KALPA

CPCRI Newsletter

Volume 40 No. 1 January-March 2021

40th Year of Publication of News, Views and Advances in Coconut, Arecanut and Cocoa Research

ICAR-Central Plantation Crops Research Institute
Kasaragod - 671 124, Kerala, India

From the Director's Desk

The post-reform budget and implications

As always, the first quarter of the year has been dominated by financial numbers – matching the achievements with targets and setting targets for the next financial year. Providing an optimistic pavement, the Institute could utilize 99.6% of the allocated budget in the financial year 2020-21, which includes 100% utilization under Scheduled Caste Sub-Plan (SCSP) and Scheduled Tribe Component (STC). Another important achievement is completing the Quinquennial Review of the Institute and AICRP on Palms & Cocoa under the Chairmanship of Dr. B. M. C. Reddy, Former Vice-Chancellor, Dr. YSR Horticultural University, Andhra Pradesh.

At the national level, everyone was eagerly waiting for the union budget 2021, which Smt. Nirmala Sitharaman, the Minister of Finance, Government of India, presented on 1 February. She has made important announcements in her budget speech to keep up the expectations to carry forward the agriculture reforms. The crucial points are (i) an increase of 1.5 lakh crores in agricultural credit target to Rs. 16.5 lakh crores; (ii) Rs. 10,000 crore increase in the rural infrastructure development fund to Rs. 40,000 crore; and (iii) doubled the Micro Irrigation Fund to Rs. 10,000 crore (via NABARD). There is an increase of six per cent in the Department of Agricultural Research and Education (DARE) allocation at Rs. 8,514 crore. Another noteworthy announcement was the extension of the 'operation green scheme' to include 22 more items to the already existing list, essentially to stabilize the supply and price of perishable commodities. It is a welcome move to integrate 1000 more *mandis* with e-NAM. Of course, the Government's commitment to providing MSP at 1.5 times the cost of production of selected commodities deserves to be highlighted.

Amidst the Covid-19 pandemic, the rural economy was greatly supported by agriculture, with 4.3% growth in agriculture during 2019-20, which has come down to 2.3% in this financial year. The horticulture production is estimated to increase 1.81% in 2020-21 to 326.58 million tonnes. The contribution of agriculture to the Gross Value Added (GVA) increased from 14.4% in 2018-19 to 19.9% in 2020-21. But the dogma of shifting the agricultural workforce to more productive employment in non-farm sectors remains relevant and poses a great challenge.

The Institute is ever committed to constructively translate the Government policies to the farmers and rural entrepreneurs. Having regard to this, an exclusive programme titled 'Training of Master Trainers on Spices and Plantation Crops Processing' was conducted during 19-23 January 2021 in collaboration with the Indian Institute of Food Technology, Thanjavur under PM Formalization of Micro Food Processing Enterprises Scheme of the Ministry of Food Processing Industries. With the right spirit and right attitude, we are committed to moving on the right path following our visionary leaders to spread prosperity to the farming community.

Inside...

SPECTRUM

Conservation and maintenance of fine cocoa types

Criollos and Trinitarios, the fine cocoa types collected from old plantations of Idukki, Kallar, Kulasekharam, Shiradi, Vittal, and Wayanad regions, are being conserved in field gene banks of CPCRI RS Vittal and evaluated for their specific pod and bean traits. Fresh bean colour ranged from white to pink or pale-purple colour. Dry bean weight ranged from 1 to 1.22g, nibs had acidic and astringent aroma and taste and fat content ranged from 33-55%: Lowest in Criollos and the highest in Trinitarios.

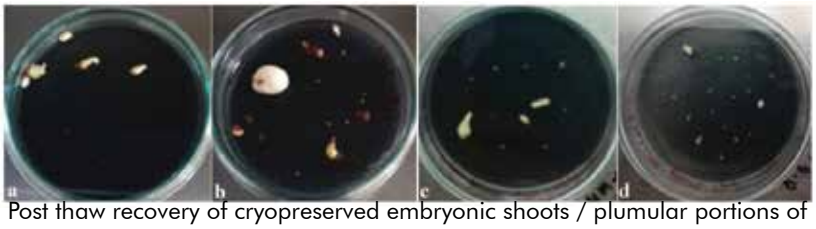
Criollo cocoa types

Trinitario cocoa types

Elain Apshara, S.

Cryopreservation protocol for coconut embryonic shoots/ meristem/plumule

As a standard procedure, coconut embryonic shoot meristem regions (or) plumular portions excised from mature zygotic embryos were precultured in a solid Y3 medium supplemented with 0.2 M to 0.7 M sucrose + 0.1% charcoal + 0.8% Agar along with cryoprotectant glycerol-0.1M for 72 h. After treating the precultured plumules with loading solution (20 minutes), plumules were transferred to V-cryoplates and then sealed with calcium alginate. Then, plumule embedded V-cryoplates were osmoprotected with PVS3 (50% glycerol + 50% sucrose) for different durations (30, 45, 60 and 90 minutes). A set of experiments was designed to investigate critical factors, i.e. optimal concentration of sucrose in preculture medium, osmoprotection duration with PVS3, and then use of cryo plate for anchoring the explant tissue during cryo conservation and their combinational effect. A total of 24 treatment combinations were tried to standardize the protocol. The optimal protocol involved preculture of plumules for 72 h on medium with 0.2 M sucrose, PVS3 treatment for 60 minutes, rapid cooling and rewarming and unloading in 1.2 M sucrose liquid medium for 30 m. Under these conditions, 30% post-thaw recovery was observed with cryopreserved plumules.



Post thaw recovery of cryopreserved embryonic shoots / plumular portions of coconut (a). control; (b) 0.2M sucrose with PVS3-60 minutes; (c) 0.4 M sucrose- PVS3-45 minutes; (d) 0.6 M sucrose- PVS3-45 minutes

Aparna Veluru, Krishna Prakash, Neema M., Murali Krishna K.S., Rajesh M.K. and Anitha Karun

Polyamine enhanced callus multiplication and somatic embryogenesis in arecanut inflorescence cultures

Polyamine induced callus multiplication and somatic embryogenesis (a). Spermidine-100 µg/L + Casein Hydrolysate- 200 mg/L; and (b). Regular callus multiplication media with Picloram- 2.5µM

Arecanut callus multiplication media is modified slightly to hasten the callus multiplication rate and somatic embryogenesis. Regular arecanut multiplication media with Picloram-2.5µM was replaced with a polyamine compound Spermedine 100 µg/L + Casein Hydrolysate- 200 mg/L. The modified media has shown around 67% and 27.38% increase in callus multiplication rate and somatic embryogenesis respectively over regular media with Picloram-2.5µM.

Aparna Veluru, Neema M., Murali Krishna K.S., Rajesh M.K. and Anitha Karun

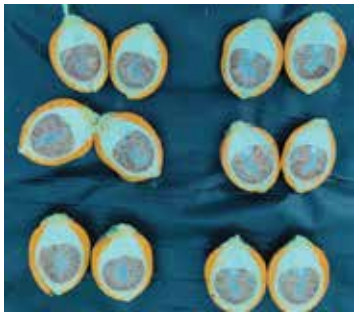
New trait specific arecanut germplasm collected from Dwaraka Estate, Kodagu

Collection of arecanut germplasm

During the period new arecanut germplasm with essential traits like high yielding with tolerance to flooding and fruit rot disease incidence was collected from Dwaraka Estate, Madikeri Taluk, Kodagu Dt., Karnataka. The average fresh weight of the nut is 42.57g, nut length and nut breadths are 5.05cm and 4.68cm respectively.

Nagaraja, N.R.

Absence of embryo in arecanut varieties



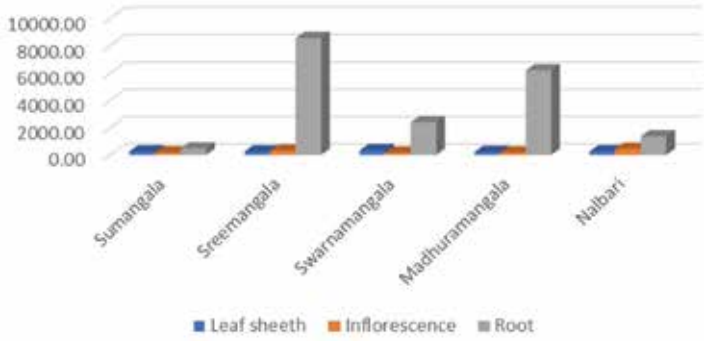
Nuts of S.K. Local variety with and without embryo

A study of thirteen arecanut varieties namely Mangala, Sumangala, Sreemangala, Mohitnagar, Swarnamangala, Kahikuchi, Madhuramangala, Nalbari, Shatamangala, VTLAH-1, VTLAH-2, S.K. Local and Sagar at ICAR-CPCRI, Regional Station, Vittal revealed that nuts without embryo varied from 0 to 20.41 per cent. In Sumangala variety 20.41% of nuts do not had embryo followed by S.K. Local (19.67%), Mangala (13.11%) and Kahikuchi (13.11%). In Sagar variety all the nuts had embryo. Overall, out of 765 nuts used for the study 56 (7.32%) nuts were without embryo.

