KALPA

CPCRI Newsletter

Volume 38 No. 2 April-June, 2019

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

From the Director's Desk

Aligning plantation crops research with national agricultural priorities

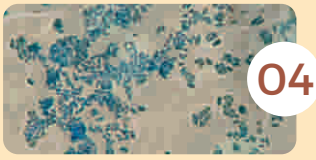
With research on coconut, arecanut and cocoa as its mandate, ICAR-CPCRI has the focal point on development, dissemination and evaluation of technologies for these plantation crops which support the livelihood of close to 20 million Indians. Palms and cocoa have several unique challenges because of their habit as well as recalcitrance to biological interventions. Despite these bottlenecks, ICAR-CPCRI is delivering many expert solutions to improve the production, protection and value addition aspects in these crops.

In tandem with the aim of the Government to enhance the income/benefits of farmers and sustain the environment, ICAR-CPCRI has chalked out future research programmes in the 2020-25 and 2020-30 roadmap documents that align with the key national agricultural priorities listed below:

- Increasing agricultural production / productivity
- Farmer welfare programmes
- Doubling farmers income
- Poverty alleviation projects
- Sustaining environment

To tap the vast genetic diversity of plantation crops, the germplasm (445 for coconut, 178 arecanut and 515 cocoa) available at ICAR-CPCRI is being subjected to conventional breeding and tissue culture approaches coupled with cutting edge 'omics' sciences to produce varieties/hybrids for targeted traits, particularly for disease resistance. While the Institute has pioneered the efficient use of natural resources through palm-based crop management involving multi-species cropping/farming systems with animal components, it is now moving ahead to harness the artificial intelligence and unmanned aerial vehicle technologies to further improve the production/productivity of these crops in the current scenario of climate variability. Recycling technologies for palm and cocoa biomass residues that return critical carbon, back to the soil and sustain the environment, are getting fine-tuned for wider adoption and for organic farming. Several next-generation value-added technologies/products that can enhance farmer's income and overcome poverty are in the pipeline. Concerted efforts to disseminate, transfer, evaluate and fine-tune the technologies in close interactions with farmers and other stakeholders are being continually upgraded. The Institute's collaboration with many think-tanks organizations to develop policy briefs to raise the visibility of palms and cocoa in national agriculture scenario are under progress. Thus, ICAR-CPCRI has streamlined its institute research programmes with national agricultural priorities and aims is to serve the stakeholders in a better manner in the coming years.

CONTENTS



SPECTRUM

Varietal Development in Coconut

A proposal for release of a coconut variety Kalpa Ratna was presented in the 28th Annual Group Meet of All India Co-ordinated Research Project on Palms. The variety has been recommended for release by the Central Sub-Committee on Crop Standards, Notification and Release of Varieties. The variety has been derived from the ICAR-CPCRI accession IND 010, Federated Malay States Tall, is high yielding, suitable for tender nut, copra and inflorescence sap production. The variety is relatively tolerant to low moisture stress with a yield of 148 nuts/palm/year with copra out turn of 27.23 kg/palm/year, which is 34.55% and 40.65% higher than the local control (WCT), respectively. The variety also recorded 34.78% higher inflorescence sap yield than WCT. This variety is suitable for cultivation in the coconut producing tracts in Western Ghats & coastal plains of Kerala, Karnataka and semi arid region of Tamil Nadu (Fig. 1).

Fig. 1. High yielding coconut variety, Kalpa Ratna

Niral, V. and Samsudeen, K.

Conservation Biological Control in the Bio-suppression of Coconut Scale Insect

Coconut scale insect, *Aspidiotus destructor* Sign. is one of the diaspidid hard scales that feed from abaxial surface on palm leaflets causing typical chlorotic patches on the upper leaf surface which subsequently turn necrotic under severe conditions. Sporadic outbreak of coconut scale insects was reported during summer period in different parts of the country and a recent emergence was observed near Kayamkulam (Alappuzha District) in May 2019. Though higher intensity of infestation was noticed in a secluded coconut garden near an uninhabited forest area, a wide array of natural enemies observed in the surveillance survey could naturally suppress the pestiferous potential of *A. destructor*. More than 50% of the hard scales were found parasitized by the aphelinid parasitoid, *Aphytis* sp. (Fig. 2a) and the population of the parasitoid was considerably higher in the pest inflicted garden. Besides, three lady beetles, *viz., Chilocorus nigritus* (Fig. 2b), *Sasajiscymnus* sp., and *Pharoscymnus horni* (Fig. 2c) and their grubs were recorded feeding voraciously on scales. *C. nigritus* was absolutely black, *Sasajiscymnus* sp. (Fig. 2d) was brown in color and the grubs resembled mealy bugs, whereas, *P. horni* with characteristic red patches on elytron was observed for the first time in palm system.

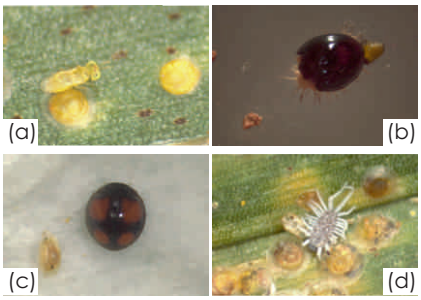


Fig. 2. Natural enemies of coconut scale insect a) *Aphytis* sp., b) *Chilocorus nigritus,* c) *Pharoscymnus horni* and d) *Sasajiscymnus* sp.

Conservation of these natural enemies forms a very important strategy in the management of coconut scale insects.

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

Forked Leaves in Coconut

In general, coconut fronds consist of a strong petiole on which two rows of leaflets are arranged on either side so as to withstand the whirling action of wind to which the palms are routinely exposed. In coconut, variations in leaves are rarely met with. A rare occurrence of forked nature of the petiole was observed in one of the segregant palms planted at ICAR-CPCRI, Regional Station, Kayamkulam wherein the main petiole is split into two petioles over which four sets of leaflets are borne on either site of the split petiole. The new branch - leaf has no separate petiole and leaflet is produced throughout its

length in two rows. A case of palm with forked leaves was earlier reported by T. A. Davis during 1956 in Orange Dwarf palm and all the leaves of that palm were three forked. According to him, the palm might have received some injury during its very early meristematic stage, as a result of which the tip might have been divided into three lobes resulting in the formation of three leaf branches, each resembling a leaf. However, in present case, normal leaves and forked leaves were found in the same palm. In the same palm, though some leaves looked like forked, due to the presence of the extra width of leaf base, some leaves can be regarded as twin leaves. Twin leaves might have formed as a result of fusion of two leaves. Due to rapidity of growth, two adjoining leaves could have fused up to the petiole and emerged out side by side. These fronds were also weaker due to higher nutrient partitioning for four sets of leaflets. This strange phenomenon was not observed on all the fronds. Whether such traits improves the photosynthetic efficiency of palms or weakens the health status of palms needs detailed investigation.

Fig. 4. Forked leaf in coconut palm at ICAR-CPCRI, RS, Kayamkulam

Shareefa, M., Joseph Rajkumar, A. and Regi J. Thomas

Association of Two Beetles with Stem Bleeding Disease in Coconut

In a stem bleeding disease affected palm with enormous exudates from the trunk located from Pollachi (Tamil Nadu), active association of the scolytid beetle, *Xyleborus perforans* was observed in April 2019. All immature stages of *X. perforans* could also be recorded from the rotten tissues scooped out from the trunk. In another similar disease affected palm, a tenebrionid beetle, *Corticeus filum* Fairmaire was observed inside the trunk with shot hole symptoms either feeding on the detritus/fungal mass/ exuding sap or suspected predatory on the scolytid beetle (*X. perforans*) from the same garden. Both *X. perforans* and *C. filum* did not occur simultaneously in the same diseased palm, but were observed in two different diseased palms located very close by. Relationship of these beetles with the disease is under progress.

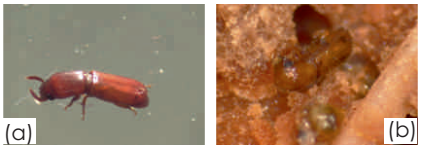


Fig. 3. Two associated beetles in stem bleeding disease a) *Xyleborus perforans and* b) *Corticeus filum*

Josephrajkumar, A., Chandrika Mohan, Merin Babu and Krishnakumar V.

Isolation, Characterization and Evaluation of Entomopathogenic Fungi *Metarhizium anisopliae* Against Tea Mosquito Bug (*Helopeltis theivora*)

Naturally infected tea mosquito bug (TMB) adults were collected from cocoa ecosystem. An entomopathogenic fungus was isolated on PDA media. Morphological and molecular characterization confirmed the identity of this fungus as *Metarhizium anisopliae*.

In-vitro efficacy study of *M. anisopliae* against laboratory reared TMB confirmed 100 per cent mortality after 72 h of inoculation. Field evaluation of this fungus will be carried out during next season of cocoa (Fig. 6 a to d).

