KALPA

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ICAR-CENTRAL PLANTATION CROPS RESEARCH INSTITUTE
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From the Director's Desk

New Year Resolution to Innovate and to Make the Country More Capable

The first day of the year 2022 signified with the release of the tenth installment of Pradhan Mantri Kisan Samman Nidhi (PM-KISAN). This empowers grassroots level farmers and is one among the many efforts of the Government to restore India to its glorious identity, as opined by the Hon'ble Prime Minister Shri Narendra Modi while addressing the farmers on the occasion.

The agriculture sector remained a crucial driver of the post-pandemic economic recovery, with its share of Gross Value Added registering a buoyant growth rate of 3.9% in 2021-22. With the record output of 314.51 million tonnes of food grains and 331.05 million tonnes of horticulture products in 2021-22, several milestones were left behind in agriculture production.

Aside from ever-changing scientific cultivation procedures and extension, various variables contribute to these accomplishments such as streamlining the purchases under MSP; promotion of per drop-more crop under Pradhan Mantri Krishi Sinchai Yojana; cash availability for small farmers for timely purchase of seeds and manure through the PM-KISAN scheme; encouragement to form farmer clusters with specific crops and form Farmer Producer Organizations; and the Pradhan Mantri Fasal Bima Yojana to minimise damage caused to farmers during natural calamities.

The Institute is at the forefront of technology development and policy support for the government. It is one of four ICAR Institutes chosen to serve as a Cluster-Based Business Organization (CBBO) to create and promote Farmer Producer Organizations (FPOs) under the National Cooperative Development Corporation's central sector programme (NCDC). As CBBO, the Institute has to form two FPOs in the Thrissur district (Mullasseri and Chavakkad blocks). The Mullasseri Block Farmers Producing and Marketing Co-operative Society Limited, Elavalli, Thrissur was registered on 30 March 2022 under the Kerala Co-operative Societies Act 1969 (Act 21 of 1969). Registration of Chavakkad FPO will be completed soon. Capacity development programmes were already been initiated for farmers of these two FPOs.

The institute strives to move along in synchronization with the larger vision of the government to make a vibrant agrarian economy with par excellent global competitiveness. In this endeavour, concerted efforts are put-in, to empower the aspiring farming community with diversified skills and capabilities.

Dr. Anitha Karun

Inside...

SPECTRUM

Vitrification of arecanut dwarf hybrid VTLAH-2 (*Areca catechu* L.) embryonic calli for long-term conservation

Cryopreservation of embryogenic calli of arecanut from inflorescence explants, were pre-cultured in a solid Y3 medium supplemented with 0.5 M and 0.6 M sucrose for 5 and 7 days. After treating the pre-cultured calli with loading solution (20 minutes), the calli portions were sealed/ beaded with calcium alginate. The calli beads were osmo-protected with PVS3 (50% glycerol + 50% sucrose) for 30 minutes. Critical factors, i.e., optimal concentration of sucrose in pre-culture medium, preculture duration, callus recovery, growth, and somatic embryo formation were investigated. The optimal protocol involved pre-culture of calli for 5 days on medium with 0.6 M sucrose, PVS3 treatment for 30 minutes, rapid cooling and rewarming and unloading in 1.2 M sucrose liquid medium for 30 minutes. Under these conditions, 70% post thaw recovery of calli was observed. The calli were sub-cultured in calli multiplication media, and within two months recovered calli started multiplying and subsequently successful formation of somatic embryos and plantlets were noticed. The standardized technique is useful for conservation of valuable arecanut germplasm in the form of embryonic calli.

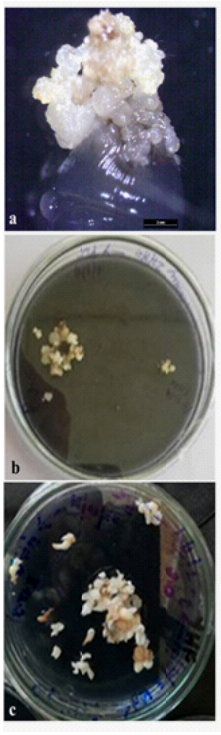

Fig.1a, b &c. Post thaw recovery of cryopreserved embryonic calli of arecanut hybrid VTLAH-2 and somatic embryo formation from cryopreserved embryonic calli

Aparna, V., Neema, M., Muralikrishna, K.S. and Anitha Karun

Compatibility studies in cocoa with natural fruit set

Around 235 grafted trees and 169 seedling trees of 12 cocoa genotypes were assessed for number of flower cushions in main stem and branches, number of flowers per cushion and the possible compatibility reaction through percentage of natural fruit set with cherelle count, aborted flowers and wilted cherelles. Among the genotypes, number of flower cushions varied from 20 to 230 and flowers per cushion from 8 to 24 and cherelle set from 5 to 10 per cushion. During this season precocious and profuse flowering was observed in red genotypes, both in grafted and seedling plants. Partial cherelle set was observed in 16 trees, which can be improved with hand/ artificial pollination. With complete abortion of flowers and wilting of all cherelles continuously for more than 3 years, 3 trees were observed as both self and cross incompatible and further utilized for molecular studies.

Fig. 2. Cherelle patterns in different cocoa genotypes

Elain Apshara, S.

Study of stomata and trichomes for selection of drought tolerant hybrids

Stomatal traits such as density and size are considered as an important parameter for drought tolerance under water deficit conditions to identify the drought tolerant Dwarf x Tall hybrids. Hence, stomatal assessment and characterization were carried out for the eight coconut hybrids along with WCT. Stomata were absent on the adaxial epidermis of the coconut (*Hypostomatous*) and stomata generally found sunken below the abaxial epidermis. Based on light microscope studies, the stomata of different coconut hybrids did not vary widely in appearance. Paracytic stomatal complex (presence of two guard cells and four subsidiary cells, two of which are roundish and the other two are lateral to the guard cells) occurred in all coconut hybrids. Significant variations was observed with a negative correlation

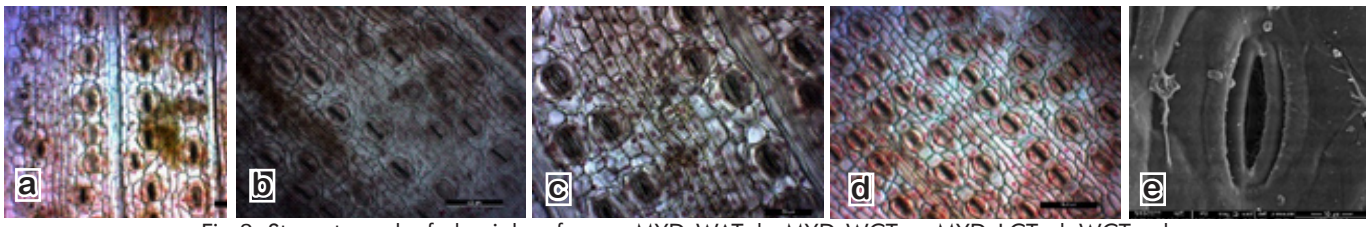

Fig 3. Stomata on leaf abaxial surface a. MYDxWAT; b. MYDxWCT; c. MYDxLCT; d. WCTand e. SEM of stomata at abaxial leaf surface of coconut (5000x)

between stomatal density and size. Stomatal density was higher in WCT (11/mm^2) while it was lower in MYDxWCT (7.8/ mm^2). The mean stomatal length was higher in CODxWCT (167.9 µm) and it was lower in MYDxWAT (137.1 µm). Mean stomatal width was higher in CODxWAT (127.6 µm) and CODxWCT (127.5 µm) while it was lower in MYDxWCT (101.2 µm). Stomatal aperture length is higher in CODxLCT (132.6 µm) and lower stomatal aperture length was observed in MYDxWCT (113.2 µm). Mean stomatal aperture width was higher in CODxADOT (43.5 µm) and it was lower in MYDxLCT (27.0 µm) and MYDxWAT (28.9 µm). The stomatal index was higher in CODxWCT (13.1) while it was lower in MYDxADOT (8.9).

Trichomes are distributed only on the abaxial surface of coconut leaves with a range of 15.5 to 36.5/ mm^2. Highest trichome density was observed with MYDxLCT followed by MYDxWAT (28/mm^2).

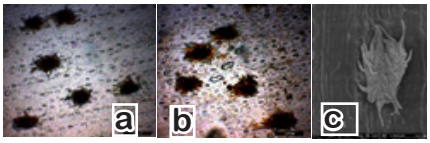

Fig 4. Trichomes on leaf abaxial surface a. MYDxLCT; b. MYDxWAT; c. Trichomes in abaxial side of leaf (8x); d. SEM of coconut Trichomes at abaxial leaf surface (1000x)

R. Sudha, V. Niral, Aparna Veluru, Neema and K. Samsudeen

Potassium dynamics in soil amended with cocoa pod husk biochar

To study the potassium dynamics in biochar amended soils, an incubation study was conducted in which soils from cultivated fields were amended with cocoa pod husk (CPH) biochar, prepared in CIAE developed kiln, @ 0, 5, 10, 20 and 40 g kg^{-1}. The soil alone and soil–biochar mixtures were incubated at 60% field capacity at room temperature for a period of 30 days. After incubation, all the soil and soil–biochar mixtures were air-dried and analyzed for various fractions of potassium. It was found that as the rate of application of biochar increased, all the fractions of potassium also increased along with the total potassium; but by calculating the per cent improvement in each fraction to the total K, it was very clear that the per cent of water extractable, exchangeable and non-exchangeable fractions showed an increasing trend and the lattice (fixed) potassium showed a reverse trend. Since the available potassium is directly related to the water extractable, exchangeable and non-exchangeable fractions of soil K, the addition of cocoa pod husk biochar can increase these fractions in soil and hence the K availability.

