is lost	Attack of leaf eating caterpillars, if needed spray Btk 1ml/l in evening with 10g jiggery or chlorantraniliprole 3ml/10l
		Eriyophid mite in coconut	Phytosanitation, spraying of 2%neem oil garlic emulsion or neem-based pesticides thrice a year on the bunches
11	Rice	Weedy rice (Varinellu) problem *Cyperusiria*, *Cyperus exaltatus* infestation	Clean seeds should be used and collected from weedy rice free areas. Stale seedbed technique to be adopted and germinated weedy rice seedlings to be killed by flooding or spraying the herbicide glyphosate or glufosinate ammonium @ 8 ml /litre of water. Drain the field after 10 days of flooding and broadcast the germinated rice seeds, without further ploughing. Pre sowing herbicide application of oxyfluorfen @ 0.2 kg ai/ha to prevent the establishment of weedy rice seedlings. It is applied after land preparation by draining the field to retain only a thin film of water. After three to four days, when the standing water has evaporated, broadcast pre-germinated rice seeds. Use KAU weed wiper to kill the emerged panicles so as to reduce weed seed

			bank. Stale seed bed technique can be adopted and killed by flooding or using the herbicide glyphosate or glufosinate ammonium @ 5 ml /litre of water. If weeds are seen after sowing, spray broad spectrum herbicide Vivaya (Cyhalofop-butyl 5.1% + Penoxsulam 1.02% OD) 2250 ml/ha or 4 ml/ l can be applied at 15-20 days after sowing. Carfentrazone ethyl (Affinity), 50g/ha or Almix, 8 g/acre.
		Bacterial Leaf Blight	Seed treatment with *Pseudomonas fluorescens* @10g per Kg seed and soil application 2.5 Kg/ha one week after transplanting followed by foliar spray one month after transplanting. Application of bleaching powder 5 Kg per ha in irrigation water. Foliar application of supernatant of fresh cowdung slurry (20g in one litre of water). Application of streptocycline @0.5g per litre of water.
		Lakshmi disease	Apply Mancozeb 0.2% in severely affected area or apply copper hydroxide (2g per litre) at the time of 50% flowering stage
12	Vegetables	Bacterial wilt in Brinjal	While cultivating solanaceous crops in polybags soil solarization of potting mixture should be done as a prophylactic measure to avoid disease. Liming of soil can reduce the disease incidence. Application of bleaching powder near the crops. Supernatant of fresh cow dung slurry can be sprayed. *Pseudomonas fluorescens* application along with cowdung slurry @ 20 g per litre. Antibiotics like Streptocycline @ 2g in 10 litre of water.
		Mosaic in Bitter Gourd	Increase the seed rate Spray neem-based insecticide for control of vectors spreading mosaic. Use yellow trap to control white flies
		Powdery mildew in Tomato	Apply sulphur containing fungicide like Sectin @ 2g per litre

		Chilli&brinjal-leaves are becoming white	Attack of mite or thrips. Destroy the infested leaves. Spray econeem 4ml/l or neem oil emulsion or *Lecanicillium lecani* 20g/l. Cover the undersurface of leaves well while spraying, organic remedies need to be repeated once in 2 weeks. If needed spray thiamethoxam 2g/10l or Spiromezifen 1ml/l
		Crinkling of leaves in chilli& whitefly attack in chilli	Crinkling is due to virus and control of vectors is important. Above mentioned control measures are applicable here too along with use of yellow and blue sticky traps for attracting and managing these insect pests.
13	Banana	Sigatoka leaf spot	Phytosanitation is important. Remove the affected leaves to reduce the disease inoculum. If in the initial stage apply Bordeaux mixture 1% with a sticker during rainy season. In advanced stage of infection apply Propiconazole @1ml per litre. Apply *Pseudomonas fluorescens* in supernatant of fresh cowdung slurry @ 20 g /l
		Panama Wilt	Treatment of sucker with Carbendazim @ 3g per litre followed by application of Tebuconazole or Propiconazole @ 1ml/ml after 1, 3 and 5 months after planting
		Erwinia rot in banana (Moko like symptom in banana)	Liming of soil can reduce the disease incidence. Application of bleaching powder near the crops. Supernatant of fresh cow dung slurry can be sprayed. *Pseudomonas fluorescens* application along with cowdung slurry @ 20 g per litre. Antibiotics like Streptocycline @ 2g in 10 litres of water.
		Leaf eating caterpillars including slug caterpillar.	Poisoned food baits can be used against *Spodoptera* larvae for attracting and killing. This can be prepared by mixing 100g bran, 10ml coconut oil and 20g jaggery with little quantity of water and adding 1ml of less smelling pesticide like imidachloprid. Small balls of this bait is made and kept in coconut shell or suitable container and placed in the field during evening hours, remove them in early morning. Sprays of Btk 1ml/l along with 10g jaggery in evening hours or