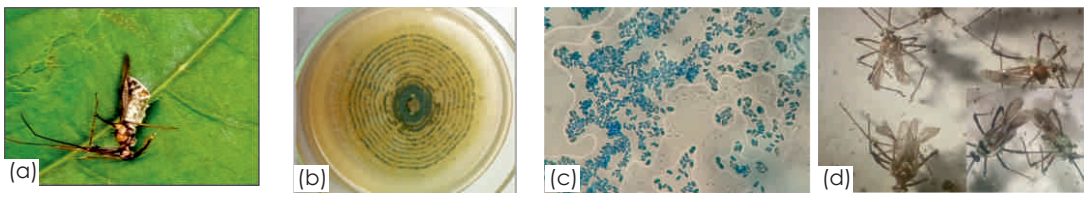


Fig. 6 a) Naturally infected TMB adult, b) Culture plate of *M. anisopliae*, c) Spores of *M. anisopliae and d)* Mortality of TMB adults due to infection of *M. anisopliae*

Shivaji Hausrao Thube, R Thava Prakasa Pandian, P. Santhoshkumar and Nirmal Kumar, B.

Occurrence of 'Midget' in Coconut Nursery

Flowering of coconut palms at an early infant stage is referred as 'midget' palms. A case of midget palm was observed in Chowghat Green Dwarf seedlings at ICAR-CPCRI, Regional Station, Kayamkulam. T.A. Davis (1955) first reported the phenomenon of coconut seedlings producing inflorescences within one year after sowing and referred to them as 'midget palms'. Generally the inflorescence bearing in coconut is axillary and inflorescence in covered in a spathe. In midget palm, the inflorescence bearing was terminal and the inflorescence was conspicuous for the absence of the spathe. They bear only female flowers and these ranged up to thirty five numbers in an inflorescence. This seedling was normal in its habit with adventitious root system. Decrease in size of leaves was noticed and the last two leaves appeared at the base of the inflorescence resembling bracts which enclose the young spadix. The phenomenon of early flowering in seedling stage has no significant practical utility to the farmers since the palm dies before producing any nut. The infant flowering noticed may be due to some photoperiodic induction which occurred in the unsplit immature leaves of the seedling as these partially matured leaves are highly sensitive and capable of initiating flowering through photoperiodic response.

Fig. 5. Midget palm of coconut at ICAR-CPCRI, RS, Kayamkulam

Regi J. Thomas, Shareefa, M. and Anes, K.M.

Scarabaeidae Diversity in Coconut Ecosystem

To determine the species occurrence, white grub adults (Coleoptera: Scarabaeidae) attracted to light traps (mercury bulb -180W) were collected during June 2019. The collected beetles were processed for identification by cleaning, sorting, pinning and labeling and species level identification was done by Dr. Kolla Sreedevi, Senior Scientist, ICAR-NBAIR, Bangalore. Species composition revealed that *Heteronychus* spp (Fig. 7a). belonging to subfamily Dynastinae of Scarabaeidae was the predominant followed by *Schizonycha ruficollis* (Fig. 7b) and *Leucopholis coneophora* belonging to Melolonthinae of Scarabaeidae. *Anomala* spp. and *Maladera* spp. were also in considerable number. Thus the generated information will be useful in regular monitoring and insect biodiversity studies.

Fig. 7a. *Heteronychus* spp.

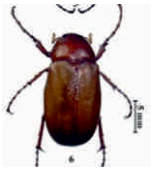


Fig. 7b. *Schizonycha ruficollis*

Sujithra M. and Rajkumar

Coconut Testa Oil: A Rich Source of Phenolics and Anti-oxidants

Physico-chemical properties of testa oil of coconut (TOC) revealed moisture content (0.29%) and specific gravity (0.95). TOC exhibited high iodine value (12.4 g/ 100 g oil) compared to virgin coonut oils (VCOs) obtained from various processes (a range of 5.7 to 8.46 g/ 100g). The free fatty acids content (0.29%) and high peroxide value (2.0 milli. eq. peroxide/ kg of oil) indicated that the oil is highly prone to oxidative rancidity. Estimation of total phenolic content of TOC revealed that it has high polyphenolic fraction of 5.82 mg/100 g and total flavonoid content constitutes 0.973 mg quercetin equivalent / 100 g of oil. Consequently, the anti-oxidant potential estimated based on CUPRAC assay is as high as 11.46 mM TE/ kg of oil. These biochemical parameters indicate that TOC is rich in phenolics and it has great anti-oxidant capacity compared to VCO and hence may confer health benefits.

Ramesh S.V.

Entomopathogenic Nematode (EPN) Infected Galleria Cadavers Formulation to Control Pests

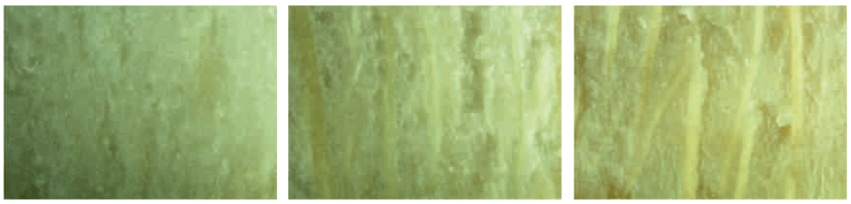
Among the various EPN formulations available, host cadaver formulation is gaining more importance currently where infected cadavers were directly used to target the pest. Larvae of *Galleria mellonella* were commonly used as host for EPN multiplication were infected with entomopathogenic nematodes and released into the field. Sustained release of infective juveniles (IJs) from the cadavers have higher longevity and greater ability to disperse and infect to the insect pest are some of the advantages of using cadaver formulation. This technique is simple, involves low cost, environmentally sustainable and could an address various pests in IPM programs of plantation crops. The laboratory studies indicated that EPN (CPCRI - SC1 & CPCRI HI1)) infected dead *Galleria* cadavers were when covered individually with parafilm sheet had enhanced shelf life up to 15 -20 days when incubated at 25 - 28°C while in control (without parafilm sheet) the emergence of IJs from EPN occurred within 4 days of cadaver death (Fig. 8). This technique provides an optimal way of delivering the EPN biologically active cadavers to long distance farmers without affecting their quality.

Fig. 8. Emergence of IJs from *Galleria* cadavers (Left) and cadaver sachets avoids emergence of IJs (Right)

Rajkumar and Sujithra M.

Textural Characteristics of Tender Coconuts

The textural characteristic features such as punching strength and cutting strength of tender coconut play an important role in the process of development of an efficient and ergonomically superior tender coconut processing machinery including punch and cutter, trimming machine, and snowball tender coconut machine. However, scientific reports describing the textural properties of tender coconut are a rarity. Punching and cutting strength were determined at six different orientations of four tender coconut varieties: Andaman Giant Tall (AGT), Chowghat Orange Dwarf (COD), Kalpa Haritha, and Ganga Bondam (GB). Irrespective of the varieties, the highest punching and cutting strength are observed at the bottom orientation of the tender coconut followed by middle and top orientation. (Fig. 9.) shows the fibre arrangement in the mesocarp section of tender coconut. It clearly depicts that the top section of tender coconut (near to perianth) contains spongy tissue (absence of fibre), the middle section is constructed with immature fibre, and the bottom section comprises mature fibres. Hence, the relative absence of fibre at the top orientation necessitates less punching and cutting strength and the presence of matured fibre at the bottom section requires more punching and cutting strength. Statistical analysis indicates that orientation and variety of tender coconut significantly ($p \leq 0.01$) affect the punching and cutting strength. Thus, this investigation provides the baseline information to design efficient tender coconut processing machinery.



Top orientation Middle orientation Bottom orientation

Fig. 9. Cross sectional view of flat portion of mesocarp section of tender coconut recorded at 10x magnification (variety COD)

Pandiselvam R., Manikantan M.R., Balasubramanian D., Mathew A.C., Shameena Beegum and Niral V.*

Multivariate Analysis of Quality Characteristics of Virgin Coconut Oil (VCO)

Multivariate analysis of physico-chemical properties of VCO samples obtained from hot extraction process (VCO-Hot), fermentation (VCO-Fer), expelled from dried gratings (VCO-EDG), centrifugation (VCO-Cen) and conventionally prepared coconut oil (CCO) was performed.

Expectedly, the highest significant positive correlations were observed between total phenol content (TPC) and anti-oxidant potential measured in assay CUPRAC (r=0.99, P < 0.01) followed by correlation between FFA and acid value (r=0.98, P < 0.01). Principal component loadings for VCO quality characteristics are shown in (Fig. 10). The first principal component represented 39.64% of the total variability; total flavonoids, total phenols, and antioxidant activity (CUPRAC), ABTS-radical scavenging activity and mineral [Mn] are the dominant variables. Second principal component accounted 28.30% of total variability is dominant for iodine value, free fatty acids, and acid value, whilst the third principal component represented 19.71% of total variability is dominant for [Zn], [Fe], peroxide value, and moisture content. Principal component analysis (PCA) revealed that important quality attributes (total phenol, total flavonoid and CUPRAC) achieved in the hot process were imperative in defining principal component 1. Hierarchical clustering showed that the hot VCO extraction process belonged to the first group with high total phenolic and flavonoids content and strong antioxidant potential.

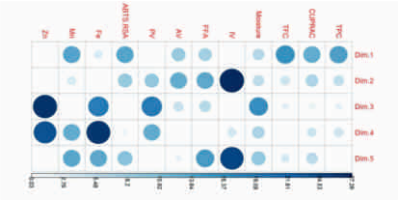


Fig. 10. Principal component loadings of quality attributes of virgin coconut oil (VCO) extracted by different methods

Pandiselvam R., Ramesh S.V., Manikantan M. R., Shameena Beegum, Hebbar K.B., Sandip Shil and Neenu S.