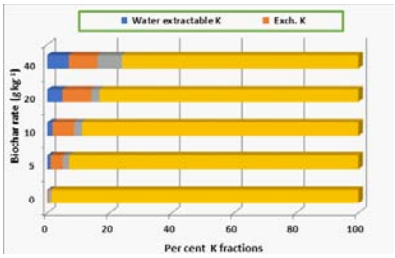

Fig 5. Water extractable potassium concentration in biochar mixed soils

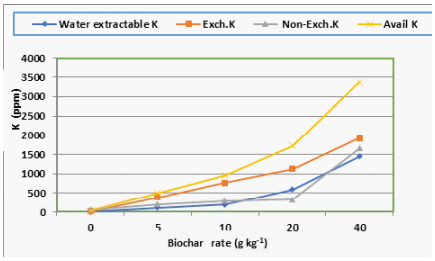

Fig 6. Potassium availability at different quantity of biochars

Neenu, S., Murali Gopal, Alka Gupta and Elain Apshara, S.

Screening of arecanut germplasm against fruit rot pathogen, *Phytophthora meadii* and *P. palmivora*

A semi-tall arecanut germplasm (free of fruit rot incidence under field condition) collected from Irde village, Puttur taluk, Karnataka was evaluated for their resistance against a highly virulent pathogen, *Phytophthora meadii* (Pm1) during 2021 under *in-vitro* condition. Nuts collected from the tall arecanut palms were used as positive control. The results showed that both the nuts collected from tall and semi-tall arecanut germplasm were susceptible to *P. meadii* stain Pm1.

Further, two *Areca traindra* germplasms (VTL2 &VTL7) and one New Guinea germplasm were screened against a highly virulent *P. palmivora* isolate CPCRIVTL-TriaS isolated originally from fruit rot infected *Areca traindra*. The experiment was carried out in a CRD design under *in-vitro* condition. The

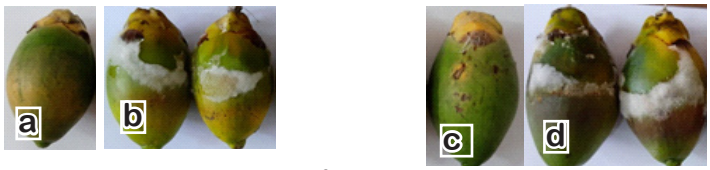

Fig.7. Control inoculation on the nuts of a) Semi-tall & c) Tall arecanut germplasm collections; *Phytophthora meadii Pm1* inoculated on the nuts of b) Semi-tall & d) Tall arecanut germplasm collections

Fig. 8. *Phytophthora palmivora* CPCRIVTL-TriaS inoculated on the nuts of a) VTL 2 (*A. traindra*) b) VTL7 (*A. traindra*) c) New Guinea germplasm collections

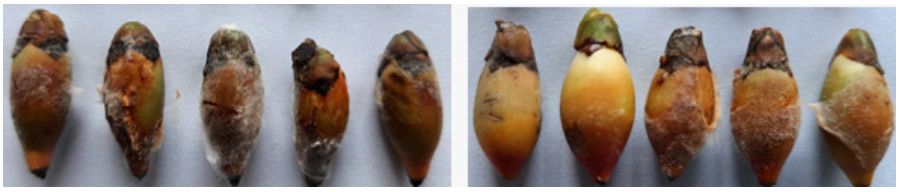

Fig. 9. *Phytophthora palmivora* CPCRIVTL-TriaS inoculated on the nuts of a) *Areca traindra* b) *Areca concinna* germplasm collections

results revealed that both VTL2 and VTL7 were highly susceptible to *P. palmivora* isolate CPCRIVTL-TriaS. Whereas, New Guinea collection did not produce any symptoms for fruit rot disease.

Areca concinna, a wild relative of cultivated arecanut germplasm collection maintained at ICAR-CPCRI RS, Vittal was subjected to laboratory screening with *P. palmivora* isolate CPCRIVTL-TriaS and found highly susceptible as similar to *A. traindra*. Results of this *in-vitro* study will certainly help in formulating breeding programmes for fruit rot resistance in arecanut.

Thava Prakasa Pandian, R., Nagaraja, N. R., and Shivaji Hausrao Thube

Hotspot risk prone area assessment of fruit rot disease in *Areca catechu L.* using suitable geostatistical approaches in Karnataka, India

Arecanut (*Areca catechu L.*) production in India is threatened by fruit rot disease (FRD) caused by *Phytophthora meadii* (McRae), which is of greater concern in southern parts of the country. In India, crop loss due to FRD represents about 10–90% of losses, with several reports estimating economic losses of up to 75% or complete yield loss. The status of FRD in arecanut has been changing rapidly, and the frequent and severe occurrence of this disease in arecanut growing regions is a serious matter of concern for arecanut growers. Up-to-date spatial information is the prime factor required to develop and maintain monitoring approaches for FRD and is necessary for quantification of the risks associated with the disease; such information may assist in FRD management aspect. This study investigated the spatial patterns and hotspot detection for risk prone area of FRD in Malnad and coastal tracts of Karnataka, India using suitable geostatistical approaches. A field survey undertaken in the major arecanut growing areas of Karnataka (covering Malnad, coastal, and Maidan tracts), India, during the *Kharif* seasons (June to September) in the years 2018 and 2019 using stratified sampling strategy. About six districts were covered during the exploratory survey, consisting of predominant arecanut growing areas across 18 administrative taluks of Karnataka, India. Geospatial approaches such as inverse distance weighting (IDW) and ordinary kriging (OK) are used to interpolate and predict the pattern in terms of the percent FRD severity cases distribution across the districts. Moran's I Index (Moran's I) statistics was used to evaluate autocorrelation in FRD spatial distribution and test how taluks were clustered or dispersed in space. Indicator kriging (IK) was used to identify the hotspot and cold spot areas within the study area. IDW and OK generated identical maps, whereby the FRD severity rates were higher in areas adjacent to the Western Ghats and the seashore. Additionally, IK was used to identify both disease-prone and disease-free areas in Karnataka. After fitting the semivariograms with different models, the exponential model showed the best fit with the semivariogram. Using this model information, OK and IK maps were generated. The identified FRD risk areas in our study, which showed higher disease probability rates (>20%) exceeding the threshold level, need to be monitored with the utmost care to contain and reduce the further spread of the disease in Karnataka. The spatially explicit risk estimation and probability distribution maps generated in the current study will help in the development of management strategies for the disease in Karnataka. Additionally, this information could be useful for farmers and extension officers in setting up control measures and preventing further invasion of FRD into neighboring districts, regions, and states in the future.

Sandip Shil, Patil Balanagouda and Arun Kumar Sit

Taxonomic characterization of bacterial contaminants of *in vitro* cultures of *Cocos nucifera*

Fifteen bacterial contaminants were isolated from six coconut tissue culture (TC) flasks, observed with severe bacterial contamination (Fig 10). Based on MALDI-TOF MS spectra (NCMR, Pune), the isolates were identified belonging to Bacillaceae and Paenibacillaceae family. Five isolates were tentatively identified as *Bacillus subtilis* as indicated by the score values (>2) and in comparison with the Bruker taxonomy database using Biotyper 3.1 software. Two other isolates with score value more than 2 were identified to be *Priestia megaterium* and *B. cereus*. Seven isolates that recorded score values ranging from 1.7 to 1.99 is grouped under the genera Bacillus. A slow growing isolate with catalase negative activity belonged to the genera *Paenibacillus* (Score value: 1.75 with closest match to *Paenibacillus timonensis* DSM 16943^T). Antibiotic sensitivity assay following Kirby-Bauer disk diffusion test indicated that bacterial isolates were sensitive to either or both ampicillin (10 µg) and tetracycline (30µg) on standard *Mueller Hinton Agar* (*MHA*) (Fig. 11).

Fig. 10. Pure cultures of bacterial contaminants

Fig. 11. Antibiotic Assay

Indhuja, S. and Shareefa, M.

First report of *Meloidogyne enterolobii* Yang & Eisenback from Kerala infesting guava in coconut garden

Association of root knot nematode was observed with wilting and dying of guava intercropped in coconut garden at ICAR-CPCRI, Regional Station, Kayamkulam. The nematode was subjected to morphological and molecular characterization. Molecular characterization of 28S ribosomal RNA gene using D2a and D3b primers showed more than 99% identity with *Meloidogyne enterolobii*. The identity was confirmed morphologically by the characteristic perineal pattern of adult females. This is a new distributional record of M. *enterolobii* from Kerala.

Fig. 12. *M. enterolobii* infested guava

Fig. 13. *M. enterolobii* infested seedling

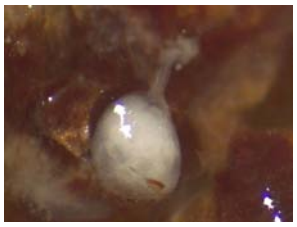

Fig. 14. *M. enterolobii*

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

Change in nutrient status of soil and leaf of coconut palms, influenced by annual rainfall pattern

To study the effect of heavy rainfall on the soil and leaf nutrient status of coconut palms, leaf and soil samples were collected from the different blocks of the Regional Station-Kayamkulam. The results indicated significant changes in the soil and leaf nutrient composition over the years as affected by the erratic rainfall. The total potassium content in the index leaf samples of WCT palms decreased from 1.69% in 2018 to 1.21% in 2021. A similar decreasing trend was observed for Ca, Mg and Zn in the leaf samples. The average content of Ca, Mg and Zn decreased from 0.32%, 0.25% and 20.34 mg/kg in 2018 to 0.17%, 0.11% and 8.14 mg/kg respectively in 2021. In the case of Block-V planted with WCT palms, K, and Mg content decreased from 1.83% and 0.15% in 2018 to 1.19 and 0.09% respectively. In Block-IX planted with different dwarf coconut varieties, the K and Ca decreased from 1.72% and 0.55 % to 0.99% and 0.23% respectively. In Block-III planted with Kalpa Sankara hybrids, a general decline in fertility in terms of P, K, Ca an Mg was observed in the surface depth. However, at 25-50 cm depth, the content showed a gradual increase evidently due to the downward leaching of nutrients, particularly that of potassium. The exchangeable Ca content in the sub surface layers decreased as compared to that in 2018. In sandy soil, the finding necessitates the application of organics to increase the nutrient holding capacity of sandy soils.

