# KALPA

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**ICAR-CENTRAL PLANTATION CROPS RESEARCH INSTITUTE**
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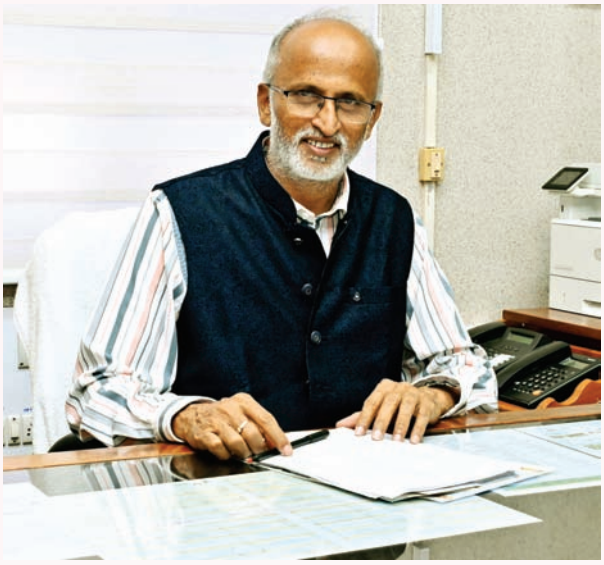
# DIRECTOR'S DESK



Cocoa is an important understory crop in coconut and arecanut orchards and grown in an area of one lakh ha in the states of Kerala, Karnataka, Andhra Pradesh and Tamil Nadu. Current production is roughly 27 thousand MT while the demand is above 60 thousand MT. At the current rate of growth it is projected to increase to 42 and 121 thousand MT by 2030 and Viksit Bharat (2047) period respectively. However, the corresponding demand during the period is estimated to be 102 and 293 thousand MT respectively. At present most of this demand is met by import.

Cocoa bean prices after a steady rise over two years, skyrocketed in early 2024, more than doubling in three months to reach a level in March twice as high as the previous record. This is due to short supply of cocoa beans from Africa especially Ghana and Ivory Coast, the two countries responsible for 60% of global cocoa production. As a consequence, there has been a huge demand for domestic cocoa beans. This price rise and some of the Government policies to reduce the import has renewed the interest in farming community as well as concerned stakeholders to spike the production both by area expansion and productivity increase through the adoption of latest scientific technologies.

In Africa, cocoa orchards are raised by clearing the forests. Majority of them are old and senile and are susceptible to deadly diseases like swollen shoot virus disease. Hardly any new area is available for new plantations. Moreover, large number of farmers are lending their orchards to illegal mining for better returns making it unsuitable for cocoa cultivation. In India orchards are relatively new, free from deadly diseases and beans are not sourced from recently deforested land or contribute to forest degradation and complies with the European Union Deforestation Regulation (EUDR) act on deforestation free products for trade.

India has certain advantages in future cocoa production as compared to most of the African countries. Huge area under coconut, arecanut and oil palm are available for cocoa under different agroecological zones. Therefore, it is important to identify the potential climatically suitable regions for intensive cocoa cultivation and raising the orchards would avoid the impact of El Nino or climate change which is one of the major factors responsible for yield loss in countries like Ghana.

Keeping these developments in mind, ICAR-CPCRI has decided to intensify research in some of the following areas.

Evolving climate resilient, bio fortified, industry friendly varieties/clones.

Establishment of polyclonal orchards for enhanced hybrid seedling production especially in north-eastern states and non-traditional areas.

Enhanced resource use efficiency to reduce the production cost and for better environmental security

Efficient, cost effective farmer friendly processing technologies like fermenters and development of new value added products like bean to bar chocolate.

Technology dissemination and demonstration of newly developed technologies in the farmer's field.

Strict quarantine measures to some of the invasive pest and diseases like swollen shoot viral disease.

