KALPA

CPCRI Newsletter

Volume 39, No. 1, January-March 2020

ICAR-CENTRAL PLANTATION CROPS RESEARCH INSTITUTE
Kasaragod, Kerala - 671 124

From the Director's Desk

A Barnstorming Past to a Vibrant Future

The New Year began with umpteen numbers of activities: On 5 January 2020, the Foundation Day was celebrated wherein we remembered the contributions of ex-employees who shaped the Institute. Every Foundation Day infuses to our minds the rich contributions of the Institute and makes us rededicate for the cause of the farming community: as the saying goes, 'the brightest future is defined by the present and built by the strong foundation of the past'. Aspirations of the Institute was rightly spelt out by Dr. B.N.S. Murthy, Horticulture Commissioner, Government of India while delivering the 104th Foundation Day address: 'Let ICAR-CPCRI elegantly conquer the heights like coconut palm, abundantly bear the goodness like arecanut palm, and be loved like a chocolate'.

The convergence of minds and ideas surpassing Institutional barriers for the organic development of science and technology is the intangible result of scientific gatherings. The Institute hosted two major events in this regard, the 29th Swadeshi Science Congress and the Rural India Business Conclave. The latter had many sub-components, the most important being the Agri-Tech Hackathon, which may be the first of its kind in the NARES.

Conducting the RAC following the IRC, during March-April every year is being meticulously followed in the Institute for several decades. The schedule for the current year was ready but disrupted due to Covid-19 pandemic. Kasaragod was one of the locations where the Covid-19 incidence was reported for the first time in India. Following the directions of the Government of Kerala, the Institute was closed on 22 March 2020, two days before the nationwide lockdown. Inspired by the words of wisdom of Dr. Trilochan Mohapatra, Secretary, DARE and DG, ICAR, the Institute had provided all support to the local administration in terms of providing RT-PCRs, preparation of large quantity of hand sanitizer, guest house facilities, and vehicle. Dr. A.K. Singh, DDG (Hort. Sci.), ICAR used to enquire about the wellbeing of the staff every day during this tough period. Staff members were provided with the essential goods through the Employees Cooperative Society, and the essential office matters were dealt inside the residential campus. The farm was managed by a limited essential staff. Slowly everyone adjusted to the new normalcy.

CONTENTS

SPECTRUM

Ecological tolerance of Cocoa Probio® bioinoculant

Ecological tolerance of Cocoa Probio® bioinoculant was studied for various parameters. Cocoa Probio® is a talc-based bioinoculant of plant growth promoting *Pseudomonas putida* recommended for application in cocoa seedlings to improve their health and vigour. Several environmental and soil conditions such as temperature, pH and salt levels affect its survival and performance when applied in the field. Hence, tolerance range of this bioinoculant for these conditions was determined. Cocoa Probio® was able to grow at a much wider range of pH 5.0 to 9.0, with optimum growth at pH 7.0, and at temperatures ranging from 4°C to 35°C with optimum at 30°C but could not tolerate NaCl concentration beyond 4% (Fig. 1).

Fig. 1. Cocoa Probio® bioinoculant

Alka Gupta and Murali Gopal

Molecular characterization of exotic whiteflies infesting coconut palms

Five exotic whiteflies *viz.,* spiralling whitefly (*Aleurodicus dispersus*), rugose sprialling whitefly (*Aleurodicus rugioperculatus*), Bondar' nesting whitefly (*Paraleyrodes bondari*), nesting whitefly (*Paraleyrodes minei*) and palm whitefly (*Aleurotrachelus atratus*) have been reported on coconut from India so far. Molecular phylogentic analysis using cytochrome c oxidase subunit 1 (*COI*) gene indicated relative affinities of five whitefly species converging into three groups *viz., Aleurodicus*, *Paraleyrodes* and *Aleurotrachelus* (*Aleurothrixus*). *Aleurodicus* and *Paraleyrodes* are intrinsically associated whereas *Aleurotrachelus* (*Aleurothrixus*) is distantly placed in concurrence with two distinct taxonomic sub-families Aleurodicinae (*Aleurodicus* spp. and *Paraleyrodes* spp.) and Aleyrodinae (*Aleurotrachelus* spp.). Evolutionary distantness of palm whitefly, *A. atratus* and solanum whitefly, *Aleurotrachelus trachoides* indicates in depth morpho-taxonomic studies required covering wide array of whitefly species for better molecular elucidation of invasive whiteflies. Ecologically, *Paraleyrodes* spp. co-exists and competitively regulates the population dynamics of *Aleurodicus* spp. and *Aleurotrachelus* spp. on infested coconut palms.

Josephrajkumar, A., Merin Babu, Anes, K.M. and Chandrika Mohan

Sporadic emergence coconut leaf beetle (*Callispa keram*) along the brackish water region in Kerala

Sporadic emergence of coconut leaf beetle, *Callispa keram* (Chrysomelidae: Coleoptera) was observed on adult coconut palms (variety: WCT) during February, 2020 along the brackish water region near Punnamada, Alappuzha, Kerala. Hitherto, reported as a minor pest on coconut nursery, the emergence of *C. keram* on adult palms assumes significance. Grubs and beetles scrap palm leaflets from undersurface causing distinctive chlorotic streaks resulting in leaf necrosis in severe infestation. The pest-infested palms resembled the damage by black headed caterpillar from distance. *C. keram* is morphologically and evolutionarily distinct from the leaf beetle (*Wallacea jarawa*) recorded on coconut seedlings from Bay Islands (Andamans) as well as the potential invasive leaf beetle, *Brontispa longissima*, so far not reported from the country.

Josephrajkumar, A., Jerard, B.A., Merin Babu, Anes, K.M. and Chandrika Mohan

Fermentation kinetics of Kalparasa®

Kalparasa® fermentation characteristics were studied at every one-hour interval under ambient (31 ± 2 °C) and refrigerated (5 ± 1 °C) storage conditions. The result showed that pH of the sap and total sugar content declined rapidly under ambient conditions than under refrigerated conditions. Acidity, turbidity, and reducing sugar content significantly ($p < 0.001$) increased for the sap stored under ambient conditions. An increase in yeast and bacteria population was observed in both the storage condition. The initial golden brown color of the Kalparasa® (0th hour of storage) changed to milky white at 6th hour of atmospheric storage. The reaction kinetics was studied to predict the effect of fermentation time and storage condition on quality attributes. The degradation kinetics of vitamin C and total sugar in Kalparasa® during natural fermentation (ambient condition) followed second-order equation whereas the reducing sugar followed the first-order equation. Nevertheless, the degradation of vitamin C during refrigerated storage conditions followed the second-order equation and the total sugar fitted in the first-order equation.

Pandiselvam, R., Manikantan, M.R., Shalu M. Binu, Ramesh, S.V., Shameena Beegum, Murali Gopal, Hebbar, K.B. and Sandip Shil

Bean to bite dark chocolate

A complete process consisting of fermentation, drying, roasting and winnowing of cocoa beans, refining of nibs, tempering, moulding, refrigeration, demoulding, packaging and storage, for the preparation of homemade bean to bite chocolate using coconut sugar was developed. The technology was showcased by providing three day hands on training, from handling of beans to chocolate making, to the 20 woman entrepreneurs at the facility established in the Agri-Business Incubation Centre. This technology was released during 104th Foundation Day celebrations of ICAR-CPCRI on 5th January, 2020.

Shameena Beegum, P.P., Manikantan, M.R., Pandiselvam, R., Hebbar, K.B., Muralidharan, K.

Protocol refinement in coconut milk powder

Foam mat drying protocol consisted of two stage drying for the production of coconut milk powder. The process was simplified to a single stage drying by incorporating foaming agent, foam stabilizer and encapsulating agent to coconut milk during the initial whipping. Foam mat drying is preferred due to its simplicity, cost-effectiveness and rapid drying rate. Foam expansion of 147% was observed while whipping. Single stage dried milk powder had a loose bulk density, packed bulk density and angle of repose of 0.37 g/cm^3, 0.49 g/cm^3, 42.32° respectively. Quantity of encapsulating material (less than 6% of the weight of coconut milk which otherwise is added at more than 20% during spray drying) and drying time (2 h for complete drying unlike 3.5 h in two stage process) could be saved in this simplified method. The product had a Hausner ratio of 1.13 ± 0.01 which falls under the category of powder with good flow character.

Manikantan, M.R., Shameena Beegum, P.P., Pandiselvam, R. and Paulraj, S.

Storage studies in ready to cook instant coconut kheer mix

Instant kheer mix (Fig. 2) standardized with coconut milk powder, coconut sugar and vermicelli was evaluated for its shelf life under ambient condition. Biochemical, sensorial and microbial storage studies revealed that the product was shelf stable during the entire storage period (three months). Proximate composition consists of 1.95% moisture, 63.61% carbohydrates, 22.92% crude fat, 9.62% crude protein and 1.94% ash content. The amount of water for reconstituting the kheer was standardized as 6:1. It was compared with commercial kheer mix sample and found superior in flavor and taste and flavor (8.01 ± 0.63 and 7.55 ± 0.63 than 7.33 ± 1.63 and 7.16 ± 1.47 for test and control sample respectively).