Jeena Mathew and A. Abdul Haris

SUCCESS STORIES

Integrated nutrient management of fodder grass under coconut through farmer participatory approach

Technology on 'Integrated nutrient management in fodder grass cultivation under coconut based mixed farming through nutrient recycling' has been refined through farmer participatory approach. Hybrid Bajra Napier Var. CO-3 can be grown as intercrop in coconut garden (60% area) with integrated nutrient management including basal dose of 90:30:24 NPK through chemical fertilizers (CF) and subsequently topdressing with 75% RDN through the recycling of organic inputs such as cow dung slurry (CDS-3750 L ha^{-1}), coconut leaf vermicompost (CLVC-2 t ha^{-1}) after every cutting in two equal splits at fortnightly intervals (6 times a year) along with *Azospirillum*

Fig. 15. Visit to fodder grass plot

(3.5 kg ha^{-1}) in a cost effective manner with a productivity of 126 t ha^{-1} (average of three years). This treatment recorded a significantly higher average herbage yield of 126.9 t ha^{-1} $year^{-1}$ for three years. It also showed higher dry matter yield (22.7 t ha^{-1} $year^{-1}$), NDF, ADF, crude protein, plant nutrient uptake and lower dry matter digestibility, dry matter intake. In general, the available soil nutrients, general and function specific microbial communities were lower in the soils (0-30 cm) top dressed with CF alone. The plants were supplied with 100% RDN (through CF and CDS + CLVC + *Azospirillum*) recorded higher yields during the first year, followed by a declining trend in subsequent years which may be due to the nitrogen induced reduction in soil pH as evident from the soil analysis. The technology developed during 2013-16 was refined through farmer participatory research (2018-2021) as additional liming @400 kg ha^{-1} $year^{-1}$ resulted in 75% higher yield with a productivity of 210 t ha^{-1}.

Management of stem rot disease caused by *Marasmiellus* sp. in arecanut

Severe incidence of stem rot disease caused by *Marasmiellus* sp. was noticed in young arecanut plantation in Dharmasthala village of Dakshina Kannada district. Among 2160 arecanut plants, 940 were affected by the disease. They were also infested by the Ambrosia beetle, *Xyloborus perforans*. After following the CPCRI recommendation *i.e.*, balanced nutrient application based on soil test values, applying neem cake (2 kg $plant^{-1}$), swabbing infected stem with hexaconazole 5EC (2%) and drenching hexaconazole 5EC (0.2%), no further spread of the disease was observed. Ambrosia beetle was managed by removing the gum oozing from the bored holes and swabbing with Chlolorpyriphos 20EC (0.2%).

Women Groups — Leading self-reliant vegetable farming

As part of *Mera Gaon Mera Gaurav* (MGMG) programme, around 25 women farmers of Bharanikkavu Panchayat initiated vegetable cultivation at their backyards. Mrs. Bindu, one of the innovators had initially commenced vegetable farming in a small piece of land surrounding her house and subsequently expanded to nearby garden obtained through lease. This women group had derived pleasure in this vegetable farming which involved their family members and adopting women-friendly approaches as well igniting the concept of family farming in the village. Total commitment was realized with this women group as the region is in greater demand for home grown vegetables which are usually safe and pesticide free and the harvested produce was very impressive.

A mini harvest festival was organized by the women farmer and the visiting scientists from Kayamkulam on 25 February 2022.

Seeing the enthusiasm and commitment of women farmers, ICAR- CPCRI encouraged them to expand their activity by forming smaller groups. Sri S. Ajaykumar, Ward Member, Kattachira expressed his interest to initiate nutrition garden in Captain N P Pillai Memorial School, Kattachira. The women farmers agreed to supply vegetable seedlings for the establishment of nutrition garden in the school premises. The group is hopeful to add more women members to further expand their activities with the technological patronage of ICAR-CPCRI through the flagship MGMG programme. This approach is the first step towards self-reliant vegetable farming for sustainability in the region.

IMPORTANT EVENTS

Foundation Day of ICAR-CPCRI

ICAR-Central Plantation Crops Research Institute (ICAR-CPCRI) celebrated its 106th Foundation Day on 5th January 2022 in a befitting manner. The on-line function was attended by dignitaries including Dr. A.K. Singh, Deputy Director General (DDG)-Horticultural Sciences, Dr. B.K. Pandey, Assistant Director General (ADG)-Horticultural Sciences, former Directors of ICAR-CPCRI, incumbent Directors of other ICAR horticultural institutes, retired CPCRI personnel and other stalwarts who have significantly contributed in the Research and Development of Plantation Crops. Dr. A.K. Singh, Deputy Director General (DDG)-Horticultural Sciences delivered Foundation day address. Dr. P. Rethinam, former ADG (Plantation Crops) & Former Executive Director, Asian and Pacific Coconut Community (APCC), Jakarta, Indonesia and former Chairman, Coconut Development Board, Kochi delivered the Dr. K.V. Ahmad Bavappa Memorial lecture. In the online function, Dr. A. K. Singh released various publications brought out by the institute *viz*., a book on "The Coconut Genome", E-book on Scientific Coconut Farming - Seed to Market (in Malayalam), audio compilations on arecanut cultivation (in Kannada and Malayalam), and a series of four extension folders pertaining to integrated disease management practices in coconut (in Kannada). Dr. A.K.Singh distributed the awards to selected staff of the institute.

The award for the Best Scientific Team Research was conferred to an inter-disciplinary team headed by Dr Rajkumar, Scientist for the team's work on management of root grubs of arecanut. Mr. C. Purandhara and Mr. Ibrahim were awarded in Technical and Skilled Supporting Staff categories, respectively.

Director honouring the scientific team and the best technical staff at ICAR-CPCRI, Kasaragod

Director honouring the best skilled support staff at ICAR-CPCRI, Kasaragod

ICAR-CPCRI Research Centre, Kidu launches its Golden Jubilee Celebrations

ICAR-CPCRI, Research Centre, Kidu, established in 1972, launched the Golden Jubilee celebrations of the Research Centre on 10th January 2022, with a Farmer-Interface programme, presided by Dr. Anitha Karun, Director, ICAR-CPCRI, Kasaragod. The president of Kukke Sree Subrahmanya Temple, Shri Mohan Ram S. Sulli inaugurated the programme by lighting the lamp. Shri Sulli, in his inaugural address, appreciated the contributions of the ICAR-CPCRI Research Centre which is unique in hosting the International Coconut Gene Bank for South Asia & Middle East, and stressed the need to strengthen it further to meet the requirements and expectations of various stakeholders. Dr. Anitha Karun, in her presidential address, presented in brief the developmental journey of the Kidu Centre over the 50 long years and highlighted the service rendered by the Centre to the farming community of the country. Dr. N. Yadukumar, Retd. Principal Scientist, ICAR-DCR, Puttur, who had earlier served at ICAR-CPCRI Research Centre Kidu was the guest of honour and shared his reminiscences about the Centre during his service in the 1980s. During the programme, kitchen garden kit for promoting nutritional security was distributed to 30 beneficiaries under the SCSP programme. This was followed by Scintist-Farmer Interface.

Dr. Anitha Karun addressing the gathering at CPCRI, RC, Kidu

Arecanut workshop as a pert of Golden Jubilee celebrations at CPCRI, RC, Kidu

Technical support for establishing coconut garden in the open prison

Dr. Anitha Karun handing over coconut seedling to Mr. T. Sudheer

The initiative of CPCRI to provide technical support for establishing one hectare coconut garden in the Open Prison and Correctional Home Campus at Cheemeni was inaugurated in the offline function held in the PJ Hall at CPCRI Kasaragod. Dr. Anitha Karun, Director (Acting) handed over coconut seedling to Mr. Sudheer T., Superintendent, Open prison Cheemeni.

Horticulture Fair

Horticulture Fair was conducted at CPCRI, RS, Vittal, Karnataka with DCCD funding on 7 March 2022. Shri Amai Mahalinga Naik, Padmashree awardee inaugurated the program. Mr. Shankar Bhat Badnaje, progressive farmer who developed various value added products from arecanut and Mr. Rajaram of EcoBlizz Areca plate making industry were felicitated. Fourteen exhibition stalls were arranged, where ICAR institutes, Coffee Board, CAMPCO chocolate factory, private nurseries participated and 200 farmers and students benefited.

Glimpses of horticulture fair at ICAR-CPCRI, Regional Station, Vittal

PUBLICATIONS

Research article

Hebbar, K.B., Abhin, P.S., Sanjo Jose, V., Neethu, P., Santhosh, A., Shil, S. and Prasad, P.V., 2022. Predicting the Potential Suitable Climate for Coconut (Cocos nucifera L.) Cultivation in India under Climate Change Scenarios Using the MaxEnt Model. *Plants*, *11*(6), p.731 (NAAS Score: 8.76).