			chlorantraniliprole 3ml/10l or malathion 1ml/l can also be done against these caterpillars. Early instars of *Spodoptera* are seen in group,scraping the leaf and turning it papery, cutting and destroying these leaves along with the caterpillars can also be done.
14	Mango	Pink disease in Mango	Apply Bordeaux paste during initial stage after scraping the affected part. In advanced stages cut the affected twig 30 cm below the affected portion and apply Bordeaux paste
15	Jack	Sudden wilting in jack and other fruit trees	Soil drenching with Carbendazim 3 g per litre. Take auger holes 1m apart from the trunk and apply fungicide. Root feeding with fungicides through feeder roots
		Fruit rot	Phyosanitation. Apply Mancozeb 2-4g per litre
		Stem borer incidence in jack	Clean and remove the bark around the hole made by the borer by chiselling, paint chlorpyrifos2ml/100ml water in and around the bore hole. Protect the chiselled portion with coal tar mixed with copper oxy chloride.
		Plague caterpillar on jack	Manage the larvae as explained in case of banana
16	Papaya	Mosaic	Vector spreading the virus can be managed by application of neem-based insecticides. Remove the weed hosts harbouring the virus
17	Tapioca	Tuber rot	Apply lime. Trichoderma enriched cow dung can reduce disease incidence. Dip the setts in Carbendazim @3g per litre for 30 minutes. Apply Combination Fungicide Carbendazim + Mancozeb @2g per litre
		Mealy bugs	New species, an exotic natural enemy is imported by NBAIR recently, it will be mass produced and made available as in the case of papaya mealy bug biocontrol
		Whiteflies	Management can be done by spraying thiamethoxam 2g/10l and installing yellow sticky traps.
18	Dragon fruit	Caterpillar	Manage the larvae as explained in case of banana

		attack	
19	Others	Galls in jamba leaves	This is due to the attack of Psyllids making galls in jamba leaves. Prune the affected branches and destroy. Chlorantraniliprole 3ml/10l can be sprayed but no chemical pesticides can be used in fruiting season, in that case neem-based pesticides can be used.
20	Wild Animals	Wild Boar	Olfactory repellent 'borep' can be applied around the field, 25g of the product can be put inside a small cloth bag and applied at a distance of 1-2 m apart around the field, keep the bag 10-15 cm above the ground with a rain guard for better result. Planting plumbago around the field is effective against boars, castor and tagetes can also be used; use of cinnamon is seen as effective in literature, but trials are pending.
		Peacock	Establish 'peafowl fence' –comprising of reflective ribbons and nylon rope -can be put in a grid fashion in the field.
		Monkey	Use 'agri canon' along with olfactory repellent borep in field
		Elephants	Electric fence, trenches and hanging solar fences can be adopted. Establishment of beehives around the field can be explored to scare away crop raiding elephants.
		Deers	'Deerep' 50ml/l can be sprayed around field/ sprayed on tree trunks, cotton cloth can be dipped in this solution and tied as a ribbon around tree trunks.
21	Snails	Giant African snail	Manage snails with community participation in an integrated way. Waste management, weed management and summer ploughing in snail affected areas will help to manage snails.

			Install traps in evening hours by putting cabbage or papaya leaves on wet jute sack/thick cloth, congregating snails can be destroyed Pongamia oil spray 2% on infested plants repel& kill the snail. Metaldehyde baits can be applied taking care that will not harm non target organisms Duck rearing has to be encouraged as the birds are found controlling snails effectively.

Researchable issues

- Development of short duration rice varieties with tolerance to flood
- Crop based field level recommendation for natural farming
- Approaches for carbon neutral farming including exploring the possibility of minimum tillage in cropping systems
- AEU based POP recommendation for major crops
- High soil acidity in Polachira Ela in Chirakkara Panchayath of Kollam district
- Rapid method of composting
- The use of Streptomycin+ Tetracyclin is about to be restricted from the use in agriculture, an alternate strategy for the management of bacterial disease has to be developed.
- Bacterial Leaf Blight of Paddy- Tolerant varieties and management strategies
- Development of effective strategy for the management of midwhorl yellowing in coconut.
- Management strategy for the viral diseases in crop plants
- Development of management strategy for wilt in tree crops.
- Documentation and management of pests in dragon fruit
- Creation of value addition facility for tuber crops
- Management of tuber rot in cassava
- Nutritional disorders in Jack

Technical Session II- PC 1 Rice & PC 5 Field crops, cereals (other than rice) millets, pulses, oilseeds, fodder and greenmanure crops

Chairman: Dr. Madhu Subramanian, Director of Research, KAU

Co-chairman : Dr. Anitha. S, Professor and Head, IF, Vellanikkara and Dr. A, Latha, Professor and Head, ARS, Mannuthy

Rapporteurs:-Dr.Sharu S.R and Dr. Nishan M.A

Sl.No.	Name of Project	Name of PI	Suggestions
1.	Elucidation of high temperature stress tolerance in rice and development of suitable management strategies	Dr. Beena R.	Presentation was done for the information of the house
2.	Feasibility of low cost hydroponics fodder crops system in Kerala – Qualitative and Quantitative study	Dr. Usha C Thomas	Technology recommended for presentation in mini POP Workshop