Fig. 2. Coconut milk based instant kheer mix

Manikantan, M.R., Shameena Beegum, P.P., Pandiselvam, R. and Hebbar, K.B.

Preservation protocol for coconut gratings under ambient condition

Coconut kernel in ready to use form is preferred by all. Coconut kernel is difficult to be preserved in fresh form for long time due to the presence of high fat, and moisture content. A processing protocol was standardized for grated coconuts and to avoid maximum contamination. It include, dehusking the fully matured coconut, surface sterilization and removal of brown colour of coconut shell by dipping in boiling water for 15 sec, cutting the nuts into two halves, blanching at 90°C for 6-7 min, grating using an electric grater, steam blanching for 3 min, incorporation of additives (singly or in combination of humectant, acidulant, buffering agent, antioxidant, preservative). Grated coconut sample without any preservatives in laminated pouch could stay without spoilage for maximum one day (24 h) in ambient and 4 days under refrigerated condition. When the grated coconuts were added with additives resulted in a shelf life of 7 days under ambient and 24 days under refrigerated condition.

Shameena Beegum, P.P., Manikantan, M.R., Pandiselvam, R. and Murali Gopal

Performance of local black pepper accessions in North East region of India

Thirteen black pepper accessions collected from Kamrup district of Assam, were evaluated f along with Panniyur-1 as a check variety at ICAR-CPCRI, Research Centre, Kahikuchi where arecanut palms were used as supports for black pepper. The data on yield and yield attributing traits were recorded for seven years, from 2013 to 2019. Significant differences were observed between the accessions for almost all the characters recorded, including growth characters and length of berry portion, number of berries per spike, number of spikes per kg, fresh yield per vine and dry yield per vine. Among the accessions, spike length varied from 9.57 cm to 13.58 cm: the length of berry bearing portion being higher in IC-0599145 (KKHP 8) (12.01 cm). The number of spikes per lateral branch (17.83), number of nodes per lateral branch (32.67), number of berries per spike (80.75), fresh pepper yield per vine (6.47 kg) and dry pepper yield per vine (2.31 kg) was found to be significantly higher in IC-0599150 (KKHP 13). The accession KKHP 13 has recorded 21.86% more fresh pepper yield and 43.62% more dry pepper yield compared to the check variety Panniyur-1. Based on the higher black pepper yield, coupled with oleoresin (10.64%), essential oil (4.00%) and piperin content (3.13%) in berries and higher dry recovery (35.54%), the accession IC-0599150 (KKHP 13) appears to be a potential variety for cultivation in North East India.

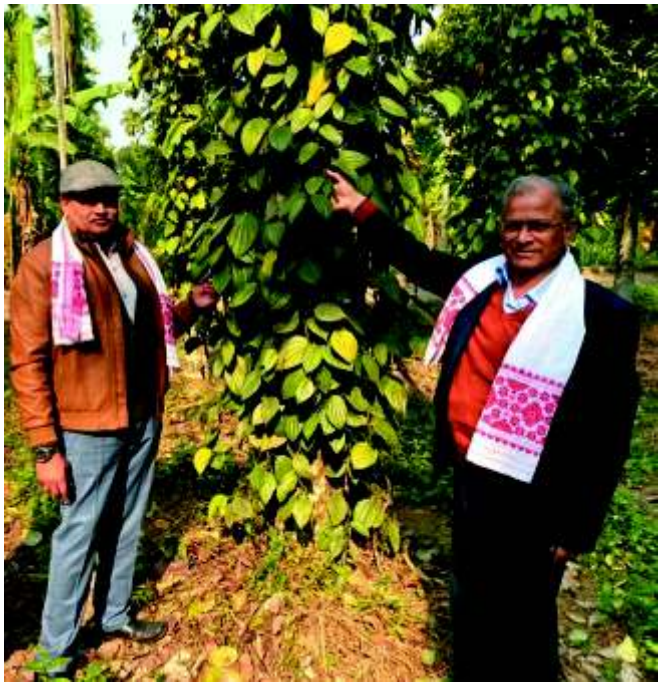


Fig. 3. Dr. A. K. Singh, DDG (Hort. Sci.), ICAR and Dr. K. V. Prabhu, Chairperson, PPVFRA,having close look on black pepper germplasm at RC, Kahikuchi

L.S. Singh, V. Niral, Anok Uchoi, G.C. Acharya and Alpana Das

NEW PROJECTS

A new project was sanctioned, entitled 'Value chain in turmeric' under the leadership of Dr. P. Muralidharan, Principal Scientist and Head, KVK. The project has Rs. 18.0 lakhs funding from FSPF of NABARD. This will be under operation for 3 years at 10 panchayats of Mavelikkara and Chengannur Blocks, Alappuzha district, Kerala.

IMPORTANT EVENTS

Foundation Day Celebration

104th Foundation Day of ICAR-CPCRI was celebrated on 5 January 2020. Dr. B.N.S. Murthy, Horticulture Commissioner, Govt. of India was the chief guest for the programme. From world's first hybrid in coconut to QR code labeled coconut seedlings, the Institute stood first in the country and in the world on many technologies, resources and services, he said. However, he further added that the greater challenge for the Institute is to ensure financial security to the coconut, arecanut and cocoa farmers. Dr. Murthy also inaugurated the custom hiring centre of KVK, Kasaragod.

EDP on use of mechanical climbing devices benefitting 38 rural youths belonging to Scheduled Castes Community and distribution of climbing devices (under SCSP); release of publications; launch of new products (Kalpa Vermiwash and Kalpa Bean-to-Bite Chocolate); exchange of MoAs with entrepreneurs on business incubation and technology transfer; were also part of the programme.

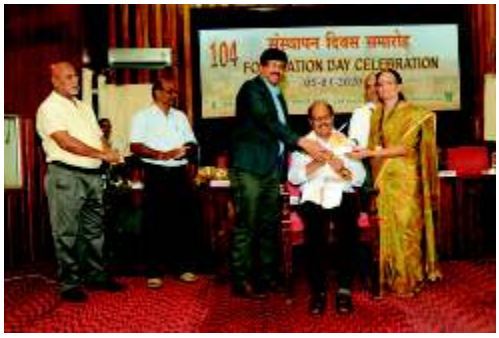
Former Directors of the Institute - Dr. K.U.K. Nampoothiri, Dr. George V. Thomas, and Dr. P. Chowdappa, were felicitated during the meeting.

Release of chocolate by Dr. B.N.S. Murthy, Commissioner of Horticulture, Govt. of India during the Foundation Day function at Kasaragod

Outstanding performances of the Institute staff were rewarded during the programme. Dr. B.N.S. Murthy has given away the Best Technical Staff Award to Shri Chandra Nairy, ICAR-CPCRI, RC, Kidu, the Best Administrative Staff Award to Shri T.N. Vidyadharan, ICAR-CPCRI, Kasaragod and the Best Skilled Support Staff Award to Shri Balappa Gowda, ICAR-CPCRI, RC, Kidu, during the programme.

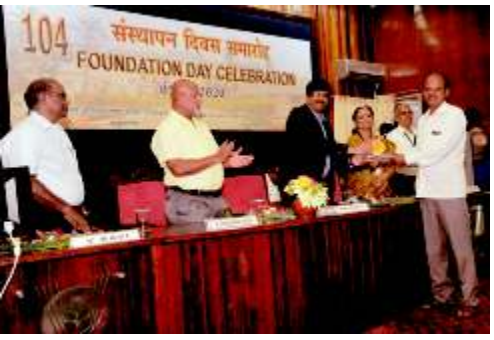
Dr. M. Gangadhara Nayak, Director (Act.), ICAR-DCR, Puttur and Dr. V. Ravi, Director (Act.), ICAR-CTCRI, Thiruvananthapuram, offered felicitations.

Felicitations offered to former Director, Dr. K.U.K. Namboothiri



Felicitations offered to former Director, Dr. George V. Thomas

Felicitations offered to former Director, Dr. P. Chowdappa



Best Technical Staff Award received by Shri Chandra Nairy

Best Administrative Staff Award received by Shri T.N. Vidyadharan

Best Skilled Support Staff Award received by Shri Balappa Gowda

Swadeshi Science Congress

The 29th Swadeshi Science Congress was held during 27-29 February 2020 at ICAR-CPCRI, Kasaragod under the focal theme 'Science and Technology for Sustainable Development'. It was jointly organized by ICAR-CPCRI, Central University of Kerala and Swadeshi Science Movement-Kerala. Sri V. Muralidharan, Hon'ble Minister of State for External Affairs and Parliamentary Affairs inaugurated the Congress on 27 February 2020. He highlighted the achievement of the nation in various advanced sectors including space science. Dr. G. Gopa Kumar, Vice-Chancellor, Central University of Kerala, Kasaragod and Prof. (Dr). A. Ramachandran, Vice-Chancellor, Kerala University of Fisheries and Ocean Studies, Kochi were the guest of honours. Dr. K. Muralidharan, Vice President, Swadeshi Science Movement Kerala presided over the function. Dr. Anitha Karun, Director, ICAR-CPCRI welcomed the gathering. Dr. Vivekananda Pai, Vijnana Bharati offered felicitations. Dr. P. Rajendran, Central University of Kerala briefed about the programmes and Dr. A. R. S. Menon, Secretry SSMK proposed vote of thanks.