Nagaraja, N.R., Shahala, M.I. and Shreeranjini

Estimation of arecoline in different parts of arecanut palm

Arecoline content was estimated from three different parts viz., leaf sheath, inflorescence and roots of palms of arecanut varieties namely Sumangala, Sreemangala, Swarnamangala, Madhuramangala and Nalbari. In leaf sheath, arecoline content was found to be 227.01 µg/gm to 329.50 µg/gm. Lowest arecoline content was observed in the leaf sheath of arecanut variety Madhuramangala (227.01 µg/gm), followed by Sreemangala (252.97 µg/gm), Sumangala (259.18 µg/gm), Nalbari (261.55 µg/gm) and the highest arecoline content was recorded from the leaf sheath of Swarnamangala (329.50 µg/gm). Among the inflorescence samples, lowest arecoline content was recorded from the arecanut variety Swarnamangala (170.01 µg/gm), followed by Madhuramangala (186.24 µg/gm), Sumangala (199.37 µg/gm) and Sreemangala (310.96 µg/gm). Highest arecoline content was observed in the inflorescence of the arecanut variety Nalbari (462.69 µg/gm). Among the root samples of the arecanut varieties, arecoline content ranged from 482.87 µg/gm to 8552.86 µg/gm. Lowest arecoline content was recorded from the root sample of Sumangala (482.87 µg/gm), followed by Nalbari (1370.49 µg/gm), Swarnamangala (2396.08 µg/gm), Madhuramangala (6197.74 µg/gm) and the highest was recorded from Sreemangala (8552.86 µg/gm).

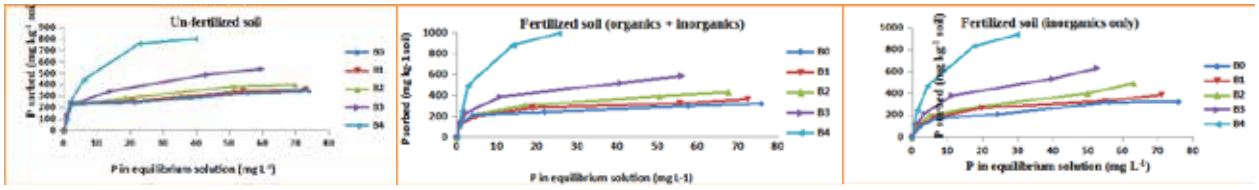


Arecoline content in different parts of areca palm

Nagaraja, N.R.

Phosphate sorption in acid soil in response to application of cocoa biochar

Sorption of phosphorus in soil is mainly due to its attachment to soil particle surfaces, thus, effectively removing the phosphates from the soil solution. Surface sites in the static soil matrix readily sorb P and on dilution rapidly desorb it. To study this dynamics in acidic cultivated soils (fertilized and unfertilized), when cocoa biochar is applied, standard isotherm equations -- the Freundlich equation and the Langmuir equation- were employed. Cocoa biochar was used @ 0, 5, 10, 20 and 40 g kg^{-1} (B0, B1, B2, B3, B4, respectively). Soil-biochar complexes were analysed for phosphorus sorption capacity by fitting the equilibrium solution and sorbed concentrations of phosphorus using adsorption isotherms. Results showed that phosphorus sorption increased with higher biochar application rates. Fertilized soils sorbed more phosphorus (323.25 – 995.27 mg kg^{-1}) than un-fertilized soils (347.25 - 805.47 mg kg^{-1}) @ 0–40 g kg^{-1} biochar (Fig.1-3). Phosphate adsorption on biochar was satisfactorily described by the Langmuir equation (r^2 = 0.96–0.99, P = 0.01) and Freundlich equation (r^2 = 0.87–0.99, P = 0.01).



Phosphorus sorption in response to biochar application

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

Coconut water for bacterial cellulose production

Bacterial cellulose (BC) is produced by a few bacterial genera in sugar-rich synthetic or natural liquid media through oxidative fermentation. Fruit juices and palm sap rich in natural sugars enticing such bacterial fermenters are good sources of indigenous BC producing bacteria. Isolations were made from coconut palm sap following standard microbiological procedures on both complex and selective media and an attempt was made to produce BC utilizing coconut water as a substrate. Four bacterial isolates could induce cellulose production in coconut water to varying degrees and are being further characterized. Indigenously isolated bacteria could prove to be a cost-effective way to convert mature coconut water, which is often a wasted by-product from most of the coconut industrial units, to high value bacterial cellulose.

Indhuja, S. and Jissy George

Farmer's friendly mass production of *T. harzianum*

Bioagent *T. harzianum* (CPTD28) is a potential native isolate found very effective in the management of major fungal diseases of arecanut, coconut and cocoa. In addition, this isolate (CPTD28) also possesses plant growth promotion activity. At present talc based formulation of *T. harzianum* (CPTD28) is in use. One of the limitations of talc based formulation is the short shelf life and availability of talc locally. Hence, four types of easily accessible and cost effective materials viz, coconut leaves based, arecanut leaf sheath, sorghum grains and sorghum grain powder were used for mass production of *T. harzianum*. Significant increase in colony forming units (cfu/g) was recorded in all the formulations (200 x 10^8 to 1813 x 10^8cfu/g) except in coconut leaves based substrate. The highest cfu/g was recorded in arecanut leaf sheath based formulation (1813 x 10^8) and also recorded increased trend in cfu/g even after six months of storage. Frequent sub culturing of any organism in synthetic media there may be chances of loss in virulence. Thus, the cost effective and potential arecanut leaf sheath based formulation could be used for regular multiplication of *Trichoderma* and also be used for maintenance of nucleus culture till six months and directly used for sub culturing.

Arecanut leaf sheath based formulation of *T. harzianum* (CPTD28)

Colonies of *T. harzianum* (CPTD28) in Trichoderma specific medium : a. Initial stage b. Advanced stage

Prathibha V.H., Daliyamol and Vinayaka Hegde

Absence of *Oryctes rhinoceros* nudivirus insensitive Guam-haplotype of coconut rhinoceros beetle

The emergence of *Oryctes rhinoceros* nudivirus (OrNV) resistant haplotype (Guam strain) of coconut rhinoceros beetle (CRB) in coconut plantations in south-east Asia led to a systematic surveillance in the look out of this Guam haplotype of CRB in India. In the surveillance programme, more than 1.3% of grubs of *O. rhinoceros* collected from natural breeding zone have been virosed with characteristic gut clearing and proplapse symptoms. In addition, more than 90% infection was realized in the grubs of *O. rhinoceros* upon artificial *per os* feeding of OrNV suspension inferring the absence of Guam haplotype. It was reported that *Mse*I restriction site polymorphism in amplified region of cytochrome oxidase gene (*COI*) of coconut rhinoceros beetle allowed A to G transition at nucleotide position 288 in the identification of CRB-Guam haplotype. However, molecular characterization of *COI* gene of coconut rhinoceros beetle collected from Kayamkulam, India had no A to G transition indicating the absence of CRB-Guam haplotype in Kerala.

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

Occurrence of rhabditid nematode

A novel entomopathogenic nematode belonging to the rhabditid group was isolated from the Thekkekkara village, Alappuzha district, Kerala. The nematode was subjected to molecular characterization by sequencing 28S rRNA gene region of the ribosomal DNA using 28SF and 28SR primers and it showed 98.72% identity with *Metarhabditis rainai* (Genbank Acc. No. EU195966.1). Bio-efficacy of the new nematode isolate against 4th instar larvae of *Galleria mellonella* indicated the entomopathogenic potential that caused 100% larval mortality within 24 hours of treatment application when applied @ 20 IJs/larva.