Dr. K. Balachandra Hebbar
(Director)

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# SPOTLIGHTS

## Grading for assessment of black pod disease in cocoa

Black pod disease (BPD) caused by *Phytophthora palmivora* is severe during monsoon as well as post monsoon seasons in high rainfall zones. The infection load will be high when cocoa canopy is not pruned properly. The main harvest season May-August coincides with monsoon and the inter-pod contamination is more, since cocoa is cauliflorous as well as cushion bearing. Pods with >1 cm husk thickness prevents the disease from spreading to beans. If beans are not blackened, they can be used for fermentation. The grading of infection in husk and beans are being followed to work out the grade index. For example, if a tree is having a total of 40 pods, of which 30 pods are free of BPD, 7 pods at grade 1, 2 pods at grade 2 and 1 pod at grade 3, the calculation will be (30x0)+(7x1)+(2x2)+(1x3) = 14/ 40 (total no. of pods) and grade index will be 0.35. It denotes that most of the damage lies between 0-1. The varieties showing yield throughout the year or late season or second season bearing are escaping from pod rot infection.

## Neera syrup infused coconut flakes

A protocol and methodology for a ready to serve coconut flakes was developed. It involved the use of different drying systems of osmotic process based on coconut inflorescence sap concentrates (neera syrup: 50ºBrix). The infusion of neera syrup not only enhanced the product's nutritional value but also contributed to its sensory profile as it improved the overall taste, flavour, and colour. Coconut flakes underwent drying through various methods at three distinct temperatures (55, 65, and 75 ºC) to determine the optimal drying method and temperature. Evaluating the bioactive profile, coconut flakes dried at 65° C using infrared-assisted hot air dehydrated coconut flakes (IRAHAD) exhibited an outstanding nutritional and physical profile, featuring a Hausner ratio of 1.04 and carrs index 4.22, rehydration ratio 2.37 %, hygroscopicity 1.68 %, bulk density 0.552 g/ml, tapped density 0.610 g/ml, protein 3.92%, carbohydrate 33.86%, fat 34.29%, ash 1.92%, total phenolic content 105.38 mg GA/100g, DPPH activity 88.81% and FRAP 0.00893 mg TE/100g.


Ready-to-eat coconut flakes

## Drying kinetics of coconut for copra production under different drying system

The initial moisture content of coconut kernels stands at 50-55% (wb), which is significantly reduced to 6-8% (wb) during the drying process. Traditional methods, including sun, solar, and hot air drying, are commonly employed to produce copra. However, improper or insufficient drying may lead to moisture retention, resulting in fungal contamination and the production of discoloured copra. Hence, the independent and combined effects of infrared and hot air-drying techniques in enhancing the copra quality was analysed. Three drying methods viz.,: infrared drying (IFD), hot air drying (HD), and infrared-assisted hot air drying (IRAHAD) were employed. Coconut pieces were exposed to varying drying temperatures (50 °C, 60 °C, and 70 °C) with a consistent air speed of 2 m/s. Optimal results were obtained in IRAHAD method at a temperature of 60°C, preserving a crucial fat content of 68.4%, essential for enhanced oil extraction from copra. Drying rates in IRAHAD were twice as high as those in IFD and HAD. Based on the highest $R^2$ value and the lowest error values, the page model emerged as the most suitable technique for characterizing the drying kinetics of copra. At a drying temperature of 60°C, the logarithmic model and the diffusion approximation model were deemed the best fit for HAD and IRAHAD, respectively.

## Refinements in RPW detector

The field level detection efficiency of acoustics-based red palm weevil detector ranged from 75%-80%. The RPW detector has undergone refinements and improvements both on the hardware and software modules. On the hardware, the detector probe was refined to provide better endurance in the application environment. On the software, the detection algorithm underwent refinements to improve accuracy and lesser processing time.

## Survey of leaf spot disease of arecanut

A comprehensive roving survey was undertaken during 2022-2023 in two prominent arecanut-growing states of India, Karnataka and Kerala, where LSD has emerged as a concern in recent times. A total of 275 GPS locations spanning 11 hotspot taluks were exclusively chosen for the survey. The interpolation and prediction of LSD severity cases distribution were facilitated through Inverse Distance Weighting (IDW) geospatial approaches. Moran's I Index (Moran's I) statistics were employed to assess autocorrelation in LSD spatial distribution and discern how taluks were clustered or dispersed in space. Indicator Kriging (IK) was utilized to pinpoint hotspot and cold spot areas within the study area.