Technical Session III – PC- 3 Vegetables & PC -4 Fruits

Chairman: Dr. Pradeepkumar T, Director of Planning & Professor and Head, Department of Vegetable Science, CoA, Vellanikkara

Co-chairman : Dr. Jyothi M.L., ADR(Farms)

Rapporteurs:-Dr.Gowry Priya and Dr. Priya Kumari

Sl.No.	Name of Project	Name of PI	Remarks
1	Standardization of agro techniques for protected cultivation of leafy vegetables	Dr. Sheeba Rebecca Isaac	Proposal in proper format for Farm Trial to be submitted to PC group (Vegetables)
2	Multi nutrient tablets for vegetable cultivation in home gardens	Dr.R.Gladis	Proposal to be submitted in proper format to PC group (Vegetables) for Farm Trial with the following suggestions Farm trial to be conducted in AEUs of south zone with at least two locations in each AEU. Use the same potting mixture in grow bags and variety with seedlings supplied to farmers. Include chilli and tomato to arrive at recommendation for Solanaceous crops. Station trial on open precision farming for brinjal, chilli and tomato using multinutrient tablets to be conducted. Comparison can be made with KAU Sampoorna and Ayar. Patent application can be submitted for the innovation.

3	Evaluation of brinjal lines for high yield	Dr.M.R.Bindu	Proposal to be submitted for Farm Trial to PC group on Vegetables Conduct farm trials in all AEUs under the zone with at least two locations in each AEU. Variety Ponnito be included instead of variety Haritha. Specify the season Screening for wilt disease and pest tolerance/ resistance to be presented at the time of presenting results of Farm Trial. Data from other AICVIP centres to be collected to support the findings.
4	Organic nutrient management of papaya (*Carica papaya* L.)	Dr. Bindu B	Proposal to be submitted to PC group on Fruits. Farm trial to be conducted in all AEUs and specify locations. Quantity of P as rock phosphate and K as SOP to be mentioned Age of seedlings and season to be specified. One month old seedlings to be supplied to farmers. Additional observations on Farmers' acceptance (organoleptic evaluation) and shelf life to be included.

Technical Session IV - PC 2 Spices and Plantation crops and PC 7 Aromatic and Medicinal plants

Chairperson: Dr. N. Mini Raj, Dean, College of Agriculture, Vellanikkara

Co-chairperson: Dr. NeemaV.P.. Professor and Head, Pepper Research Station, Panniyur (Project Co-ordinator, Spices and Plantation Crops)

Rapporteurs:- Dr. Reshmi C.R. and Dr. Gayathri G.

Sl.No.	Name of Project	Name of P.I.	Remarks
1.	Germplasm collection evaluation and evolving management practices for regular bearing in clove (*Syzigium aromaticum*) accessions	Dr. Sreekala G.S.	The work has to be continued and completed focusing on the approved objectives. Focus on elite accessions and development of management practices for high density planting as well as nutrient management. Raise the promising accessions and plants at IF Vellayani and CRS Balaramapuram for

			observation and keep under constant vigil. Confirm whether the dry buds of elite accessions fit to grade I. Identify the accessions which show special characteristics like dwarfness and clustered inflorescence.
2.	Evaluation of turmeric and kacholam accessions in the homesteads	Dr. Bindu M.R.	<u>Turmeric</u> Leaf blotch tolerance and curcumin content of the accessions to be assessed and present in the next ZREAC. <u>Kacholam</u> Continue the work by including released varieties and more accessions
3.	Conservation of germplasm and developing climate resilient black pepper varieties for sustainable farming	Dr.Bindu M.R.	Evaluate the collected germplasm for climate resilience, oil and piperine content and other economic characters. Avoid duplication of accessions.

Technical Session V - PC 11 Crop Pests and Beneficial Insects & PC 12 Plant Pathogens and Beneficial Microbes

Chairman: **Dr.N. Anitha,**Professor & Head, Department of Agricultural Entomology, CoA, Vellayani (**Project Coordinator** Crop Pests and Beneficial Insects)

Co-chairman: **Dr. Raji.P, Professor** (Plant Pathology), Regional Agricultural Research Station, Pattambi (Co-ordinator)

Dr. Faizal M .H, Professor, Department of Agricultural Entomology, CoA, Vellayani