A Rapid Method for Estimation of Crude Protein and Fat in Coconut Milk

The protein content of the coconut milk was estimated and compared using Kjeldahl and Pynes methods. Though the Kjeldahl method is widely followed for protein analysis in food products it is time consuming especially for the liquid products as the liquid milk is required to be dried then digested for nitrogen estimation. High protein content of coconut milk observed in Kjeldahl method (8.78±0.04%) could be attributed to the relatively high fat content of coconut milk and other non-protein nitrogenous substances that might interfere in the estimation process. However, the protein content of coconut milk based on Pynes method (3.57±0.17%) was in accordance with the values reported elsewhere and in the scientific literature. Hence, it can be safely concluded that Pynes method-that indirectly measures the quantum of amino groups- would be a rapid method of choice to analyse the protein content.

A similar comparison was made for determination of crude fat content in coconut milk using Soxhlet and Rose-Gottlieb methods. The crude fat contents of coconut milk from respective methods are 35.78 ±0.75% and 39.94 ±0.43%. Rose-Gottlieb's method is quite expeditious as the protein component of coconut milk is dissolved in ammonia and precipitated using ethanol thereby organic solvents (diethyl ether or petroleum ether)-based extraction of fat becomes much easier and entails less time compared to Soxhlet-based fat estimation. Additionally, unlike the latter, Rose-Gottlieb's does not involve milk drying or relatively long extraction processes. The practical utility of this finding is that, henceforth, Rose-Gottlieb and Pynes methods could be utilized for the estimation of crude fat and protein in coconut milk-based frozen delicacies developed at ICAR-CPCRI.

Shameena Beegum P.P., Ramesh S.V., Manikantan M.R., Pandiselvam R., Jwala P. Nair and Hebbar K.B.

Coconut Milk Based Ice Cream

Coconut milk based ice cream formulation was made with coconut milk as the major ingredient along with milk powder, refined sugar and vanilla flavour. The processes involve mixing the dry ingredients such as refined sugar, stabilizers and emulsifiers, pasteurization of the ice cream mix i.e., dry ingredients, coconut milk and milk powder at 75°C for 15 min, homogenization at 2000psi, ageing at 4°C, freezing at -5°C and hardening at -28°C. The resultant products based on coconut milk and cow milk powder have 9.2 and 7.5% fat, 7.0 and 4.7% protein content respectively. The technology was commercialized to M/s. Dinesh Foods, Kannur, Kerala.

Manikantan M.R., Shameena Beegum P.P., Pandiselvam R., Ajeet Singh, Jwala, P. Nair and Hebbar K.B.

Antioxidant Potential of Frozen Coconut Delicacy

A protocol has been standardized for the estimation of antioxidant activity of frozen coconut delicacy (FCD) developed at ICAR- CPCRI. The coconut frozen delicacy comprises coconut milk, coconut sugar, tender coconut pulp and tender coconut water as major ingredients. Considering the nutraceutical potential of coconut ingredients it is pertinent to measure the total antioxidant capacity of FCD. Total anti-oxidant potential of FCD was estimated as ascorbic acid equivalent based on a colorimetric assay that determines the reduction of Mo (VI) to Mo (V) by the FCD extract and formation of a green phosphate Mo (V) complex at acidic pH. The procedure suggested by Khongjeamsiri et al., (2009) was modified. Briefly, extracts of FCD obtained with 57% ethanol and 57% methanol were found suitable for estimation of anti-oxidant activity and among them, 57% methanol extract could help to determine the complete anti-oxidant potential of FCD. Also, on the mechanical front, it was standardized that 60 sec of vortexing the sample with 57% methanol would suffice to yield maximum anti-oxidant activity. The antioxidant potential of FCD was found to be 203.61 mg ascorbic acid equivalent per 100g. This modified protocol could be useful in ascertaining the anti-oxidant potential of a premium product developed at ICAR-CPCRI.

Ramesh S.V., Shameena Beegum P.P., Manikantan M.R., Pandiselvam R., Jwala P. Nair and Hebbar K.B.

Engineering Properties of Extrudates Formulated from Coconut Milk Residue-Foxtail Millet Flour-Corn Flour-Rice Flour Mixtures

A three-numeric factor, three-level Box-Behnken design was adopted to study the effect of feed composition (foxtail millet flour: 10%, 20% and 30%), extrusion temperature (110, 120 and 130 °C) and screw speed (240, 252 and 264 RPM) on the engineering properties of extrudates such as expansion ratio, piece density, and bulk density. Expansion ratio of extrudates varied from 2.28 to 2.58, piece density ranged from 0.19 to 0.33 $g.cm^{-3}$ and bulk density varied from 0.09 to 0.24$g.cm^{-3}$. The expansion ratio values were low with a higher percentage of foxtail millet flour. The percentage of foxtail millet flour has a positive linear relationship with piece density and bulk density. Extrusion temperature and screw speed have shown a negative correlation with piece density and bulk density. The data obtained from the present study could be used for control of product characteristics and possible commercial production of extrudates from coconut milk residue-rice-corn-foxtail millet flour based formulations.

Pandiselvam R., Manikantan M. R., Shameena Beegum and Mathew A.C.

IMPORTANT EVENTS

Asia-Pacific Cocoa Breeders Working Group Meeting

Dr. N. Kumar, Vice Chancellor, Tamil Nadu Agricultural University (TNAU), Coimbatore, Tamil Nadu, inaugurated the Asia-Pacific Cocoa Breeders Working Group meeting, which was held during 20th – 25th May, 2019. Dr. N. Kumar, VC, TNAU in his inaugural address stressed the need to evolve cocoa hybrids with higher yields and resistance to pests and diseases. He also suggested the exchange of such hybrids among the countries to multiply locally for distribution to the farmers. High density planting of cocoa as a monocrop was suggested to experiment for an increase of productivity. The meeting was presided over by Dr. Venkatesh N. Hubballi, Director, Directorate of Cashewnut and Cocoa Development (DCCD), Kochi. Dr. Venkatesh N. Hubballi, in his presidential address, informed the international community that Indian cocoa beans are the best in the world. He called for close

linkage of research and development departments to fulfil the Hon'ble Prime Minister's vision to enhance area under cashew and cocoa, the poor man's crops.

Dr. Smilja Lambert, Cocoa Research Manager (Asia/Pacific), Mars Inc., briefed the gathering regarding the activities and breeding programmes of Asia-Pacific Cocoa Working Group.

Shri S.N. Bhat, Vice-President, CAMPCO, Dr. H.P. Maheswarappa, Project Coordinator, AICRP (Palms), Dr. J. Dilip Babu, Director of Research, Dr. YSR Horticultural University have felicitated the meeting. CAMPCO activities were highlighted by Shri SN Bhat. Highlighted the various brands of chocolates and the products from Cocoa. He highlighted the role played by the CAMPCO in the supply of seedlings and in the raw cocoa beans collection. Dr. Maheswarappa indicated the perspectives of area expansion and productivity improvement in cocoa needs the collaborative effort of researchers and development agencies including private companies in the field. Dr. Dilip Babu stressed the need for supply of good planting materials to the farmers in quickest possible time to support economic production.

Along with 31 delegates from ICAR-CPCRI, Kerala Agricultural University, Tamil Nadu Agricultural University and Dr. YSRHU, Andhra Pradesh, working on Cocoa research, 13 delegates from eight countries have participated in the meeting, including Australia, Indonesia, Malaysia, Philippines, Vietnam, USA, Belgium and Papua New Guinea.

Region specific prospects and problems in cocoa sector were discussed and breeding strategies in resilience with climate change perspectives were formulated during the meeting.

Inauguration of APCBWG international meet at ICAR-CPCRI, Kasaragod

Participants of the APCBWG meet at ICAR-CPCRI, Kasaragod

Workshop-cum-Training on Plant Health Management in Coconut

A Workshop-cum-Training on Plant Health Management in Coconut was organised at ICAR–CPCRI, Kasaragod on 14th May 2019 before the onset of south-west monsoon.

Farmers from Kasaragod district and extension personnel of the Department of Agriculture and Farmers' Welfare participated in the programme. Mrs. Tizamma Thomas, Principal Agricultural Officer, Kasaragod inaugurated the programme and Dr. K.B. Hebbar, Acting Head, Division of PB & PHT, presided over the inaugural function. Mr. A.A. Jaleel, President, Mogral Puthur grama panchayat released the publication on 'Incidence and intensity of pests and diseases of coconut in North Kerala, and offered felicitations. Mrs. Stella Jacob, Project Director, Agricultural Technology Management Agency (ATMA), Kasaragod also addressed the gathering in the inaugural function. After the presentations, group discussion on 'Strategies for scaling up the adoption of recommended technologies by coconut growers through appropriate interventions of State Dept. of Agriculture / ATMA / Local Self Governments' was held.

Release of the publication on 'Incidence and intensity of pests and diseases of coconut in North Kerala' during the Workshop-cum-Training on Plant Health Management in Coconut

Scheduled Castes Sub Plan (SCSP) Programmes

A meeting of the beneficiaries of the Scheduled Castes Sub Plan (SCSP) was organized by the Regional Station of ICAR-CPCRI, Kayamkulam on 13th June 2019 at the Krishi Vigyan Kendra, Kollam. Dr. K. Muralidharan, Acting Head of Division, Social Sciences, ICAR-CPCRI, Kasaragod inaugurated the SCSP activities of Kollam District. The meeting was presided over by Dr. Bindu P., Head, KVK, Kollam. There was an orientation training programme to the beneficiaries on apiculture and coconut palm climbing device. Forty-five SC-BPL beneficiaries from various parts of Kollam district attended the training programme.