The findings revealed that LSD severity rates were elevated (>0.8% severity) in Hosanagara, Tirthahalli, Narasimharajapura, Sringeri, Koppa, and Mudigere taluks of Karnataka. Factors such as farm size, palm age, and planted variety were identified as drivers of disease prevalence. Effective disease management strategies, encompassing fungicide application, sanitation, and cultural practices, are imperative to alleviate its impact on arecanut cultivation nationwide.

# TIPS AND GUIDANCES

## Ecological engineering concept

Coconut-based heterogenous landscaping with crop pluralism, bird perch, fish pond, honey bees, *in situ* biomass recycling, eco-feast plants generated continuous farm-income, pest-regressive, climate-smart, ecosystem well-being, microbiome conservation and accomplished sustainable development goal.

## Green technology for managing coconut rhinoceros beetle

Application of *Metarhizium majus* (MM 601) in cow dung pits was found to reduce the leaf damage by coconut rhinoceros beetle by 50%-60%. *M. majus* can be multiplied in semi-cooked rice and distributed to the dairy farmers who have cow dung pits.

## Cocoa seedling standard (Indian Minimum Seed Certification Standards Part II):

| Characters | Standards |
|---|---|
| Age of the seedling: | 5-6 months |
| Height of seedling: | 45-50 cm |
| Girth of seedling: | 3.5-4 cm |
| No. of leaves: | 5-6 pairs |
| Growth: | Straight from the middle of the polybag, without branching or jorquetting. |
| Foliage: | Green, healthy, without crinkling and nutrient deficiency, middle leaves of 15 cm length and 6 cm width. |
| Root: | Tap root branched with young spreading roots without netting. |
| Potting mixture: | 2:1:1 Soil: Sand: FYM in poly bag of 6” x 9” size and 250 gauge thickness with drain holes. |
| Precautions: | Free from nursery diseases and pests. Ball of earth in the poly bag should be wet and loose without pot bound condition. Care should be taken not to break or damage the tap root. Seedlings should not be kept in the nursery over ten months. |

# IMPORTANT EVENTS

## Farmer's Meet and Agricultural Technology Exhibition at Kidu

A Farmers Meet was organized at ICAR-CPCRI Research Centre, Kidu, Karnataka on 11.03.2024.

Sushri Shobha Karandlaje, Hon'ble Minister of State for Agriculture and Farmers Welfare was the Chief Guest on the occasion. About 2000 farmers from coconut and arecanut growing districts attended the mela along with officials from state Govt., development agencies, FPOs, KVKs and other agencies. Hon'ble Minister highlighted various measures taken by central government to protect the

interest of coconut and arecanut farmers of the region to manage some of the sudden outbreak of pest and diseases and prevailing price fluctuation and to prevent illegal import of commodities from neighbouring countries. She also emphasized that the approved multi-institutional project involving reputed research organizations like AIIMS, IISC, CCMB, JIPMER, NIMHANS, NBRI and other private medical institutes would establish scientific evidence to show that chewing arecanut alone is not carcinogenic and instil confidence in beleaguered farmers.

Dr. S.K. Singh, Deputy Director General (Hort. Sci.), ICAR, New Delhi presided over the function and urged the farmers to adopt improved technologies in agriculture to reduce the cost of production and tide over the climate crisis. Dr. Prabhat Kumar, Horticulture Commissioner Govt. of India called upon farmers to make use of the Coconut Development Board (CDB) schemes to rejuvenate old gardens with improved high yielding varieties to check declining crop productivity. Vegan population in Europe/America is particularly looking for coconut products and advised the farmers to think of eco-friendly produce (harmless harvest), use minimum water and adopt multi cropping. Sushri Bhagirathi Murulya, MLA (Sullia), Dr. Homy Cheryian Director DASD, Dr Hanumanthe Gowda CCDO CDB, Shri Kishore Kodgi President CAMPCO and Shri Satish Kalige, Bilinele Ward Member, graced the occasion.

Earlier Hon'ble Minister commissioned a water storage tank of 20 lakh litre capacity. On the occasion, improved coconut variety - Kalpa Suvarna, cocoa varieties - VTLCH1, VTLCH2, and a handbook on 'Improved Coconut Varieties developed by ICAR-CPCRI' were released by the Hon'ble Minister.

MOUs on technologies were exchanged with CEO of YGP Coconut Farmers Producers Company Ltd. Davanagere (Hybridization Technology) and South Canara Coconut Farmers Company Ltd. (Kalpa Organic Gold). Four retiring staff of the Centre were felicitated on this occasion.