Rapporteurs: - Dr.Amritha V S and Smt.Divya S

Sl.No.	Name of Project	Name of PI	Remarks
1	Development of improved formulations of entomopathogenic fungi	Dr.Reji Rani O P	The result was presented for the information of the house Project proposal can be submitted for procuring tablet press.
2	Proposal for price fixation in KAU	Dr.Reji Rani O P	Proposal can be submitted along with the data of field efficacy and spore viability studies.
3	Bio-intensive management of root-knot nematode in	Dr.Nisha.M.S.	Include two treatments – 1) Soil application of *Purpureocillium lilacinum*

	ginger		2) Chemical treatment Farm trial proposal has to be submitted as per the standard format including the locations mentioning the AEUs, number of treatments, replications and plot size. Strain of the treatment, *Purpureocillium lilacinum* has to be mentioned
4	Field performance of *P. indica*-colonised banana plants against natural incidence of fungal, bacterial and viral diseases	Dr. Joy M.	Proposal to be examined by the expert committee (Dr. Surendra Gopal, Dr. Raji P. and Dr. Jyothi M. L. (ADR,Farms) before submitting as farm trial proposal. As part of the comparison, chemical control as per Package of Practices has to be included as a treatment. AEUs have to be named in the proposal. Station trials (FSRS Sadanandapuram and CRS Balaramapuram) have to be conducted separately for individual crops against specific disease as per standard protocols.
5	Field performance of *P. indica*-colonised vegetable crops *viz.*, tomato, chilli, bhindi and vegetable cowpea against natural incidence of fungal, bacterial, phytoplasmal and viral diseases	Dr. Joy M	Proposal to be examined by the expert committee (Dr. Surendra Gopal, Dr. Raji P. and Dr. Jyothi M. L., (ADR, Farms) before submitting as farm trial proposal. As part of the comparison, chemical control as per Package of Practices has to be included as a treatment. AEUs have to be named in the proposal. Station trials (FSRS Sadanandapuram and CRS Balaramapuram) have to be conducted separately for individual crops against specific disease as per standard protocols.
6	Assessment of Cashew Nut Shell Liquid based botanical pesticide for pest management in yard long bean.	Dr. Lekha M	Commercially available neem-based formulation to be included as check. One more season trial has to be conducted at FSRS, Sadanandapuram

Technical Session VI – PC 13 Post Harvest Technology and value addition & PC 14 Community Science

Chairman: Dr. Mini C, Professor & Head, Dept. of Post-Harvest Technology, COA Vellayani
Co-chairman: Dr.N.E. Safiya, Assistant Professor, KVK Wayanad
Rapporteurs: Smt. Athulya S. Kumar and Smt. Rakhi R.

Sl. No	Name of Project	Name of PI	Remarks
1	Product development on functional ready to serve beverages: refinement and protocol development	Dr. P.R. GeethaLekshmi	Submit proposal to PC group for presentation in ToT
2	Refining technologies for by product utilization of major crops: jackfruit and pineapple	Dr. P.R. GeethaLekshmi	Submit proposals for all the products except wine to PC group for presentation in ToT
3	Horticultural Therapy - a tool to rehabilitate the differently abled children at schools	Dr. Beela G.K.	Presented for the information of the house

Technical Session VII Extension Activities and AKC highlights

Chair man:-. Sri K.M. Raju, PAO Trivandrum.
Rapporteur :-Dr AswathyVijayan

Sl.No.	**Name of Project**	**Representative of AKC**	Remarks
1.	AKC presentation	Dr.Smija.P.K.	Solutions to field problems is available without delay after introducing AKCs. Whatsapp groups are very effective in reaching to farmers. By introducing new information communication technologies, the extension activity can be made more effective.

Technical Session VIII Station Presentations

Chairman: Dr. Madhu Subramanian, Director of Research, KAU
Co-chairman: Dr. Seema B Associate Director of Extension (SZ) and

Dr. Jacob John, Professor & Head, IFSRS, Karamana

The activities and progress of the research projects being implemented at three satellite stations (IFSRS, Karamana, CRS, Balaramapuram& FSRS, Kottarakkara station), On Farm Research Centre, Vellayani and KVK, Kollam were presented by the respective Station heads.

Suggestion/recommendations raised by the panel:

1. IFSRS, Karamana
   Suggested for pesticide residue analysis of IFS model components from farmers' fields.
2. CRS Balaramapuram
   Include the pepper varieties *viz.,*Panniyur 9, Panniyur 10, and Vijay in germplasm collection of the station
   Validate and analyze the reason for the efficacy of curd formulations for the management of fungal diseases
3. KVK Kollam
   Regarding blackseeded cowpea cultivation, discuss with AICRP Pulses, Dr.RoshniVijayan and Dr Anitha S, PC Coordinator Field crops.
4. On Farm Research Centre, Vellayani-
   It was suggested to come out with success stories from research conducted under OFR centre.

Technical Session IX –AICRP/AINP

Chairperson: Dr. N.V.Radhakrishnan, Professor & Head, Coconut Research Station, Balaramapuram

Co-chairman: Dr. Rani B, Professor & Head, Department of Soil Science & Agricultural Chemistry, CoA, Vellayani

Rapporteurs: Dr.Ameena, Dr.Sreeja, Dr.Vijayasree, Dr.Gayathri

The salient achievements and progress of the research work conducted in the five All India Co-ordinated Research Projects ;two All India

Network Projects and the On Farm Research Centre were presented in this session by the respective Principal Investigators.

