KALPA

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

From the Director's Desk

Outmanoeuvring the Pandemic

The first quarter of the financial year 2020-21 left behind us certain never to have happened experiences: Research and farm activities were forced to curtail during the first phase of nationwide lockdown. Preventing the entry of COVID-19 became the top priority and we are successful in that during this quarter. The farm operations in all the centres of the Institute were carried out with limited number of staff and the Institute is largely indebted to them. The administrative and accounts matters were also carried out to bring satisfaction.

The COVID-19 pandemic and subsequent lockdown have made disruptions in domestic and global value chains of plantation crops. The repercussions in the production front are inadequate irrigation especially in large plantations; break in production of planting material; delay in harvests; difficulties in on-farm preliminary processing resulting post-harvest loss; problems in nursery management; and not taking up plant protection measures in time. Many jobs in the rural sector dried up and migrant workers decided to leave for their native place. The discontinuation of farm-gate trade of commodities and products had made the farmers experience money crunch which will have a long-lasting effect on production. The closing down of large scale industries resulted in piling up the stock of raw material which in turn would have a short-term effect in the supply chain. The impact of the pandemic on international trade would also influence the fortunes of these crops in future. How best we managed the impact of COVID 19 pandemic would definitely change the course of our road map towards sustainable growth in plantation crops.

Restrictions on public/vehicle movement, labour utilization, and closure of processing units, and markets would have resulted in an estimated loss of Rs. 25,770 million in the coconut processing sector and Rs.23,190 million in the production sector during the first two phases of lockdown. Additionally, the loss in the coir sector was estimated to be Rs.4500 million. Owing to difficulties in take up crop management practices in time, an economic loss of 1800 million rupees is expected in the arecanut sector. In the case of cocoa, there will be a reduction of 10602 MT dry beans worth Rs 2458 million in the industry in the industry: The loss in the production field would be Rs. 29 million.

Following relaxations in the lockdown, the farming activities picked up and commodity prices remained almost stable. The public at large was adapted to the Covid-19 preventive protocols quickly. The Institute had issued crop advisories to farmers through different means-conventional media as well as social media. The WhatsApp groups of farmers revived the linkages with the Institute. Increase in the download of the mobile App, 'e-Kalpa' was also observed. The Institute Research Council Meeting and Research Advisory Committee Meeting were conducted through videoconferencing. Strategic research programmes were formulated in the backdrop of Covid-19 pandemic.

All staff members contributed one-day salary towards 'PM Cares Fund' to combat COVID-19.

CONTENTS

SPECTRUM

Morphological distinctiveness among the cocoa germplasm

Cocoa germplasm collections are conserved at ICAR-CPCRI, Regional Station, Vittal, and Karnataka. It consists of 515 accessions and 50 hybrids in the field gene bank. Among these, a few trait-specific clones have distinct morphological characteristics and pod features which have been found to be stable over locations (Fig. 1 to 4).

Fig. 1. Cocoa pods of VTLCC 8
(Long pods >20 cm)

Fig. 3. Cocoa pods of Trinitario selection
(Big pods 1000 g)

Fig. 2. Cocoa pods of VTLCC 2
(Short pods 10 cm)

Fig. 4. Cocoa pods of Amelonado selection
(Small pods 100 g)

Elain Apshara, S.

Fertigation studies in hybrid coconut 'Kalpa Sankara'

A field experiment is in progress at ICAR-CPCRI, Regional Station, Kayamkulam since 2017 with five treatments: T1-50%, T2-100%, T3-150%, T4-200% of soil test based nutrient recommendation through fertigation and T5 with basin application of nutrients under drip irrigation, in 'Kalpa Sankara' variety of coconut. Fertigation was scheduled with conventional fertilizers, urea and muriate of potash (for N and K) in the proportionate doses required. Phosphorus was applied as basal dose in the form of Rajphos. Organic manure at the rate of 25 kg/ palm was applied in the basins every year. Water and nutrients were applied in different treatments in 20 split applications per year. Results obtained during the third year after planting revealed precocious flowering and more number of inflorescences in all palms under fertigation treatments, compared to T5 (Fig. 5. surface application of nutrients). All experimental palms came to flowering within 30 months after planting in the treatment T3 and T4. The number of buttons produced and initial fruit set was highest in the treatment T4 with 200% application of nutrients.

Fig. 5. Fertigation experiment with hybrid coconut Kalpa Sankara

A. Abdul Haris

Neemazal, insecticide and other botanicals for the management of coconut invasive whitefly complex

A field experiment was conducted during Nov 2019 to test the efficacy of azadirachtin based botanical formulation, Neemazal T/S* (Azadiractin 1% EC) against whitefly complex (*A. rugioperculatus, P. bondari, P. minei*) at different doses (0.25%, 0.5% & 1%). Water spray alone was the control. Pest observation at 3 days after spraying (DAS) evinced very low mortality in all the treatments. Similarly, the mortality was below 20% in all the conditions at 7 DAS. However, at 14 DAS, Neemazal @1% caused the highest mortality (40 50 %) and no new colony formation was noticed on the treated leaves whereas Neemazal @ 0.25 and 0.5% showed population reduction by 20 and 25% respectively.