A publication on 'Farmer participatory technology transfer' brought out by the Institute was released by the Hon'ble Minister during the occasion. He also distributed the i-STED project awards to Shri AM Subrahmanyan Nair, Kalichanadukkam, Kasaragod (best Papaya Farmer) and to The Papain Society, Vandum, Malappuram (Best Papaya Enterprise). Memorandum of Understanding between CPCRI and KUFOS, Kochi was exchanged during the occasion.

The Conference was held simultaneously in three different halls. Over 200 papers presented in the 10 technical sessions. Technical Sessions started with the Padma Vibhushan Parameswarji Memorial Lecture delivered by Prof V. P. N. Nampoori, Emeritus Professor, CUSAT on the topic 'Panini, Euclid and Mendeleev'. More than 300 delegates participated in the conference.

Shri V. Muralidharan, Hon'ble Minister of State for External Affairs and Parliamentary Affairs inaugurating the Swadeshi Science Congress at Kasaragod

A Student-Scientist Interface Programme was held as a part of the 29th Swadeshi Science Congress on 29 February 2020. The programme was inaugurated by Prof. K. Jayaprasad, Pro-Vice Chancellor, CUK, Kasaragod followed that the C.V. Raman Memorial Lecture was delivered by Prof. Reji Philip, Raman Research Institute, Bangalore. The following scientists interacted with the students: Prof. G.M. Nair, Kerala Biotechnology Commission, Dr. V.P. Balagangadharan, Former ISRO Scientist, Dr. K. Ganesh Raj, NRSC, ISRO, Bangalore, Prof. V.P.N. Nampoori, Prof. Reji Philip, , Dr. P.V. Mohan, Scientist-G, Sree Chithra Thirunal Institute of Medical Sciences & Technology, Dr. Suresh C.H.,

Kathakali performance on life of Bharat Ratna C.V. Raman performed by Dr. C.G.N. Namboothiri

NIIST, Thiruvananthapuram, and Dr. Anitha Karun. More than 500 students participated in the interactions.

A Kathakkali performance on life of Bharat Ratna C.V. Raman was staged by Dr. CGN Namboothiri, Technical Officer and his team.

Valedictory session was held on 29 February 2020, chaired by Dr. Anitha Karun, Director (Acting), ICAR-CPCRI. Dr. N.G.K. Pillai, former Director, CMFRI, Kochi, Dr. K. Muralidharan, Vice President, SSMK, and Dr. M.K. Rajesh, Chairman Programme Committee and Principal Scientists, ICAR-CPCRI were the dignitories on the dais.

Rural India Business Conclave

The Agri-Business Incubation Centre, ICAR-CPCRI and Kerala Startup Mission jointly organized Rural India Business Conclave during 27 February to 3 March 2020 at ICAR-CPCRI, Kasaragod. Programmes of RIBC are:

(i) SITI (Science, Invention, Technology and Innovation) Expo (27 Feb to 3 Mar 2020): Sri V. Muraleedharan, Honourable Union Minister of State for External Affairs and Home Affairs inaugurated the SITI (science, invention, technology and innovation) exhibition on 27 February 2020. More than 100 science and technology institutions/ startups/input agencies participated in the expo.

(ii) Conference: Startups to leverage rural economy: It was held on 1 March 2020. Sri N.A. Nellikunnu MLA Kasaragod inaugurated the Conference. Mr. A.G.C. Basheer, District Panchayath President presided over the function. Dr. Saji Gopinath, CEO, Kerala Startup Mission flagged the focal theme of the conclave that the inclusive growth of rural economy has a decisive role in achieving nation's aspiration to become a five trillion dollar economy by 2024. Dr. Anitha Karun, Director (Acting), ICAR-CPCRI welcomed the gathering. Founders of six highly successful start-up ventures shared their experience and vision; they included Sri Mathew Joseph, Co-Founder, 'Fresh to Home' (a retail supply chain of fresh fish and meat operating in different cities); Sri Senthil Kumar, Founder, 'Savemom' (provides connected maternal care using a smart device and telemedicine); Sri Mohamed Jamsheer, CFO, 'Green Worms' (involved in solid waste management); Sri Sikkendar Meeranaik, CEO, Sankalpa Rural Development Society (a Society that works for recharging dried bore wells); Sri Pradeep Punarka, CEO, 'FarmersFZ' (linking production from farmer-clusters to consumers, and Dr. Saji Vargese, CEO, 'Coconut Leaf Straw' (manufacture of drinking straws from coconut leaflets).

(iii) Networking dinner: Networking dinner-talk on investment opportunities with startups delivered by Sri P. K. Gopalakrishnan, Indian Angel Network.

(iv) Dream Big Kalpa: 'Dream Big Kalpa Workshop' on sourcing agriculture technologies from different ICAR institutes was conducted on 2 March 2020. Commercialized technologies from the following institutes were presented in the session chaired by Dr. C. Thamban, Principal Scientist (Agrl Extn.); ICAR-CIAE (Dr. Ravindra Naik); ICAR-IIMR (Dr. Dayakar Rao) ICAR-CIFT (Dr. George Ninan); ICAR-IISR (Dr. T.E. Sheeja); ICAR-CPCRI (Dr. K. Muralidharan); ICAR-SBI (Dr.P. Muralidharan); ICAR-CTCRI (Dr. D. Jaganathan); ICAR-NRCB (Dr.K. N. Shiva); and ICAR-IIHR (Dr. R.H. Laxman).

(iii) Expert-Talks: There were two expert-talks in the second day: Sri Nagaraja Prakasam, Angel Investor & Startup Mentor delivered a talk on 'Focus on India's strength People, Problem and Technology'. He cited examples where rural youths provided solutions

Dr. Saji Gopinath lighting the lamp during inauguration of Rural India Business Conclave

Shri N.A. Nellikkunnu, Hon'ble MLA, Kasaragod delivering inaugural speech

Shri V. Muralidharan, MoS External Affairs and Parliament Affairs visiting SITI exhibition stalls

matching with global standard and converging resources including sourcing of technologies from ICAR institutes. Sri Harikrishnan C.A., dwelt upon the legal, financial and policy issues in his expert talk.

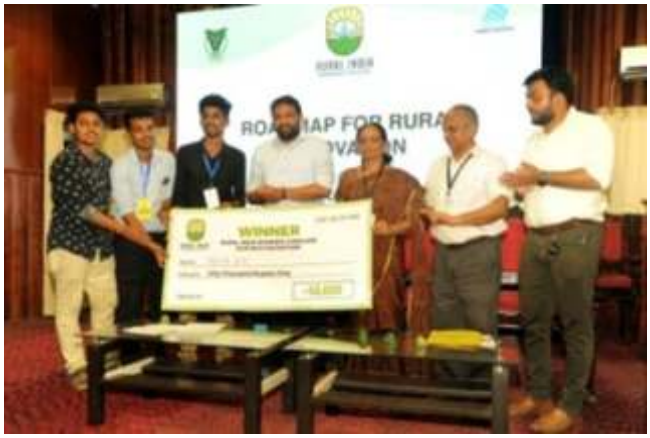
(iv) Agri-tech hackathon: As part of RIBC, an Agri-tech hackathon was conducted to find solutions under the following themes:

- Robotic assisted grafting of plants.
- Technology for identification of maturity of coconut without human interface.
- Computer/mobile based monitoring and controlling of drip irrigation system for multiple cropping systems.
- Virtual Santhai - To enable seamless marketing of Rural India commodities and products.
- Mobile App for connecting waste aggregators.

Dr. Saji Vargese addressing the gathering

Out of 75 teams registered, 24 were shortlisted and 15 teams participated in the 30 hours hackathon started at 9.30 am on 29 February 2020. The progress of work carried out by the individual teams was evaluated continuously. Mentors included faculty from ICAR-CPCRI, LBS Engineering College, Kasaragod and Central University of Kerala. Five best teams were selected for a presentation on 2 March 2020. The award for the best idea was bagged by Team DTi from Sahyadri College of Engineering and Management, Mangaluru (comprising of Pushparaj A., Ramkishor K., Harshith Kumar and Dhanush M.), who were awarded a cash prize of Rs. 50,000/- during the valedictory function held on 2 March 2020.

Mentoring and evaluation process of the Agri-Tech Hackathon



Team DTi receiving the winner's check from the Director, CPCRI

Science-centered Sasthra Patham programme for School Students

Two '*Sasthra Patham*' programmes were conducted at ICAR-CPCRI Regional Station, Kayamkulam during 17 January 2020 and 27 January 2020 for school students selected by Government of Kerala for pursuing science-related career. The programme was coordinated by M.S.M. College, Kayamkulam. Science orientation lectures and an agriculture quiz programme were organized by scientists of the Regional Station. The students visited different laboratories, experimental plots and acquainted with the advancements.

PUBLICATIONS

Research Articles

Anithakumari, P., and Jayasekhar, S. 2019. Leadership and social intelligence of coconut farmer leaders and implications in extension services. *Journal of Plantation Crops*, 47 (3): 158 166.