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

Development of a software module for functional metagenomic content prediction

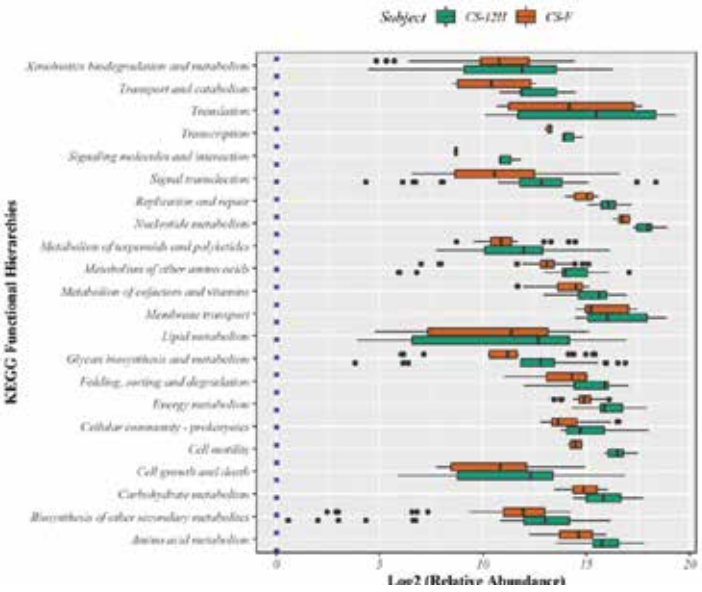


Fig. KEGG functional metabolic pathways involved in Coconut Sap identified by the developed software module for functional metagenomic content prediction

In order to predict functional content of bacterial community over the samples, a software module in R script has been implemented using renowned Piphillin algorithm that predicts functional metagenomic content based on the relative abundance of detected 16S rRNA gene sequences corresponding to genomes in regularly updated, functionally annotated genome databases; subsequently, for the retrieval of feature and pathway tables containing predicted KEGG orthologues (KO) occurrence with 95 or, 99% cutoff threshold in spreadsheet. Further, the KOs can also be annotated using the Kyoto Encyclopedia of Genes and Genomes (KEGG) database. Successful implementation of this module has been tested over the Illumina generated sequence datasets of Kalparasa® (coconut inflorescence sap) for elucidating its microbiome.

Sandip Shil, Murali Gopal, Arun Kumar Sit and Alka Gupta

Areacanut value chain dynamics in Himalayan Terai and Dooars region of West Bengal

A baseline survey was conducted to delineate areacanut value chain dynamics in Jalpaiguri district of Himalayan Terai and the Dooars region of West Bengal during the month of March-2021. Different sets of schedules related to arecanut marketing were finalised for the possible actors in the domestic value chains. Further, randomly collected data from 2-3 persons per group of entities within the Jalpaiguri district. Two types of dominant marketing channels based on disposal types (tender nuts and ripened nuts) were identified. The key actors identified were growers, rural traders/local agents, processors, bulk traders, wholesalers, retailers and consumers.

Market Chanel I- (for tender arecanut)

Arecanut farm garden/ Growers ->Rural traders/Local agents-> Processing centers-> Middle man-> Bulk traders/ Wholesalers-> Outside of district markets-> Wholesaler-> Post processing factories-> Whole salers-> Retailers/Pan Shops-> Consumers.

Market Chanel II- (for raw ripe arecanut)

Arecanut farm garden/ Growers ->Rural traders/Local agents-> Processing centers-> Middle man-> Bulk traders / Wholesalers-> Post processing centers/ Inside / Outside of district markets -> Retailer/Pan Shops-> Consumers.

Another Market Channel III *(for raw ripe arecanut)*

Arecanut farm garden/ Growers ->Rural traders/Local agents-> Processing (Fermentation) centers-> Retailer/Pan Shops-> Consumers.

There may be the possibility of some more key micro actors playing a significant role in this channel; those are needed to be identified. The survey work for the identification of other key factors is in progress.

Sandip Shil, S. Jayasekhar, Arun Kumar Sit and K. Muralidharan

IMPORTANT EVENTS

105th Foundation Day

The 105th Foundation Day celebrations of the Institute was held on 5 January 2021 with various programmes.

Farmers' Meet

Sri Rajmohan Unnithan, Hon'ble MP (Lok Sabha), Kasaragod inaugurated the Farmers' Meet organized in connection with the Foundation Day. Sri N. A. Nellikunnu, MLA, Kasaragod presided over the function in which Smt. Baby Balakrishnan, President, Kasaragod District Panchayat was the guest of honour. Sri Prashanth, P. V., Programme Executive, AIR, Kannur offered felicitations. Critical inputs to farmers and youths belonging to SC were distributed in the Farmers' Meet. Several extension publications including an audio CD on 'Thengum Thanalum' based on AIR programme, were also released during the meeting. Dr. Anitha Karun, Director (Act.), welcomed the gathering and Dr. C. Thamban proposed vote of thanks.

Sri Rajmohan Unnithan, M.P., Kasaragod inaugurating the Foundation Day Programme at ICAR-CPCRI Kasaragod

Foundation Day Address

Dr. A. K. Singh, Deputy Director General (Horticultural Science), ICAR, New Delhi delivered the Foundation Day address. In the backdrop of agriculture reforms, he urged the research institutions to create awareness among farmers on different opportunities including Farmer Producer Organizations. He released two technologies: (i) an electronic device for early detection of red palm weevil infestation,

developed in partnership with M/s Resnova, Kochi with the financial support from Coconut Development Board; and (ii) coconut sap chiller made with the mold developed with the financial support from Coconut Development Board.

Dr. K.V. Ahammed Bavappa Memorial Lecture

Dr. N. M. Nayar, Former Director, ICAR-CPCRI delivered the first Memorial Lecture instituted in memory of Dr. K.V.A. Bavappa, the founder director of ICAR-CPCRI.

Dr. Jelfina C. Alouw, Executive Director, International Coconut Community, Jakarta; Dr. Venkatesh N. Hubballi, Director, Directorate of Cashewnut and Cocoa Development, Kochi, Dr. Homey Cheriyan, Director, Directorate of Arecanut and Spices Development, Kozhikode, Dr. B. K. Pandey, ADG (Hort. Science), ICAR, New Delhi, and Dr. Saradindu Das, CCDO, Coconut Development Board, Kochi offered felicitations.

ICAR-CPCRI signed MoA with Dr. YSR Horticultural University for academic collaborations. Dr. T. Janakiram, Vice Chancellor represented the University.

Staff Awards

ICAR-CPCRI Awards for the year 2019 were distributed on the Foundation Day. The Best Scientific Team award was given to Dr. M.R. Manikantan and team consisting Dr. A.C. Mathew, Dr. R. Pandiselvam, and Dr. Shameena Beegum, Dr. S.V. Ramesh, Dr. Arivazhagan, Dr. K.B. Hebbar, Dr. Murali Gopal and Dr. Paulraj. The Best Technical Staff Award was shared among Shri K Krishnan Nair, Technical Officer, CPCRI, Kasaragod and Shri Santhosh Kumar P., Senior Technical Assistant, CPCRI, RS, Vittal. The Best Skilled Support Staff award was also shared among Shri T.J. Ninan, SSS, CPCRI, Kasaragod and Shri Sudhakara, SSS, CPCRI, RS, Vittal.

The on-line programme was attended by Dr. S. P. Ghosh, formerly DDG (Hort. Sci.) and Chairman, RAC of ICAR-CPCRI, members of QRT, past directors and other retired staff, directors of different ICAR institutes and other invitees. Dr. Anitha Karun, Director (Act.), offered welcome address and Dr. K. Muralidharan proposed vote of thanks in the online programme.

Valeditctory function of Kalpa Graduate Readiness Programme

The valedictory function and certificate distribution of Kalpa Graduate Readiness Programme (KGRP) was conducted on 23 January 2021. Dr. Anil Rai, ADG (ICT), ICAR, New Delhi was the Chief Guest, who had delivered an inspiring and thought provoking lecture to the young graduates. Dr Anitha Karun, Director, ICAR-CPCRI presided over the function. KGRP was conducted during 17 September to 16 December 2020 through online mode for the final year B.Sc. (Agriculture/ Horticulture) students of the agricultural universities across India with an aim to empower these young professionals on latest technologies for production and processing of coconut, arecanut and cocoa. From an initial registration of 1650 students, only 100 were qualified according to the continuous evaluation process (regular attendance in the sessions and participated in the online evaluations and assignments). The successful students represent 25 universities across India. The certificates embedded with QR Code to ensure the authenticity and validity of the document, were virtually presented to the students by the Chief Guest. Dr. K. Muralidharan, Head, Division of Social Sciences welcomed and Dr Jayasekhar S., Course Director proposed vote of thanks.

Convocation for distribution of certificates

ICAR-CPCRI, Regional Station, Kayamkulam as the Nodal Training Institute, has successfully completed a one year Diploma in Agricultural Extension Services for Input Dealers (DAESI) Programme for the agricultural input dealers of Alappuzha District in collaboration with ATMA-Alappuzha, SAMETI-Kerala and MANAGE-Hyderabad. The programme was envisaged to enable them to serve the farmers through the delivery of right information and quality inputs for sustainable agriculture. All 40 participants had successfully completed the course with 38 Distinctions and 2 First classes and all were awarded with diploma certificate during the convocation programme organized on 12 January 2021.