Josephrajkumar, A., Evans, G.A., Chandrika Mohan, Merin Babu, Anes, K.M., Alagar, M and Vinayaka Hegde 2022. Morphological and Molecular Identification of the woolly whitefly, *Aleurothrixusfloccosus* (Maskell). *International Journal of Tropical Insect Science* https://doi.org/10.1007/s42690-022-00777-8 (NAAS Score: 6.54).

Mathew, J., Haris, A.A., Indhuja,S., Nair, K.M., Krishnakumar, V., Bhat, R., Anilkumar, K.S. 2022. Effectiveness of site specific management practices on the amelioration of soil acidity in the entisols and ultisols of humid tropics. *Journal of Soil Science and Plant Nutrition* **22**: 1060-1073 (NAAS Score: 8.16).

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Ready Reckoner

Elain Apshara, S., Sudha, R., Aparna Veluru, Ranjini Bhat, Chaithra, M. and Priya, U.K. 2022. *Ready reckoner on cocoa, coconut and arecanut*. Ready Reckoner No.1, CPCRI, Kasaragod, p. 42.

Videos

Hand pollination in cocoa in English.

Soil sampling methods in arecanut and cocoa gardens in English and Kannada.

Bordeaux mixture preparation in English and Kannada.

HUMAN RESOURCES DEVELOPMENT

Trainings/ Meetings attended

Name & Designation	Title of programme	Organized Place & Date
Dr. Alka Gupta, Principal Scientist (Microbiology) Dr. S Paulraj, Sr. Scientist (Microbiology) Dr. Merin Babu, Sr. Scientist (Plant Pathology) Dr. Induja S., Scientist (Microbiology)	Online training programme on metagenomic data analysis	ICAR-IASRI 19-24 January, 2022
Dr. Chandran K.P., Principle Scientist (Agr. Statistics) Dr. Selvamani V., Sr. Scientist Dr. Sandip Shil, Scientist, RC, Mohitnagar	Online training programme on geospatial analysis using QGIS & R"	ICAR- NAARM, Hyderabad February 14 - 19, 2022
Dr. Neema M. Sr. Scientist	Online training program on data science and machine learning for bioinformatics- using R	Decodelife, Garhi Bohar, District Rohtak, Haryana 19 February, 2022 to 18 March, 2022.
Dr. Chandran K.P., Principle Scientist (Agr. Statistics)	Online training programme on competency enhancement programme for effective implementation of training functions by HRD Nodal Officers of ICAR 21 - 23 February, 2022.	ICAR-NAARM, Hyderabad 21 - 23 February, 2022.
Dr. M.K. Rajesh, Principal Scientist (Ag. Biotechnology)	Virtual training program on *Phytophthora*: Isolation to functional genomics	ICAR- IISR, Kozhikode 2-11 March 2021.
Dr. B.J. Nirmal Kumar, Technical Assistant, ICAR-CPCRI, RS, Vittal	Online training programme on analysis of experimental data"	ICAR- NAARM, Hyderabad 17- 22 January, 2022.
Mr. Paulson Sam George, Assistant Smt. Preethi K., Assistant	Online training programme on "Pension & retirement benefits" for officers and staff of ICAR	ICAR-NRRI, Cuttack 12-14 January, 2022.

Awards/ honours

On International Women's Day, 8-03-2022, Dr. Neelofar Illiaskutty was honoured by Women and Children Development Office, ICDS, Kasaragod at Muncipal Town Hall, Kasaragod for her contribution to the nutrition of women and children.

Dr. Neelofar being honoured at Kasaragod

TRANSFER OF TECHNOLOGY

Workshop and Technology Clinic on Coconut Value added products

A Workshop and Technology Clinic on 'Coconut value added products' was conducted at CPCRI, Kasaragod during 02-03 March 2022 in collaboration with District Industries Centre, Kasaragod. Mrs. Swagat Bhandari Ranveer Chand IAS, District Collector Kasaragod inaugurated the programme.

Smt. Swagat Bhandari IAS addressing the workshop at ICAR-CPCRI, Kasaragod

Workshop on 'Decentralised planning for sustainable development'

Workshop on 'Decentralised planning for sustainable development' was organised by Kasaragod District Panchayat at CPCRI Kasaragod on 4 January 2022. The workshop was inaugurated by Dr. Joy Ilamon, Director General Kerala Institute for Local Administration (KILA), Thrissur. Dr. Thamban C., Principal Scientist presented the paper on 'Sustainable development of agriculture in Kasaragod district-Status and strategies for implementing interventions through LSGs'.

Dr. K.B. Hebbar, Director I/c addressing the participants

Training on 'Gender dimensions for knowledge integration and sustainable food systems through IFS'

Online collaborative training program of ICAR-CPCRI and MANAGE, Hyderabad on 'Gender dimensions for knowledge integration and sustainable food systems through IFS' was organized during 4-6th January, 2022. Forty two participants from 22 states including Bihar, Manipur, Gujarat, Uttar Pradesh, Jammu & Kashmir, Uttarakhand, Assam, Kerala, Tamilnadu, Telangana, Andhra Pradesh, Karnataka, Maharashtra, Madhya Pradesh, Orissa, West Bengal and Malawi, from Agricultural Universities, ICAR institutions, Art & Science Colleges and Krishi Vigyan Kendras. The topics included gender aspects of innovations in IFS and doubling women farmers' income, women friendly technology development, Indigenous Technical Knowledge (ITKs), Urban agriculture, Entrepreneurship aspects, Women Farmer Producer Organizations (FPOs), Impact analysis and Participatory tools and techniques for gender aggregated data analysis. The program was perceived as very useful with relevant topics in relation to gender studies. The research topics were included for orienting gender aggregated data documentation.

Training programmes

Training programme on Micro-irrigation for coconut

A farmers' training programme on 'Micro-irrigation for coconut' was conducted as part of the foundation day celebration on 5th January 2022. Selected farmers from five micro-watersheds in Kasaragod district under the NABARD assisted scheme attended the training programme organised in collaboration with Centre for Rural Development (CRD) Nileshwar.

Participants of micro-irrigation training interacting with the experts

Training programme for pollination workers

A training programme on 'Hybridization technique in coconut' was organised at CPCRI Kasaragod on 5 February 2022 for pollination workers in collaboration with TxD Centre, Chalode, under the Department of Agriculture Development and Farmers' Welfare, Govt. of Kerala.

Training programme on 'Cinnamon intercropping in coconut garden'

A training programme for farmers on 'Intercropping of cinnamon in coconut garden' was organized

at Pathiri in Mullankolli grama panchayat, Wayanad, Kerala on 4th March 2022. The programme was conducted by ICAR-Central Plantation Crops Research Institute (CPCRI) Kasaragod in collaboration with Regional Agricultural Research Station (RARS) Ambalavayal, Wayanad as part of the project on Cinnamon intercropping in coconut gardens funded by Directorate of Arecanut and Spices Development (DASD), Kozhikode.

Collaborative training programme on Coconut Production Technology

A training programme on Coconut Production technology was conducted at CPCRI, Kasaragod on 19 March 2022 for the Director Board members of Malabar Farmer Producer Company, Kozhikode.

A training programme on Coconut Production technology was conducted at CPCRI, Kasaragod on 22 March 2022 for selected farmers from Sulthan Bathery Block in collaboration with ATMA Wayanad

A training programme on Coconut Production technology was conducted at CPCRI, Kasaragod on 24 March 2022 in collaboration with Mithram Farmers' Club, Chakkarakallu.

Training program and farmer felicitation on 'Integration of fodder

Training programme at Wayanad, Kerala

Participants of the training programme with resource persons

cultivation for improving quality and profitable milk production' was organized on 07.01.2022 at Ward 15 of Pathiyoor Panchayat and 48 farmers participated. Mr. Gopalakrishna Pillai, Mr, Rajeev and Mr. Dharaneendran (model IFS farmers) were felicitated in the function. Mr Jayan, Ward Member inaugurated the training program. Dr. Purushotham Sharma, Principal Scientist, IGFRI, Jhansi handled the session followed by field visits and interaction session.

Shareholders meeting: of Odanadu Farmer Producer Company was organized on 01.03.2022 at Pathiyoor. In the meeting decision was taken on coconut procurement and

Participants of the CPT training programme with experts

Participants of the CPT training programme with experts

processing for increasing farmers income and launched the distribution of vegetable seedlings for nutria-gardens in homesteads for improving balanced nutrition intake with garden fresh farm produces.

Training on cocoa production and processing technology was conducted with DCCD funding on 7 March 2022, around 50 farmers participated.

District level seminar on cocoa was conducted on 8 March 2022 with DCCD funding in commemoration of International Womens' Day. Mrs. Jayashree, a progressive woman farmer managing multispecies cropping system, mixed farming system and co-ordinating self help group in Sullia was felicitated and cocoa technologies were demonstrated to 60 participants,

Cocoa production technology training at Vittal

among them 40 were women beneficiaries.

Training program on plant health management in arecanut

DASD, Calicut sponsored Field Day program on plant health management in arecanut was

Glimpses of the district level training programme at Vittal

organised by ICAR-CPCRI, RS, Vittal at Gundyadka Vasu Poojari's arecanut garden in Kowdichar, Dakshina Kannada on 4 February 2022. Information on plant nutrition, integrated disease management and integrated pest management practices in arecanut was delivered by Mr. Bhavishya, Dr. R.T.P. Pandian and Dr. S.H. Thube, respectively. Progressive farmers, Mr. Sureschandra Thottethodi and Mr. Vishnu Bhat shared their

experience on arecanut based cropping system (involving black pepper and nutmeg as component crops) and integrated management of inflorescence die back disease as per the CPCRI recommendation, respectively. Demonstration of live pest and disease samples, spraying and harvesting using carbon fibre pole and bunch catching using gunny bag were well received by the farming community and about 125 farmers attended the program.