Sl. No.	Name of Project	Name of PI	Remarks
1.	AICRP on Nematodes	Dr. Nisha M.S	
2.	AICRP on Forage Crops	Dr. Usha C. Thomas	For the ICAR recommended technology for topfeed production, demonstration plots has to be set up.
3.	AICRP on Honeybees and Pollinators	Dr. Amritha V.S	

4.	AICRP on Mushrooms	Dr. Heera. G	
5.	AICRP on Biological Control of Crop Pests	Dr. Reji Rani O.P	
7.	AINP on Soil Bio diversity-Biofertilizers	Dr. Chitra. N	
8.	AINP on Pesticide Residues	Dr. Thomas George	It was suggested to help the newly established pesticide residue laboratories under KAU for achieving NABL accreditation

Plenary Session

Dr. Roy Stephen, Associate Director of Research, RARS (SZ) delivered the welcome speech. ADR expressed his gratitude to DR and Chief (Agri.), Planning Board for their constructive suggestions and support. Dr. Madhu Subramanian, Director of Research, KAU, in his presidential address emphasized the impact of Farmer- Scientist Interface program and reminisced the lively discussions. He reiterated that South Zone being a resourceful one, can propose more number of projects and on-farm trials. Recalling the current intake of many faculties, he suggested the need for established guidelines on all the activities for streamlining the organization in a better way.Dr. Roy Stephen, presented the Report of 38th ZREAC.

Sri. Nagesh S.S., Chief (Agri.), Planning Board, highlighted the importance of small, but significant multistaker forums like ZEARC. Recalling the state policies in combating the pandemic, he encouraged KAU to harness the possible opportunities. He exhorted to establish science based approaches especially in areas like carbon reduction technologies. He also highlighted the doubling farmer's income schemes and pressed the need for developing basic data of resources and scientific farm plan development strategies. He also suggested aggregation of farm level units to Producer Companies, new technology augmentation, reimaging production process, productivity enhancement, mechanization and investing for scientific community for infrastructure development. He also reiterated towards proposing projects on genomic research, introducing more KAU varieties to market, and mitigating risk in farming through non-insurance approaches like integrated farming. Dr.Shalini Pillai P, Professor & Head, Department of Agronomy, CoA, Vellayani & Chairperson Programme Committee delivered the vote of thanks.

Sd/-
Director of Research,
Kerala Agricultural University

LIST OF ONGOING RESEARCH PROJECTS

Sl. No	Title of the Project	Principal Investigator	Budget Provision (Lakh)	Date of start
1.	Development of and rographolide based biopesticide formulations against sucking pests of commonly cultivated vegetables in Kerala.	Dr. Santhoshkumar T., Assistant Professor, Agricultural Entomology	2	2020
2.	Annual Plan Project 2020-21"Centre of Excellence in Microbial Technology at College of Agriculture Vellayani.	Dr.K.N.Anith, Professor & Head, Agricultural Microbiology.	10.00	19.12.2020
3.	SHM "Establishment of Advanced Referral plant clinic at CoA, Vellayani for diagnosing pests, diseases and nutritional problems of crops of Kerala"	Dr.Radhika.N.S, Assistant Professor, Plant Pathology	25	02.2021
4.	KSSM Project "Providing Horticultural Therapy and Establishing Community Garden for differently abled".	Dr.Beela.G.K, Associate Professor, Community Science	22.8	2020
5.	Annual Plan 2018-19- "Multidisciplinary Diagnosis Support to address field problems of farmers in Kerala(Karshaka Santhwanam)" .	Dr. Santhoshkumar T., Assistant Professor, Agricultural Entomology.	3	2018
6.	Annual Plan 2019-20 – CIB & RC Registration of Biocontrol Agents.	Dr.K.N.Anith, Professor & Head, Agricultural Microbiology.	57.2	10.09.2021
7.	Annual Plan 2017-18 –"Evolving GAP for control of pest and diseases- An Advanced Research Centre for crop disease diagnosis and management".	Dr.Ayisha.R, Assistant Professor, Plant Pathology	2	2018
8.	Plan project "Centre of Excellence in Postharvest technology: Component III-Establishment of centre for post harvest management and value addition for under exploited fruits and vegetables of Southern Kerala"	Dr.Mini.C, Professor & Head, Post Harvest Technology	2	01.11.2019
9.	Chitosan mediated elicitation of plant growth and alleviation of biotic	Dr. Deepa S Nair, Assistant Professor	2	04.02.2021