Another experiment on the effect of botanical oils i.e., Neem oil and Pongamia oil (0.5%, 1%, 2% and 3%) against invasive whitefly complex conducted during March 2020. Whitefly population was completely nil on coconut leaflets treated with Neem oil @ 3%, while Pongamia oil @ 3% showed 70% reduction on 14 days after spraying (DAS). Neem oil @ 0.5, 1 and 2 % gave 36, 54 and 75% reduction, respectively. Similarly, Pongamia oil @ 0.5%, 1 % and 2% imparted only 30, 45, and 58 % reduction. Though, water spray (Control) on its immediate effect reduced 40 % colony; however, reoccurrence of new colonies noticed on 3 - 4 DAS itself. Thus spraying of botanical oils especially neem oil creates misty droplets which remain intact on the leaf surface for a longer time thereby enhancing its efficiency against whitefly colonies.

Sujithra, M. and Rajkumar

Emergence of invasive cassava mealybug in coconut system

Cassava (*Manihot esculenta*) cultivated as intercrop in coconut system was found infested by the exotic cassava mealybug (*Phenacoccus manihot*i Matile-Ferrero) at Kayamkulam, Kerala during April-May, 2020 as confirmed by ICAR-NBAIR. This invasive pest was first reported on cassava from Thrissur (Kerala) during March 2020. Though it was reported as a destructive pest inflicting severe yield loss in several African countries, the impact of the pest was negligible in Kerala. It was observed on aerial plant parts and primarily restricted on leaf undersurfaces causing extensive curling of leaves. In severe case, the bunchy top appearance was observed at all internodes. It has an oval membranous body, ox-yoke shaped circulus and anal ring with three-pairs of setae (Fig. 6). However, all affected cassava plants recovered successfully with the onset of monsoon and the emergence of fresh shoots. Strict domestic quarantine is to be imposed to prevent the indiscriminate movement of planting material (setts) and to curb the spread of the pest into other tapioca-growing areas.

Fig. 6. Cassava affected with mealybugs (Inset: mealy bugs)

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

Coconut milk peda

Peda is one of the most popular Indian sweets made from milk and sugar. An effort was made to standardize the methodology for the preparation of peda from coconut milk and coconut sugar. Second and third extractions of coconut kernel were found ideal for making peda which were pooled for the preparation. Pooled extraction consisted of 74.7 ± 1.52% moisture, 25.26 ± 1.52% total solids and 23.5 ± 3.3% crude fat. It had a total soluble solids content of 5.35 ± 0.5ºBrix and acidity of 0.23%. It was concentrated to form khoa stage and sugar was added. Sugar level varied from 20-50%. Result from the sensory evaluation showed incorporation of 30% sugar to the weight of coconut milk as the optimum for peda making. The comparison of coconut milk peda prepared with refined sugar and coconut sugar revealed more acceptability of coconut sugar over refined sugar. Recovery/ yield of peda were ranged from 50-53%. Peda made with coconut sugar was superior ($p < 0.001$) in mineral (ash) and protein contents than those made with refined sugar. It had moisture, carbohydrate, crude fat, crude protein and ash content of 23.5 ± 2.4%, 42.5 ± 1.1%, 23.75 ± 0.7%, 5.6 ± 0.3% and 3.01 ± 0.2% respectively.

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

Quality evaluation and shelf life extension of tender coconut juice

Tender coconut consisting of water and pulp is highly nutritious with humongous health benefits. This study was aimed in the development of a preservation protocol for tender coconut juice made with tender coconut water, tender coconut pulp, sugar and cardamom. The effect of different pasteurization temperature and time combinations (from 70°C, 75°C, 80°C to 85°C for 5min to 15min), homogenization (0, 2000 psi), cooling methods (slow and immediate cooling), the addition of class II preservatives (nisin, natamycin, polylysine and sodium benzoate), packaging (LDPE stand up pouches and LDPE cups with aluminium foil sealing) and storage conditions (refrigerated i.e., 4±2°C and ambient temperature *i.e.*, 32±2°C were studied in details in response with the quality parameters such as physicochemical (density, pH, TSS, titratable acidity, total sugars), microbiological (total plate count) and sensory attributes (appearance, colour, flavour, taste and overall acceptability) once in two days. Fresh and unpasteurized tender coconut juice had pH, TSS, density, flow rate, titrable acidity and total sugar of 6.15±0.55, 14.87±0.41°Brix, 1.05±0.01g/cm3, 53.27±0.22 sec, 0.075±0.002% and 13.22±1.72% respectively. Result revealed a shelf life of fourteen days at refrigerated condition and three days under the ambient condition when the juice was pasteurized (at 75°C for 15 min), homogenized (at 2000 psi), followed by immediate cooling, added with 750 ppm sodium benzoate, packaged in LDPE standing pouches and pasteurized (in the pack at 80°C for 15 min).

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

Time course study of freshly extracted coconut milk

Coconut milk gets spoiled quickly as it contains high fat and water content. Freshly extracted coconut was analyzed in an interval of one hour for the changes in pH, TSS, titrable acidity, free fatty acids, and sensory attributes to acquaint with its shelf life. The critical biochemical parameters determining the shelf life of coconut milk were free fatty acids and titrable acidity. Fresh coconut milk, when packaged in simple LDPE pouches, would stay for maximum 7.2 ±1.55h despite the presence of much variation among nut to nut. The result was further confirmed with methylene blue reductase test to see the relative microbial load which also gave a similar result.