Demonstration of live pest and disease affected arecanut samples

Progressive farmer Mr. Sureschandra T.R. sharing his experience in arecanut based cropping system

Training programme on spraying and harvesting using telescopic pole under SCSP programme

Four days field experience training programme on spraying and harvesting using carbon fibre telescopic pole under SCSP programme was organised at ICAR-CPCRI, RS, Vittal on 16th – 19th March 2022 for rural youths of Scheduled Caste community. Training on spraying fungicides and insecticides, harvesting arecanut and coconut bunches and removing dried inflorescences was given to 12 rural youths from Scheduled Caste community. There is lot of scope for the rural youths to take it as a profession, as there is huge scarcity for skilled labourers in arecanut farming.

Training on Micro Irrigation systems

A 75-days Field experience training programme on "Installation and maintenance of Micro Irrigation systems" was organized at ICAR-CPCRI, RS, Vittal under SCSP scheme. Mr. Bhavishya was the course director.

Arecanut Training Programme

As a part of the Golden Jubilee celebrations of ICAR-CPCRI Research Centre Kidu, a training programme on "Good Cultivation Practices in Arecanut and Arecanut based Multi-Species Cropping System" was conducted for farmers at ICAR-CPCRI Research centre, Kidu on 25 January 2022. The chief guest Dr. K.S. Ananda, Former Head, ICAR-CPCRI Regional Station, Vittal inaugurated the programme and shared his invaluable experiences and reminiscences about the centre. Dr. V. Niral, Principal Scientist, ICAR-CPCRI Kasaragod, during her presidential address briefed the farmers about the service rendered by ICAR-CPCRI, Kidu in production and distribution of quality planting material production of coconut, arecanut and cocoa to farmers across the country. A small exhibition with display charts on improved varieties/ hybrids, quality planting material production, production technologies, arecanut based cropping system, integrated pest and disease management etc. was also arranged for giving first-hand information to the participants.

Trainees of telescopic pole harvest along with trainers at ICAR-CPCRI, Regional Station, Vittal

Consultancy visit to Coconut oil unit Amini Island, Lakshadweep

A team of scientists from ICAR-CPCRI Kasaragod comprising Dr. A.C. Mathew, Dr. Thamban. C., Dr. P. Subramanian and Dr. Shameena Beegum visited the coconut oil unit in Amini Island, under the Lakshadweep Development Corporation Limited (LDCL), U.T. of Lakshadweep on 8 February 2022 and submitted the report to LDCL on measures to revive the unit to a state of the art coconut oil unit.

Interaction meets and Workshop for Sustainable Coconut Farming in Lakshadweep

ICAR-CPCRI Kasaragod and KVK-Lakshadweep organised a series of programmes during the period 07-11 February, 2022 with an objective to assess the research and extension needs in the coconut sector of Lakshadweep islands. Farmers' interaction meet and focus group discussions involving scientists from ICAR-CPCRI Kasaragod, staffs from KVK, extension personnel from Department of Agriculture, farmers, palm climbers and tappers etc were conducted as per the following details.

Training on coconut inflorescence sap collection at Lakshadweep

Date	Interaction meets and FGDs		Case studies	Workshop
	Island	Participants		
07.02.2022	Agatti	15	2	-
08.02.2022	Amini	24	2	-
09.02.2022	Kadmat	15	2	-
11.02.2022	Kavaratti	20	2	30

Thematic areas in the interactions and FGD's included adoption of cultivation practices for sustainable coconut production, constraints experienced and strategies to overcome the challenges in coconut farming, avenues for income and employment generation through coconut based microenterprises on value addition, relevance of farmer collectives and palm climbers' collectives, assessing effectiveness of technologies such as 'coconut sap chiller' in tapping of 'Kalparasa'(coconut inflorescence sap) in comparison with the traditional 'Neera tapping', preparation of value added products such as vinegar, jiggery, coconut sugar, etc. using coconut inflorescence sap, use of mechanical device for coconut tree climbing, etc.

Interactive meeting with the farmers at Lakshadweep

Diagnostic Field Visits

Scientists from ICAR-CPCRI Kasaragod along with personnel of KVK Lakshadweep visited coconut gardens in Agatti, Amini and Kadamat islands and diagnosed various field problems. The major field problems included deficiencies of potassium, nitrogen, boron and stem bleeding disease, eriophyid mite and white fly. Remedial measures for managing the field problems taking into account the organic farming policy being adopted in Lakshadweep islands were suggested.

Training-cum-Demonstration on production of coconut sugar

A training-cum-demonstration programme was conducted at Kavaratti on 11 February 2022 on production of coconut sugar using the technology developed by ICAR-CPCRI. KVK personnel and selected entrepreneurs participated in the training programme. Dr. Shameena Beegum, scientist from ICAR-CPCRI Kasaragod took the class on production of coconut sugar and imparted hands on training to the participants.

Workshop on "Practice to Policy" "Prospective Coconut Development Strategies and Enterprises in Lakshadweep Islands"

The workshop on "Practice to Policy" "Prospective Coconut Development Strategies and Enterprises in Lakshadweep Islands" was organised at Kavaratti on 11th February, 2022. The major objective of the workshop was to

Workshop on production policy at Lakshadweep

discuss and formulate strategies and interventions towards enhancing sustainability of coconut production and coconut based enterprises on value addition and marketing in Lakshadweep islands based on the findings of an earlier study conducted by ICAR-CPCRI. Participants in the

Mr. Santhoshkumar Reddy IFS, Special Secretary (Agriculture) visiting exhibition

workshop included scientists, extension personnel, farmers and entrepreneurs. Mr. Santhoshkumar Reddy IFS, Special Secretary (Agriculture) inaugurated the workshop. Dr. Thamban, C., Dr. A.C. Mathew, Dr. P. Subramanian, Dr. Shameena Beegum, scientists from CPCRI Kasaragod; Dr. P.N. Ananth, Sr. Scientist and Head, KVK- Lakshadweep, Mr. Shareef, District Agriculture Officer, UT administration of Lakshadweep and Mrs. Leenamol, Development Officer, CDB Kochi presented papers in the workshop.

Field Day on 'Arecanut based multi species cropping system'

ICAR-CPCRI, Regional Station, Vittal, organized a Field Day on 'Arecanut based multi species cropping system'sponsored by Directorate of Arecanut and Spices Development (DASD), Calicut, at Shri Yashodhara Gowda's Garden, Koddolu House, Ujire Village, Guripalla Post, BelthangadyTaluk, Dakshina Kannada Dt., on 28 February 2022. The event was witnessed more than 130 participants.

Field Day on Arecanut Dwarf Hybrids

A Field Day on "Arecanut Dwarf Hybrids" sponsored by Directorate of Arecanut and Spices Development (DASD), Calicut, was organized by ICAR-CPCRI, Regional Station, Vittal at Mundoor Primary Agricultural Coooperative Society Hall, Puttur Taluk, on 9 March 2022. The event was witnessed more than 150 participants.

Skill oriented training programmes

Skill-oriented training programmes have been inaugurated by Dr. Rajendra K.V. IAS, Deputy Commissioner, Dakshina Kannada at ICAR-CPCRI Research Centre, Kidu as a part of the Golden Jubilee celebrations. Friends of the Coconut Tree (FoCT) training programme attended by 20 youth and Coconut Handicrafts training programme attended by 15 persons from the backward communities. Dr. Anitha Karun, Director (Acting) and Shri Govind, N. S., Principal, KSS College, Subrahmanya were the diginitories present during the programme.

Skill training on coconut climbing using climber device at CPCRI, RC, Kidu

Training programme on 'Scientific Coconut Cultivation'

A training programme on 'Scientific Coconut Cultivation' was organized for the farmers of Krishi Bhavan, Kottayam on 16 March 2022 at ICAR-Central Plantation Crops Research Institute, Regional Station, Kayamkulam as part of the ATMA programme. Twenty farmers and 3 officials of Krishi Bhavan attended the training.

Training programme on 'Crop health management in Arecanut'

A training programme on 'Crop health management in Arecanut with special emphasis on arecanut fruit rot disease' was organised at ICAR-CPCRI, Kidu, Dakshina Kannada district, Karnataka on 28 March 2022. The programme was inaugurated by Sri Shivashankar, President, Bilinele Gram Panchayath, Puttur Taluk, Dakshina Kannada. Sri Medhappa, Head, Shri Kshetra Dharmasthala Rural Development Programme (SKDRDP), Puttur taluk, presided over the programme. More than 100 farmers were participated in the programme.

Training cum field demonstration

Training cum field demonstration on management of palm invasive whitefly complex using entomopathogenic fungi, *Simplicillium lanosoniveum* and other IPM approaches was conducted at ICAR - CPCRI Research Centre, Kidu on 28 March 2022. There were more than 110 farmers from dakshina kannada district participated in the training programme. The programme was inaugurated by Sri Shivashankar, President, Bilinele Gram Panchayath, Puttur Taluk, Dakshina Kannada. Sri Medhappa, Head, SKDRDP, presided over the programme.