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Pandiselvam, R., Manikantan, M. R., Balasubramanian, D., Shameena Beegum, P.P., Mathew, A. C., Ramesh, S.V., Hebbar, K.B. and Niral,V. 2020. Mechanical properties of tender coconut (*Cocos nucifera* L.): Implications for the design of processing machineries. *Journal of Food Process Engineering*, 43(2):e13349. DOI: 10.1111/jfpe.13349.

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Ramesh, S.V., Pandiselvam, R., Thushara, R., Manikantan, M.R., Hebbar, K.B., Beegum, S., Mathew, A.C., Neenu, S. and Shil, S., 2020. Engineering intervention for production of virgin coconut oil by hot process and multivariate analysis of quality attributes of virgin coconut oil extracted by various methods. *Journal of Food Process Engineering*, p.e13395.DOI: https://doi.org/10.1111/jfpe.13395.

Sivakumar, T. and Yeshwanth, H.M. 2019. *Helopeltis theivora* (Heteroptera, Miridae) as a pest of betel vine (*Piper betle*). *Indian Journal Agricultural Science*, 90 (2): 242-243.

Sivakumar, T. and Yeshwanth, H.M. 2019. New hosts of tea mosquito bug, Helopeltis theivora Waterhouse on eggplant (*Solanum melongena* L.) and amaranth (*Amaranthus* sp. L.) from India. *Phytoparasitica*. 47:499-503. Https://doi.org/10.1007/s12600-019-00750-1.

Sujithra, M, Rajkumar, V. H. Prathibha, Vinayaka Hegde and J. Poorani 2019. Occurrence of nesting whitefly *Paraleyrodes minei* iaccarino (Hemiptera: Aleyrodidae) in India. *Indian Journal of Entomology*, 81(3): 507-510.

Papers presented in seminar/ symposia/ conference/ workshops

Alka Gupta, Murali Gopal, Priya George and George V. Thomas. 2020. Kera Probio™ : a bioinoculant developed specifically for coconut seedlings. *In:* 29th Swadeshi Science Congress: National Conference on 'Science and Technology for Sustainable Development'. Central Plantation Crops Research Institute, Kasaragod, Feb. 27 29, 2020. Abstract Book pp. 25 26.

Josephrajkumar, A., Chandrika Mohan, Merin Babu, Anes, K.M., Regi J. Thomas and Vinayaka Hegde. 2020. Strengthening quarantine and Incursion Management of Invasive Pests on Coconut. *In*: International Seminar on Transboundary Pest Management, Souvenir cum Abstracts, 4 5 March, 2020, pp 137-138.

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HUMAN RESOURCES DEVELOPMENT

Deputation Abroad

Dr. Murali Gopal, Principal Scientist (Agrl. Microbiol.) was deputed to University of Delaware, Newark, DE, USA. He attended the IUSSTF funded Indo-US Bilateral Workshop on 'Transnational Research needs and Applications of Plant Microbiomes' from 25-27 February, 2020. He made a presentation on recycling of coconut residues and their impact on soil and plant health and sustaining coconut ecosystem services.

Training attended

Dr. Anok Uchoi, Scientist, ICAR-CPCRI, Research Centre, Kahikuchi attended an ICAR sponsored 21 days training on “Organic agriculture and soil health” at Assam Agriculture University, Jorhat, Assam from 28th February to 11th March, 2020.

Awards/ Honours

ICAR-CPCRI, Kasaragod Centre of AICRP on PHET attained first position for Best Centre of the year 2019-20 Award during 35th Annual Workshop at JNKVV, Jabalpur during 23-25 January 2020.

Dr. M.R. Manikantan, Principal Scientist (AS&PE) received “ISAE Commendation Medal 2019” award by Indian Society of Agricultural Engineers (ISAE), New Delhi during 54th Annual Convention of ISAE and International Symposium on “Artificial Intelligence Based Future Technologies in Agriculture” at Hotel Hyatt Regency, Pune during 7-9 January 2020.

Dr. G. Panjavarnam, Scientist (fruit science), Crop production, ICAR-CPCRI, Kasaragod received Appreciation Award for Ph. D. Dissertation on International Conference on Bananan-2020 held during 22nd to 25th Feb, 2020.

Dr. Sujithra M. has been awarded best oral presentation for the research paper entitled" Characterization and entomopathogenecity of *Simplicium cylindrosporum* isolated from rugose spiralling whitefly, *Aleurodicus rugioperculatus* Martin" in International Seminar on Transboundary Pest Management" held at TNAU, Coimbatore organized by Entomological Society of India, New Delhi during 4 5 March 2020.

The research paper by Josephrajkumar, A., Chandrika Mohan, Merin Babu, Anes, K.M., Regi J. Thomas and Vinayaka Hegde entitled 'Strengthening quarantine and incursion management of invasive pests on coconut' authored was adjudged as the best oral presentation during the International Seminar on Transboundary Pest Management, held during 4-5 March, 2020 at TNAU, Coimbatore.

TRANSFER OF TECHNOLOGY

Training Programmes

Programme	Date	No. participated	Remarks
ICAR-CPCRI, Kasaragod			
Coconut cultivation and value addition	07-09 Jan 2020 08-10 Jan 2020	20 20	Tenkasi Block, Tamil Nadu Kinathukadavu,Tamil Nadu
Neera production techniques	22-24 Jan 2020 27-30 Jan 2020 27-30 Jan 2020 27-30 Jan 2020 10-12 Mar 2020	20 20 20 20 20	Sathyamangalam, TN Alanganallur block, TN Melur Block, TN Uthamapalayam, TN Kanyakumari, TN
Neera tapping and value added products (Study visit)	29 Jan 2020 30 Jan 2020	5 40	Telengana Govt. Officials & Goud Community members Odisha
Exposure visit cum training	17 Feb 2020	17	ARYA scheme of ICAR-KVK, Kanyakumari, TN
EDP on cocoa cultivation and processing (Under STC)	7-14 Mar 2020	20	Members of ST community from Paderu block, AP
ICAR-CPCRI, Regional Station, Kayamkulam			
Advances in pest and disease management in coconut (officials of Agri. Dept.)	29 Jan 2020 18 Feb 2020	42 75	Thrissur district Kollam district
Farmer participatory area wide plant protection in coconut	5 Jan 2020	82	Cherunniyoor, Thiruvananthapuram
Soil test based nutrition management in coconut and inter crops	7 Jan 2020	27	Chunakkara, Alappuzha
Farmers Field School	10 Jan 2020	25	Parathodu, Kottayam District
Area wide plant protection in coconut	15 Jan 2020	48	Ochira, Kollam District
Health management in Coconut	21 Jan 2020	60	Ernakulam District
Farmers Club	21 Jan 2020	21	Kooroppada, Kottayam
Technology integration for inclusive farming strategies	22 Jan 2020	50	Madappally Block, Kottayam
Health management in coconut	28 Jan 2020	55	Ezhupunna, Kodamthuruthu Cherthala Taluks
Pest management strategies in coconut	30 Jan 2020	16	Pahtanamthitta
Health management in coconut	13 Feb 2020	75	Sengottai, Tamilnadu
Coconut pests and their management	19 Feb 2020	100	VIT, Vellore
Coconut health management	22 Feb 2020	50	RATTC, Kozha
Exposure visit of farmers	25 Feb 2020	21	Assam State Dept. of Horticulture
Coconut health management	07 Mar 2020	300	Thopramkudi, Idukki
ATMA Exposure visit of farmers	11 Mar 2020	30	Namakkal, Tamil Nadu

Programme	Date	No. participated	Remarks
ICAR-CPCRI, Regional Station, Vittal			
District level seminar on 'Cocoa production and processing technology'	7 March 2020	50	Financial support from DCCD
Arecanut Nursery Practices	12-13 Feb 2020	2	On payment basis
Exposure visit-cum-training	7 Jan 2020 21 Jan 2020 23 Jan 2020 29 Jan 2020 3 Feb 2020 14 Feb 2020 15 Feb 2020 19 Feb 2020 26 Feb 2020 11 Mar 2020	25 8 23 21 11 20 21 16 37 42	Kanyakumari, TN Karuvarukundu, Malappuram Officials of Dept. of Agriculture, Karnataka Theni District, TN Bhagamandala, Karnataka Officers/farmers Meghalaya DATC, Belthanady Ankola, Uttara Kannada WRD, Dhorgel, Goa ICAR-KVK, Tiptur
ICAR-CPCRI, Research Centre, Kahikuchi			
Training and demonstration on Role of Farm Mechanization in Enhancing Agricultural Production*	3 Jan 2020 to 10 Jan 2020	430	Kamrup (R), Nalbari, Baksa, Goalpara, Barpeta, Darang and Morigaon districts
Role of farm mechanization in agriculture**	17 Jan 2020	50	
Scientific cultivation and management practices of arecanut in Assam	31 Jan 2020	50	
Scientific cultivation and management practices of coconut in Assam	5 Feb 2020	102	
Bio-village demonstration camp	19 Feb 2020	15	Murshidabad, West Bengal
ICAR-CPCRI, Research Centre, Mohitnagar			
Crop Diversification in Plantation garden with Spices	4 Mar 2020 5 Mar 2020	60	Sadar Block Jalpaiguri

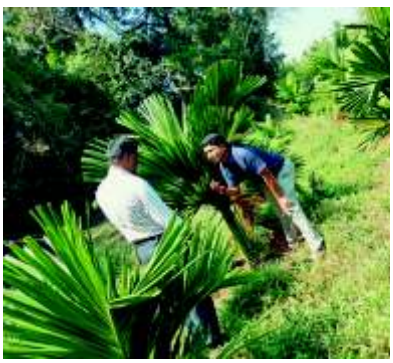
* Under Consortium Research Platform (CRP)-Farm Mechanization and Precision Farming (FM & PF) project
** With financial assistance from ICAR-VPKVS, Almora, Uttarakhand under North-East programme.