Sl. No	Title of the Project	Principal Investigator	Budget Provision (Lakh)	Date of start
	stress in black pepper (Piper nigrum L.).	&Head, Plantation Crops& Spices		
10.	Network project on Soil lose estimation, monitoring and management in the high land eco systems of Kerala.	Dr. Gladis R, Assistant Professor, Soil Science & Agricultural Chemistry	4.048	18.12.2020
11.	Development of nanoparticle incorporated edible coating for extending shelf life of Nendran banana.	Smt.Athulya S Kumar, Assistant Professor, Post Harvest Technology	3	20.12.02021
12.	Development and evaluation of bio-organic ready to use	Dr. Nishan M A, Assistant Professor, Agronomy	3	2020
13.	Strengthening of Lead Centre for Organic Farming at College of Agriculture, Vellayani.	Dr. Aparna B., Assistant Professor, Soil Science & Agricultural Chemistry	3	01.02.2021
14.	Development and evaluation of polyploids and superior genotypes in ginger (*Zingiber officinale* Rosc.) for yield and resistance to rhizome rot.	Dr.Sreekala G.S., Assistant Professor, Plantation Crops & Spices	2	17.12.2020
15.	Scaling up of processing technologies in Jackfruit standardized at KAU.	Dr. Suma Divakar, Professor & Head, Community Science	7	29.01.2021
16.	Development of value chain in banana and pineapple for post harvest loss reduction and enhanced farmer income.	Dr. Geetha Lekshmi PR, Assistant Professor, Post Harvest Technology	1.5	02.2021
17.	Network project on development of high yielding short duration rice varieties tolerant to abiotic stress through marker assisted breeding and mutagenesis.	Dr. Beena R, Assistant Professor Physiology.	12	17.12.2020
18.	Development of production protocol for Dwarf Red Banana (Musa acuminata cv. Dwarf Red Banana).	Dr. Sheeja K Raj, Assistant Professor, Agronomy	2	02.2021
19.	Artificial intelligence and predictive analysis for the development of decision support system for crop pest surveillance for rice farmers of	Smt. Linitha Nair, Assistant Professor & Head, Agricultural	5	2020

Sl. No	Title of the Project	Principal Investigator	Budget Provision (Lakh)	Date of start
	selected agro ecological units	Meteorology.		
20.	Estt. of Techno-incubation centre for the commercialization of value added products from under exploited fruits and vegetables	Dr.Mini.C, Professor & Head, Post Harvest Technology	99.85	01.02.2018
21.	Establishment of centre for formulation of convenient foods	Dr.Mini.C, Professor & Head, Post Harvest Technology	105	01.07.2016
22.	Upgradation of technoological facilities at Regional Agricultural Research Station (Southern Zone), College of Agriculture, Vellayani.	Dr. Geetha Radhakrishnan, Assistant Professor, Computer Science, RARS(SZ), Vellayani	6.5	12.2021
23.	Demonstration unit of Rosarium and Hydroponics System.	Dr. Rafeekher M, Assistant Professor & Head, Fruit Science	1.5	19.02.2021
24.	Establishment of mother plamnt blocks of spice plants.	Dr.Sreekala G.S., Assistant Professor, Plantation Crops & Spices	2.5	21.12.2020
25.	Development and quality analysis of beverages fortified with botanicals.	Dr. Suma Divakar, Professor & Head, Community Science	1	2020
26.	Strengthening tissue culture unit for commercial and medicinal plants.	Dr. M.M Viji, Professor & Head, Plant Physiology.	2	25.02.2021
27.	Strengthening the breeder seed production of selected newly released varieties of vegetables.	Dr. Simi S, Assistant Professor Vegetable Science	1.5	21.12.2020
28.	Growth and defence trade off in ustable continuum: Exploitation of root, endophytes including piriformospora indica & their biomolecules, for enhanced yield and management of biotic and abiotic stress in tropical fruits and vegetable crops.	Dr. Joy M., Associate Professor & Head, Plant Pathology, FSRS, Sadanandapuram	5.5	2019
29.	Performance Evaluation of Promising Fodder Varieties in Different AEUs in Kerala.	Dr. Usha C Thomas, Assistant Professor, AICRP on FC & U.	4	18.12.2020

Sl. No	Title of the Project	Principal Investigator	Budget Provision (Lakh)	Date of start
30.	Annual State Plan project 2020-21-NewProject-"Network project on fruit development and planting material propagation protocols and cataloguing of minor fruits"Sub project 3:Characterisation of mango genotypes grown in southern Kerala and development of field gene bank of superior types'	Dr. Simi S, Assistant Professor, Vegetable Science	2	12.02.2021
31.	Development of Biologically Intensified Disease Management Strategy of Leaf Rot of Coconut.	Dr.Susha S.Thara, Assistant Professor & Head, Plant Pathology	14.92	07.07.2018
32.	Characterization in Vitro Culturing and in Vitro Manipulation for enhanced Production of Secondary Metabolites of Medicinal Orchids and Aloevera.	Dr. M.M Viji, Professor & Head, Plant Physiology	3	14.11.2019
33.	Extraction and Utilization of Plant Based Natural Colours for Safe to Eat Food Production.	Dr.Mini.C, Professor & Head, Post Harvest Technology	2	01.11.2019
34.	Investigation on Etiology of Root (wilt) and Yellowing Disease in Coconut	Dr. Joy M., Associate Professor & Head, Plant Pathology, FSRS, Sadanandapuram	23.00	2019-20
35.	Product Formulation and Standardization of Secondary and Micronutrient Fertilizer Mixtures for Southern Kerala.	Dr.Rani B, Professor & Head, Soil Science & Agricultural Chemistry	2	2019
36.	Productivity Enhancement of Coconut Based Cropping System through Vertical Intensification.	Dr. Shalini Pillai P, Professor & Head, Agronomy	2	03.2020
37.	Standardization of Ago Techniques for Protected Cultivation of Leafy Vegetables.	Dr. Sheeba Rabecca, Professor, Agronomy	2	01.2020
38.	Development and evaluation of Anthurium Hybrids.	Dr.Beena Thomas, Assistant Professor , Plant Breeding & Genetics	1	2019
39.	Drought management through	Dr.Poornima Yadav,	2	2019