Hands on training on insect pest identification

Skill training on coconut climbing using climber device at CPCRI, RC, Kidu

Scheduled Caste Sub Plan (SCSP) Outreach Activties

Under Govt. of India 'Scheduled Caste Sub Plan (SCSP)' ICAR-CPCRI in collaboration with Scheduled Caste Department Kasaragod, Kerala conducted five days demonstration cum training programme on "Scientific cultivation practices of coconut' for Scheduled Caste beneficiaries ' at ICAR-CPCRI, Kasaragod from 15 to 19 February 2022. Dr. K. B. Hebbar, Director I/c, ICAR - CPCRI inaugurated the programme and appealed to the beneficiaries to actively participate in the training and improve their scientific skills in coconut cultivation and processing so as to find better employment opportunity and adopt the skill learned during training in establishing new coconut garden in their villages. Each trainee was awarded a vegetable seed kit consisting of brinjal, okra, amaranthus, long bean and gourds procured from ICAR - IIHR, Bengaluru for cultivation in their fields.

Dakshina Kannada Dalit Seva Samithi, Vittal and Puttur

Beneficiaries meeting, training and distribution of inputs to forty SC, BPL families was conducted on 31st March, 2022 at Bhudhabhoomi, Thonnakkal SC colony, Pothancode Block, Thiruvanthapuram, Kerala. A training on "summer cultivation practices for coconut and intercrops' by Dr. Nihad K. was given to the beneficiaries who were supplied with planting materials of coconut and other intercrops during June 2020 to September 2021. The programme on distribution of inputs was inaugurated by Mr. V. Sasi, MLA, Chirayinkeezhu, Thiruvanthapuram. The inputs

Training on summer cultivation of coconut at Kayamkulam

Mr. V. Sasi, MLA, Chirayinkeezhu addressing the benificiaries

such as poultry birds, accessories for making poultry sheds, feeding vessels, cowpea seeds as green manure crop for coconut, compost, and irrigation hose were distributed to the identified beneficiaries for their nutritional and livelihood security. The activities were co-ordinated through ICAR-CPCRI, Regional Station, Kayamkulam.

Vegetable seeds packages comprised of (Amaranthus (40g), Bhendi (40g), Brinjal (10g), Pumpkin (15g), Yard Long Bean (25g)) for establishment of kitchen/ nutrition garden under SCSP program were distributed to 47 beneficiaries in Manchi and other villages in Bantwal and Puttur Tks.

Installation of honeybee boxes and training on bee keeping was conducted from 17-19 March 2022 at a cost of Rs.1,25,000/- to 5 beneficiaries from Manchi village.

Distribution of vegetable seeds

Training on Bee Keeping

Supply of bee boxes and accessories to beneficiaries of Manchi village

Exposure visit cum training

One day exposure visit programme was organised at CPCRI Kasaragod for the post graduate students of Department of Environmental Studies, Central University of Kerala, Periya on 21 March 2022.

Farmers from Koppa taluk of Chikmagalur district of Karnataka visited ICAR-CPCRI, RS, Vittal on 16 March 2022. Information on varietal wealth, scientific arecanut cultivation and yellow leaf disease was delivered to them.

Farmers from Honnalli taluk of Davanagere district of Karnataka visited ICAR-CPCRI, RS, Vittal on10 March 2022 and gathered information on scientific arecanut cultivation.

Students' visit to biotechnology laboratory at ICAR-CPCRI, Kasaragod

Plantation based technologies were discussed with a batch of 48 input dealers under DAESI programme (5th Batch) from KVK, Darjeeling visited ICAR-CPCRI, Research Centre, Mohitnagar on 7 January 2022 as a part of exposure visit.

Exposure visit of Input DAESI trainees of KVK, Darjeeling

Radio talks

Dr. Thamban C, Principal Scientist (Agrl. Extension) presented the following radio programmes.

1. Radio programme on 'Intercropping exotic fruits in coconut garden' in Malayalam broadcast through All India Radio Kannur on 05.03.2022.
2. Radio talk on 'Strategies for sustainable coconut farming in Lakshadweep islands' in Malayalam broadcast through All India Radio Kavaratti, Lakshadweep on 04.02.2022.

Mr. Bhavishya delivered a radio talk on "*Xylosandrus crassiusculus*: a new pest of arecanut (Kannada)", broadcast from AIR Mangalore on 14.01.2022.

Dr. Arun Kumar Sit, Research Centre, Mohitnagar delivered the bites for recording of two numbers of programme "Cocoa cultivation" and Black pepper as mixed crop in plantation garden as News for Kisan Channel, DD Kendra, Jalpaiguri on 27.01.22 and telecasted on 28.01.22

Dr. T. Sivakumar, SMS, delivered a talk on "Integrated Pest Management in Mango" broadcasted by All India Radio, Thiruvananthapuram on 7th February 2022.

COMMERCIALIZATION OF TECHNOLOGY

During the period from January to March, 2022, six technologies were commercialized by the Institute to nine entrepreneurs through MoA as per the details given below, an amount of Rs. 2,30,000/- has been collected as technology transfer fees.

Technology	Date of licensing	Transfer fees (Rs.)	Entrepreneurs
Technical knowhow of production of virgin coconut oil	23-02-2022	40,000	South Canara Coconut Farmers Producer Company Limited,1-101, Near Mangala Mantapa CPCRI, Vittal, Dakshina Kannada, Karnataka – 574243.
Coconut Chips	12-01-2022	25,000	Mr. Naveen Poojary, 11-18-6, Manikanta Nilaya, Kemmade, Mooru Kaveri, Menna Bettu, Kinnigoli, Dakshina Kannada, Karnantaka – 574150.
	25-01-2022	25,000	Mr. Venkata Vikas Vepuri, Vepuri Agro Products Pvt. Ltd., F203, Gananada heights apartments, Paramata, Vijayawada, Krishna Dist, Andhra Pradesh – 520007.
	08-03-2022	25,000	Praveen Jacob, CEO, Alpha Natural, Misgar Complex, Keregundi road, Sirsi, Uttara Kannada, Karnataka – 581402.
Kalpa Vardhini	18-03-2022	25,000	ESAF Swasraya Producers Company Ltd., TC/10/121/1, Santhi Nagar, Ollukkara, Mannuthy, Thrissur – 680651, Kerala.
Aqua formulation of EPN Kalpa EPN (CPCRI-SC1)	03-02-2022	25,000	South Canara Coconut Farmers Producer Company Limited,1-101, Near Mangala Mantapa CPCRI, Vittal, Dakshina Kannada, Karnataka – 574243.
	08-03-2022	25,000	M/s Sahasra Crop Science (P) LTD, Hyderabad, Telangana.
	17-03-2022	10,000	The Senior Scientist and Head, ICAR – KVK, Mitraniketan, Vellanad, Trivandrum, Kerala – 695543.
Kalpa Organic Gold (Coconut Leaf Vermicomposting)	03-02-2022	20,000	Mr. Rajesh S., Namaste Agri Marketing, Thenku Kajekar Village, Bantwal, D.K, Karnataka.
Trichoderma Coir Pith Cake.	17-03-2022	5,000	The Associate Director of Research, Regional Agricultural Research Station, Kerala Agricultural University, Ambalavayal, Wayanad, Kerala – 673593.
	17-03-2022	5,000	The Senior Scientist and Head, ICAR – KVK, Mitraniketan, Vellanad, Trivandrum, Kerala - 695543.
Total		**2,30,000**	

ICAR - KRISHI VIGYAN KENDRA, KASARAGOD

Webinar on 'Pest, Disease and Nutrient Management in High Density Cashew Plantations'

A webinar was conducted on 28 January 22 on 'Pest, Disease and Nutrient Management in High Density Cashew Plantations' under the FLD by Dr. K.M. Sreekumar, Professor, KAU, Padannakkad and Interface with farmers with the expert Dr. J. Dinakara Adiga, Principal Scientist, DCR, Puttur.

District Level Seminar on Scientific Cultivation Practices of Cashew

A district level seminar on Scientific cultivation practices of Cashew sponsored by Directorate of Cashew and Cocoa Development was organised by ICAR-KVK, Kasaragod and Chandragiri Agroservices Farmer Producer Company, Cheemeni on 26 March 2022. Dr. K.M. Sreekumar, Professor, College of Agriculture, Padnekkad and Dr. Meera Manjusha, Assistant Professor, RARS, Pilicode were the resource persons for the one day programme. The scientific cultivation practices of cashew and the different high yielding varieties were elabortated in the classes which was followed by a method demonstration of sparying of pesticides to manage Tea Mosquito Bug.

Dr. K.M. Sreekumar and Dr. J. Dinakara Adiga delivering lectures on cashew cultivation

Trainings

An off campus training on Integrated Nutrient Management in coconut cultivation under ATMA was organized by KVK, Kasaragod at Kuttikkol on 10 January 2022 with a participation of 18 men, 13 women and 3 extension personnel.

Another off campus training on Input production for organinc farming in collaboration with ATMA was organized at Chemnad on 22 January 2022 with a participation of 23 men, 12 women and 2 extension officials.

Entreprenur Development Programme on 'Production of Nutri Cookies'

Conducted 7 days EDP programme on Production of Nutri cookies using functional ingredients during 15 to 26 February 2022. (millets, sesame, poshak powder, virgin coconut oil residue, coconut milk residue, groundnut, flax seeds, curry leaf, moringa powder, sprouted ragi powder, banana powder, arrowroot powder). Around 7 self help groups participated.

Women trainees getting hands-on experience doing nutri-cookies

Value Addition to Fruits and Vegetables

Capacity Building Programme for Entreprenurs on 'Value addition of fruits and vegetables' was conducted for 7 days during March, 2022. Technology Disseminated included squashes from locally available seasonal fruits (lemon, orange, amla, pineapple, grapes), fruit jams, jelly, ketchup, dehydrated fruit and vegetable products, papads, chutney mixes and spice powders.

EDP programmes on Value addition of Seasonal fruits

Value addition to amla has been done on 11 and 19 January 2022 using 100 kgs of the fruit, promoting it as immunity booster. 6 women entreprenurs took part in the programme.