Capacity building training programme on quality planting material production

Study visit of Telengana Government Officials

Trainees of EDP on cocoa cultivation and processing (under STC)

Women trainees visiting Cocoa Nursery at Vittal



Demonstrating hybridization technique in arecanut

Training programme on coconut climbing at Kahikuchi

Off-campus trainings

1. Friends of Coconut Tree' training programme on 'Scientific management of coconut including harvesting coconut using climbing devise' for the inmates of Open Prison, Nettukaltheri, Thiruvananthapuram during 24-29 Feb 2020. The programme was funded by Coconut Development Board, Kochi.
2. Training cum demonstration program conducted on "Postharvest handling of coconut" at RATTC, Palakkad on 14 February 2020 for 25 coconut farmers and entrepreneurs.

Directorate of Arecanut and Spices Development (DASD), Kozhikode sponsored training programmes.

3. 'Arecanut Based Multispecies Cropping System and Integrated Pests and Diseases Management', 25 Feb 2020, Pambetthady, Sullia (120 farmers attended).
4. 'Arecanut varieties, arecanut based multispecies cropping system and integrated pests and diseases management', 5 Mar 2020, Harihara-Pallathadka, Sullia (160 farmers).
5. 'Arecanut based multispecies cropping system and integrated pests and diseases management', 9 Mar 2020, Belthangady, Dakshina Kannada Dt., (150 farmers).

Seminars

A District Level seminar on "Coconut Cultivation was organized with the financial help of CDB, State Centre, Kolkata on 19 February 2020 at Research Centre,. The seminar was inaugurated by Sri Pranab Jyoti Pandit, Additional Director of Agriculture, North Bengak Region, Govt. of West Bengal in presence of Dr. Papiya Bhattacharya, Asst. Director of Agriculture (Admin.), Jalpaiguri (200 farmers participated).

District level seminar on 'Cocoa production and processing technology' was organised at Punacha village in collaboration with Punacha Primary Agriculture Service Co-operative Society Ltd. with DCCD funding on 6 March 2020 (90 farmers participated).

Farmers - Scientist interface programmes

- "Crop diversification in plantation garden"
  At Hort. Research and Dev. Farm, Mohitnagaron 7 February 2020 (50 female farmers).
  At Swapnotoron" Jalpaiguri on 24 February 2020 (40 women participants).
- "Black prepper cultivation in arecanut palntation" at Hort. Research and Dev. Farm, Mohitnagar on 12 February 2020 (45 farmers).
- "Crop diversification in plantation garden with spices and scientific arecanut cultivation" at Salbari, Siliguri, organized by KVK, Darjeeling on 28 February 2020 (40 input dealers attending the the training of DAESI).

Farmer FIRST Programme (FFP)

The IAC meeting of the FFP was organized on 18 February 2020 at ICAR-CPCRI, Regional Station, Kayamkulam. Dr. Anitha Karun, Director (Actg.), ICAR-CPCRI chaired the session and Dr. Chandre Gowda, Director (Actg.), ICAR-ATARI, Bengaluru coordinated the discussions. A total of 27 participants attended the session and approved the action points for FFP interventions for the next years.

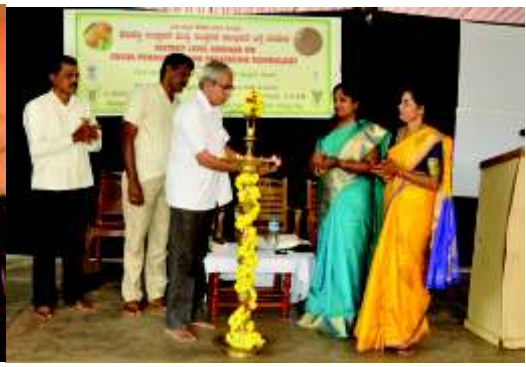
Group meetings and inauguration of harvesting of sesamum and finger millets in 27 locations of FFP panchayath were inaugurated by Sri Arif A.M., Hon. MP, Alappuzha and Mrs. Prathibha U., Hon. MLA, Kayamkulam.

Distribution of bioprimed polybag coconut seedlings

The distribution of bioprimed polybag coconut seedling at Chunakkara under the *Kera Nanma* project was done on 5 February 2020.

Shri Rishiraj Singh, IPS handing over palm climbing device to inmates of Open Prison, Nettukaltheri

Inaugural session of the DASD-sponsored training programme at Pambetthady, Sullia



District level seminar on cocoa at Punacha

Exhibitions

Centre participated	Programme & Date
ICAR-CPCRI, Kasaragod	Vaiga 2020 at Thrissur, 4-7 Jan 2020 Global potato Conclave, Ahmedabad- Gujarat, 28-31 Jan 2020 National horticultural fair 2020- Organized by ICAR-IIHR- Banglore, 5-8 Feb 2020 Post Harvest Machinery and Technology Demonstration Mela at Kelappaji College of Agricultural Engineering and Technology, Tavanur, 14 Feb 2020 HortExpo, Organized by ICAR-NRC Banana at Thiruchirappilly, 22-23 Feb 2020 SITI Exhibition, at ICAR-CPCRI, Kasaraod, 27 Feb to 3 Mar 2020
ICAR-CPCRI, Regional Station, Vittal	At Pambetthady, Sullia, 25 Feb 2020 At Harihara-Pallathadka, Sullia, 5 Mar 2020 At Belthangady, 9 Mar 2020.
ICAR-CPCRI, Research Centre, Kahikuchi	State Level Farmers Fair Horticultural Research Station, Kahikuchi, Guwahati, Assam, 26-27 Feb 2020

Radio talks

Sl. No.	Name of scientist	Topic	Date of broadcast
1	Dr. P. Anithakumari, Principal Scientist, ICAR-CPCRI, RS, Kayamkulam	Management of coconut gardens during summer season	17.01.2020
2	Dr. S. Kalavathi, Acting Head, ICAR-CPCRI, RS, Kayamkulam	Vayalum Veedum- Climate Resilient Adaptations under Coconut Based Farming Systems	25.02.2020
3	Dr. A. Joseph Rajkumar, Principal Scientist, ICAR-CPCRI, RS, Kayamkulam	Vayalum Veedum-Pest management and crop-habitat diversification in coconut	03.03.2020
4	Dr. T. Sivakumar, SMS (Ag. Entomology)	Pest management in Mango	10.03.2020

ICAR-Krishi Vigyan Kendra, Kasaragod

Frontline Demonstrations

A total of ten frontline demonstrations were conducted during January to March 2020. The significant achievements include the introduction of HYV Manu Ratna which yielded 4.9 tonnes per hectare with a BC ratio of 1.8. This was found to be highly suitable to Kasaragod conditions in view of the severe moisture stress during the second and third cropping seasons as it is a suitable short duration variety with 85 days to maturity. The other demonstrations include high yielding variety of paddy, Pournami M O-23, hybrid cashew H 130 developed by DCR, Puttur, high yielding variety of fodder grass, Sampoorna, high yielding grain cowpea variety DC 15 and mechanization of rice cultivation. The CPCRI technologies on value addition like Coconut vinegar production technology, VCO based wheat muffins with and Vegan peda and paneer were also demonstrated.

Frontline demonstration of paddy

Sampoorna fodder grass cultivation

On Farm Trials

On farm trial on assessment of yard long bean varieties was carried out with the varieties Manjary, Jyothika and Geethika. It was observed that the variety Geethika performed very well with a yield of 18.2 tonnes per hectare and with a BC ratio of 2.3 and was found to have good consumer preference.

Validation of farmer led innovations in plantation sector was carried out with two farmer innovations *viz.*, Pepper thresher developed by Shri G.K. Sharma and Chemberi model of coconut climbing device were carried out. Shri G.K. Sharma was honoured during Pusa Krishi Mela at IARI during January 2020 with best Farm Innovator Award.

Trainings

Training programmes were organized for farmers, farm women, rural youth and members of self-help groups on coconut vinegar production technology, VCO based muffins and bakery products, value addition of seasonal fruits, grafting in vegetables, cassava processing, etc. The major programmes include 'Entrepreneurship Development Programme on Processing of Seasonal fruits' wherein underutilized fruit such as kokum with high nutraceutical properties, pineapple, grapes, lemon and orange were processed to create income generation through group activity. Members of 'Evergreen food security group' of Puthige panchayath processed approximately around 82 litres of kokum syrup, 32 litres of orange squash, 32 litres of grape syrup, 3 litres of lemon squash, 16 litres of pineapple squash, 25 litres of Kokum squash and 2.5 kgs of dehydrated kokum and earned a net profit of around Rs. 25,000/- through sales promoted through KVK.