ICAR-CPCRI, in collaboration with Niduvalli Grama Panchayat, Kadur Tk., Chikkamagaluru Dt., Karnataka organized a programme to launch Scheduled Caste Sub Plan (SCSP) in Uppinahalli Village of Niduvalli Grama Panchayat on 17th June 2019 for ameliorating the life of the scheduled caste communities of the panchayat by transferring various scientific technologies developed by the institute in the coconut sector and encouraging self-employment opportunities among the rural youths through organizing trainings, demonstrations, etc. Mrs. Bharatamma, President, Niduvalli Grama Panchayat, inaugurated the programme. More than 58 participants attended the programme.

Meeting of farmers of Niduvalli Village, Chickamagaluru, Karnataka

Annual Group Meet of AICRP on Palms

The 28th Annual Group Meeting of All India Coordianted Research Project on Palms was organized at Tamil Nadu Agricultural University, Coimbatore during 6th & 7th June 2019. The inaugural function was presided by Dr. N. Kumar, Vice-Chancellor, Tamil Nadu Agricultural University, Dr. W.S. Dhillon, Assistant Director General (Horticultural Science-II), ICAR, New Delhi was the Chief Guest. Dr. P. Rethinam, Former Executive Director, Asian and Pacific Coconut Community, Jakarta, Dr. R.K. Mathur, Director, ICAR-IIOPR, Pedavegi and Dr. K. Muralidharan, Acting Head, Division of Social Sciences, ICAR-CPCRI, Kasaragod were the guests of honour. Dr. H.P. Maheswarappa, Project Co-ordinator of AICRP (Palms), in his report briefed the mission and achievement of AICRP on five crops - coconut, oil palm, palmyrah, arecanut and cocoa distributed across 30 centres in the 14 states and one Union Territory under the 13 State Agricultural Universities, four ICAR Institutes and two central universities.

Inauguration of 28th Annual Group Meeting of AICRP on Palms at TNAU, Coimbatore

PUBLICATIONS

Research Articles

Gangadhara Naik, B., Maheshwarappa, H.P., Rajkumar, M., Kalleshwaraswamy, C.M., Gowdra Nagamma and Latha, S. 2019. Evaluation of entomopathogenic nematodes for the management of white grub, *Leucopholis lepidophora* Blanchard (Coleoptera: Scarabaeidae). *Journal of Entomology and Zoology Studies*, **7**(1): 9-13.

Hamid, A., Zhai, Y., Ramesh, S.V., Pappu, H.R. 2019. Complete genome characterization and population dynamics of *Potato virus Y*-NTN strain from India. *Virus Disease,* **30**(2): 252-260.

Jha, U.C., Kole, P.C., Singh, N.P., Shil, S., Kumar, H. 2018. GGE bi-plot analysis for grain yield in chickpea under normal and heat stress conditions. *Indian Journal of Agricultural Sciences*, **89**(4): 721–5.

Josephrajkumar, A., Chandrika Mohan, Merin Babu, Arya Krishna, Krishnakumar, V. Vinayaka Hegde and Chowdappa, P. 2019. First record of the invasive Bondar's Nesting Whitefly, *Paraleyrodes bondari* Peracchi on coconut from India. *Phytoparasitica* DOI 10.1007/s12600-019-00741-2.

Krishna Prakash, Sunil Kumar, K. and Rekha Chaudhury. 2018. Cryopreservation of kernel and zygotic embryos of oil palm *(Elaeis guineensis* Jacq.). *Journal of Plantation Crops*, **47** (1): 16-23.

Krishna Prakash, Rekha Chaudhury, Rohini, M.R., Badal Singh and Malik, S.K. 2019. Contrasting seed biology of two ornamental palms: Pygmy Date Palm (*Phoenix roebelenii* O'Brien) and Fishtail Palm (*Caryota urens* L.) and implications for their long-term conservation. *Indian Journal of Traditional Knowledge,* **18**(3): 477-484.

Mondal, D., Mandal, S., Shil, S., Sahana, N., Pandit, G.K. and Choudhury, A. 2019. Genome wide molecular evolution analysis of begomoviruses reveals unique diversification pattern in coat protein gene of Old World and New World viruses, *Virus Disease*, **30**(12): DOI:10.1007/s13337-019-00524-7.

Muralidharan, K., Subramanian, P., Mathew, A.C., Thamban, C., Jayasekhar, S., Krishnakumar, V. and Madhavan, K. 2019. Upscaling a coconut value chain: Empirical evidence from North Kerala. *International Journal of Innovative Horticulture*, **8** (1):72-80.

Ramesh, S.V., Govindasamy, V., Rajesh, M.K., Sabana, A.A. and Praveen, S. 2019. Stress responsive miRNAome of *Glycine max* (L.) Merrill: Molecular insights and way forward. *Planta,* **249**(5): 1267-1284.

Ramesh, S.V., Shivakumar, M., Ramteke, R., Bhatia, V.S., Chouhan, B.S., Goyal, S., Singh, A., Praveen, S., Gill, B.S., Chand, S. 2019. Quantification of a legume begomovirus to evaluate soybean genotypes for yellow mosaic disease (YMD) resistance. *Journal of Virological Methods* **268**: 24-31.

Shivaji H. Thube, Gagana Kumar Mahapatro, Chandrika Mohan, Thava Prakasa Pandian, R., Elain Apshara and Jose, C.T. 2019. Biology, feeding and oviposition preference of *Helopeltis theivora*, with notes on the differential distribution of species of the tea mosquito bug species complex across elevations. *Animal Biology, doi.org/10.1163/15707563-20191083*

Papers Presented in Seminars/Symposia/Conference/Workshops etc.

Rajkumar, Jagnathan, D., Shivaji Thube, Harsha, K., Sujithra, M. and Vinayaka Hegde. 2019. Application of *Steinernema carpocapsae* aqua formulation for integrated management of white grub infestation in areanut gardens of Western Ghats from Karnataka, India (Oral presentation). *In:* Book of Abstracts, 23rd Plantation Crops Symposium, 6–8th March, 2019 at Chikkamagaluru. P96.

Thomas, R.J., Shareefa, M., Nampoothiri, C.K. and Mathew, J. 2019. Evaluation of green dwarf varieties of coconut for tender nut purpose in the root (wilt) disease prevalent tract. *In: Proc. Provectus Plantae'19 (International Conference on Exploring the scope of Plant Genetic Resources)* 22-24th May 2019, Department of Botany, University of Kerala, Thiruvananthapuram, Kerala State. pp 416-419.

Popular Articles

Alka Gupta, Murali Gopal and Maheswarappa, H.P. 2019. Vermicomposting of stovers from baby corn, an intercrop of coconut garden. *Indian Coconut Journal,* **62**(1): 20-22.

Anithakumari, P. and Mohan, M. 2019. Let us regain the summer crops in coconut gardens. *Karshakasree*, **25** (4): 34-37.

Anithakumari, P., Shareefa, M., Indhuja, S. and Josephrajkumar, A. 2019. Kera Nanma - for coconut palms and farmers. *Indian Naleekera Journal,* **10** (5): 17-20.

Anithakumari, P., Shanida Beevi, Thejaswibhai and Priya K. Nair. 2019. Participatory technology delivery mechanisms for coconut farming communities. Indian Coconut Journal. **62** (1): 12 17.

Anithkumari, P. and Indhuja, S. 2019. Recycling for resource efficiency: A practical model for up scaling. *LEISA India* **21** (2): 33-36.

Haris, A.A., Thomas, R.J., Josephrajkumar, A. and Krishnakumar, V. 2019 *Mazhakala Paricharanam*: Thenginum Thaikalilum Appropriate planting of coconut seedlings in Monsoon (*In Malayalam*). *Kerala Karshakan,* **64** (11): 35-36.

Jissy George. 2019. Brining of raw jackfruit. *Karshakashree,* 2**5** (4): 56-58.

Jissy George. 2019. Value added products from honey. *Karshakashree,* **25** (5): 82.

Jissy George. 2019. Value added products from jack seeds. *Karshakashree,* **25** (6): 70.

Josephrajkumar, A., Thamban, C. and Beegum, S. 2019. Barn owl for rodent management in Lakshadweep Islands. *Indian Coconut Journal,* **51** (12): 25-26.

Kalavathi, S. and Haris,A.A. 2019. Indigenous Technical Knowledge on Coconut. *Indian Naleekera Journal,* **10** (4): 14-17.

Mathew, J., Krishnakumar, V., Indhuja, S. and Haris, A.A. 2019. Nutrient management in coconut for sustaining productivity. *Indian Coconut Journal,* **62** (2): 12-19.

Nihad, K. 2019. Bush Jasmine as a profitable farming enterprise. *Krishi Jagaran,* **3** (6): 36-37.

Nihad, K., Haris, A.A., Krishnakumar, V. and Bhat, R. 2019. Fodder as Intercrop in coconut garden under Mixed Farming System. *Indian Coconut Journal,* **52** (2): 20-22.

Nihad,K., Krishnakumar, V., Haris, A.A. and Bhat, R. 2019. *Heliconia stricta* 'Iris'- An ornamental intercrop for shaded plantations. *Indian Coconut Journal,* **51** (12): 13-15.