Trainees on value addition to fruits and vegetables

Demonstration of Scientific Dehydration Techniques Fruits and Vegetables

SHG's of Village Muliyar, Periye, Panathady, Kudlu and Ednad were demonstrated scientific dehydration techniques for local seasonal fruits and vegetables using renewable energy source.

Trainees on dehydrated fruits and vegetables

Frontline Demonstrations

FLDs on 'nutritional supplement to the disabled children', 'promotion of value added products from mussels' and 'demonstration of turmeric boiler for quality enhancement are in progress.

Turmeric processing by farmers

Entrepreneurship training

ICAR - KRISHI VIGYAN KENDRA, ALAPPUZHA

Large scale demonstration of aerial spraying of nutrients in paddy using drone

Use of drones (UAV) for large scale aerial spraying of nutrients was demonstrated in a total of 175 acres of paddy fields in three villages *viz.*, Edathua, Muttar, and Puliyur by KVK-Alappuzha in the first fortnight of February. The technology demonstrations in Edathua and Muttar villages of Kuttanad region were covered under the NICRA project where a package of climate resilient technologies was demonstrated to paddy farmers. Foliar nutrition using the multi nutrient mixture 'Sampoorna' of KAU (containing B, Cu, Mn, Fe, Zn and Mo) though aerial spraying using the drone was

Aerial spraying using Drone Muttar

done as a component technology in 125 acres of Mulavanakary padasekharam of Muttar and Vadakara padasekharam of Edathua villages. In the meeting arranged on the occasion, Alappuzha District Panchayath Member Smt. V. M. Priya, President and members of the Muttar Grama Panchayath; Dr. P. Muralidharan, Head, KVK, Asst. Director and Agrl. Officer of Dept. of Agriculture; and more than 50 farmers were present.

The programme under the FLD of the KVK in Puliyur village was inaugurated by Sri. M.G.Sreekumar, President of the Grama panchayath in the presence of ward members, Dept. officials, KVK officials, and progressive farmers of the region. An area of 50 acres of paddy was covered with aerial spraying of the micronutrient formulation in this village. Overall, the KVK could create a good awareness on the use of drones in farming activities to the farmers through the demonstrations and the media coverage at a proper time when Govt. of India is promoting use of drones in the sector.

District level Farmer-Scientist-Extension Official Interface conducted

A district level Farmer-Scientist-Extension Official Interface was organised by KVK-Alappuzha on 9th March, 2022 in collaboration with the Agricultural Development and Farmers' Welfare Department. Smt. D. Ambujakshi, President, Muthukulam Block Panchayath inaugurated the interface in the presence of Smt. P. Sasikala, Chairperson, Kayamkulam municipality and Smt. R. Sreerekha, PAO, Alappuzha district. Selected partner farmers of the KVK in different technology interventions shared their newer experiences to the audience followed by interactions from farmers of different parts of the district. They also raised their unsolved field problems and constraints in the field on which fruitful discussions were held and solutions suggested. Scientists from KAU and Officials of the Agricultural department took part in the interface in addition to the SMSs of the KVK. Multidisciplinary team visits to some plots for an appraisal and diagnosis of the field situation were also finalised. More than seventy five persons participated in the programme.

Harvest festival of the demonstration on 'Climate resilient technologies in paddy'

Large scale demonstration on 'Climate resilient technologies for paddy' under NICRA project implemented by the KVK in Edathua and Muttar panchayaths of Kuttanad proved to be an encouraging experience to the farmers of the region. A package of technologies including high yielding short duration paddy variety 'Manuratna', sowing of seeds using drum seeder, soil test based nutrient management, use of *Pseudomonas* for seed treatment, placing tricho cards against pests, and foliar nutrition of multi nutrient mixture (containing B, Cu, Mn, Fe, Zn and Mo) from KAU by aerial spraying using the drone (UAV) was demonstrated in an area of 50 ha in the unique wet land ecosystem where below sea level farming is practiced. The demonstration was carried out by involving 45 farmers. Harvest festival was conducted at Vadakara padasekharam of Edathua panchayath in the presence of peoples' representatives and more than 30 farmers. The partner farmers were very much satisfied with the technologies and the package of technologies yielded 7.5 t/ha with a BC ratio of 1.87 compared to 6.25 t/ha and 1.56, respectively for conventional practices.

Harvest festival of paddy

Skill training on 'Small Poultry Farmer'

Skill Training programme on 'Small Poultry Farmer' for 20 participants (15 men and 5 women) including farmers, rural and gulf returned youth concluded on 5 January 2022. The trainees were exposed and oriented to Egger nursery, Broiler farming, Layer farming, and Alternative poultry faming such as Quail, Turkey, Goose, and Duck farming during the 30 days programme spread over three months. Various skill activities like poultry vaccination, de-beaking, poultry meat processing, incubator and hatchery management were trained to the participants. In addition, modules on farm

Small Poultry Farmer-Trainees

licensing, Banking & Financing, safe handling of meat with emphasis on public health were also arranged with resource persons from Animal husbandry, banking and public health departments. Exposure visits were arranged to different government farms and progressive farmers' field during this programme to obtain firsthand experience. The trainees were very happy and satisfied with the exposure obtained and skills learned and expressed confidence of establishing enterprises with continued technical support.

Internship Programme for B. Sc. (Voc) Food Processing students

Eight B.Sc. (Voc.) Food Processing students from Vimala College, Thrissur under Calicut University underwent internship programme on food processing for three months from 1st Dec, 21 to 28th Feb, 22 in the Agro-Processing Training cum Incubation Centre (APTIC) of the KVK. During this three months period the students were exposed to different aspects of processing of agricultural produce with hands-on-training and involved in the incubation activities having interaction with farmers and entrepreneurs. Each student has taken up a project work for three months related to food processing, carried out the same, made observations to derive inferences and prepared the report for submission to their parent institution which is a partial fulfillment for the degree programme. The programme was coordinated by Smt. Jissy George, SMS (Home Science) with guidance from Dr. P.Muralidharan, Principal Scientist and Head, KVK. The students expressed great enthusiasm and satisfaction for the experience obtained in the real ground situation and interaction with the entrepreneurs.

Capacity building programme for Odisha tribal group

Two groups of tribal farmers from Odisha visited the KVK during the period for capacity building on "Value addition of Jackfruit". One group of 16 persons including officials of ITDA, Volunteers of the Good Samaritans NGO and tribal farmers attended the on campus training programme for four days from 21st to 24th March including exposure visit to a processing unit. They were trained on the preparation of more than 25 products from Jackfruit through hands-on-training. A business plan also was prepared for their situation including details of jackfruit processing machineries. Another group of 22 tribal women along with 5 officials as a part of the Jackfruit mission of Odisha State visited KVK on 21st March, 22 for an orientation on the prospects of value addition of Jackfruit. The tribal women group was sponsored by RRDO (NGO) Thakkumunda, Mayurbhanj. Both the programmes were supported by NABARD.

Exposure visit by Odisha group

Internship programme for B.Voc.(Agricultural Technology) students

A group of eight students from St. Dominic College, Kanhirappally underwent internship programme on "Mushroom production technology and Food processing" for 15 days from 2nd to 19th March, 22 in the KVK. The students were oriented on different aspects of mushroom and spawn production, value addition of coconut and papaya, and integrated farming systems. Exposure visits of the students to ICAR-CPCRI, RS. Kayamkulam, ORARS (KAU), Kayamkulam and mushroom production and value addition units of entrepreneurs also were conducted during the period.

Skill Training for Rural Youth

Skill training for 13 rural youth on "Mushroom production and organic farming" was conducted for seven days from 22nd to 29th March, 2022. The participants for the programme were selected from different parts of the district by the sponsoring agency, ATMA-Alappuzha. The trainees underwent hands-on-training on mushroom and spawn production technologies, recycling of the spent waste for organic manure production, conversion of other organic residues to manure using EM solution, organic farming

practices for vegetables, and value added products from mushroom and vegetables during the period. In addition they were exposed to the real field situation by visiting the mushroom entrepreneurs' units supported by the KVK.

Rural youth on skill training

CELEBRATIONS

International Women's Day

International Women's Day was celebrated under the theme 'Gender equality today for a sustainable tomorrow' # Break The Bias 2022 at ICAR – CPCRI Kasaragod on March 8 2022. The programme was presided by Dr. Anitha Karun Director, CPCRI. Dr. Anitha Karun highlighted the significance of celebrating International Womens' Day. She added this day is important to call the action for accelerating gender parity. Smt. Girija Pathekara, renowned Malayalam poet was the chief guest. Smt. Girija Pathekara spoke about the issues faced by

Inauguration of International Women's Day at ICAR-CPCRI, Kasaragod

women at work place.

Women cell of ICAR-CPCRI Regional Station, Kayamkulam organized a thematic talk on 'Alzheimer's and female brain' on 8th March, 2022 in hybrid mode as part of International Women's Day 2022 celebrations.The programme started by 2.30 pm in the institute auditorium. The key speaker was Dr. Sheeja Navakkode Gangadharan, Senior Research Fellow, Nanyang Technological University, Singapore. The session dealt with the aspects on global scenario of Alzheimer's disease, synaptic features associated, difference of incidence and severity among genders, methodologies adopted in the experiment, nuances and features of brain function in memory and memory loss and socio-economic factors related to Alzheimer's diseases. The meeting was attended by 38 online and 22 offline participants including staff of ICAR-CPCRI Regional Station, Kayamkulam and ICAR-KVK, Alappuzha.