PUBLICATIONS

Research Articles

Aparna Veluru, Krishna Prakash, Neema M., Muralikrishna K S, Samsudeen K., Chandran K.P., Rajesh M.K. and Anitha Karun. 2021. Pollen storage of coconut dwarf accession Chowghat Orange Dwarf (COD) at low temperature. *Indian Journal of Agricultural Sciences* **91** (2): 321-324. NAAS Score 6.21.

Aparna Veluru, 2021. Genetic diversity analysis of Rose (*Rosa × hybrida* L.) cultivars based on morphological markers. *International Journal of Current Microbiology and Applied Sciences* **10**(2):1349-1352. NAAS Score **

Hebbar K. B., Arya Santhosh, Abhin Sukumar P., Neethu P, Ramesh S.V., Selvamani V. (2021). Effect of sea water substitution on growth, physiological and biochemical processes of coconut (*Cocos nucifera* L.) seedlings - A hydroponic study. Scientia Horticulturae **280**: 109935. https://doi.org/10.1016/j.scienta.2021.109935 NAAS Score 8.77.

Mathew, J., Haris, A.A., Bhat, R., Krishnakumar,V., Muralidharan, K. and Susan John, K. 2021. Comparative assessment of nutrient partitioning in healthy and root (wilt) disease affected coconut palms grown in an Entisol of humid tropical Kerala. *Trees* **35**, 621-635. NAAS Score 8.13.

Pandiselvam, R., Manikantan, M.R., Binu, S.M., Ramesh, S.V., Beegum, S., Gopal, M., Hebbar, K.B., Mathew, A.C., Kothakota, A., Kaavya, R. and Shil, S., 2021. Reaction kinetics of physico-chemical attributes in coconut inflorescence sap during fermentation. *Journal of Food Science and Technology*, pp.1-9 NAAS Score 7.85.

Papers presented

Aparna Veluru, Subramanian, P., Kanwar Pal Singh, Namita, Sapna Panwar, Selvamani, V., Vandita Kumari and Ravi Bhat. 2021. Transforming coastal zone for sustainable food and income security. *In:* International Symposium on Coastal Agriculture (ISCA Webinar), organized in virtual mode during 16th- 19th March 2021, 80p.

Pandian, R. T. P., Thube, S. H., Bhavishya, Nagaraja, N. R., Pratibha, V. H., Merinbabu, Chaithra, M., Santhoshkumar, P., Nirmalkumar, B. J. and Hegde, V. 2021. Identification of an effective isolate of *Trichoderma harzianum* ACT1 for the Management of basal stem rot disease in arecanut. pp.81-82. In: Book of Abstracts- International Symposium on Coastal Agriculture: Transforming Coastal Zone for Sustainable Food and Income Security. Sarangi, S. K., Mahanta, K.K., Raut, S., Bhutia, R. N. and Prakash, N. R. (Eds.), 16th to 19th March, 2021. Indian Society of Coastal Agricultural Research, ICAR-Central Soil Salinity Research Institute, Regional Research Station, Canning Town - 743 329, West Bengal, India, 298 p.

Priya, U. K., Bhavishya, Ravi Bhat, Nagaraja, N. R. and Thava Prakasa Pandian, R. 2021. Carbon dynamics in plantation crops under different cropping systems in ultisols of coastal belt of Karnataka. pp.208-209. *In:* Book of Abstracts- International Symposium on Coastal Agriculture: Transforming Coastal Zone for Sustainable Food and Income Security. Sarangi, S. K., Mahanta, K.K., Raut, S., Bhutia, R. N. and Prakash, N. R. (Eds.), 16th to 19th March, 2021. Indian Society of Coastal Agricultural Research, ICAR-Central Soil Salinity Research Institute, Regional Research Station, Canning Town - 743 329, West Bengal, India, 298 p.

Review Articles

Ramesh S.V., Krishnan V., Praveen S. and Hebbar K.B. (2021). Dietary prospects of coconut oil for the prevention and treatment of Alzheimer's disease (AD): A review of recent evidences. *Trends in Food Science & Technology* **112**:201-211 *https://doi.org/10.1016/j.tifs.2021.03.046*

Popular Articles

Alka Gupta, Aparna Veluru, Murali Gopal and Maheswarappa, H.P. 2021. Mokkajonna vyardhalato vermi compostu tayaari. *Annadata* **53**(3): 59p.

Anithakumari, P., Jithin, S., Ijaz, N.M. and Anju Krishnan. 2021. Fruit crops and vegetables in coconut gardens. *Karshakan* **29**(3): 63-64

Babu, K., Mathur, R.K., Venu, M.V.B., Shil, S., Ravichandran, G., Anita, P. and Bhagya, H.P., 2021. Genome-wide association study (GWAS) of major QTLs for bunch and oil yield related traits in *Elaeis guineensis* L. *Plant Science*, **305**, p.110810.

Jerard, B.A., Josephrajkumar, A. Damodaran V., Zamir Ahmed SK., Singh LB. and Jaisankar, I. 2021. Invasive whiteflies infesting on Coconut palms in Andaman, *The Echo of India*, Port Blair, 26 March, 2021.

Jissy George. 2021. Value added products from roots and tubers. *Karshakashree*, **27**(1): 69 (in Malayalam).

Josephrajkumar, A., Chandrika Mohan, Jijo Paul, Jayalakshmi, T., Rajendran, K., Hegde, V., Kalavathi, S. and Anitha Karun. 2021. Red palm weevil detector. *Indian Coconut Journal* **63**(10): 16

Josephrajkumar, A., Chandrika Mohan, Jijo Paul, Jayalakshmi, T., Rajendran, K., Hegde, V., Kalavathi, S and Anitha Karun. 2021. Red palm weevil detector (Malayalam). *Indian Naalikera Journal*, **12**(1): 26.

Kalavathi,S., Haris, A.A., Chandran, A.K. and Jacob, A. 2021. "Varanam Yuvathalamura Thenginu Thangakan" (*In Malayalam*) *Indian Nalikera Journal* **12** (3): 13-15.

Murali Gopal, Alka Gupta, Aparna V. 2021. Kobbari pottuto sendreeya eruvu tayaari. *Annadata* **53**(2):

10p.

Nagaraja, N. R., Pandian, R. T. P., Thube, S. H., Chaithra, M., Thanuja, G., Bhavishya, Nayana, H., Khadke, G. N. and Jose, C. T. 2021. *Phytophthora:* Adikeya apariharya shathru (Kannada). *Krishi Bimba Patrike*. 19(7): 74-77.

Neenu, S., Karthika, K.S. and Anilkumar, K.S. 2021. Kuttanad soils: the potential acid sulphate soils of Kerala. *Harit Dhara E Magazine*, 3(2):19-23.

Neenu, S., Karthika, K.S. and Anilkumar, K.S. 2021. Role of chlorine in coconut cultivation. *Indian Nalikera Journal,* 12(1):11-13.

Nihad, K. 2021. Bird of Paradise adds beauty to gardens with ornamental flowers, leaves. 'Mathrubhumi' Daily online edition 27 January 2021.

Rajeev, G., Chandran, A.K., Mathew, J. and Haris, A.A. 2021. Integrated Nutrient Management in Coconut-Mannarinju Valam Cheyyam *(In Malayalam) Indian Nalikera Journal* **12**(1):16-19

Rajeev, M.S. and Muralidharan, P. 2021. Start preparation for summer season sesamum cultivation. *Kerala Karshakan,* **66**(6): 28 – 29 (in Malayalam).

Rajeev, G., Arsha G.M., Jinu S. and Anes K.M. 2021. *'Nimavirakal Shathruvo Mithramo'* (*In Malayalam*). *Indian Naalikera Journal*, **12**(3): 20-21.

Ravi, S. 2021. Calf and dairy feeds. *Karshakan,* **29**(1): 18-19 (in Malayalam).

Sajnanath, K., Arathy, J. and Muralidharan, P. 2021. Organic manure from aquatic weeds. *Karshakashree, 27(3): 57 (in Malayalam).*

Singh L. S., Anok Uchoi, Elain Apshara S. and Alpana Das. 2021. Present Scenario of cocoa cultivation in Assam. *The Cashew and Cocoa Journal,* **9**(1): 12-15.