Nihad, K., Krishnakumar, V., Haris, A.A. and Bhat, R.. 2019. Heliconia for income maximization from coconut garden, *Indian Naleekera Journal* **10** (4):20-23.

Rajkumar, Jagnathan, D., Shivaji Thube, Nagraj, N. R. and Vinayaka Hegde and Ravi Bhat. 2019. Management of root grub in arecanut with entomopathogenic nematodes – A success story. *Indian Journal of Arecanut, Spices and Medicinal plants*, 20 (3):8-14.

Samsudeen, K. and Thamban, C. 2019. Planting material production in coconut: status and strategies. *Indian Coconut Journal,* **62**(2): 5-11.

Sit, A.K. 2019. Supari Vittik Mishra Chas (Arecanut based cropping system). *The Anonada Bazar Patrika,* 20th June, 2019. p. K4.

Sit, A.K. 2019. Uttor Bonge Orthokori Cocoa Chash (Cocoa cultivation in Northbengal). *The Anonada Bazar Patrika,* 6th May, 2019. p. K4

Sivakumar, T. 2019. Mango fruit fly-integrated management. *Karshakan*, **27**(6): 49-50.

Sivakumar, T. 2019. Vegetable crop protection practices in summer season. *Karshakan*, **27**(4): 56-58.

Subramanian, P., Surekha, R., Bhat Ravi and Thamban, C. 2019. Fodder grass cultivation in coconut garden. *Indian Coconut Journal*, **62** (1): 17-19.

Thamban, C. and Subramanian, P. 2019. Thenginthoppil June maasathile krishippanikal (in Malayalam). *Indian Nalikera Journal*, **10**(5): 30-34.

Thamban, C., Samsudeen, K., Shameena Beegum, and Jerard, B.A. Lakshadweepile krishivikasanam: prasnangalum, saadhyathakalum (in Malayalam). *Indian Nalikera Journal*, **10** (5): 5-11.

Thamban, C., Subramanian, P., and Joseph Rajkumar. 2019. Cultivation practices for coconut-May. *Indian Coconut Journal,* **61**(12): 33-36.

Thamban, C., Subramanian, P., and Joseph Rajkumar. 2019. Thenginthoppil May maasathile krishippanikal (in Malayalam). *Indian Nalikera Journal,* **10**(4): 31-34.

Thamban, C., Subramanian, P., and Joseph Rajkumar. 2019.Cultivation practices for coconut –June. *Indian Coconut Journal,* **62**(1): 31-36.

Thomas, R.J., Shareefa, M., Sunayana, S., Sreelekshmi, J. S. and Anes, K.M. 2019. Vikendreekritha nursey vazhi ini oro jillakkum swantham thengukal (*In Malayalam*). *Indian Nalikera Journal* **10** (4):11-13.

Book Chapters

Josephrajkumar, A., Chandrika Mohan, Prathibha, P.S., Rajkumar, Nalinakumari, T. and Nair, C.P.R. 2019. Pest Dynamics and Suppression Strategies. *In:* Nampoothiri, K.U.K., Krishnakumar, V., Thampan, P.K., Achuthan Nair, M. (Eds). The coconut palm (*Cocos nucifera* L.) - Research and Development Perspectives. Springer. pp. 557-634.

Training Manual

Anes, K.M., Nihad, K., Kalavathi, S., Joseph, P.J. and Krishnakumar, V. 2019. *Compendium of lecture notes, Diploma in Agricultural Extension Services for Input Dealers (DAESI), Volume -1*, ICAR-CPCRI, Regional Station, Kayamkulam, 118 p.

Anes, K.M., Nihad, K., Kalavathi, S. and Joseph, P.J. 2019. *Practical manual on 'Crop protection, DAESI'*, ICAR-CPCRI, Regional Station, Kayamkulam, 10 p.

HUMAN RESOURCE DEVELOPMENT

Awards/Honours

Dr. R. Sudha, Dr. V. Niral, Dr. K.B. Hebbar, Dr. K. Samsudeen and Ms. Ranjini, T.N, were conferred with Best Oral Presentation Award for the paper entitled "Evaluation of coconut genotypes for coconut inflorescence sap yield" during 9th International Conference on Agriculture, Horticulture and Plant Science organized by The Society of Tropical Agriculture, New Delhi held at Dharamshala, Himachal Pradesh from 27-28th June, 2019.

Dr. P. Muralidharan, and Dr. S. Ravi, were conferred with the best poster presentation award for the poster on "Climate resilient technologies for sustainable poultry rearing in flood affected areas of Kuttanad, Kerala" in the Annual Review Workshop of Technology Demonstration component of NICRA held at ICAR-CRIDA, Hyderabad from 4th to 6th June, 2019.

Ph.D. Awarded

Dr. Anok Uchoi has been awarded doctoral degree from the department of Spices and Plantation Crops, Tamil Nadu Agricultural University (TNAU), Coimbatore, for his thesis entitled "Studies on effect of Pre and post harvest treatments on yield and quality of cocoa (*Theobroma cacao* L.) under the guidance of Dr. N. Shoba, Professor (Hort.)., TNAU.

Distinguished Visitors

Dr. S. Bhaskar, ADG (AAF&AM), New Delhi visited ICAR-CPCRI, Kasaragod on 6th April, 2019

Smt. V. Usha Rani IAS, Chairperson, Coconut Development Board visiting ICAR-CPCRI, RC, Kahikuchi on 17th May, 2019.

TRANSFER OF TECHNOLOGY

Training Programmes

Training for Sri Lankan delegates

Familiarisation visit programme was conducted at ICAR-CPCRI Kasaragod on 17th May 2019 for a team of Field Extension Officers, Coconut Cultivation Board, Sri Lanka in collaboration with Indian Institute of Plantation Management Bengaluru under the Special International Programme on Sustainable Plantation Management.

Field Extension Officers, Coconut Cultivation Board, Sri Lanka with resource persons

Field visit of Field Extension Officers, Coconut Cultivation Board, Sri Lanka

Training Programme on Production of *Trichoderma* Coir Pith Cake

Training programme on "Production of *Trichoderma* coir pith cake" was conducted for technicians of Agro service center and Karshika Karma Sena from Pinarayi panchayath, Kannur district during 8th and 9th April 2019 at ICAR-CPCRI, Kasaragod. Five technicians from Agro service center and Karshika Karma Sena were participated in the training programme. The *Trichoderma* coir pith cake technology was transferred to Agro Service Center, Pinarayi panchayath, Kannur by MoA with the Institute.

Training programme on Production of *Trichoderma* coir pith cake

Off Campus Programmes

An interactive session of 'Community extension approaches and group methods among coconut farming community' was conducted for Thanal Coconut Producers Society, Kandalloor on 28th June 2019 for 42 farmers.

Refresher Training Programme on Hybridization Technique in Coconut

Refresher training programme on 'Hybridization technique in coconut' for Officials from Coconut Development Board was conducted during 11-15th June, 2019 at ICAR-CPCRI, Kasaragod. Nineteen CDB officials from different states *viz*., Kerala, Karnataka, Andhra Pradesh, Tamil Nadu, Bihar, Odisha, Assam and Chhattisgarh were participated in the training programme.

Release of Training Manual by
Mrs. Usha Rani, IAS Chairperson, CDB

Participants and resource persons of training programme on hybridization techniques in coonut

Entrepreneurship Development Programme on Value Chain in Coconut

An Entrepreneurship Development Programme (EDP) sponsored by National Horticulture Board for the selected young farmers and entrepreneurs from Lakshadweep islands on 'Value chain in coconut' was conducted at ICAR-CPCRI, Kasaragod during 29th April 2019 to 16th May 2019. Dr. K. N. Satheeshan, Associate Director of Research, Regional Agricultural Research Station, Pilicode inaugurated the programme. Dr. Ariz Ahammed IAS, Managing Director, National Horticulture Board, interacted with the participants of the programme on 16th May, 2019.

Dr. Ariz Ahamed IAS MD, NHB with the participants of EDP

Technology Empowerment and Upskilling of Agro-service Technicians

As part of the flagship programme funded by Bharanikavu Block Panchayat titled 'Participatory rejuvenation and refinement of coconut based homestead system models for food security and income' a technology empowerment and up skilling of Agro-Service Technicians was conducted at the Regional Station, Kayamkulam on 30th May 2019 which was attended by 17 team members.

ATMA interstate training programme on 'Crop management and value addition in coconut' for 20 farmers from Kinathukadavu block, Tamil Nadu was conducted at ICAR-CPCRI, Kasaragod during 18-20 June 2019.

A farm training programme was conducted on 17th May, 2019 on arecanut based cropping system at ICAR-CPCRI, Research Centre, Mohitnagar. A total of 60 farmers of Sadar Block of Jalpaiguri district attended the programme.

Exposure Visits

A total of 255 farmers, 43 extension personnel and 732 students visited ICAR-CPCRI Kasaragod. The visiting stakeholders were provided exposure on activities and research achievements of the Institute.

Forty farmers from Punalur, Kollam district attended one day orientation on 'Health Management in Coconut' on 3rd April 2019 and 51 farmers from Thodupuzha, Idukki district attended one day training on 'Pest and Disease Management of Coconut' on 8th April 2019 at ICAR-CPCRI, Regional Station, Kayamkulam.

As a part of 'Technology outreach in Plantation Sector', a team of four officials from Garo Hills, Meghalaya under the leadership of Sri. Marcus D. Sagma,

A total of 255 farmers, 43 extension personnel and 732 students visited ICAR-CPCRI Kasaragod. The visiting stakeholders were provided exposure on activities and research achievements of the Institute.