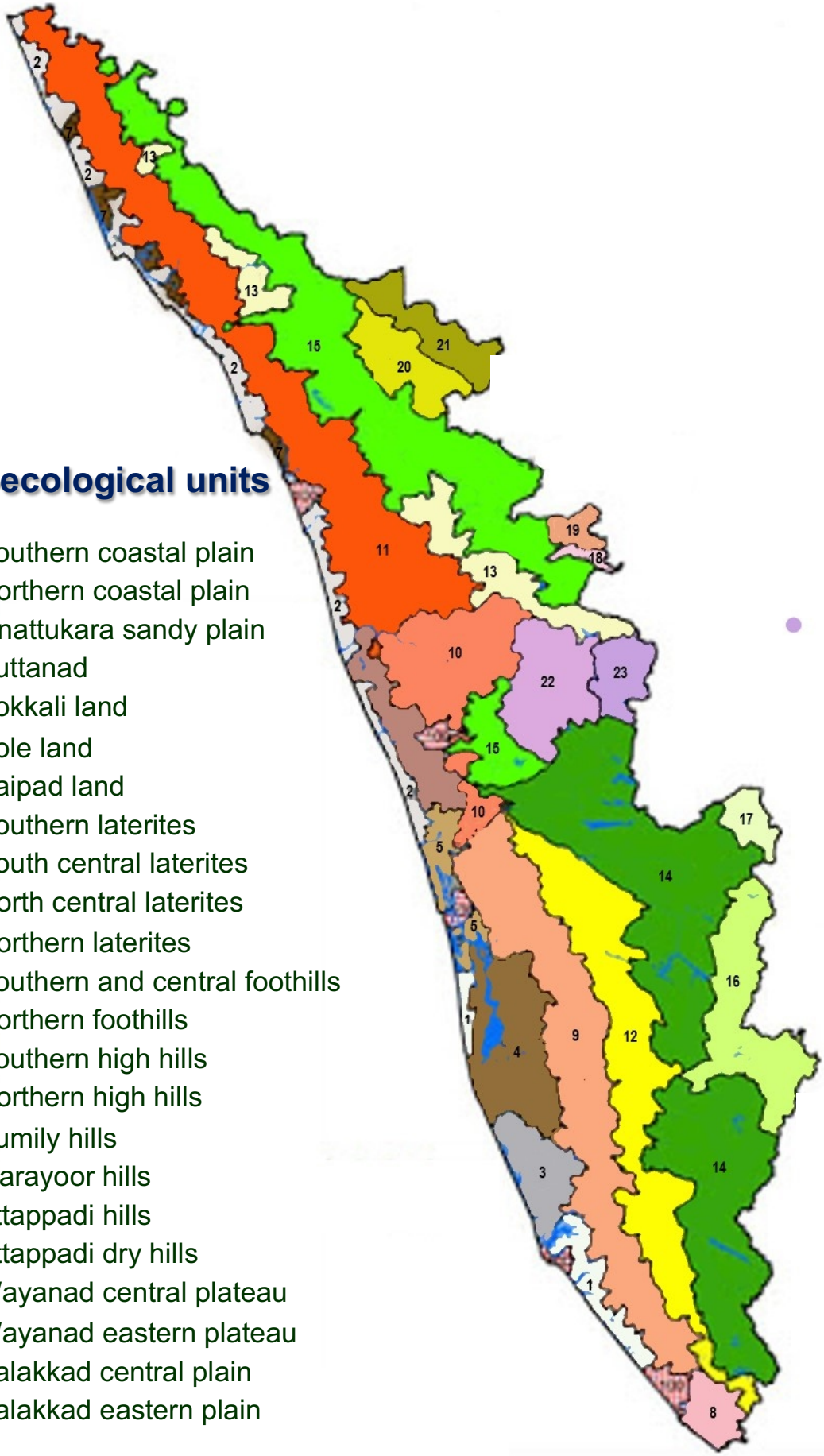
Sl. No	Title of the Project	Principal Investigator	Budget Provision (Lakh)	Date of start
	control of soil crosion, in siturain water harvest, organic waste utilization and crop diversification in coconut based mediculture systems of Kerala.	Assistant Professor, KVK Kollam.		
40.	Development of hybrid rice technology for the State of Kerala.	Dr.V.G.Jayalekshmi, Professor & Head, Seed Technology	3	09.08.2019
41.	Role of nutrients in the management of viral disease in vegetables.	Dr.N.S.Radhika, Assistant Professor, Plant Pathology	3	2019
42.	Comparative yield trial of the promising tomato and cherry tomato hybrids.	Dr.V.G.Jayalekshmi, Professor & Head, Seed Technology	1	09.08.2019
43.	Product development on functional ready to serve beverages, refinement and protocol development.	Dr. Geetha Lekshmi PR, Assistant Professor, Post Harvest Technology	1.5	2019
44.	Annual State Plan Project - Identification of stylosanthes species for yield and quality suited for cultivation in Kerala.	Dr.Gayathri G., Assistant Professor, Forage Crops & utilization	2	2020
45.	Annual State Plan Project - Network project on Utilization of beneficial endophytes for plant growth promotion and management of plant diseases in important crops of Kerala.	Dr.K.N.Anith, Professor & Head, Agricultural Microbiology	7.5	09.02.2021
46.	Annual State Plan Project - Technological interventions for productivity enhancement in wet land rice.	Dr. Ameena M, Associate Professor, Agronomy	2	01.2021
47.	Annual State Plan Project - Breeding Yard longbean for yield and anthracnose resistance.	Dr. Sarada S., Assistant & Head, Vegetable Science	2.5	18.12.2020
48.	DOECC Project - Development of drought tolerant cardamom hybrids through pollen selection and selective fertilization	Dr. Roy Stephen, Professor, Plant Physiology	24	15.03.2021
49.	Agro meteorology Advisory Service	Smt. Linitha Nair, Assistant Professor	12.62	21.03.1997