A Kisan Goshti organised at Kolathur on 8 March 2022. Dr. Prathibha P.S., Scientist, CPCRI Kasaragod delivered a speech on women empowerment in agriculture. Around 23 attended the programme. Field visit and latest scientific technology on agriculture, fish farming and green house were demonstrated.

International Women's day was celebrated on 8th March with the participation of women and men farmers, entrepreneurs, and students along with staff members of the KVK Alappuzha, with propagation of the theme "Gender equality today for a sustainable tomorrow". Dr. P. Anithakumari, Acting Head, ICAR-CPCRI, RS, Kayamkulam delivered the keynote address in the function presided by Dr. P. Muralidharan, Head, KVK. Mrs. Radhamani Rajan, Member, Krishnapuram Grama Panchayath distributed turmeric and vegatble seeds to women farmers. A


International Women's Day programme at ICAR-KVK, Alappuzha

training programme on 'Scientific turmeric cultivation' was also organized for the women farmers on the occasion. A total of about 45 persons attended the programme.

As a part of International Womens Day Celebration at KVK, Kasaragod training programme on "Technology options for women for Entreprenurship" was conducted. Around 25 women Entreprenurs participated.

Republic Day

ICAR - CPCRI, Head Quarters, Kasaragod, celebrated the 73rd republic day on 26thJanuary, 2022 , strictly following all Covid 19 protocols. The program started with flag hoisting by Dr. K.B. Hebbar, Director in-charge followed by salutation of the national flag and thereafter the national anthem. Dr. Hebbar, delivered the republic day message highlighting that though agricultural research was hampered to a certain extent due to Covid 19 pandemic, various seminars/programmes could be conducted online and scientists could obtain recognitions / awards during the period. At RS, Kayamkulam, the program started with flag hoisting by Dr. Abdul Haris, Principal Scientist followed by salutation to the national flag. Republic Day was also observed at all the ICAR-CPCRI locations with patriotic furor.


Dr. K.B. Hebbar, Director I/c delivering Republic Day address

PARTICIPATION IN NATIONAL SEMINARS/ SYMPOSIA/ CONFERENCES/ WORKSHOPS/ WEBINARS

Name & Designation	Title	Place and Date
Dr. Neenu, S., Sr. Scientist, Aparna V., Scientist	International conference on Advanced Biology 2022 (icab 2022) organized by Inter University Centre for Evolutionary and Integrative Biology (iceib)	University of Kerala, Thiruvananthapuram, Kerala 23-25 February 2022
Sandip Shil, Scientist,	Annual (web) conference on Recent Advances in Statistical Theory and Applications (RASTA 2022)	NAARM, Hyderabad
Dr A. Joseph Rajkumar Principal Scientist	International webinar on Rugose Spiralling Whitefly and delivered a talk on 'Rugose Spiralling whitefly-Bionomics, Defenders, Hosts and Management' for the Bangladesh experts	USAID, FAO and Virginia Tech, USA on 24.01.2022
Dr. M. Shareefa, Senior Scientist	National webinar on 'Emerging techniques in molecular biology for Crop Improvement'	NASC for Plant Biotechnology and Molecular Biology, KAU on 16.02.2022

NEW PROJECTS/ INITIATIVES

Project title	Duration	PI	Outlay (Rs. Lakhs)	Funding agency
Establishment of a molecular marker based accreditation laboratory for coconut hybrids	three years	Dr. M.K. Rajesh, Principal Scientist (Biotech.), ICAR-CPCRI, Kasaragod	41.23	Coconut Development Board, Kochi
Evaluation of Farmer's Variety MM2 of betel vine	two years	Dr. Arun Kumar Sit, ICAR-CPCRI, Research Centre, Mohitnagar	7.458	NIFI, DST
Development of biodegradable plate from tender coconut husk	eighteen months	Dr. R. Pandiselvam, Scientist (AS&PE), ICAR-CPCRI, Kasaragod	24.90	Coconut Development Board, Kochi
Diversity analysis of *Ganoderma* sp. infecting coconut and their eco-friendly management	three years	Dr. Daliyamol, Scientist (Plant Pathol.), ICAR-CPCRI, Kasaragod	30.00	Coconut Development Board, Kochi
Identification of drought tolerant coconut palms in Tamil Nadu and utilization for developing adaptive gene pool	three years	Dr. K. Samsudeen, Principal Scientist (Eco. Bot.), ICAR-CPCRI, Kasaragod	18.16	Coconut Development Board, Kochi

DISTINGUISHED VISITORS

Dr. S.K. Malhothra, Agri. & Horti. Commissioner, Ministry of Agriculture and Farmers Welfare visited CPCRI, RS, Vittal on 7 January 2022, reviewed the DCCD/ DASD programs and interacted with scientists on the GOI policies on our mandate crops.

Prof. H. Venkateshwarlu, Vice-Chancellor, Central University of Kerala visited ICAR-CPCRI, Kasaragod on 3 March 2022 and interacted with the scientists.

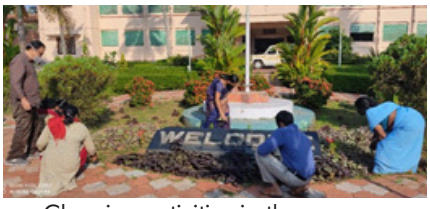
Dr. S.K. Malhothra visiting hi-tech nursery at ICAR-CPCRI, Regional Station, Vittal

Hon'ble Vice Chancellor, Central University of Tamil Nadu interacting with the scientists

OTHER INFORMATION

Swachhta activities

Every Friday, all the employees were involved in cleaning of Institute surroundings and residential quarters. Every Thursday all the Institute buildings were sanitized with 1% Sodium hypochlorite.



Cleaning activities in the campus garden at ICAR-CPCRI, RS, Kayamkulam

PERSONALIA

Dr. P. Anithakumari, Principal Scientist (Agrl. Extension) assumed charge as Acting Head, ICAR-CPCRI Regional Station, Kayamkulam w.e.f. 01.03.2022.

PROMOTIONS

Name of the staff	From (Designation)	To (Designation)	w.e.f.
Shri G.S.Hareesh	Technical Officer (Instrumentation Engg.)	Senior Technical Officer (Instrumentation Engg.)	29.07.2019
Smt. Sugatha Padmanabhan	Asst. Chief Technical Officer	Chief Technical Officer	01.01.02017
Dr.G. Rajeev	Asst. Chief Technical Officer	Chief Technical Officer	02.12.2018
Shri K. Devaraj	Sr. Technical Assistant (Junior Engi.)	Technical Officer (Junior Engi.)	14.06.2020
Shri Sunil S.	Sr. Technician (Electrical Engg.)	Technical Assistant (Electrical Engg.)	18.08.2020
Dr. P. Ravindran	Asst. Chief Technical Officer	Chief Technical Officer	01.01.2020
Shri K. Shyama Prasad	Asst. Chief Technical Officer	Chief Technical Officer	01.01.2018
Shri B. Anil Kumar	Sr. Technical Officer	Asst. Chief Technical Officer	30.03.2020
Dr. S. Ravi	Asst. Chief Technical Officer	Chief Technical Officer	06.06.2018
Dr. T. Sivakumar	Asst. Chief Technical Officer	Chief Technical Officer	21.10.2018
Shri M. Manamohan	Technical Officer (Mechanical Engg.)	Sr. Technical Officer (Mechanical Engg.)	21.06.2020
Shri Thomas P.M.	Level-6	Level-7 III MACP	03.12.2020
Shri Subhash Paul	Level-6	Level-7 III MACP	06.12.2020
Smt. Sreelatha K.	Level-6	Level-7 III MACP	28.04.2021
Shri C.R. Babu	Level-3	Level-4 III MACP	03.08.2020
Shri T.J. Ninan	Level-3	Level-4 III MACP	08.08.2021
Shri B. Chandrahasa	Level-3	Level-4 III MACP	23.10.2021
Shri K.A. Madhavan	Level-2	Level-3 III MACP	21.09.2021
Shri M. Anandan	Level-2	Level-3 III MACP	24.09.2021
Shri Nripan Ch. Roy	Level-2	Level-3 III MACP	24.09.2021

TRANSFER

Name & designation of the staff	From (Place)	To (Place)	w.e.f.
Shri Ajith Mattappadan, SSS	ICAR-CPCRI, Regional Station, Kayamkulam	ICAR- CMFRI, Regional Station, Calicut	02.03.2022
Smt. Aswathy A.S., SSS	ICAR-CMFRI, Kochi	ICAR-CPCRI, Regional Station, Kayamkulam	02.03.2022

RETIREMENT

Name	Designation	Place	Date
Shri K. Kunhiraman Nair	Private Secretary	CPCRI, Kasaragod	31.01.2022
Shri T.J. Ninan	SSS	CPCRI, Kasaragod	31.01.2022
Shri A. Mohana	SSS	CPCRI, Kasaragod	31.01.2022
Shri P. Krishna Naik	Asst. Administrative Officer	CPCRI, RS, Vittal	31.01.2022
Dr. G. Rajeev	Asst. Chief Technical Officer	CPCRI, RS, Kayamkulam	31.01.2022
Shri K. Rajendran	Technical Officer (F/F)	CPCRI, RS, Kayamkulam	31.01.2022
Smt. K. Shobhana	SSS	CPCRI, Kasaragod	28.02.2022
Shri K.K. Sudhanandan	Technical Officer	CPCRI, RS, Kayamkulam	28.02.2022
Dr. S. Kalavathi	Principal Scientist	CPCRI, RS, Kayamkulam	01.03.2022
Shri K.N. Radhakrishnan Nambiar	Technical Officer	CPCRI, Kasaragod	31.03.2022
Smt. V.A. Leela	Technician	CPCRI, Kasaragod	31.03.2022

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