A technical session on latest technologies on plant and soil health management, value addition, farmers support initiatives, marketing etc., demonstrations of drone enabled spraying; hybridization technique in coconut; coconut tree climbing device were also conducted.

A training session on Agro-techniques in coconut, arecanut and cocoa for Scheduled Caste and Scheduled Tribe communities was conducted during the programme with more than 120 participants.

Sushri Shobha Karandlaje, Hon'ble Minister of State for Agriculture and Farmers Welfare, inaugurated the programme at Kidu

## Dream Big-Kalpa: Institute-Industry Interface Meeting

"Problems of many are the opportunities for the entrepreneurs", opined Shri Nagaraja Prakasam, startup mentor and investor, while inaugurating Dream Big-Kalpa, the Institute-Industry interface at ICAR-CPCRI on 5 March 2024. Agriculture sector will continue to be a driving force in the Indian startup ecosystem and the research institutions and agri-business incubators have a decisive role to convert such initiations to successful ventures, he said.

Dr. K. Balachandra Hebbar, Director, ICAR-CPCRI, addressing the gathering

"Interaction between researchers and industrialists will enable much needed refinements in technologies for effectiveness and wide adoption" said Dr. K. Balachandra Hebbar, Director, ICAR-CPCRI, in his presidential address.

Shri Nagaraja Prakasam, startup mentor and investor, delivering inaugural speech

Dr. Ramachandra Hebbar, Scientist G & General Manager RRSC-South, NRSC, Bangalore highlighted the space technology applications in agriculture and rural sector. He mentioned that the students can utilize the facilities of ISRO at free of cost.

Dr. K. Muralidharan, Principal Scientist, ICAR-CPCRI, delivered the keynote address focusing on commercialized technologies from the Institute and scope for improving through integration of advances in IoT, AI, UAV, and robotics. Dr. Manoj P. Samuel, Executive Director, CWRDM, Kozhikode was present on the occasion.

There were two panel discussions: The one on 'Farming in the 5G+ Era: Leaving drudgery for leisure' and the second on 'Breaking the technology stalemate'.

Four MoAs were inked for technology transfer: Mr. Shivakumar P, Production and Marketing Manager, Ecophytocare India Pvt. Ltd., Mysuru for microbial probiotic technologies (Kera Probio', 'Kera Probio+', 'Cocoa Probio' and 'KerAM); Gramalakshmi

Marketing Producer Company Limited for Kalpa Soil Care; Ramnagara Zilla Mango and Coconut Crop Farmer Producer Company Ltd. for Kalparasa; and Praveen, R. for Coconut chips.


Panel discussion on farming in the 5G Era: Leaving druggery for leisure

Exibition at CPCRI Kasaragod in favor of Dream Big-Kalpa: Institute-Industry Interface Meeting

Signing of MoAs for technology transfer

## 108th Foundation Day of the ICAR-CPCRI

ICAR-Central Plantation Crops Research Institute, Kasaragod celebrated 108th Foundation Day on Friday 5th January 2024 in a befitting manner. Dr. N. K. Krishna Kumar, Former Deputy Director General (Horticultural Science), ICAR, New Delhi delivered the Foundation Day address.

Dr. Krishna Kumar in his address emphasized that innovation is the key for facing the challenges experienced in coconut, arecanut and cocoa and other plantation crops in the current scenario.

Dr. George V Thomas, former Director, ICAR-CPCRI Kasaragod delivered Dr. K.V. Ahamed Bavappa memorial lecture on "Biodiversity and conservation-based approaches to enhance soil health, system productivity and ecosystem services in plantation crops". He also distributed climbing devices and certificates to palm climbers under the Scheduled Tribe Component scheme.

Dr. K. Balachandra Hebbar, Director, ICAR-CPCRI gave introductory remarks. Dr. J. Dinakara Adiga, Director, ICAR-Directorate of Cashew Research, Puttur, Dr. Anitha Karun, former Director, ICAR-CPCRI Kasaragod, Dr. B. Hanumanthe Gowda, Chief Coconut Development Officer, Coconut Development Board, Kochi, and Shri Dadasaheb Desai, Deputy Director, Directorate of Cashew nut and Cocoa Development, Kochi graced on the ocassion.