Forty farmers from Punalur, Kollam district attended one day orientation on 'Health Management in Coconut' on 3rd April 2019 and 51 farmers from Thodupuzha, Idukki district attended one day training on 'Pest and Disease Management of Coconut' on 8th April 2019 at ICAR-CPCRI, Regional Station, Kayamkulam.

As a part of 'Technology outreach in Plantation Sector', a team of four officials from Garo Hills, Meghalaya under the leadership of Sri. Marcus D. Sagma, Horticulture Inspector, and other members Smt. Nerren Ch. Sangma, District Horticulture Officer, Smt. Alinaro Ch. Momin, DHO and Sri. Hilberth, Ch. Marak, Horticulture Development Officer visited ICAR-CPCRI, Regional Station, Kayamkulam on 16th May, 2019.

Thirty trainee teachers from SNTTI, Karunagappally (Kollam District) and 25 B.Sc. (Botany) students from St. Thomas College, Ranni (Pathanamthitta District) visited ICAR-CPCRI, RS, Kayamkulam on 16th April 2019 and 26th June 2019, respectively.

Training Cum Exposure Visit on 'Advances in arecanut and cocoa production & processing technology' was conducted for 45 Officers and Farmers from DISHA Trust (R), Kaikamba, Kannikambla, Dakshina Kannada Dt. on 2nd April 2019, *seven* staff's and 33 students from Abhimata TV, Moodubidire, on 22nd April 2019 and DGM and 40 officers from BIRD (NABARD), Mangaluru, Dakshina Kannada, on 28th *May* 2019 at ICAR-CPCRI, Regional Station, Vittal.

An exposure visit of 21 farmers from different districts of Mizoram was held on 25th May, 2019 on scientific cultivation practices of arecanut, coconut and cocoa to ICAR-CPCRI, RC, Kahikuchi.

Two students of fourth year of College of Horticulture and forestry, CAU, Imphal visited ICAR-CPCRI, Research Centre, Mohitnagar as a part of their Educational tour on 19th June, 2019 and 16 UG student with three faculty members of Siliguri College under University of North Bengal visited Mohitnagar as a part of their excursion and collection of plant samples.

Farmer Field School

An interactive session on Poultry clusters and market led extension in poultry at Pathiyoor Veterinary Hospital hall on 25th April 2019 which was inaugurated by Mr. Prabhakaran V., President, Pathiyoor grama panchayath. A total of 59 poultry farmers attended the meeting.

Dr. Ravi Bhat, Acting Head of the Division of Crop Production conducted a diagnostic field visit on yellow leaf disease of arecanut, to farmers garden in Siddapur Taluk of Uttara Kannda District on 13th May, 2019.

Farmer Field school (FFS) session has been organized at Cherunniyoor Krishibhavan for 25 FFS participants on diagnosis of field problems and scientific management for improving health and yield of coconut palms. A meeting of the FFP farmers conducted for the formation of farmer Producers Organization (FPO) for the sustainability of the FFP interventions and ensuring continued income through better marketing at pathiyoor on 6th June 2019.

Another Farmer Field Schools (FFS) session has been organized on 12th June 2019 for inauguration of seednut sowing under the Kera Nanma programme at Chunakkara panchayath in which 38 coconut farmers attended. One more interactive session of 'Community extension approaches

Hands on training on vermicomposting

and group methods among coconut farming community' has been conducted for the Thanal Coconut producers Society, Kandalloor on 28th June 2019 for 42 farmers.

A training programme on 'Fish farming in homestead ponds' organized on 18th June 2019 at PHC hall, in which 69 FFP fish farmers attended.

Exhibitions

Participated in Kanakotsavam during 5th – 15th April, 2019 at Kanakakunnu Palace, Thiruvananthapuram.

Radio Talks/TV Programme Telecast

Dr. V. Krishnakumar, Acting Head, ICAR-CPCRI, RS, Kayamkulam delivered a radio talk on 'Care while planting coconut seedlings' broadcast from All India Radio, Thiruvananthapuram on 27th May 2019.

ICAR-Krishi Vigyan Kendra, Kasaragod

Frontline Demonstrations

ICAR KVK, Kasaragod has initiated four frontline demonstrations including high yielding variety of paddy Pournami MO 23 and high yielding fodder grass Sampoorna at Karichery, Panayal village, hybrid cashew H 130 at Sheni village of Enmakaje panchayat, drum seeder at Kolavayal and Zero till seed cum fertilizer drill for line sowing of paddy at Mogral Puthur and Kolavayal Padasekharams.

Zero till seed cum fertilizer drill demonstration at Mogral Puthur

Training Programmes

Seventeen on campus and five off-campus trainings for the benefit of 396 participants (210 men and 186 women) comprising of farmers, farm women, rural youth and members of self help groups. The various topics were neera processing, value addition of honey, stingless beekeeping, mechanised coconut climbing, mushroom training, jackfruit processing and goat rearing, arecanut leaf sheath plate making, paddy mechanization and mat nursery preparation.

Special emphasis was given to seasonal fruit preservation. Important training programmes conducted include "Entrepreneur Development Programme on Processing of Seasonal fruits" wherein underutilized fruit such as kokum with high nutraceutical properties, pineapple, grapes, lemon and orange were processed to create income generation through group activity. Members of "Evergreen food security group" of Puthige panchayath processed a large quantity of kokum syrup, kokum squash, dehydrated kokum, orange squash, grape syrup, lemon squash, pineapple squash, and earned a net profit of around Rs. 25,000/- through sales promoted by KVK.

Skill development training on fruit processing was imparted to Mellisa Honey Group and bulk processing of Mango squash, jackfruit squash and amla squash was taken up. Bulk processing and sale of Amla squash were also taken up by "Nisarga Agro Products, Vorkady a women's group. Skill oriented training on "Mechanical coconut climbing was imparted with a participation of 10 young men and five women participants wherein coconut climbing device was given to the trainees.

Extension programmes conducted /coordinate include Farmers visit KVK from Dakshina Kannada, Puttur, Karnataka and Palakkad. Technologies related to food processing and activities of KVK was imparted. Also coordinated participation of women beneficiaries exhibition held at Kannur.

Farmers' Exposure Visits

A team of 23 goat farmers were lead to RARS, Pilicode Goatery as a part of goat rearing training programme organized under the guidance of Dr. Chandrababu, Veterinary Surgeon.

Foot and Mouth Disease Awareness Campaign

An awareness campaign on FMD management was organized at Perladukkam, Bedadukka panchayat on 27th June, 2019. Dr Vineetha, Veterinary surgeon spoke on the subject, followed by a farmer – expert interaction. Around 40 dairy farmers attended the programme.

Farmer Exposure Through Mass Media

KVK in collaboration with All India Radio, Kannur FM station and Prasar Bharati conducted Kissan Vani – KVK Farmer profile series. This was aimed at giving wider publicity to the success stories of the master farmers including Shri K.M. George of Rajapuram for his purely organic mixed farming with harvested rainwater as the sole source of irrigation throughout the year. The farmer has 7 tanks of capacities ranging from 40000 to 4 lakh litres in his farm. Some of these tanks are utilized additionally for fish farming too. Another farmer was Shri Unnikrishnan of Nileswaram highlighted for his highly developed Mushroom and Spawn production units.

NFSM Programme on Green Gram

The demonstration of high yielding green gram var BGS 9 was carried out in Kolavayal, Kalluvarambath and Periya Padasekharams. The programme was highly successful and obtained wide coverage in print and visual media throughout Kerala. In Kolavayal, a record harvest of 11 quintals per ha was obtained. A Harvest festival was organized on the 25th of May, 2019.

Training on Beekeeping

A training programme on stingless beekeeping has been conducted on 27th May, 2019, inaugurated by Dr. Anitha Karun, Acting Director, ICAR-CPCRI, Kasaragod. Training was conducted by the master trainer Shri Charlie Mathew, President, Kasaragod Rural Development Society, Kolichal. The programme was convened by Dr. S. Leena, SMS, KVK, in which around 70 farmers participated.

ICAR-Krishi Vigyan Kendra, Alappuzha

Harvest festival and field day of technology demonstration in paddy at Thalavady

Harvest festival in connection NICRA technology demonstration on "Resource conserving and eco-friendly technologies in paddy" was organised at Chootumali Padasekharam in Thalavady panchayath on 6th April 2019. Dr. P. Muralidharan, Head, KVK; P.K. Verghese (Standing Committee chairman and member, Thalavady Grama panchayth); Smt. Remya Premkumar, Agrl. Asst, KB, Thalavady addressed the farmers on the occasion. Partner farmers shared their experience which inspired about fifty farmers who participated in the programme. Dr. T. Sivakumar, Mr. Rajeev M.S., Dr. S. Ravi and Dr. Sajnanath K. (SMSs, KVK) also attended the function.

Paddy harvest fest at Thalavady under NICRA

Field Days

A Field Day of frontline demonstration (FLD) on 'Scientific sesamum cultivation with moisture management' implemented at Vallikunnam panchayath involving 20 partner farmers was conducted on 10th April 2019. The technology demonstrated involves use of Thilarani - high yielding sesamum variety released by OARS, Kayamkulam and sprinkler irrigation at different critical stages.