Skill development training on fruit processing was imparted to Mellisa Honey Group and bulk processing of mango squash, jackfruit squash and amla squash was taken up. Around 50 litres of amla squash, 10 litres of jackfruit squash, 10 litres of mango squash were processed and sold. Bulk processing and sale of amla squash was also taken up by Nisarga Agro Products, Vorkady, a women's group and around 43 litres of amla squash was produced for sale.

Skill development training programmes under ASCI

A skill development training was carried out under the Agricultural Skill Council of India programme on the brand-Mushroom Grower. A total of 20 participants attended the programme.

Extension Activities

Technology Week and Kisan Mela

The technology week was celebrated from 27th February 2020 to 3rd May 2020 along with Kisan Mela at ICAR-CPCRI, Kasaragod. As a part of the programme, seminars on various topics viz., hydroponics, IPDM in coconut, commercial fish farming, value added honey products, commercial goat rearing, energy management, urban horticulture, etc. were organized. Around 600 farmers participated in these training programmes and 2,000 farmers visited the exhibition. KVK put up two pavilions, one on technologies and value added products and the other on machinery which also received good attention.

NFSM programme on green gram

Cultivation of pulses was popularised in Kasaragod district under National Food Security Mission (NFSM) programme by promoting Green gram (BGS-9) and grain cow pea (Panthalayani-1) in 30 ha of area belonging to 74 farmers in Majibail, Meenja, Mugu, Nirchal and Badiadka. As a part of the programme, demonstration of zero till drill was carried out for pulses in Kerala for the first time.

Paramparagat Krishi Vikas Yojana (PKVY)

Paramparagat Krishi Vikas Yojana (PKVY) was initiated in Bambrana and Sheni village with the participation of 56 farmers. Various organic farming technologies for coconut, arecanut, vegetables. Paddy and intercropping and organic measures for augmenting soil fertility was demonstrated to the farmers.

Farm women with VCO based muffins and bakery products

Meeting of KVK officials with PKVY farmers at Bambrana, Kasaragod, Kerala

ICAR-Krishi Vigyan Kendra, Alappuzha

Externally funded projects

The ICAR Project on 'National Innovations on Climate Resilient Agriculture (NICRA) is implemented in Muttar and Thalavady panchayath of Kuttanad region in Alappuzha district. The following technology demonstrations were carried out during the year in Thalavady: Composting of aquatic weeds using EM solution; resource conserving and eco-friendly technologies for climate resilience in paddy; improving nutritional security and income through mushroom cultivation; climate resilient package of practices for coconut; elevated goat sheds, housing of poultry in slatted floor to overcome the flood conditions; and fish silage preparation for backyard poultry farmers, Integrated farming system. In addition, conducted 'mastitis control programme' for dairy sector and initiated a planting materials production unit as entrepreneurship development programme in the village as a part of the project.

Important Events

Sowing Inauguration of CFLD on Sesame at Chettikulangara

Sowing inauguration of cluster FLD on oil seeds - Sesamum was conducted at Chettikulangara on 27 January 2020. Adv. U. Prathibha, MLA inaugurated the programme in a meeting presided by Smt. C. Krishnamma, President Chettikulnagara Grama Panchayath and attended by 150 farmers.

18th Scientific Advisory Committee meeting

18th Scientific Advisory Committee (SAC) Meeting of the KVK was conducted on 18 February 2020. The meeting was presided over by Dr. Anitha Karun, Director (Actg.), ICAR-CPCRI, Kasaragod. Dr. M.J. Chandre Gowda, Director (Actg.), ATARI, Bengaluru highlighted the relevance of implementing technologies suitable to overcome the climate change and increasing farmers' income. Twenty five members of the SAC including officials of the line departments, neighboring KVKs, farmers' representatives, and media officials and all staff members of the KVK participated in the meeting.

Seminar on Scientific cultivation and value addition of coconut

ICAR-KVK, Alappuzha and Coconut Development Board, Kochi jointly organized a District level seminar on 'Scientific cultivation and value addition of coconut' on 19th February 2020 at ICAR-CPCRI Regional Station, Kayamkulam for selected 150 progressive coconut farmers of the Alappuzha district. In the inaugural address, Dr. Anitha Karun, Director (Acting), highlighted the need of proper management of coconut palms for achieving higher yield and returns.

Release of publication during the SAC meeting

Inauguration of seminar on coconut value addition

Fertilizer Application Awareness Programme

A district level Fertilizer Application Awareness Programme funded by the Dept. of Agriculture and Farmers' Welfare, Govt. of India was organized on 20 February 2020 at ICAR-CPCRI campus, Krishnapuram. The 105 participant farmers were also facilitated to visit technology demonstration units established in ICAR-CPCRI and KVK farms.

Awareness programme on fertilizer application

Adv. U. Prathibha, MLA inaugurating sesame sowing

Animal Disease Control Programme Campaign

A campaign on Animal Disease Control Programme of the Govt. of India was conducted at Vallikunnam APCOS on 10. March 2020. Bharanikkavu Block Panchayath President Smt. Rajani Jayadev inaugurated the campaign.

Field day of the FLD on 'Integrated disease management in cowpea'

Field day of the FLD on "Integrated disease management in cowpea" was conducted at Parankulangara in Thazhakkara on 10 March 2020. Shri. S. Anirudhan, Vice President, Thazhakkara Grama Panchayath presided over the function.

Monthly technology advisory

Three SMS messages on technology tips and related information to 1565 registered farmers, officers of line departments and entrepreneurs were sent through m-Kisan portal during the period.

On farm testing

Technologies such as eco-friendly management of rice bug; short duration turmeric variety Pragathi in Onattukara region; bio agents in rhizome rot management of turmeric; and microbial inoculums for composting of organic residues were conducted through OFTs in Thazhakkara and Chettikulangara panchayaths during the year.

Training programmes

During the period KVK organized 24 training programmes benefitting a total number of 509 farmers/rural youths.

Skill training programme

Thirty days skill training programme on 'Small Poultry Farmer' sponsored by Agricultural Skill Council of India (ASCI) and attended by 20 selected rural youth was conducted from January 20 to March 18 at KVK - Alappuzha.

Mera Gaon Mera Gaurav

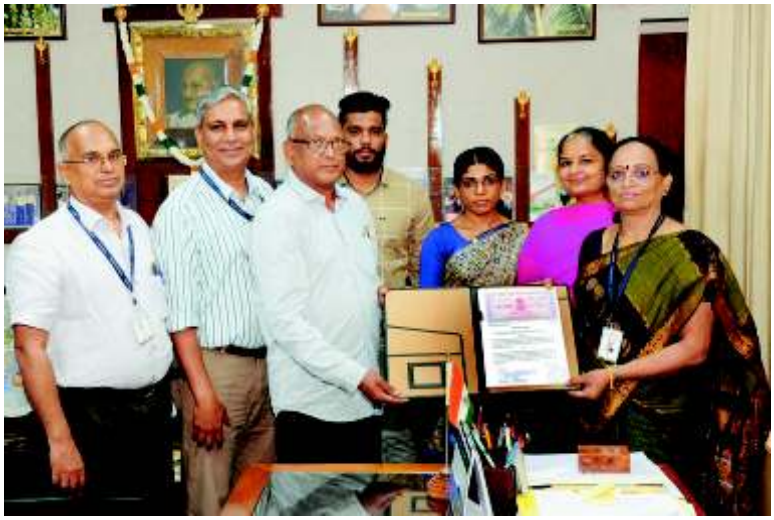
Coconut seedlings produced under decentralized *Kera Nanma* programme in three Panchayats have been a great success with more than 2500 seedlings available for distribution among farmers. As the seedlings produced have a personal touch with the selection endorsed by scientists, it had a certificate and more value in the distribution process. Farmers are enthused to obtain the seedlings produced by them for their region benefitting them all. Efforts have been made on need based nutrient delivery, pest management solutions, and secondary agriculture as well. Yield enhancement and self-sufficiency towards self-reliance is envisioned in this process.

ICAR-CPCRI, Research Centre, Mohitnagar was actively participated in MGMG programme. Received queries through SMS and messages and replies were made.

Farmers from Nahira and Bongara villages participated in the training programme on scientific cultivation and management of arecanut, coconut and cocoa conducted at ICAR-CPCRI RC, Kahikuchi.