Thomas, R.J., Shareefa, M. and Ashokan, E.R. 2021. Integrated farming system approach in coconut: A success story from Attappady Hills. *Indian Coconut Journal* **58**(11): 11-14

Thomas, R.J., Shareefa, M. and Asok, A. 2021. Quick Response (QR) code labeling as a quality assurance mechanism for coconut seedlings *Indian Coconut Journal* **58**(9): 15-17

Book Chapters

Ramesh S.V., Mangruthia S.K. and Praveen S. (2021). Genetic modifications for disease resistance in crops. In. Genetically Modified Crops in Asia Pacific (Eds. Gujar G.T., Trisyono, Y.A., Chen M.) CSIRO PUBLISHING Pp. 273-290. (ISBN: 9781486310920)

Extension Folders

Chaithra M., Elain Apshara, Vinayaka Hegde, Harsha Priya. 2021. Cocoa health card (Disease). Extension Folder No: 295 ICAR- CPCRI, Kasaragod & DCCD, Kochi, p.2. (in Kannada).

Elain Apshara, S., Chaithra, M. and Thava Prakasa Pandian, R. 2021. Cocoa health card *(Diseases).* Extension Folder No. 294 (English), ICAR- CPCRI, Kasaragod & DCCD, Kochi, p.2.

Elain Apshara, S. and Bhavishya. 2021. Cocoa Nutri Card. Extension Folder No. 296 (English), ICAR-CPCRI, Kasaragod & DCCD, Kochi, p. 2.

Technical bulletins

Thube, S. H., Pandian, R. T. P., Nagaraja, N. R., Rajkumar and Saneera, E. K. 2021. Integrated pest and disease management in arecanut. Technical bulletin No. 150. ICAR-CPCRI, Kasaragod, Kerala. 28 pp.

e-Publications

CPCRI. 2021. Videos on cocoa nursery and pruning techniques prepared in Kannada, Malayalam, Tamil and Telugu.

HUMAN RESOURCES DEVELOPMENT

Training conducted

Three days training programme on 'Basics in computer and e-office' for Skilled Supporting Staff (SSS) of ICAR-CPCRI Research Centre, Kahikuchi was conducted from 22nd to 24th February, 2021. Dr. Salam Jayachitra Devi, Scientist, Computer Application & IT, ICAR-NRC on Pig was the resource person of the training program. The participants were Mr. Pankaj Das, Mr. Satish Bhaisya and Mr. Tanka Bahadur Thapa, SSS from ICAR-CPCRI, Reasearch Centre, Kahikuchi.

Computer training for SSSs at Kahikuchi

A three days training programme on "Basic Computer, ERP and e-office" was conducted from 18th to 20th February 2021 for administrative, technical and skilled support staff at ICAR-CPCRI, RC, Mohitnagar.

Awards/ Honours

Dr. Abdul Haris A., Principal Scientist (Agronomy) and Dr. Jeena Mathew, Senior Scientist (Soil Science) officiated as Evaluator for the preliminary evaluation of 11 projects under Young Innovators Programme of Kerala Development and Innovation Strategic Council (KDISC), Trivandrum.

Participation in training programmes

Name & designation	Title of the programme	Organizer & Date
Dr. Ravi Bhat, Principal Scientist Dr. Sandip Shil, Scientist	Online Training Programme on Time Series Data Analysis	ICAR-NAARM, Hyderabad 04-09 January, 2021
Dr. Avrajyoti Ghosh, ACTO, Mr. Pratap Kumar Sarkar, STA. Mr. Jagadish Roy, STA, Mr. Prakash Barman, TA (Field/Farm) and Mr. Subhash Paul, Assistant	Basics computer, ERP and e-office	ICAR-CPCRI, RC, Mohitnagar 18-20 February, 2021
Mr. Chandu Naik and Mr. Choma, LDCs	Basics of computers and e-Office	ICAR-CPCRI, RS, Vittal 6-8 February, 2021
Skilled Support Staffs		
Mr. M. Shankara, Mrs. K. Baby, Mr. A. Mohana, Mr. K. Sukumaran, Mr. P. Kumaran, Mr. V.S. Pakeeran, Mrs. V. Thambai, Mrs. G. Kamala, Mr. K.G. Sureshbabu, Mr. T.J. Ninan, Mrs. Chithralekha K., Mr. B. Chandrahasa, Mr. V.T. Rameshan, Mrs. K. Shobhana, Mr. M. Krishnan, Mr. V.A. Leela, Mr. U. Sarojini, Mr. V. Krishnankutty, Mr. Chaniya Naik, Mr. B. Ramachandran, Mr. B. Sanjeeva Patali, Mrs. N.V. Sasikala, Mr. Lakshmana Naik, Mrs. Lalitha Bai, Mr. N. Bhaskaran, Mr. B. Sundara, Mr. K. Sureshan, Mr. A Madhu, Mr. K.A Madhavan, Mr. Aneesh E.M., Mrs. Vanamalini, Mr. Sarath Kumar, Mr. Ashok Kumar R., Mr. Praveen Raj P.R. and Mr. Kripesh Kumar	Basic Computer Application and E-Office	ICAR-CPCRI, Kasaragod 18-20 March, 2021
Mr. Sudhakara, Mr. Dharmapala, Mr. Vinod, Mr. Isubu, Mr. Ibrahim, Mr. Gopala, Mr. Somappa, Mr. Mohana and Mr. M. Ananda	Basics of computers and e-office	ICAR-CPCRI, RS, Vittal
Mr. Sailen Seal, Mr. Krishna Kumar Manda, Mr. Nipendra Chandra, Mr. Kartik Chandra Biswas, Mr. Sushanta Barman and Mr. Mahade Misra	Basics computer, ERP and e-office	ICAR-CPCRI, RC, Mohitnagar 18-20 February, 2021
Mr. Pankaj Das, Mr. Tanka Bahadur Thapa and Mr. Satish Bhaishya	Basic computer and e-office	ICAR-CPCRI, RC, Kahikuchi 22-24 February, 2021

PERSONALIA

Promotions

Sl. No.	Name	From	To	w.e.f
1	Dr. (Mrs.) Merin Babu	Scientist	Sr. Scientist	21.04.2018
2	Dr. (Mrs.) Jeena Mathew	Scientist	Sr. Scientist	15.12.2018
3	Smt. K.R. Rejitha	Steno Gr. II	Personal Assistant	01.01.2021
4	Sri. K.P. Ibrahim	Skilled Support Staff	LDC	10.03.2021
4	Sri. K. Soman, SSS	MACP Grade Matrix Level-03	Matrix Level-04	15.06.2020
5	Smt. N. Suma, SSS	MACP Grade Matrix Level-02	Matrix Level-03	04.01.2019

Retirement

Sl. No.	Name	Designation	On account of	w.e.f.
1	Sri. T.K. Mani	Skilled Support Staff	Superannuated	31.01.2021

TRANSFER OF TECHNOLOGY

Training programmes

ICAR-CPCRI Research Centre, Kahikuchi conducted 21 training programme on 'Role of farm mechanization in enhancing agricultural production in Assam'. A total of 1050 (415 men and 635 women) farmers from 6 districts of Assam participated. Farmers were trained and demonstrated on use of self-propelled vertical conveyor reaper, power tiller, tender nut punching and slicing and arecanut leaf plates, cup making devices, brush cutter, turmeric grinder, chain saw, coconut climbing devices, trolley operated power sprayer, post hole digger, rotary tiller, knapsack sprayer, foot pump and rocker sprayers.

Eight training programmes on 'Scientific Cultivation and Production Technology of Coconut, Arecanut and Cocoa in Assam' were conducted for farmers from eight districts in Assam. Total 320 farmers participated during the programme.

Training programme on 'Role of farm mechanization in enhancing agricultural production in Assam'

Cocoa training: Training programme on 'Cocoa production and processing technology' was conducted from 18-20 February 2021 with DCCD funding, 42 participants benefitted.

Demonstration during training programme

Field visit as part of training programme in Kahikuchi

Farmers visiting nursery at Kahikuchi during the training programme

Skill Development Program: Agriculture Skill Council of India (ASCI) training programme on 'Nursery Worker' (AGR/Q0807) was conducted from 15 February to 11 March 2021 in collaboration with Directorate of Cashewnut and Cocoa Development (DCCD), Kochi with a participation of 25 trainees (including 12 women and 2 physically challenged) participants. Nursery implements, accessories and post training support were provided to them.

'Hybridization techniques and palm health management in coconut': ICAR-CPCRI, Regional Station, Kayamkulam conducted a one day contact class on 4 January 2021 as a part of the online training on 'Hybridization techniques and palm health management in coconut'. Altogether 20 participants from different locations in Kerala attended the contact class.

RAWE Programmes

A batch of five B. Sc. (Ag.) students from College of Agriculture, Vellayani, Thiruvanathapuram have undergone RAWE training programme during 01-07 March, 2021 at the Regional

'Skilled nursery men' training at Vittal

'Skilled nursery women' training at Vittal

Station, Kayamkulam and were exposed to experimental designs, formulation of research projects, coconut production technologies including field and lab visits. Drs. K.M. Anes, Scientist and M. Shareefa, Senior Scientist were the course coordinators.