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

Coconut testa-based food colourant

Colouring agents of plant origin have considerable commercial potential as additives in the foods, drinks, pharmaceuticals, cosmetics, etc. Coconut-testa, a brown skin covering of a coconut endosperm (kernel) is one of the by-products of the coconut processing industries that remain underutilized despite being a rich source of phenolic compounds and colour. Hence, coconut testa-based food colourants were extracted using various combinations of organic solvents and ultra-sonication treatment. CIELAB colour parameters (*L*, a*, b**) of various testa-based colourant extracts revealed that use of acidified organic solvents in lab-scale water bath yielded dark brownish or reddish coloured products whereas extracts resulting from ultrasonication process is comparatively visually appealing with dark pink, orange and such other colours. Biochemical characterization of the colourants divulged that acidified ethanol yielded 23.71 ± 2.19 mg/ kg Cy-3-glc equivalents. Ultrasonication assisted extraction using acidified ethanol also yielded 18.20 ± 2.09 mg/ kg Cy-3-glc equivalents. The colourants were applied as additives to the jelly prepared from the coconut mature water (Fig 7 & 8). The physicochemical properties of the resultant food products and their organoleptic characteristic features are being investigated. This research output is a prelude towards finding an appropriate end-use for the nutrient-rich coconut-based products.

Fig. 7. Coconut water-based jelly

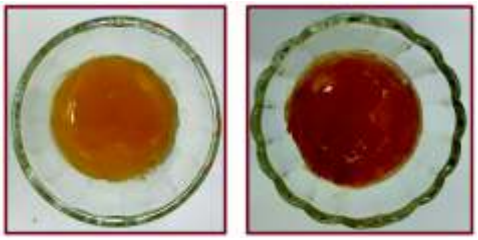

Fig. 8. Jelly infused with coconut testa-based colorants

Ramesh S.V., Rose Mary, Shameena Beegum., Pandiselvam R., Manikantan M.R., Niral V., Hebbar K.B.

Phenolic content and antioxidant potentials of Kalpa bean to bite dark chocolate

A protocol for estimation of total phenolic content (TPC) and antioxidant properties of bean to bite chocolate was standardized. Bean to bite chocolate comprises 30% coconut sugar among others. Four different organic solvents were used to extract the phenolic fractions from the defatted dark chocolate samples. Among the solvents, 70% acetone, acidified acetone (70%, 1.2M HCL), 80% ethanol and acidified ethanol (80%, 1.2M HCl) yielded TPC (determined using Folin-Ciocalteu assay) of 448±0.04, 480±0.07, 341±0.06 and 367±0.04 mg GAE/100g dark chocolate respectively ($p<0.001$) suggesting the efficacy of acidified acetone in extracting maximum phenolic content. Similarly, antioxidant potential was determined using DPPH and FRAP assays, wherein 70% acetone extract showed high percentage inhibition (91.8%) than the acidified extracts (89.4%) in DPPH assay.

Shameena Beegum, P.P., Ramesh, S.V, Sugatha P, Arifa Nooh, Pandiselvam, R., Manikantan, M.R. and Hebbar, K.B.

Development of continuous type coconut testa removing machine

Testa removing is an important unit operation involved during the production of many high-value coconut products such as virgin coconut oil, coconut chips, desiccated coconut powder, coconut milk-based beverages, etc. ICAR-CPCRI has developed a batch type model for removing the coconut testa. Coconut processing industries and farmer producer companies are interested in the continuous type testa removing machine. The attempt was made to design the continuous type testa removing machine based on the principle of friction and abrasive force. Based on the engineering properties of the deshelled coconut, the essential components of testa removing machines such as screw conveyor and abrasive rollers has been designed and developed.

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

Development and optimization of jaggery based coconut chips by osmo-convective drying

Coconut chips using jaggery as an osmotic agent by osmo-convective drying has been developed. In this work, the conventional osmotic agent such as sugar is replaced by nutrient-rich jaggery and the process parameters were optimized by response surface methodology (RSM). The optimal condition for osmo-dehydrated coconut product from coconut slices by osmo-convective dehydration was evaluated. The process parameters selected for the experiment were: slice thickness (0.5-1 mm), solution concentration (45-55 °Brix) and convective drying temperature (50-70 °C). A Box-behnken design was employed to assess the different osmo-convective parameters. Optimization was done by taking into consideration of responses such as final moisture content, drying rate, rehydration ratio, water loss, solute gain and sensory attributes. The optimized conditions for jaggery based coconut chips were found to be 0.65 mm slice thickness, 54.5 °Brix concentration and 69 °C convective drying temperature (Fig. 9). The sensory analysis showed very good acceptability by the panellists. Mineral analysis of the sample reveals that the developed product is rich in both micro and macro mineral content than refined sugar-based chips (iron-5.141 mg, zinc- 3.51 mg, manganese- 3.85 mg, sodium- 418.67 mg, potassium -291 mg per 100 g of chips sample).

Fig. 9. Coconut chips with jaggery infusion

Pravitha, M., Manikantan, M.R., Shameena Beegum, P.P. and Pandiselvam, R.

IMPORTANT EVENTS

Research Advisory Committee Meeting

The 22nd Research Advisory Committee (RAC) meeting of ICAR-CPCRI was held on 5th May 2020 through videoconferencing under the chairmanship of Dr. S.P. Ghosh, former DDG (Hort.). Dr. Abraham Verghese, Former Director, NBAIR, Bengaluru, Dr. K.V. Bhat, Former Principal Scientist, ICAR-NBPGR, New Delhi, Dr. B.S. Hansra, Former ADG (Extension), Noida, Uttara Pradesh and Dr. B.K. Pandey, Principal Scientist, ICAR (Nominee of ADG (HS-II)), members, RAC, were also present during the online RAC meeting.