Sl. No	Title of the Project	Principal Investigator	Budget Provision (Lakh)	Date of start
		&Head, Agricultural Meteorology.		
50.	Network Project on Potential impact of climate change and flood on Kerala Soils: AEU wise mitigation and adaptive strategies	Dr.Rani B, Professor & Head, Soil Science & Agricultural Chemistry	10	2020
AICRP and AINP RESEARCH PROJECTS				
51.	AICRP on Nematodes in Agriculture	Dr. Nisha M.S., Assistant & Head Professor, Nematology	14.74	1977
52.	AICRP on Forage Crops & Utilization	Dr.Usha C. Thomas, Associate Professor & Officer i/c AICRP on Forage Crops & Utilization	72.80	2003
53.	AICRP on Honeybees and Pollinators	Dr. Amritha V.S., Associate Professor, AICRP onHoney Bees and Pollinators, Vellayani Centre	50.00	1/3/1994
54.	AICRP on Mushrooms	Dr. Heera. G., Assistant Professor, AICRP on Mushrooms	60.00	2001
55.	AICRP on Biological Control of Crop Pests	Dr. Reji Rani O.P., Associate Professor Agricultural Entomology	12.90	03/09/2018
56.	AINP on Soil Biodiversity - Biofertilizers - Integration of biofertilizer technology with farming practices of tribal farmers of Attappady	Dr.K.N.Anith, Professor & Head, Agricultural Microbiology	22.40	28/03/2015
REVOLVING FUND				
57.	RF on Honey Bees and Pollinators	Dr. Amritha V.S., Associate Professor, AICRP onHoney Bees and Pollinators, Vellayani Centre	2.50	8/11/2006
58.	Soil Testing (SSTL & MSTL)	Dr. R.Gladis,	2.5	30/10/2012

Sl. No	Title of the Project	Principal Investigator	Budget Provision (Lakh)	Date of start
		Assistnat Professor, Soil Science & Agricultural Chemistry		
59.	Solid Waste Management	Dr. Naveen Leno, Assistant Professor, Soil Science & Agricultural Chemistry	1.00	2015-16
60.	RF Biotech Keralam	Dr.Chithra.N, Assistant Professor, Agricultural Microbiology	0	2005
61.	Integrated Management of Fruit Flies Infesting Fruits & Vegetable Crops - concluded project - Sustenance Programme	Dr. Reji Rani O.P., Associate Professor Department of Agricultural Entomology	3.15	30/3/2015
62.	RF-Establishment of Leaf/Tissue Analytical Lab at CoA, Vellayani	Dr.Shalini Pillai.P, . Professor & Head, Agronomy	1.25	03.2012
63.	RF on Vegetable seed production	Dr. Sarada S., Assistant & Head, Vegetable Science	7	2012
64.	Commercialization of value added products	Dr. Suma Divakar, Professor & Head, Community Science	1	2016
65.	Planting material production in Fodder crops	Dr.Usha C. Thomas, Associate Professor & Officer i/c AICRP on Forage Crops & Utilization	1.00	2019

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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