COMMERCIALIZATION OF TECHNOLOGY

During the period from January to March, 2020, two technologies were commercialised by the Institute to entrepreneurs through MoA as per the details given below, an amount of Rs.35,000 has been collected as technology transfer fees



Exchange of MoA on Kalpa Soil Care technology between ICAR-CPCRI and Shri Anantha Rao, Telangana

Sl. No.	Name of Technology Commercialized	Date of Signing MOU	Value (In INR)	Licensee
1	Tender Coconut Trimming Machine	05-01-2020	10000	M/s Stonehat Technologies, No.62C-1, Siruvani Main Road (East), Coimbatore 41, Tamil Nadu
2	Incubation facility for marketing of products	05-01-2020	-	District Mission Co-ordinator, Kudumbashree, Civil Station, Vidyanagar Post, Kasaragod 671123
3	Incubation facility of VCO	05-01-2020	-	M/s Panchamala Agro & Horticulture Farmers Producer Company Ltd., Anandashram, Kasaragod - 671531
4	Kalpa Soil Care	10-03-2020	25000	Mr. Anantha Rao M., Banana Biotech Pvt. Ltd., Karimnagar District, Telangana

SUCCESS STORY

Harvest of pest free vegetables intercropped under coconut with EPN biocontrol technology

Biological control of insect pests is always an enduring topic among the farmers because of its versatile benefits in the natural environment. Prime Minister's vision for famers to take up organic farming under 'Paramparathgath Krishi Yojana' in which crop protection techniques relies purely on biological control. In this aspects, ICAR-CPCRI has shown its commitment through promoting entomopathogenic nematode (EPN) technology. This technology has been transferred to a few local entrepreneurs producing bio-control agents in Kerala and Karnataka through on-farm mass production of nematodes and its use at local levels. EPNs parasitize the larvae of insect pests within 2-3 days of application of infective juveniles (IJs) of *Steinernema* and *Heterorhabiditis* species. The effectiveness of EPNs was already demonstrated successfully through various farmers' participatory programmes against arecanut root grub (*Leucopholis* sp.) in Karnataka and Kerala. However, these EPNs can also be used for raising pest free vegetables without pesticides as followed in other countries.

Recently in one of the Krishi Melas held at Meeyapadavu, Kasaragod, Kerala during 7-8 March 2020, the farmers were highlighted the results on use of EPN technology for the biological management of lepidopteran caterpillars (leaf eating caterpillar, *Spodoptera litura* & diamond back moth, *Plutella xylostella*) especially in cabbage and cauliflower by fortnightly spraying of 150 ml of aqueous suspension of EPN, *Steinernema carpocapsae* (CPCRI-SC1)

Spodoptera larvae feeding on leaves

View of cauliflower cultivation and EPN spraying

Harvested pest free cauliflower from the farm

(contains 10 lakh IJs) mixed in 10 liters of water gave 100% control.

Dr. Varanashi Krishna Moorthy and Dr. Ashwini K. Moorthy of Varanashi Organic Farmers Society in Adyanadka village of Karnataka are running on farm EPN production units adopting the EPN technology from ICAR-CPCRI since 2017, testified the use of EPNs for effective management of caterpillar damage in cauliflowers, cabbages and okra, etc., through prophylactic and curative control. Besides they could reap huge seasonal harvests which were completely pesticide free.

WOMEN'S WELFARE COMMITTEE ACTIVITIES

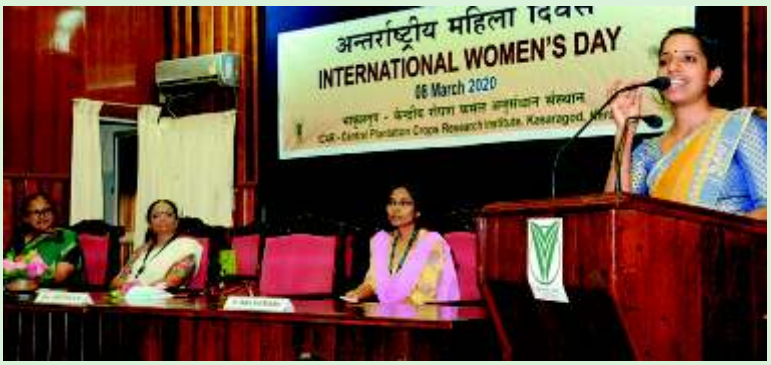
International Women's Day

The International Women's Day was organized on 9 March 2020 at ICAR-CPCRI, Kasaragod. Adv. (Mrs.) S.N. Saritha, Legal Counselor of Women Protection Officer of Kasaragod was the chief guest. She enlightened the audience about the legal provisions available to handle issues. Dr. Anitha Karun, Director (Acting) presided over the function and emphasized on the importance of gender equality and the influencing roles women can play in nation building and importance of women's education in realizing the same. All staff members of the institute participated in the programme.

At ICAR-CPCRI, Regional Station, Kayamkulam Dr. S. Kalavathi, Acting Head presided over and chief guest was Smt. T.N. Vijayalekshmi, the woman who climbed Mount Kanjunjunga in 1984. District level seminar on cocoa was organized at ICAR- CPCRI Regional Station, Vittal on 7 March 2020 as a part of International Womens' Day. A total of 35 women participants comprised of farmers and ladies club members benefitted from the program.

ICAR- KVK, Kasaragod celebrated the International Women's Day 2020 with a participation of more than 70 women farmers. Ethnic foods and their health benefits were displayed enriched from ITK. Two eminent women entrepreneurs Smt. Khadeeja who bagged the Karshaka Tilak award of Kerala State Government recently and Smt. Lakshmi Bhat, an expert in ITK were honoured during the occassion.

KVK, Alappuzha organized International Women's Day celebrations on 7 March 2020 at ICAR-CPCRI campus, Krishnapuram. Five woman farmers - Smt. R. Jagadhamma (Crop production), Smt. Viji Gopan (Value addition), Smt. P. Sathi (Mushroom Cultivation), Smt. Anitha Kumari (CBIFS) and Smt. Sheeba Sadique (Animal Husbandry) were honoured An awareness programme on 'Rights of women' by Smt. T. Geetha (President, Centre for Social Studies, Alappuzha) was conducted. Technological input kits for nutrition garden were distributed to 60 women farmers attended the programme.



Adv. S.N. Saritha addressing the gathering at ICAR-CPCRI, Kasaragod

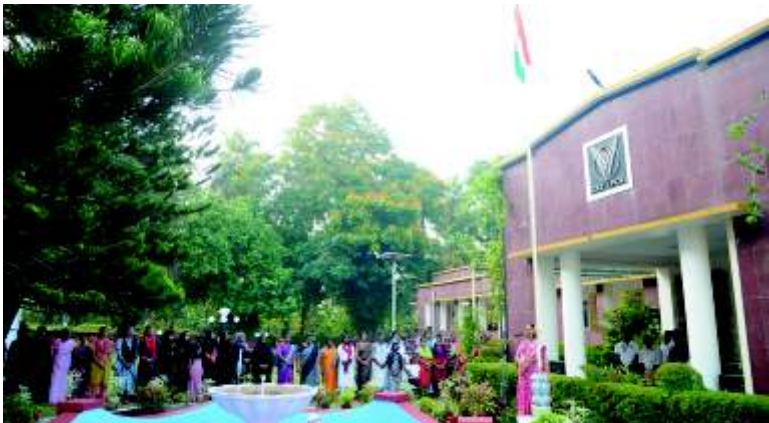
Participation in National Conferences/Seminars/ Symposia/Workshops/Webinars

Name and designation	Programme	Place & Date
Dr. Shameena Beegum, P.P. Scientist	International workshop on value addition in Agriculture	Kerala Agricultural University, Vellanikkara, Thrissur 4-7 January 2020
Dr. M.R. Manikantan, Principal Scientist	54th Annual Convention of ISAE and International Symposium on Artificial intelligence based future technologies in agriculture	Hotel Hyatt Regency, Vimannagar, Pune 7-9 January 2020
Dr. M.R. Manikantan, Principal Scientist and Dr. R. Pandiselvam, Scientist	35th Annual Workshop of AICRP on PHET	Jawaharlal Nehru Krishi Vishwavidyalaya, Jabalpur 23 25 January 2020
Dr. Anitha Karun, Director (Actg.), Dr. K. Muralidharan, Dr. K.B. Hebbar, Dr. Vinayaka Hegde, Acting Heads, Dr. H.P. Maheswarappa, Project Coordinator, Dr. A.C. Mathew, Dr. P. Subramanian, Dr. C. Thamban, Dr. M.K. Rajesh, Dr. K.P. Chandran, Dr. M. R. Manikantan, Principal Scientists, Dr. S. Jayasekhar, Senior Scientist, Dr. M. Sujithra, Dr. Rajkumar, Dr. Nagaraja, N. R., Dr. Sudha R., Dr. Neema M., Dr. Daliyamol, scientists, Dr. K.S. Muralikrishna, Tech. Asst.	29th Swadeshi Science Congress- National Conference on Science and Technology for Sustainable Development	ICAR-CPCRI, Kasaragod 27-29 February 2020
Dr. M.R. Manikantan, Principal Scientist	National Conference on "Sustainable Natural Resources Management: An Engineering Perspective"	College of Forestry, Ponnampet, Kodagu, Karnataka 28-29 January 2020
Dr. A. Joseph Rajkumar, Principal Scientist and Dr. M. Sujithra, Scientist	RSW workshop and Farmer's Conclave	TNAU, Coimbatore 3 February 2020
Dr. S. Kalavathi, Acting Head	SAC Meeting of KVK	KVK, Kumarakom 12 February 2020
Dr. A. Joseph Rajkumar, Principal Scientist	Coconut Workshop for students and farmers	VIT, Vellore 19 February 2020
Dr. P. Muralidharan, Principal Scientist & Head	XI National KVK Conference - 2020	NASC Complex, New Delhi 28 February to 1 March 2020
Dr. A. Joseph Rajkumar, Principal Scientist and Dr. M. Sujithra, Scientist	International Seminar on Transboundary Pest Management	TNAU, Coimbatore 4-5 March 2020

CELEBRATIONS

Republic Day

71st Republic day was celebrated on 26 January, 2020 by officials and staffs of ICAR-CPCPRI at Kasaragod, Regional Station, Kayamkulam, Regional Station, Vittal, RC, Kahikuchi, Kidu and Mohitnagar.