Dr. Anitha Karun, Director (Acting), ICAR-CPCRI hosted the meeting from ICAR-CPCRI, Kasaragod. She welcomed the RAC of ICAR-CPCRI and presented various activities and achievements made by the institute in the R&D sector. Dr. Ravi Bhat, Principal Scientist, Member Secretary, RAC and Dr. H.P. Maheswarappa, Project Coordinator (Palms), Heads of Divisions, programme leaders and other scientists of ICAR-CPCRI attended the meeting from thirty different locations. These include ICAR-CPCRI Kasaragod, ICAR-CPCRI, Regional Station, Kayamkulam, Kerala, ICAR-CPCRI, Regional Station, Vittal, Karnataka, ICAR-CPCRI, Research Centre, Kahikuchi, Assam, ICAR-CPCRI, Research Centre, Mohitnagar, West Bengal, ICAR-CPCRI, Research Centre, Kidu, Karnataka and from their respective locations. Heads of ICAR-KVK, Kasaragod and Alappuzha also attended the meeting.

Presentation of action taken report on previous RAC was done by Dr. Ravi Bhat, Principal Scientist, Member Secretary, RAC. Programme Leaders presented their work from their computers at different locations. These include 'Improvement of coconut, arecanut and cocoa', 'Biotechnological investigations in palms and cocoa', 'Production technology in palms and cocoa', 'Integrated management of diseases in palms and cocoa', 'Integrated management of pests and nematodes in palms and cocoa', 'Production physiology and biochemistry in palms and cocoa', 'Value chain management in palms and cocoa', 'Economics and statistical aspects and transfer of technology for palms and cocoa', followed by discussions. Based on the points emerged during discussions, RAC recommendations were made, which were compiled and e-mailed for finalization. The meeting came to an end with the vote of thanks by Member Secretary, RAC.

Institute Research Committee Meeting

The 48th Institute Research Committee (IRC) meeting of ICAR-CPCRI was held from 27th April to 2nd May 2020 for the first time through videoconferencing under the chairmanship of Dr. Anitha Karun, Acting Director, ICAR-CPCRI, Kasaragod at ICAR-CPCRI, Kasaragod. She inaugurated the meeting with her opening remarks on 27th April 2020. Project Coordinator (Palms), Heads of Divisions, programme leaders and other scientists of ICAR-CPCRI attended the meeting different locations including ICAR-CPCRI Kasaragod, ICAR-CPCRI, Regional Station, Kayamkulam, Kerala, ICAR-CPCRI, Regional Station, Vittal, Karnataka, ICAR-CPCRI, Research Centre, Kahikuchi, Assam, ICAR-CPCRI, Research Centre, Mohitnagar, West Bengal, ICAR-CPCRI, Research Centre, Kidu, Karnataka. Heads of ICAR-KVK, Kasaragod and Alleppey also attended the meeting.

Presentation of work done report on various projects under ICAR-CPCRI including externally funded projects was made by the scientists. The Plenary Session was

A view of the RAC Meeting through videoconferencing

held on 2nd May 2020, was attended by Dr. Abraham Verghese, Former Director, NBAIR, Bengaluru, Dr. B.S. Hansra, Former ADG (Extension), Noida, Uttara Pradesh, Members of RAC, Dr. B.K. Pandey, Principal Scientist, ICAR (Nominee of ADG (HS-II)), Dr. C.N. Ravishankar, Director, ICAR-CIFT, Kochi, Dr. Nirmal Babu, IISR, Kozhikode, Dr. V. Ravi, Director CTCRI, Thiruvananthapuram, Dr. Uma S., Director, NRCB, Trichy, Dr. Homey Cheriyan, Director, DASD, Kozhikode, Dr. Sujatha, Director, Coconut Mission, KAU, Padannakkad and about twelve farmers from Kerala, Karnataka, Tamil Nadu and Telangana have joined the meeting from their respective locations. The presentations were followed by discussions.

During the meeting, project-wise reports, action taken on previous RAC recommendations, the proposed technical programme for 2020-21 were presented. The technical programmes were finalised by incorporating the 22nd RAC recommendations.

Dr. Anitha Karun, Director (Acting) interacting with Dr Homey Cheriyan, Director, DASD, Kozhikode during the Plenary Session of IRC Meeting through videoconferencing

PUBLICATIONS

Research Articles

Deo, M.M., Mathew, A.C., Manikantan, M.R. and Hebbar, K.B. 2020. Performance evaluation of power operated coconut de-shelling machine for different varieties of coconut, *Journal of AgriSearch*, 7(3): 154-157.

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Srikanth, V., Rajesh, G. K., Kothakota, A., Pandiselvam, R., Sagarika, N., Manikantan, M. R., & Sudheer, K. P. 2020. Modeling and optimization of developed cocoa beans extractor parameters using box behnken design and artificial neural network. *Computers and Electronics in Agriculture*, 177, 105715

Popular Articles

Anes, K.M., Josephrajkumar, A., Chandrika Mohan and Merin Babu. 2020. *Thengile velleecha, virunninethhunna shathru* (In Malayalam). *Karshakasree* 26 (4): 36-38.