A Field day of the FLD on 'Male calf rearing for increasing dairy farm income' and 'Kadaknath breed of poultry for high value meat and egg production in backyard system' was conducted on 27th April 2019 at Vallikunnam.

A Field day of FLD on 'Use of multinutrient mix for Onattukara soils in Cowpea' was conducted in Krishi Bhavan, Thamarakulam on 30th April 2019. A total of 52 persons including partner farmers, vegetable cluster members and KB officials participated.

A FLD on "Scientific apiculture techniques for doubling income from rubber plantations" was concluded with a field day on 1st May 2019 at Vallikunnam. Mr. B. Sunil, Manager, Horticorp, was the chief guest. He explained different apiculture promotion schemes of Horticorp, the leading Govt. of Kerala agency for apiculture.

Multinutrient mix for cowpea

Beekeeping

A Field day of the FLD on 'Nutri-gardens for year round nutritional security in Anganwadies' was conducted on 2nd May 2019 at Thamarakkulam.

A Field day of the FLD on "Eco friendly disease management in betel vine" was conducted at Thamarakulam on 3rd May 2019. Betel vine farmers from all over the panchayath participated in the programme.

A Field Day on FLD 'Cluster based integrated pest management practices against mango fruit fly' was conducted on 19th June 2019 at Vallikunnam. Persons including Partner farmers, peoples' representatives and department officials participated in the programme.

Mango fruitfly management

Scientific sesamum cultivation

Scientific vegetable cultivation

Training Programmes

During the period organized 16 training programmes benefitting a total number of 338 farmers/rural youths. The details of the training programmes were as follows:

Training	No. of Programmes	Participants		
		Men	Women	Total
On campus	4	45	30	75
Off campus	10	96	124	220
Sponsored	2	18	25	43
TOTAL	**16**	**159**	**179**	**338**

Extension Activities

Extension activities during the period include helpline service – 653nos; Agro-clinic – 132; soil testing campaign – 3 nos; Seminar – 1 no.; method demonstration- 5 nos.; film shows-2 nos.; radio coverages – 4nos; soil and water testings - 46 nos. and newspaper coverage – 6 nos.

MERA GAON - MERA GAURAV

As part of Mera Gaon - Mera Gaurav initiative a class as well as method demonstration session on Integrated plant health management in arecanut was conducted at Karicheri, Pallikkara Village of Kanhangad block. The team from CPCRI consisting Dr. Ravi Bhat, Dr. V. Selvamavi, Dr. M. Neema, Mr. Manikantan, Dr. Daliyamol and Mr. Raghavan conducted the class and demonstration. Dr. Daliyamol, scientist, Division of Plant Protection, CPCRI Kasaragod explained various diseases and pests of arecanut and their eco-friendly management techniques. The information on soil health management for increased arecanut production was also given. A demonstration of Bordeaux mixture preparation for effective management of 'Mahali' disease in arecanut was also done. The farmers got many of their doubts clarified regarding arecanut cultivation. About 50 farmers attended the programme.

The farmer-participatory and scientist linked coconut seedlings production programme, as part of MGMG, was expanded to nearby panchayats such as Chunakara, Valikunnam as "*Kera Nanma*" programme and has made good impact among farmers to be self sufficient on the demand of seedlings. Value addition in jack and mushroom processing using women SHG's has taken shape into small production units making them profitable and self sustainable. Technology integration for inclusive farming was showcased at Cherthala using coconut farming in synergy with fisheries and vegetable production centres. Scientists have transformed the respective villages more knowledge centric, risk-bearing and developing profit making secondary agriculture units.

A diagnostic field visit under Mera Gaon Mera Gaurav has been conducted to the villages viz., Palthady, Balpa and Kokkada from ICAR-CPCRI, Regional station, Vittal.

SUCCESS STORY

Impact of Institute Technologies

The technology on 'Kera Probio' developed by ICAR CPCRI for coconut farmers could be popularized reducing the time gap in technology dissemination and utilization and benefitted 1500 farmers of Thriruvananthapuram, Kollam and Alappuzha districts through model Farmer- Scientist-Community participation in the farmer FIRST program (FFP). The technology was formally transferred to 'Kalpakam Kera Probio Production Unit' of seven rural youths of Pathiyoor Grama Panchayath during July 2018 followed by intensive training at microbiology laboratory of ICAR CPCRI, Kasaragod. The unit established the laboratory for Kera Probio production in Ward 19 of Pathiyoor and produced 4.8 tons of Kera Probio of excellent quality parameters. The process was facilitated by the institute in terms of protocols followed quality of the produce, packing and technical backstopping. The unit mobilized 65 per cent of the expenditure for setting up the laboratory and production process and functioning as a success story of science based entrepreneurship by rural youths which are set to develop as a start-up venture.

Dr. Anitha Karun, Acting Director releasing Kera Probio to the farming community

COMMERCIALIZATION OF TECHNOLOGY

During the period from April to June 2019, 9 numbers of technologies were commercialised by the Institute to enrepreneurs through MoA as per the details given below, an amount of Rs. 2,47,500/- have been collected as technology transfer fees.·

Name of Technology	Date	Amount (Rs.)	Name of Licensee
Matured coconut water based value added products	02-04-2019	15,000	Mrs. Shani V., P.O. Nirmalagiri, Kannur District, Kerala – 670701
	15-05-2019	15,000	Mr. Santhosh N., Ganapathy, Coimbatore – 641006
Trichoderma Coir Pith Cake	09-04-2019	5,000	Secretary, Agro service Centre, Pinarayi, Kannur, Kerala
	17-06-2019	5,000	Agricultural Officer, Krishi Bhavan, Anad, Thiruvananthapuram.
Virgin coconut oil	10-05-2019	40,000	Mr. Sreeraj K.M., Muvattupuzha, Ernakulam, Kerala – 686673
	13-05-2019	40,000	Nischal Industries, Mathodu (Hobli), Hosadurga (Tq), Chitradurga (Dist), Karnataka - 577533
Collection of fresh and hygienic Kalparasa and production of natural coconut sugar	04-06-2019	1,00,000	M/s Udupi Kalparasa Coconut and All Spices Producer Company Limited, Main Road, Kundapura Udupi, Karnataka - 576201
Coconut Chips	21-06-2019	25,000	M/s Roligt Foods Pvt. Ltd., Malakpet, Hyderabad, Telangana – 500034
Snowball Tendernut Machine	21-06-2019	2,500	-do-
	Total	**2,47,500**	

Participation of Scientists In Seminar, Symposia, Conference And Workshops

Name & Designation	Title of Programme	Place & Date
Dr. Anitha Karun, Acting Director, Dr. K. Muralidharan, Dr. Ravi Bhat, Dr. K.B. Hebbar, Dr. Vinayaka Hegde, Acting Heads of Division, Dr. H.P. Maheshwarappa, Acting PC (Palms), Dr. C.T. Jose, Acting Head, RS, Vittal, Dr. V. Niral, Dr. M.K. Rajesh, Dr. K. Samsudeen, Dr. Elain Apshara, Dr. M.R. Manikantan, Pr. Scientists, Dr. M. Senthil Amudhan, Dr. S. Jayasekhar, Sr. Scientists, V.H. Pratibha, Dr. R. Sudha, Dr. Neema M., Dr. Nagaraja N.R., Dr. Shivaji Hausrao Thube, Dr. R. Thava Praksh Pandian, Dr. Ms. Ranjini T.N., Dr. Pandiselvam R., Dr. Krishna Prakash, Scientists	International Meet on Asia Pacific Cocoa Breeders Working Group	ICAR-CPCRI, Kasaragod 20th-25th May 2019
Dr. K. Muralidharan, Dr. K.B. Hebbar, Dr. Ravi Bhat, Acting Heads of Division	International Conference on Innovative Horticulture and Value Chain Management – Shaping Future Horticulture	GBPUA&T, Pantnagar, Uttarakhand 28th-31st May, 2019
Dr. Ravi Bhat, Dr. Vinayaka Hegde, Dr. K.B. Hebbar, Dr. K. Muralidharan, Acting Heads of Division, Dr. V. Krishnakumar, Dr. C.T. Jose, Acting Head, RS's, Dr. P. Subramanian, Dr. V. Niral, Dr. Elain Apshara, Dr. Josephrajkumar, Dr. Regi J. Thomas, Pr. Scientists, Dr. M. Senthil Amudhan, Sr. Scientist, Dr. Nagaraja N.R., Dr. Shivaji Hausrao Thube, Dr. R. Thava Praksh Pandian, Dr. Priya, U.K., Ms. Saneera, E.K., Ms. Suchithra, M. and Dr. Merin Babu, Scientists	28th Annual Group Meeting of "All India Coordinated Research Project on Palms"	TNAU Coimbatore 6th-7th June 2019
Dr. P. Muralidharan, Principal Scientist and Head, KVK Alappuzha	Annual Review meeting of KVKs of Zone XI	KVK, Chikkmagaluru 14th-16th May, 2019
Dr. P. Muralidharan, Principal Scientist and Head, KVK Alappuzha	NICRA Annual Review Workshop	ICAR-CRIDA, Hyderabad 4th-6th June, 2019
Dr. R. Sudha, Scientist	9th International Conference on Agriculture, Horticulture and Plant Science	Dharamshala (H.P) 27th-28th June, 2019
Dr. C. Thamban, Pr. Scientist	State level workshop on 'Agro-biodiversity conservation'	Kerala State Bio-diversity Board, Thiruvananthapuram on 5th June 2019.
Dr. Arun Kumar Sit, Pr. Scientist	Zonal Workshop of KVK	UBKV, Pondibari, Coochbehar, West Bengal 8th June, 2019
Dr. V. Krishnakumar, Acting Head, RS, Kayamkulam, Dr. Jeena Mathew, Scientist	National Workshop on 'Fertilizer policy for promoting balanced use of nutrients' organized by FAI	Thiruvananthapuram 21st June 2019
Dr. Chandrika Mohan, Pr. Scientist	28th Annual workshop of AICRP on Biological Control of crop pests	Anand Agricultural University, Anand, Gujarat, 6th-7th June 2019

CELEBRATION

World Environment Day

Celebration of World Environment Day

KVK in collaboration with Social Forestry Division of Kasaragod celebrated the World Environment Day at Kolavayal and Karicheri villages. The programmes were inaugurated by Dr. Anitha Karun, Director, ICAR CPCRI, Kasaragod and Dr. Ravi Bhat, Head, Crop Production Division, ICAR CPCRI, Kasaragod respectively. During the programmes 2000 saplings of various fruit and shade trees were distributed to 250 farmers.