Horticulture Based Industrial (HBI) placement course for Final B.Sc. (Hort.) students from College of Horticulture, Mudigere, University of Agricultural and Horticultural Sciences, Shivamogga was organized during 29 March to 12 April 2021 at ICAR-CPCRI, Regional Station, Vittal.

Off campus programme

The following training programmes were conducted with the financial support from Directorate of Arecanut and Spices Development (DASD), Calicut.

i. 'Varietal wealth in arecanut and arecanut based multi species cropping system' on 23 February, 2021 at Padpinangady, Sullia, Dakshina Kannada district (136 participants)

Training programme at Padpinangady, Sullia

ii. 'Good cultivation practices in arecanut and arecanut based multi species cropping system' on 26 February, 2021 at Mitthabhagilu, Belthangady DK district (135 participants);

iii. Same topic as (ii) above on 9 March 2021 at Panja, Sullia, DK district (139 participants);

iv. Same topic as (ii) above on 24 March, 2021 at Ubaradka Mithoor, Sullia, DK district (56 participants)

Training programmes in NE Region

i. 'Scientific cultivation and management practices of Arecanut, Coconut and cocoa' in Tripura on 16 March, 2021

ii. Same topic on 17 March 2021 in Tripura (Total of 110 farmers)

Training programme at Tripura

iii. 'Scientific cultivation and management practices of Arecanut' in Meghalaya on 25 March, 2021 (30 farmers from Umsawnongbri village of Ribhoi District).

Two training programmes were conducted on "Scientific cultivation of turmeric and ginger under plantation garden" at Roypara, Mohitnagar on 12.02.21 and 13.02.21. Fifty farmers attended the programme on each day.

District level seminar on cocoa: Cocoa seminar was conducted on 8 March 2021 with DCCD funding as part of International Women's Day. 46 participants attended the seminar including 37 women farmers, nursery workers, entrepreneurs and Pingaara (FPO) beneficiaries.

Training programme at Meghalaya

Hands on training on cocoa pruning

Demo on primary processing of cocoa

Other programmes

Krishi Padashala organized by State Department of Agriculture and Farmer's Welfare

Programme/date	Title of the programme	Conducted at
8th January, 2021	Integrated nematode management in coconut intercrops	Valachal, Vallikunnam, Alappuzha District
14th January, 2021	Scientific coconut farming	Ambalappuzha, Alappuzha District
18th January, 2021		RATTC, Vytilla
19th January, 2021	Integrated nematode management in coconut intercrops	Padayanivattom, Vallikunnam, Alappuzha District
11th February, 2021	Health Management in Palms	Trikunnapuzha

Training cum method demonstration for the biological suppression approaches for the management of rhinoceros beetle at Vallikunnam on 11.02.2021.

Created awareness about the nematode infestation in Pathiyoor and Devikulangara Panchayath and Distributed 15 kg of Trichoderma culture to the farmers for the management of plant parasitic nematodes in coconut intercrops.

Online Entrepreneurship Development Training Programmes were conducted on Bush pepper cultivation (02.01.2021), EDP opportunities in Livestock sector (16.01.2021), Coconut oil products (23.01.2021), Scientific cultivation of sesamum (30.01.2021). Total of 586 farmers of various panchayaths attended in these programmes.

Site Plan Implementation Group (SPIG) meeting of the Farmers FIRST Programme (FFP) was conducted on 11.01.2021 at Conference Hall of Pathiyoor Panchayath. Dr. P. Anithakumari, PI presented the activities and achievements of FFO along with proposed FFP interventions for the ensuing period.

Participatory demonstration of coconut rejuvenation program from seedlings to value addition was inaugurated on 06.02.2021, by Smt. Usha L., President, Pathiyoor Panchayath (34 participants)

An online training series on decentralized bio input production was culminated on 13.02.2021 after six months of training including online sessions, practical exercises and monitoring by scientists of Agricultural Microbiology Division, College of Agriculture, Vellayani and ICAR- CPCRI, RS, Kayamkulam. Farmer groups of Pathiyoor, Vallikkunnam and Chunakkara participated in the training programme series.

Odanandu Farmer Producer Company Ltd. initiated procurement of coconut (4500) and turmeric (2.4t) from FFP farmers for value addition.

A group of women farmers in Vallikunnan were empowered on the farm level production of green muscardine fungus, Metarhizium majus using semi-cooked rice during January-February 2021. The initial attempt on the localized production made by the women farmers was a grand success which inculcated enormous confidence in the mass production programme. All the dairy farmers in the village were supplied with M. majus for delivery in the cow dung pits.

Mera Gaon - Mera Gaurav

Success in the decentralized coconut seedling production programme (Kerananma) and effective distribution of seedlings for all stakeholders in Bharanikava, Chunakara and Vallikunnam is a real success for follow-up in all panchayats. Area-wide soil testing campaign and empowering farmers on soil health management had created a good impact in the villages. Integrated management of pests and diseases, crop residue management, climate smart agriculture including secondary agriculture are other successful programmes launched in the villages.

Technical bulletins, 30 cocoa guide (English), 25 cocoa note book (Kannada) were distributed among the cocoa growers of Bantwal Taluk. Under MGMG, agricultural issues faced by the farmers of the three adopted villages (namely Pradhanpara, Southmatiali and Kudipara) were solved over virtual/online mode/ phone calls/ SMS.

Diagnostic Visits

A field diagnostic visit for vegetables was made on 26 January 2021 at the Diara land of the river Teesta. Discussion was made on control of diseases and pests of cucumber, onion, bitter gourd, etc.

Radio talks/TV programme broadcast

Three television documentaries Keralathinte kerananma (*In Malayalam*) on KERANANMA project activities were broadcasted in Doordarshan Kendra, Thiruvananthapuram depicting the farmer participatory quality seedling production of WCT palms, demonstration of root (wilt) disease management practices and management of coconut seedlings. The programmes were part of KERANANMA project implemented by ICAR-CPCRI and Bharanikkavu Block panchayath.

Dr. Alpana Das, Principal Scientist delivered a television talk on Current scenario, scope and importance of plantation and spices crop in North-Eastern states of India, telecast on DD Kisan channel under the title 'Badte Kadam', episode – 19.

Smt. Jissy George, SMS (Home Science) delivered a talk on 'Fruit preservation' in Farm and Home Programme of All India Radio broad casted on 7 January 2021.

Mr. Rajeev M.S, SMS (Agronomy) delivered a talk on 'Agricultural Mechanisation' in Farm and Home Programme of All India Radio broad casted on 17 February 2021.

KRISHI VIGYAN KENDRA, KASARAGOD

Training programmes

A total number of 17 training programmes on various topics - floriculture, nutrigarden, supplementary food for differently abled children, banana vermicelli preparation, bee keeping, awareness on organic plant protection, Capacity Building And Mobilization of Farmers to take up Scientific Vegetable Cultivation, pickle making, mat nursery preparation, Transplanting machinery, Capacity buidling programme on bulk processing of pineapple and coconut water into squash for income generation, Demonstration of Black pepper thresher, Promotion of CPCRI technology on coconut water squash through bulk processing and marketing by SHG's, EDP on Bulk processing of black grapes for production of squash to promote sales and marketing among women's group, crop nursery techniques, coconut based bakery products, Processing of Carambola Indigenous food sources for good health and boosting immunity, coconut vinegar production, etc. were organized with a participation of 108 male and 159 female including 7 from SC and 34 from ST categories.

Inaugration of an SSI Unit and Meeting of Farmers was organized at Perladukkam in which 40 SHG members participated.