Jissy George. 2020. Juices made from fruits. *Karshakasree.* 26(5): 47.

Nihad, K., Haris, A.A. and Kalavathy.S.2020. Scope of floriculture in coconut garden. *Indian Coconut Journal* LXIII(1): 5-8.

Sajnanath K. And Muralidharan P. 2020. Enhancing income from coconut gardens through soil moisture conservation. *Indian Naleekera Journal*. 11 (8):14-16.

Shareefa, M., Rajesh, K.S., Nazrin, N. and Thomas, R.J. 2020. Farmers also can produce hybrid seedlings of coconut (*In Malayalam*). *Krishi Jagaran* May Issue.

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Book Chapters

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TRANSFER OF TECHNOLOGY

Reaching out virtually through online training for coconut farmers

The first online training programme of ICAR CPCRI was conducted on May 14, 2020 on ' Virgin Coconut Oil production for village entrepreneurship for farmers of Munrothuruthu panchayath, Kollam district and Pathiyoor panchayath, Alappuzha district. A total of 38 rural youths and coconut farmers attended the training programme, which was inaugurated by Mr. Binu Karunakaran, President, Munrothuruthu panchayath. The keynote address was given by Dr. Anitha Karun, Director, ICAR CPCRI and Dr. Muralidharan, HoD (Social Sciences) spoke on Way forward in reaching out programmes to stakeholders virtually. Dr. Shameena, Scientist, PHT delivered the session and a panel of scientists answered the queries of the participants. Mr. Jageshkumar and Mr. Radhakrishnan, Coconut entrepreneurs shared their experiences and lessons learned for the benefit of the participants. Dr. P Anithakumari, Program coordinator summarized the programme with the session of rural entrepreneurship in the coconut sector.

Online Interface programme on 'Enhancing productivity and income from coconut-based farming systems'

Online Interface programme on 'Enhancing productivity and income from coconut-based farming systems' was conducted on 16th June 2020 in collaboration with Haritha Kerala Mission, Government of Kerala. Dr. T.N. Seema, Executive Vice-Chairperson, Haritha Keralam Mission and Dr. Anitha Karun Director, ICAR-CPCRI, Kasaragod made the introductory remarks. Dr. C Thamban, Principal Scientist, ICAR-CPCRI presented the topic and Dr. P Subramanian, Principal Scientist, Dr. Prathibha P S, Scientist and Dr. Shameena Beegum, Scientist, participated as resource persons. Dr Jayasekhar S, Sr. Scientist, Mr. Sanjeev S.U., Consultant (Agriculture) and Mrs. Haripriya Devi, Technical officer (Agriculture), Harita Kerala Mission coordinated the programme. The programme was streamed through Facebook live.

Experts from ICAR-CPCRI, Kasaragod participating in Haritha Keralam Facebook Live interaction

Micro-Enterprises in Coconut Sector: Level 1 Online Training

An online training program/ webinar was organized with the theme of 'Entrepreneurship development on coconut diversification' on 14 May, 2020. Thirty-seven participants of Munrothuruthu Panchayath of Kollam district and Pathiyoor Panchayath of Alappuzha district participated. Mr. Binu Karunakaran, President, Munrothuruthu Panchayath, inaugurated the training program and Dr. P Anithakumari, Principal scientist, ICAR CPCRI, RS, Kayamkulam welcomed the participants to the program, highlighting the importance of observing the precaution of COVID-19 and using the Arogya Setu App.

Dr. Anitha Karun, Director, ICAR-CPCRI, Kasaragod offered the keynote address highlighting the importance of processing technologies developed by ICAR-CPCRI which could double the coconut farmers income along with providing nutrition and edible fat in a balanced diet. She stressed on organizing more online webinars/ training programs for continued outreach programs for the farming communities.

Dr. K. Muralidharan, HOD (Social Science) delivered a lecture on 'Business models and choices of processing technologies of coconut by the customers'. He highlighted business/EDP models of a single product, multiple products and integrated models of various

Dr Anitha Karun, Director (Acting) delivering keynote address during EDP training

parts of coconut like food products, coir, shell, bio inputs etc. Dr. Shameena Beegum, Scientist delivered a lecture on coconut food products, virgin coconut oil (VCO) units, with a practical session on the handling of various machinery and the economies and investment required.

Coconut products entrepreneurs, Mr. Jagesh Kumar and Mr. Radhakrishnan shared their experiences and economics of the coconut products units, which was well received by the participant farmers. The session was followed with very active and purposeful discussions on practical points and coconut products.

Kalpa Green Chat Videoconferencing

Kalpa Green Chat was organized jointly by the Kalpa Agri-Business Incubator, ICAR-CPCRI and Kerala Startup Mission, aiming at promoting entrepreneurship with technology base in agriculture sector. In the backdrop of COVID-19 pandemic, the Kalpa Green Chat series were conducted on every Saturday to benefit a wider range of participants. Multilingual interactions were held, facilitated by a panel of scientists. During June 2020, the following six programmes were conducted.