Dr. Anitha Karun, Director (Actg.) addressing the gathering on the occasion of Republic Day

National Science Day

National Science Day 2020 celebrated at ICAR-CPCRI, Regional Station, Kayamkulam on 26 February 2020. As part of the National Science Day-2020 celebrations, a one-day workshop on 'Inculcating Spirit of Science and Plant Health Management' was organized at ICAR-CPCRI, Regional Station, Kayamkulam on 26 February 2020. The workshop fully supported by KSCSTE, Thiruvananthapuram was hosted with the patronage of Department of Science and Technology, New Delhi. Around 100 college students from nine colleges participated in the workshop commemorated with the theme for the year as "Women in Science". Dr. C.N. Ravisankhar, Director, ICAR-CIFT, Kochi inaugurated the programme under the chairmanship of Dr. S. Kalavathi, Acting Head. On this occasion two e-publications viz., E-compendium on 'Coconut Root (Wilt) Disease Research (1908-2019)' and the E-compilation of the proceedings of the workshop entitled 'Science Connect with New Age Students' comprising lecture notes of scientists were also released. Technical sessions on Women in Science, Knocking pest suppression through endophytes, Spirit of Science and plant health, Fundamentals in biochemical sciences and Laboratory instrumentation techniques were handled by scientists of the Regional Station imparting science with basic and applied techniques. An agricultural quiz and an elocution competition with the theme "Women in Science" were conducted for the benefit of students to imbibe more knowledge in these fields. The students were also taken around the experimental plots to understand farm science through system approach and crop-habitat diversification concept.

OTHER INFORMATION

Agro Processing Training cum Incubation Centre (APTIC)

The Agro-Processing Training cum Incubation Centre (APTIC) sanctioned by the Department of Agriculture Development and Farmers Welfare, Govt. of Kerala to KVK, Alappuzha with a budget of Rs. 73 lakhs has been established. The centre envisages strengthening the capacity of entrepreneurs in processing and value addition of coconut, jackfruit, and seasonal fruits and vegetables. The incubation centre will facilitate the development of technology based and knowledge driven agri business ventures during the start-up period by providing an integrated package of technology, work space, access to specialized equipments and pilot plant.

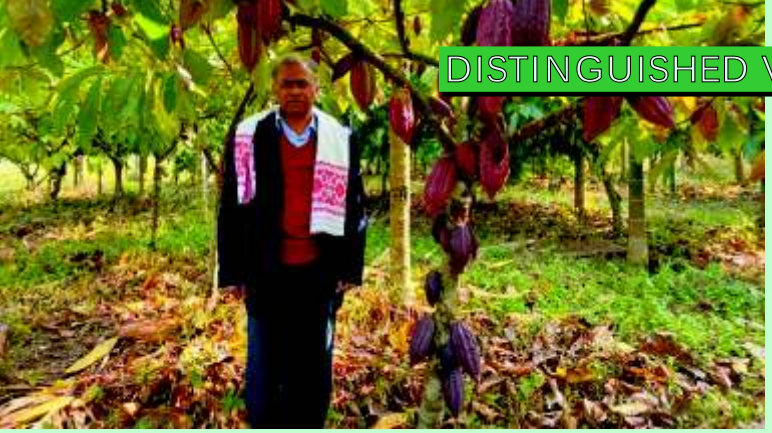
ICAR CPCRI Lined-Up in the COVID-19 Warfront

In compliance of the words of concern of Dr. Trilochan Mohapatra, Secretary, DARE and DG, ICAR, the Institute has extended full support to the district administration for combating the spread of corona virus spread in Kasaragod. Dr. Anitha Karun, Director (Acting) interacted with Dr. D. Sajith Babu IAS, District Collector and provided two real-time PCR machines for the use of testing suspected samples. With this, the testing facilities created in the Central University of Kerala could be enhanced to 87 samples per day.

The Institute also prepared the use of virgin coconut oil with alcohol to make hand sanitizer. Initially, 500 liters of sanitizer could be made and supplied for general use. Besides, the Chandragiri Guest House of the Institute is being used for the stay of state level monitoring officials and the other guest houses are being kept available for use as isolation rooms if the district administration finds its requirement.

ICAR-CPCRI, Regional Station, Kayamkulam also has joined hands with district and local administration to fight against COVID-19 and also supported farmers for self-sustenance by raising food and nutritional crops. Prepared and supplied 28 litres of hand sanitizer. The Institute has also offered advisory service. The farmers could harvest vegetables locally during lock down period and could also provide it to community kitchens and neighbours.

DISTINGUISHED VISITORS



Dr. A.K. Singh, ICAR-DDG (Hort.) visiting the cocoa plantation at ICAR-CPCRI, RC, Kahikuchi

Professor Thomas Issac, Finance Minister, Government of Kerala, interacting with the scientists at Agro Processing Lab at ICAR-CPCRI, Kasaragod

Dignitaries visited	Centre	Date
Dr. BNS Murthy, Horticultural Commissioner, Govt. of India, New Delhi	Kasaragod	5 Jan 2020
Dr. A. K. Singh, DDG (Hort. Science), ICAR;	Kahikuchi	11 Jan 2020
Dr. K. V. Prabhu, Chairperson, PPVFRA, Govt. of India, New Delhi Prof. TM Thomas Issac, Hon'ble Finance Minister, Kerala	Kasaragod	30 Jan 2020
Sri V. Muralidharan, Hon'ble Minister of State for External Affairs and Parliamentary Affairs, Govt. of India, Dr. G. Gopa Kumar, Vice-Chancellor, Central University of Kerala, Periya, Kasaragod, Kerala, Prof. (Dr). A. Ramachandran, Vice-Chancellor, Kerala University of Fisheries and Ocean Studies, Kochi, Kerala, Prof. G.M. Nair, Chairman, Kerala Biotechnology Commission, Thiruvananthapuram,	Kasaragod	27 Feb 2020
Sri N.A. Nelikunnu MLA Kasaragod, Dr. Saji Gopinath, CEO, Kerala Startup Mission, Sri Nagaraja Prakasam, Angel Investor & Startup Mentor	Kasaragod	1 Mar 2020

PERSONALIA

PROMOTIONS

Name of the staff	From (Designation)	To (Designation)	w.e.f.
Shri Ansary K.M.	Sr. Tech. Asst.	Tech. Officer	11.01.2018
Smt. Bijila P. V.	Sr. Tech. Asst.	Tech. Officer	04.02.2018
Shri V. Suresh Kumar	Sr. Tech. Asst.	Tech. Officer	21.10.2018
Shri Y. Shrinivasa Bhat	Sr. Tech. Asst.	Tech. Officer	27.10.2018
Shri K. Krishnan Nair	Sr. Tech. Asst.	Tech. Officer	05.08.2019
Shri M. Narayana Naika	Sr. Tech. Asst.	Tech. Officer	08.08.2019
Shri Sunny Thomas	Sr. Tech. Asst.	Tech. Officer	28.09.2019
Dr. Mualikrishna K.S.	Technical Assistant	Sr. Tech Asst.	10.03.2019
Shri Santhosh Kumar P.	Technical Assistant	Sr. Tech. Asst.	11.03.2019
Smt. Jesmi Vijayan	Technical Assistant	Sr. Tech. Asst.	27.03.2019
Shri Jinu Sivadasan	Technical Assistant	Sr. Tech. Asst.	10.03.2018
Shri K. Panduranga	Senior Technician	Technical Assistant	07.12.2017
Shri B. Choma	SSS	LDC	12.03.2020
Shri Chandu Naika	SSS	LDC	12.03.2020
Shri C.R. Babu	SSS	LDC	12.03.2020
Shri M. Durgesha	SSS	LDC	12.03.2020

RETIREMENTS

Name	Designation	Place	Date
Shri P. K. Sunil Kumar	Sr. Tech. Asst.	Kayamkulam	31.01.2020
Shri Anurag Meena	(Stenographer Grade-III)	Kasaragod	Resigned 10.02.2020
Shri Y. Shrinivasa Bhat	Tech. Officer	Vittal	29.02.2020
Shri K. V. Krishnan	SSS	Kasaragod	29.02.2020
Shri K. C. Damodaran	SSS	Kayamkulam	31.03.2020

Published by: Dr. Anitha Karun, Director (Actg.)
Compiled and edited by: Dr. Murali Gopal, Dr. K. Muralidharan, Shri H. Muralikrishna and Dr. Anitha Karun
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