KRISHI VIGYAN KENDRA, ALAPPUZHA

Alappuzha district in Kerala which was famous for its quality turmeric production in the world is facing a lot of constraints nowadays in availability of good quality seed materials, marketing, value addition and processing of turmeric. ICAR- Krishi Vigyan Kendra -Alappuzha intervened in these issues through a series of OFTs and FLDs and as a result a Farmer producer Organization (FPO) named 'Onattukara Spices Farmer Producer Company Limited' (OSFPCL) was initiated during 2016. Now the FPO has 300 shareholders with an annual production and processing of 20-25 tones of turmeric. For facilitating and supporting the shareholder farmers with good quality service and inputs, the OSFPCL have initiated a Farmer Facilitation Centre and Rural Mart with the technical support of the KVK and financial support of NABARD at Kattanam of Bharanikkavu Block. Adv. U. Prathibha, Kayamkulam MLA inaugurated the Rural Mart and Farmer Facilitation Centre on 02.03.2021. The rural mart aims to make available the critical inputs like seeds, planting materials, fertilizers and plant protection chemical to the shareholder farmers and also facilitate the marketing activities of the company. Besides this the Rural Mart also facilitates the farmers with all types of agricultural machineries like tractor, power tiller, bed former etc., for land preparation and other operations in the field. In this occasion, processing equipments were handed over to a group of women farmers, who were trained in the processing and value addition of ginger as part of the EDP programme in the meeting by Adv. U. Prathibha

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Field day on FLD Cassava

Harvest festivals and Field days

Sl. No.	Programme	Location	Date of event
1.	'Value Chain in Turmeric' project	Puliyur Venmony	18.02.21 20.02.21
2	FLD on 'Short duration paddy variety Manu Ratna'	Palliyarvattom Padasekharam of Thekkekara Panchayath	15.02.21
3	FLDs on 'Rhizome maggot management and Dry rot management in turmeric'	Thekkekara Grama Panchayath	03.03.21
4	FLD on 'Nutrient efficient variety of Cassava (Sree Pavithra) in Onattukara region'	Chettikulangara Grama Panchayath	09.03.21

Field day on turmeric

Field day on paddy harvest

Interaction with the FPOs

Scientific Advisory Meeting

19th SAC meeting of the KVK was conducted on 27th February 21 under the chairpersonship of Dr. (Mrs.) Anitha Karun, Director, ICAR-CPCRI, Kasaragod. Dr. V. Venkatasubramanian, Director, ATARI, Bengaluru and Dr. Jiju P. Alex, Director of Extension, KAU participated and reviewed the progress of activities of the KVK for the last year. Twenty one members of the SAC representing different line departments, farmers, entrepreneurs, and sister organizations and all the KVK staff members participated in the programme. Suggestions for the future activities of the KVK were obtained form the members and recorded.

SAC meeting at KVK, Alapuzha

Training programmes

During the period 39 training programmes were organized benefiting a total number of 783 farmers/rural youths. The details of the training programmes were as follows:

Training	No. of Programmes	Participants		
		Men	Women	Total
On campus (online)	21	269	264	533
Off campus	14	128	74	202
Sponsored	2	18	13	31
Vocational	2	10	7	17
Total	39	425	358	783

Vocational training

Conducted a five day vocational training on 'Operations of farm machineries' to train a group of 8 SC youths under Mahila Kisan Sakthikaran Pariyojana of Bharanikkavu Block .The training modules included operation of power tiller, brush cutter, tractor with its attachments like rotovator, cultivator, bed former, zero till cum fertilizer drill etc.

Short Video films produced

Produced eight short video films on different technologies/impact of projects and being utilised for training and other purposes:

1. Farm Machineries
2. Mushroom production technology
3. Egger nursery
4. Impact of NICRA project activities
5. Composting of aquatic weeds
6. Biogas production units
7. Climate resilient practices in dairy farming
8. Climate resilient practices in poultry rearing.

NEW PROJECTS/ INITIATIVES

A New Project on 'Refinement of *in vitro* immature inflorescence culture of coconut for multiplication of true-to-type planting materials' with a total outlay of Rs. 28.95 lakhs was sanctioned from Coconut Development Board (Govt. of India), Kochi for period of three years with Dr. M. Shareefa, Senior Scientist as Principal Investigator.

PARTICIPATION IN SEMINARS, SYMPOSIA, CONFERENCES, WORKSHOPS AND WEBINARS

Name & designation	Title of the programme	Organizer & Date
Dr. S. Elain Apshara and Dr. A. Joseph Rajkumar, Principal Scientists, Dr. M. Shareefa and Dr. Paulraj, Senior Scientists and Dr. S V Ramesh, Scientist	Virtual Golden Jubilee ISPC webinar on Plantation Crops genomics: An overview of Current Research"	ICAR-CPCRI, Kasaragod during 18-20 January, 2021
Dr. A. Joseph Rajkumar, Principal Scientist	National Webinar on Coconut Production and Value Addition.	HRS, Ambajipeta (YSRHU) 26.02.2021
Dr. Regi J. Thomas, Principal Scientist	Online Meeting of State Level Award Committee to finalize the State Farmers Award for 2020	Directorate of Agriculture Development & Farmers Welfare, 13.01.2021
Dr. A. Joseph Rajkumar, Pr. Scientist Dr. Merin Babu, Senior Scientist	International webinar on Coconut Lethal Yellowing phytoplasmas-Methods of Detection and status of control	ACIAR, Canberra 20-21 Jan, 2021
Dr. A. Joseph Rajkumar, Pr. Scientist	Valedictory function of Kalpa Graduate Readiness Programme	ICAR-CPCRI, 23rd January, 2021
Dr. Regi J. Thomas, Principal Scientist	Pre-Conference meeting for Agriculture Session conducted in connection with International Conference on 'Kerala Looks Ahead'	State Planning Board Govt. of Kerala 27.01.2021
Dr. M. Shareefa, Senior Scientist	e- Workshop on 'Coconut based high density multispecies cropping system'	ICAR-CPCRI, Kasaragod 29.01. 2021.
Dr. Abdul Haris A., Principal Scientist Dr. Regi J. Thomas, Principal Scientist	'Role of New Technologies in Bridging Yield Gaps' in the online International Conference and Consultation on 'Kerala Looks Ahead'	State Planning Board Govt. of Kerala 02.02.2021
Dr. Abdul Haris A, Principal Scientist	Session on 'Insight with policy makers'	Agri India Hackathon Meet-7 on 05.02.2021
Dr. A. Joseph Rajkumar, Pr. Scientist Dr Merin Babu, Senior Scientist	Webinar on Discussion Meeting on the Challenges in management of phytoplasma diseases	IWST, Bengaluru on 05.02.2021
Dr. A. Joseph Rajkumar, Pr. Scientist Dr. Merin Babu, Senior Scientist	Webinar on Enigma of Bud rot disease in Oil palm	ICAR-IIOPR, 16.02.2021
Dr. A. Joseph Rajkumar, Pr. Scientist	Webinar on Agricultural Research through Knowledge Delivery	CABI and Telengana Agricultural University on 23.02.2021.
Dr. Regi J. Thomas, Principal Scientist	Online meeting to discuss the availability of coconut seedlings for distribution under Kerala Coconut Development Council Programme	Directorate of Agriculture Development & Farmers Welfare 26.03.2021
Dr. Arun Kumar Sit, PS	Workshop on Rajbhasha	Organized by ICAR-CPCRI, Kasaragod on 15.01.21
Dr. Sandip Shil, Scientist	3 days open webinar in Plantation Crop Genomics: An Overview of Current Research	Organized by ISPC in collaboration with Bionivid Technology Pvt. Ltd. Held between 18-01-2021 to 20-01-2021
Dr. Sandip Shil, Scientist	Online Training Programme on Time Series Data Analysis	Organized by ICAR-NAARM, Hyderabad during 04-09 January, 2021
Dr. S. Elain Apshara, Principal Scientist (Hort.)	Management Development Program for Women Officers in Development Sector	MANAGE, Hyderabad, 14-18 December 2020
	Webinar on 'Plantation Crop Genomics: An Overview of Current Research'	ISPC, 18-20 Jan 2021
	Stakeholders meet on cocoa	DCCD & Dept. of Horticulture, AP, Vijayawada 23 Jan 2021
	Workshop on Coconut based high density multispecies cropping system	CPCRI, Kasaragod 29 Jan 2021
Chaithra M.,	International Conference on "Industrial perspective, challenges and strategies in the development of novel bio-pesticides: Its implication in sustainable pest and disease management (ICBC- 2021)"	TNAU, Coimbatore & Shastri Indo-Canadian Institute 11 to 12 March 2021
Dr. S. Ravi, SMS	webinar on 'Critical Care and Management of Diseases in Fowls'	TNVASSU, Chennai 7 January2021
	Webinar on 'Fluid Homeostasis and Electrolyte Imbalance in Small Animal Critical Care and Emergency'	TNVASSU, Chennai 10 February 2021
	Clinical Workshop online on 'Stethoscopy in Veterinary Practice'	TANUVAS – Intas Animal Health 17 February 2021
	webinar on 'Production of high value products from fish waste'	CIFT 25 February 2021

CELEBRATIONS

World Water Day

The institute along with Krishi Vigyan Kendra, Kasaragod has celebrated world water day on the 22nd March 2021. An online workshop, Kisan Ghoshti (on campus) and demonstration (on campus) of water conservation and low cost water harvesting structures developed by the institute for farmers were the main events of the world water day. Theme of the workshop was 'Judicious and efficient use of water in agriculture to ensure higher agricultural water productivity (Malayalam)'. Dr. Anitha Karun, Director, ICAR-CPCRI presided over the function. Dr. P. Subramanian, Principal Scientist gave a lecture on the theme topic. Mrs. R. Veena Rani, Principal Agricultural officer, Kasaragod, Dr. Manoj Kumar T.S, Programme Cordinator, KVK, Kasaragod and Sri. Ashok Kumar, District Soil Conservation Officer, Kasaragod also attended and provided information regarding various soil and water conservation schemes available in the district. Two progressive farmers, Sri. Chandrasekhara Yethadka and Sri. Radhakrishnan Polakada shared their experience of in implementing water conservation and water harvesting measures in their farm. On campus workshop was attended by 33 farmers and whereas 28 farmers attended the same online. An essay competition was conducted for high school Students of three nearby schools on the theme topic 'Valuing water'. Commendation certificates were distributed by to the winners of the essay completion by Dr. Anitha Karun, Director during the valedictory function of the World water day, 2021 on the 22nd March 2021 after noon.