Experts from ICAR-CPCRI, Kasaragod, interacting with entrepreneurs

Details of Kalpa Green Chat programmes

Sl. No.	Date	Topics	No. of participants	Duration (minutes)
1	06.06.2020	Processing of coconut for copra and oil: What to do and not to do	65	140
2	06.06.2020	'Neera' turned Kalparasa: Scope and limitations	55	120
3	13.06.2020	Virgin coconut oil: A most wanted coconut product	60	90
4	13.06.2020	Production and marketing of organic inputs of agriculture	50	75
5	20.06.2020	Coconut nursery: An emerging enterprise	65	100
6	27.06.2020	Value addition to coconut water: Challenges and opportunities	75	150

Diagnostic field visit

A team comprising of Dr. A. Abdul Haris and Dr. A. Joseph Rajkumar, Principal Scientists visited the coconut groves at Kuppapuram, Kainakary Panchayat (Ward-I) on 16 June 2020. Based on the observations, the soil and palm health status fostering the ecological sensitivity of region located on the banks of the Vembanad Lake, one of the Ramsar sites, it was suggested improved agro-techniques, soil management and plant protection measures to counter water logging problem, inappropriate crop geometry and incidences by rugose spiralling whitefly, rhinoceros beetle, red palm weevil and leaf rot disease.

Mera Gaon Mera Gaurav

Mother palm selection and seed nut collection were completed in the selected three villages *viz.*, Bharinikavau, Chunakara and Vallikunnam in a participatory mode with the active participation of all stakeholders under the technical guidance of ICAR-CPCRI. The *Kera Nanma* programme under MGMG is thus creating greater strides for decentralized coconut seedling production in the respective villages for meeting out the local demand of high-quality disease-free planting materials.

Radio talks/TV programme telecast

Dr. A. Joseph Rajkumar, Principal Scientist delivered a radio talk on 'Pest Management in Coconut' for *Vayalum Veedum* programme of AIR, Thiruvananthapuram (Broadcast on 15 May 2020).

Smt. Jissy George, SMS (Home Science) delivered radio talk on 'Value added products from Banana and jack fruits' on 7th , 12th and 20th May, 2020.

Dr. S. Kalavathy delivered a radio talk (interview) on 'Pre-monsoon advisory services for coconut farmers' All India Radio, Thiruvananthapuram on 12 June 2020.

Dr. A. Joseph Rajkumar, Principal Scientist delivered an online talk on 'Management of beetle pests on coconut' for *Vayalum Veedum* programme of AIR, Thiruvananthapuram (broadcast on 25 June 2020).

ICAR-Krishi Vigyan Kendra, Kasaragod

Action Plan 2020-21

The action plan comprising of 3 OFTs and 13 Frontline demonstrations were approved for the year 2020-21. On-farm trials include the introduction of new pepper variety Arka Coorg Excel, assessment of functional foods for addressing anaemia, and dietary supplements for differently-abled children. The frontline demonstrations include the introduction of new paddy varieties Manuratna and Shreyas and turmeric variety Pragathi, bhindi variety Salkeerthi, yard long bean, Manjari and cashew H-130. Other demonstrations include a demonstration of coconut-based farming system, basin management in coconut, mechanization in paddy cultivation, zero till drill for pulses, mini parboiling unit and demonstration of the hybrid dryer.

Front line demonstration (FLD)

The newly initiated FLDs during the period under report as given below:

a) Initiated FLD on the introduction of high yielding rice variety-Shreyas at Bambrana village of Kumbla grama panchayath. Distributed paddy seeds and conducted farmers group meeting.
b) Initiated FLD on the introduction of high yielding turmeric variety at Sheni village of Enmakaje grama panchayath. Distributed turmeric rhizome and conducted farmers group meeting.
c) Initiated FLD on basin management in coconut at Neerchal, Mogral Puthur grama panchayath. Distributed grain cowpea seeds and conducted a method demonstration on sowing of cowpea seeds in coconut basin.

Farmers Helpline. KVK Kasaragod has been identified as Farmers helpline centre for Kasaragod district to address various queries related to crop production, protection and post-harvest technologies of different crops grown in the district during the lockdown period. In this connection, attended 528 queries during this period.

Sowing of cowpea seeds in coconut basin

Planting of turmeric rhizome

ICAR-Krishi Vigyan Kendra, Alappuzha

During the period KVK organized 6 training programmes benefitting a total number of 81 farmers/rural youths. The details of the training programmes were as follows:

Training	No.of Programmes	Participants		
		Men	Women	Total
Online trainings	4	33	20	53
Off campus trainings	1	7	4	11
ASCI Trainings on FoCT	1	15	2	17
Total	6	55	26	81

Skill training programme on 'Friends of Coconut Tree (FoCT)'

A twenty-five days skill training programme on 'Friends of Coconut Tree (FoCT)' sponsored by Agricultural Skill Council of India (ASCI) and attended by 20 selected rural youth was conducted from 5th February to June 25th, 2020 at KVK - Alappuzha. The trainees were trained to climb coconut tree using a climbing machine. They were also given training on scientific coconut cultivation, pest and disease management, seedling production, management of coconut nurseries, banking, entrepreneurship development etc.

Participants getting trained to climb coconut palm with the climbing device

Monthly technology advisory

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

On farm testing

Initiated the OFT on “Management of repeat breeders in Dairy cows” in Thazhakkara and Chettikulangara panchayaths during the period.

Frontline demonstrations

The following FLD's were initiated during the reporting period

1. High yielding short duration turmeric variety Pragathi in coconut gardens
2. Management of turmeric rhizome maggot using improved variety, IISR-Pragati
3. Integrated nutrient and disease management in banana
4. Integrated dry rot management in turmeric
5. Specific mineral mixture for a goat for enhancing productivity
6. Demonstration of Opheocephalus (Varaal) fish in homestead ponds
7. Nutrient efficient variety of Cassava (Sree Pavithra) in Onattukara region.