Dr. Anitha Karun,
Acting Director inaugurating
World Environment Day
at Kolavayal, Kasaragod

World Environment Day was celebrated ICAR-CPCRI with a seminar on 'Organic connection with coconut fostering ecological sustainability and air purification" on 14th June, 2019 at Regional Station, Kayamkulam, supported by KSCSTE, Thiruvananthapuram. About 80 students from ten colleges participated in the programme. Dr. V. Krishnakumar, Acting Head inaugurated the seminar in which Dr. R.C. Pandalai, Former Head, KFRI, Peechi was the Chief Guest. Shri. G.S. Hareesh Nair, CAO distributed tree saplings to the student participants.

Inauguration of
World Environment Day
at ICAR-CPCRI, RS, Kayamkulam

International Yoga Day

International Day of Yoga was celebrated at ICAR-CPCRI, Kasaragod on 21st June 2019. On the occasion, Dr. Pramod Tadapatri, Physics lecturer, PU College, Alike and Shri. Shameer, Ayurveda and Spa trainer at Hybusak University, Armenia have demonstrated a yoga session with a few basic steps of Upa-Yoga for the well beings. Staff members participated in the yoga session.

International Yoga Day was celebrated on 21st June, 2019 at ICAR-CPCRI, RS, Vittal. Dr. S. Elain Apshara, Principal Scientist (Hort.) of this station conducted the Yoga Session and enlightened the participants on the values of Yoga in maintaining physical, mental and spiritual health and betterment of day to day life. All the staff members actively participated and benefitted by the Yoga program.

Yoga Day at ICAR-CPCRI, Kasaragod

Festival of Yoga and Well-being was organized at ICAR-CPCRI, Regional Station, Kayamkulam during the eve of 5th International Day of Yoga on 21st June, 2019. The programme included Quiz competition, Essay writing competition, Lecture and demonstration cum practice of yogasanas. Officers, staff and students of the Regional Station actively participated in various events.

International Yoga Day, was observed at ICAR-CPCRI RC, Kahikuchi on 21st June, 2019.

Yoga Demonstration cum Practical
Session at ICAR-CPCRI, RS, Kayamkulam

The International Day of Yoga was celebrated at ICAR-CPCRI, Research Centre, Mohitnagar on 22nd June, 2019. All the staff participated in Yoga practice session.

Yoga Day at ICAR-CPCRI, RS, Vittal

OTHER INFORMATION

Swachh Bharat

The staff members of ICAR-CPCRI, Regional Station, Kayamkulam actively participated in the sanitation and cleaning drive as part of Swachh Bharat Campaign on 30th April, 22nd May and 19th June, 2019. The overgrown weeds and bushes around canteen, office main garden and boundary of Block I were cleared during the programme.

Staff involved in Swachh Bharat programme at ICAR-CPCRI, RS, Kayamkulam

PERSONALIA

Appointment

Name	Designation	Place	Date
Smt. Ashamol E.P.	Technician	ICAR-CPCRI, Kasaragod	25.04.2019
Shri Lagesh K.P.	Technician (Driver)	ICAR-KVK, Kasaragod	26.04.2019
Shri Vivek Singh	Stenographer Grade-III	ICAR-CPCRI RS Vittal	29.04.2019
Shri Anurag Meena	Stenographer Grade-III	ICAR-KVK, Kasaragod	30.04.2019
Shri Suvith P.S.	Technician	ICAR-CPCRI, Kasaragod	01.05.2019
Shri Ajith Kumar R.	Technician	ICAR-CPCRI, Kasaragod	01.05.2019
Shri Sajin B.J	Technician (Driver)	ICAR-KVK, Alappuzha	10.05.2019
Shri Vineeth V.S.	Technician	ICAR-CPCRI RS Vittal	27.05.2019

Promotions

Name of the Staff	From (Designation)	To (Designation)	w.e.f
Dr. Shareefa M.	Scientist (Horticulture) ICAR-CPCRI, RS, Kayamkulam	Sr. Scientist, (Horticulture) ICAR-CPCRI, RS, Kayamkulam	10.02.2018
Dr. Nihad K.	Scientist (Horticulture) ICAR-CPCRI, RS, Kayamkulam	Sr. Scientist (Horticulture) ICAR-CPCRI, RS, Kayamkulam	21.05.2018
Dr. R. Sudha.	Scientist (Fruit Science) ICAR-CPCRI, Kasaragod	Sr. Scientist (Fruit Science) ICAR-CPCRI, Kasaragod	14.09.2017
Dr. Neenu S.	Scientist (Soil Science) ICAR-CPCRI, Kasaragod	Sr. Scientist (Soil Science) ICAR-CPCRI, Kasaragod	21.04.2018
Dr. S. Paulraj,	Scientist (Microbiology) ICAR-CPCRI, Kasaragod	Sr. Scientist (Microbiology) ICAR-CPCRI, Kasaragod	08.01.2017
Dr. Selvamani V.	Scientist (Soil Science) ICAR-CPCRI, Kasaragod	Sr. Scientist (Soil Science) ICAR-CPCRI, Kasaragod	08.01.2017
Smt. Sugatha Padmanabhan,	Sr. Technical officer	Asst. Chief Technical Officer	01.01.2010

Transfer

Name of the Staff	From (Place)	To (Place)	w.e.f
Smt. Daliamol Scientist (Plant Pathology),	ICAR-CPCRI, RS, Kayamkulam	ICAR-CPCRI, Kasaragod	01.06.2019
Shri Pradeep Kumar Vasu, Asst. Admn. Officer	CPCRI RS, Kayamkulam	CPCRI, Kasaragod	10.06.2019
Smt. Jayashree K., UDC	ICAR-CPCRI RS Vittal	ICAR-CPCRI Kasaragod	12.06.2019
Smt. Mary A.J, UDC	ICAR-CPCRI Kasaragod	ICAR-CPCRI RS Vittal	04.06.2019
Shri Arun N.K. Raj, LDC	ICAR-CPCRI, RC, Kidu	ICAR-CPCRI, RS, Kayamkulam	14.06.2019
Shri Umesh Kumar, LDC	CPCRI, Kasaragod	CPCRI RC, Kahikuchi	14.06.2019

Retirement

Name	Designation	Place	Date
Shri K. Balakrishnan	Technical Officer	CPCRI, Kasaragod	30.04.2019
Shri B. Balakrishnan	Bearer (Dept. Catneen)	CPCRI, Kasaragod	30.04.2019
Smt. S. Leena	CTO	KVK, CPCRI, Kasaragod	31.05.2019
Shri A. Sadanandan	Technical Officer	CPCRI, Kasaragod	31.05.2019
Shri V. Radhakrishnan	Senior Technician	CPCRI, Kasaragod	31.05.2019
Shri Justine Jayaraj Das	Tea /Coffee Maker (Dept. Canteen)	CPCRI RS, Kayamkulam	30.05.2019
Shri K. Monappa Gowda	SSS	ICAR-CPCRI RS Vittal	30.06.2019
Shri A. Shivarama Poojary	Canteen Bearer	ICAR-CPCRI RS Vittal	30.06.2019

Resignation

Name	Designation	Place	Date
Shri Najeeb Naduthodi	Scientist (Fruit Science)	CPCRI, RS, Vittal	11.04.2019

हर कदम, हर डगर
किसानों का हमसफर
भारतीय कृषि अनुसंधान परिषद
Agrisearch with a human touch

KALPA

Cover Photo: Inauguration of Asia-Pacific Cocoa Breeders Working Group Meeting at ICAR-CPCRI, Kasaragod

Published by: Dr. Anitha Karun, Acting Director
Compiled and edited by: Dr. Murali Gopal, Shri H. Muralikrishna and Dr. Anitha Karun
Photo credits: Shri K. Shyama Prasad

ICAR-Central Plantation Crops Research Institute, Kudlu P.O., Kasaragod, Kerala - 671 124
Phone: 04994 232893, 232894, 232895, 233090, 232333 (Director); Fax: 04994 232322
E-mail: directorcpcri@gmail.com, cpcrinews@gmail.com
Website: www.cpcri.gov.in; Facebook: cpcrikasaragod.kerala
Printed at: M/s Digantha Mudrana, Yeyyadi, Mangalore – 575008. Ph: 9686675271 2212551