In commemoration of the World Water Day celebration, various programmes were organized at ICAR-CPCRI, RS, Kayamkulam on 22 March 2021. An interactive online workshop was convened in the forenoon on the theme: 'Valuing water for food security'. Dr. S. Kalavathi, Acting Head, ICAR CPCRI, RS, Kayamkulam welcomed the participants and the webinar was inaugurated by Dr. Manoj P. Samuel, Executive Director, KSCSTE-CWRDM, Kozhikode. In his inaugural address, he highlighted the entangled role of water management along with soil conservation measures for sustaining crop productivity. The special lecture on 'Importance of water on livelihood and food security' was delivered by Dr. U. Surendran, Head, Department of Land and Water Management, KSCSTE-CWRDM, Kozhikode. A quiz competition was conducted in the afternoon session for the staff members of the Regional Station. The programme was co-ordinated by Drs. Jeena Mathew, Anes K.M, Shareefa M., G. Rajeev and S. Kalavathi.

World Water Day was celebrated on 22 March 2021 at CPCRI RS Vittal. Mr.John D'Souza, Asst.Professor, Govt.College, Vittal talked on the value of water. Micro irrigation trainees arranged exhibits and demonstrated different efficient irrigation systems to conserve water.

Republic Day

Officials and staffs of ICAR-CPCRI HQ, Research Stations, Research centres and KVKs celebrated 72th Republic day on 26 January, 2021.

International Women's Day

The International Women's Day on the theme "Women leadership in Agriculture: Entrepreneurship, equity and empowerment" was celebrated at ICAR-CPCRI, Kasaragod on the 8 March 2021. Dr. Anitha Karun, Director (Acting) presided over the function. Dr. Ashwini Krishna Moorty, Zooligist and an organic farmer-cum-agri-entrepreneur was the chief guest on the occasion and delivered a talk on the theme. On the occasion two women entrepreneurs were felicitated viz., Dr. Ashwini Krishna Moorty of VAST Centre, Adyanadka, Dakshina Kannada, Karnataka for her contributions in the field of organic inputs for organic farming and Mrs. G. Gomathi of Gagni Foods, Erode, Tamil Nadu for contribution in the area of value addition in coconut. A quiz competition on the theme for the staff and an online speech competition on ' role of women in nation building was conducted for the students of Kendriya Vidyalaya No.1, Kasaragod and prizes and certificates were distributed. A training on 'indigenous food sources for good health and boosting immunity was conducted by Dr. Saritha Hegde, SMS, KVK, Kasaragod. About 30 women farmers/farm women participated in the programme along with the institute staff. The invited farm women were taken on a visit of the Institute farm in the morning and also watched

the web-cast of the ICAR event.
At ICAR-CPCRI, RS, Vittal, a woman entrepreneur Mrs. Reshma Rajaram, MD and co-owner of Eco-Blizz, successful industry making areca sheath products and exporting was felicitated. Eco-Blizz is collecting areca sheath from farmers, processing into plate products of various size and shapes and harboring around 650 women workers. During COVID pandemic also it was managed with half of the workers. She also proved herself as leader administering as President, Kodungai Panchayat. Another small entrepreneur Mrs. Sasikala Rajkumar, Vittal who purchased areca plate making machine from Eco-Blizz and started her own unit at home level was also felicitated. She employed five women workers and during pandemic also she put her effort in continuing the operation and supplied areca plates to nearby market.
At KVK Alapuzha, the day was observed on with different programmes in association with ICAR-CPCRI, RS, Kayamkulam. About 30 women delegate farmers participated, followed by honoring of five women farmers, for their remarkable entrepreneurship, achievements and leadership in the field of Agriculture and allied sectors. Adv.A.K. Rajasree, Coordinator, Human Rights Law Network, Alappuzha delivered the keynote address.


Dr. Ashwini Krishnamurthy addressing the gathering at Kasaragod


Mrs. Reshma Rajaram, woman entrepreneur and President, Kodungai Panchayat being honoured


Mrs. Sasikala Rajkumar, woman entrepreneur being honoured


Areca pheath plate making machine


Members of womens committee at thre Eco-Blizz facility


Eco Blizz- Areca sheath products


International Womens Day programme at KVK, Alapuzha

National Science Day

National Science Day-2021 was celebrated at ICAR-CPCRI, Kasaragod. The programme was organized through video conferencing. Dr. Rajendra, P, Director of Research, Central University of Kerala, Kasaragod was invited as Chief Guest for the programme. Dr. Anitha Karun, Director, ICAR-CPCRI presided over the event. Welcome address delivered by Dr. R. Sudha, Sr. Scientist. Dr. Anitha Karun, Director, ICAR-CPCRI, in her presidential address highlighted the significance of celebrating the National Science Day in commemoration of Sir Chandrashekhara Venkata Raman for receiving the noble prize for discovery of Raman Effect. She also thrown light on the significance of science day and the theme of this year "Future of STI: Impacts on Education, Skill and Work" and also the role of science and technology in our daily life. Dr. Rajendra, P, Chief Guest of this programme highlighted the status of science and technology in India before independence and its growth after independence of India. He elaborated the Science Technology and Innovation policies. As a part of National Science Day celebration different competitions viz., Essay writing competition, quiz and extempore speech competition were conducted for the school students and staff members of CPCRI.

As part of the National Science Day celebrations 2021, a Virtual Interactive Workshop on the theme: 'Science, Technology and Innovation for the Empowerment of Students' was conducted from ICAR-CPCRI, Regional Station, Kayamkulam on 1st March 2021. More than 100 students from seventeen colleges participated in the online workshop. The keynote address for the session was delivered by Dr. G. Byju, Principal Scientist, ICAR-CTCRI.

OTHER INFORMATION

Institute biosafety Committee (IBSC) Meeting

The first Meeting of the reconstituted Institute biosafety Committee (IBSC) of ICAR-CPCRI, Kasaragod was held on 4th March/2021 under the Chairmanship of Dr. Anitha Karun, Director, ICAR-CPCRI and Chairman, IBSC, at ICAR-CPCRI, Kasaragod over video-conferencing mode. The Meeting was attended by all the members of the Committee including Dr. A Ishwara Bhat, Principal Scientist, ICAR-Indian Institute of Spices Research, Kozhikode, Kerala (DBT Nominee), Dr. Rajendra Pilankatta- Associate Professor, Head of the Department, Central University of Kerala, Periye, Kerala (Outside Expert), Dr. Rekha Rai, Professor (Microbiology), K. S. Hedge Medical Academy, Mangalore (Medical Officer) and among other internal Members. The research proposals which require Bio safety Level-(BS-1) were presented and the committee approved the same.

Infrastructure Developed

The Central pollen cryo-preservatory at ICAR-CPCRI, Regional Station, Kayamkulam was strengthened with installation of following equipments worth Rs. 9.75 lakhs: Liquid Nitrogen Storage container of 240 litres capacity (1 nos.), Inventory systems (Rack and Box system) with capacity to store 4000 pollen vials - 1 no., Inventory systems (Rack and Box system) with capacity to store 750 pollen vials - 3 nos., Liquid Nitrogen storage container (55 litre capacity) - 2 nos. and Liquid nitrogen storage container (35 litre capacity) -1 no. and related accessories. The equipments were purchased under the external aided project 'Large-scale production of elite and hybrid seedlings of coconut for the root (wilt) disease prevalent tract' funded by Department of Agriculture Development & Farmers Welfare, Govt. of Kerala with Dr. Regi J. Thomas, Principal Scientist as the Principal Investigator.

Vaccination Against Covid-19

A Vaccination Camp was arranged at ICAR-CPCRI, Kasaragod for its staff and the officials in the neighbouring localities during 4-6 March 2021. It was arranged from the Community Health Centre, Mogral Puttur.

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किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद

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Published by: Dr. Anitha Karun, Director (Actg.)
Compiled and edited by: Dr. Murali Gopal, Dr. K. Muralidharan, Dr. K. Samsudeen, Shri H. Muralikrishna and Dr. Anitha Karun
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Cover Photo: High yierlding Kalpa Raja variety of coconut identified for release