FLD on turmeric cultivation

Mineral mixture for goat

HUMAN RESOURCES DEVELOPMENT

Training attended

Dr. T. Sivakumar, SMS (Agrl. Entomology) attended online training on 'Science communication for smart scholars' organized by ICAR-CIFE, Mumbai from 26th May to 8th June, 2020.

COMMERCIALIZATION OF TECHNOLOGY

Business Incubation

Virgin Coconut Oil Incubation facility has been lent to Mr. Jayaraj P., Trichambaram, Taliparamba, Kannur, Kerala, with effect from 9 June 2020 for one year. An amount of Rs. 2,000 has been collected as fees.

CELEBRATIONS

World Environment Day

World Environment Day was observed at ICAR-CPCRI, Kasaragod by planting trees in the campus. The programme was inaugurated by Dr. Anitha Karun, Director (Acting) on 5th June 2020.

As part of World Environment Day (WED) celebration on June 05, 2020 at ICAR-CPCRI, Regional Station, Kayamkulam, Dr. Chandrika Mohan, Acting Head i/c planted a sapling of soursop (Annona muricata) in the Ecological Engineering garden. This coconut-based crop-habitat diversification is a self-reliant model of inclusiveness (Nariyal Dhuvara Aatmanirbhar Krishi), providing continuous income, employment and pest regression. Besides, she harvested a jack fruit from Vietnam Super Early, planted two years ago in the same garden. As environment and economy following two sides of the same coin, a symbolic planting of tree sapling (Environment) and harvesting a jack fruit (Economy) assumes significance on this day.

Dr. Anitha Karun, Director (Acting) planting a sapling at ICAR-CPCRI, Kasaragod

Dr. Chandrika Mohan, Principal Scientist planting *Annona muricata* on the occassion of World Environment Day

Dr. Chandrika Mohan, Principal Scientist harvesting jack fruit on the occassion of World Environment Day

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

Name and designation	Programme	Organizer & Date
Dr. P. Muralidharan, Head, KVK, Sri. M.S.Rajeev, Smt.Jissy George, Dr. T. Sivakumar, Smt. G. Lekha, Dr.S.Ravi and Dr. K. Sajnanath (SMSs)	Action plan meeting of KVKs online	ATARI Zone XI 14 May, 2020
Dr. Chandrika Mohan and Dr. A. Joseph Rajkumar, Principal Scientists, Dr. K.M. Anes, Scientist	Virtual meet on 'AICRP on Biological Control workshop'	ICAR-NBAIR, Bengaluru 21-22 May, 2020
Smt Jissy Geroge, SMS	Online interface with entrepreneurs organized by Agropark, Piravom	22nd May, 2020
Dr. Chandrika Mohan and Dr. A. Joseph Rajkumar, Principal Scientists	Virtual meet 'Outbreak of Desert Locust in North India'	ICAR-NBAIR, Bengaluru 5 June, 2020
Dr. Jeena Mathew, Scientist	Webinar on 'An environmental agenda for the future'	Centre for Science and Environment, New Delhi 5 June, 2020
Dr. Chandrika Mohan and Dr. A. Joseph Rajkumar, Principal Scientists	Virtual meet on 'Impact and implications of COVID-10 on Agrochemicals industry and banning of 27 molecules'	FICCI, New Delhi 11 June, 2020
Dr. S. Kalavathy, Acting Head Dr. Chandrika Mohan, Dr. Regi J. Thomas, Dr. A. Joseph Rajkumar, Principal Scientists Dr. M. Shareefa, Senior Scientist Dr. Merin Babu, Dr. K.M. Anes, Scientists	Webinar on 'Way Forward for the Global Coconut Industry'	International Coconut Community (ICC), Jakarta 11 June, 2020
Dr. Shameena Beegum, Scientist	Webinar on 'Efficient Tools for Effective Research Communication and Publications'	World Food Preservation, Center, USA 12 June 2020 to 14 June 2020.
Dr. K. Sajnanath, SMS	Finalization of 'Jaivagruhum (Integrated farming Systems)' project as part of Rebuild Kerala Initiative	Mavelikkara Block on 15 June, 2020
Dr. S. Ravi, SMS	Resource Persons meeting to prepare Block level plan for Subhiksha Keralam	Harippad Block on 17 June, 2020

Activities During Covid 19 Lockdown Period

Sale of coconut seedlings from ICAR-CPCRI, Regional Station, Kayamkulam

A total of 5585 coconut seedlings of released varieties of coconut were distributed to 1150 farmers during June 2020, following Covid-19 protocols. In addition, 1000 coconut seedlings (Kalpasree-900 and WCT-100) were handed over to Director of Agriculture, Govt. of Kerala for distribution among farmers who attended the State Level inauguration of 'Njattuvela Chanda' conducted on 22.06.2020 at Secretariat Complex, Thiruvananthapuram.

Other activities during the lockdown period

The Station supported our farmers to sustain themselves by raising food and nutritional crops during the Covid 19 lockdown period. Advisory services were provided through mass media and social media. The office was completely sanitized after the two lockdown periods and facilities for hand sanitization has been arranged at office entrance and office buildings.

Advisory Services to farmers

Advisory service is being provided through the Whatsapp group 'Climate change adaptation' group on various queries related to drainage during waterlogging, pests and disease problems, irrigation and moisture conservation strategies. Usually, the farmers from problematic areas do not produce vegetables during extreme stress conditions like severe summer and rainy months. However, the farmers covered under the project in remote problem affected areas could harvest around 1700 Kg vegetables and tubers during the lockdown period. This bumper harvest was achieved through the adoption of adaptation strategies viz., low cost vertical gardening practice of vegetables under coconut based cropping system, potting mixtures containing microbial enriched organic substrate combinations with low weight, optimum drainage capacity and low nutrient leaching for filling grow bags in areas of waterlogging during rainy season. The farmers could overcome the difficulty for access to fresh vegetables. In addition they could effectively utilize their time during the lockdown period. The farmers could supply vegetables to community kitchens and also to their neighbours. One farmer along with a group of members could run a community kitchen of their own during the entire lockdown period and served daily food to around 70 old people. In addition, the farmers planted different varieties of banana, elephant foot yam, tapioca, colocasia, ginger and turmeric in 16.5 acres of land during the period. Our station supported the farmers by distributing coir geotextile mats to prevent soil erosion, botanicals for plant protection, supplied planting materials of fruit crops, tuber crops, pepper, ginger and turmeric along with manures.

Advisory service / Technological information through Dailies during Lockdown period:

- ICAR-CPCRI empowering farmers through innovative adaptations to meet climatic challenges in Deshabhimani dated 12.05.2020
- ß Be ready to receive the monsoon: Advisory service by ICAR-CPCRI to the coconut farmers in Malayala Manorama dated 16.05.2020
- ß Coconut seedlings should be planted before heavy monsoon: Pre-monsoon advisory for coconut growers in Mathrubhoomi dated 19.05.2020
- ß Pre-monsoon advisory services for coconut farmers in Mangalam dated 21.05.2020.

OTHER INFORMATION

Patent Applications Filed

Two patent applications were filed from the institute at Patent Office online. One application on 'Process protocol for foam mat dried coconut milk powder using sodium caseinate, maltodextrin and carboxymethylcellulose' was filed on 26 June 2020 (TEMP/E-1/29398/2020) by Shameena Beegum, P.P., Manikantan, M.R., Pandiselvam, R., Paulraj,S. Another was on 'Linear Actuator based Minimal Processing Machine for Tender Coconut' (TEMP/E-1/30543/2020-CHE on 30 June 2020) by Pandiselvam, R., Manikantan, M.R. Mathew, A.C., Shameena Beegum, P.P.

Quinquennial Review Team

The QRT for 2014 to 2020 has been constituted by the ICAR under the chairmanship of Prof. Dr. B.M.C. Reddy, Former Director, IIHR & Former VC Dr YSRHU. Other members of QRT are given here alongside:

1. Dr. M.G. Bhat, Former Director, DCR, Puttur, Vanashree, Near Santhome Guru, Mandir, Mukrampady, Darbe P.O., Puttur 574202
2. Dr. H. Hameed Khan, Former PC, AICRP on Palms, 160/14, D.B. Road, Optic Craft, R.S. Puram P.O., Coimbatore-641002
3. Dr. S. Lingaraju, Emeritus Professor, Former Director, Institute of Organic Farming
4. Dr. John Zachariah, Former Head, ICAR-IISR, Kozhikode
5. Dr. S. Arulraj, Former Director, ICAR-IIOPR, Pedavegi, Plot No. 16 B, Door No. 2/44 V. G. N. Nagar, A. N. E. Salai, Ayyappan Thangal, Chennai-600056
6. Dr. H. P. Maheshwarappa, Project Coordinater AICRP Palms (Member Secretory).

The team will be reviewing the activities and achievements of ICAR-CPCRI as well as AICRP on Palms for the period from 1 April 2014 to 31 March 2020.

PERSONALIA

TRANSFERS

Name & designation	From (Place)	To (Place)	w.e.f.
Dr. Krishna Prakash (Scientist)	ICAR-CPCRI, Kasaragod	ICAR-IARI, RC, Jharkhand	16.06.2020

RETIREMENTS

Name	Designation	Place	Date
Dr. H. Moosa	CTO	ICAR-CPCRI, RS, Vittal	30.04.2020
Dr. M. Shanavas	CTO	ICAR-CPCRI, RS, Kayamkulam	31.05.2020
Shri Thajuddin	ACTO	ICAR-CPCRI, RS, Kayamkulam	31.05.2020
Shri Jacob Kurian	ACTO	ICAR-CPCRI, RS, Kayamkulam	31.05.2020
Shri V. Suresh Kumar	Technical Officer	ICAR-CPCRI, Kasaragod	31.05.2020
Shri K. Kesava	SSS	ICAR-CPCRI, Kasaragod	31.05.2020
Shri N.B. Mahesan	SSS	ICAR-CPCRI, Kasaragod	31.05.2020
Smt. S. Susheela	SSS	ICAR-CPCRI, RC, Kidu	31.05.2020
Shri Chandra Nairy	Tech. Officer	ICAR-CPCRI, RC, Kidu	30.06.2020

OBITUARY

Mr Krishnan Kunhi, SSS, ICAR-CPCRI, Kasaragod had breathed his last on 16.06.2020. Director and staff of ICAR- CPCRI pray the Almighty for the peace and tranquility to the departed soul.

Agrisearch with a human touch

Cover photo: Distinct characters of different accessions in the cocoa field gene bank.

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