Exchange of MoUs/Material Transfer Agreements on different technologies with entrepreneurs and other stakeholders was also made during the function.


Dr. N.K. Krishna Kumar, Former DDG (HS) addressing the gathering


Dr. George V. Thomas, Former Director, ICAR-CPCRI delivering Dr. KVA Bavappa memorial lecture

## National Science Day

As part of the National Science Day 2024, a workshop on the theme: 'Climate Change in Plantation Sector' was conducted at ICAR-CPCRI, Regional Station, Kayamkulam on 28.02.2024.

The workshop was inaugurated by Dr. K. Balachandra Hebbar, Director, ICAR-CPCRI, Kasaragod. In his inaugural address, he highlighted the way in which innovative thoughts translate into useful technologies for the betterment of humanity. He described the role of science, technology and innovation in the progress of the nation.

Dr. B. Sasikumar, Retired Head, Division of Crop Improvement, ICAR-IISR, Kozhikode, was the Chief Guest for the programme. He delivered a thought-provoking lecture on the topic "Science for Societal Welfare: Some Imprints". He highlighted the importance of observations as an important quality of a scientist.

A view of the delegates of the National Science Day

Director inaugurating National Science Day programme at Kayamkulam

Dr. M. Murugan, Professor and Head, Cardamom Research Station (KAU), Pampadumpara, delivered the keynote address. Dr. Regi Jacob Thomas, Head, ICAR-CPCRI, Regional Station, Kayamkulam briefly explained the history of plantation crops in India. 'Kalpa Darshika', a publication with the profiles of all the past and present staff members of ICAR-CPCRI, Regional Station, Kayamkulam, as well as an

awareness video on 'Vascular streak dieback in cocoa', was released during the occasion.

An elocution competition on the topic 'Science for a Sustainable Future' and a quiz contest were conducted for the student participants. In the valedictory session, Dr. K.B. Hebbar distributed prizes to the winners of the elocution and quiz competitions. More than 80 students from different colleges along with farmers participated in the workshop.

National Science Day was celebrated at CPCRI, RC, Kahikuchi also on 28.02.2024. About 200 students and staff members participated in the programme, which included visits to all the laboratories to get an exposure of CPCRI technologies and interaction with the scientists. A quiz competition was also organized.

## Meeting of Members of NSC on Arecanut and Arecanut Farmers with Sushri Shobha Karandlaje

The Minister of State for Agriculture and Farmers Welfare (MoS & FA) Sushri Shobha Karandlaje called upon a meeting of members of the National Scientific Committee on Arecanut and representative farmers of All India Arecanut Grower's Association on 07.01.2024 at Chikkamagaluru to discuss yellow leaf disease (YLD) and leaf spot disease (LSD) of arecanut. The Chairman of NSC on Arecanut Dr K.B. Hebbar, Director, ICAR-CPCRI and members of NSC including Dr. Homey Cheriyan, Director, DASD, Dr. Ravi Bhat, Principal Scientist, ICAR-CPCRI, Dr. H.R. Naik, Deputy Director of Horticulture, Dakshina Kannada, Dr. B. Gangadhar Naik, Prof. & Head (Plant Pathology), KSNUAHS, Shivamogga and Dr. Vinayaka Hegde, Head Crop Protection, ICAR-CPCRI, Kasaragod, attended the meeting. The meeting was also attended by Shri Araga Jnanendra, MLA, Thirthahalli, Shivamogga, Shri Jeevaraj, former MLA, Sringeri, Mr. Mahesh H.S., Vice President and other members of MAMCOS, Shivamogga, Officers from Dept. of Horticulture and Agril., Chikkamagaluru, Mr. M.J. Dinesh, Chairman, Coffee Board and Mr. Talavane Prakash, President, Areca Grower's Organisation.

During the meeting, farmer's representatives were updated on research findings. It was also decided to take up one more demonstration plot of arecanut in the Koppa or Sringeri area in the disease affected garden.

Later Minister mentioned that the case regarding the harmful effect of arecanut is in the Supreme Court and there is a need to provide the published evidence that arecanut is 'not harmful' to the Supreme Court. For which, Dr. K.B. Hebbar explained that ICAR-CPCRI has recently conducted a workshop with doctors from reputed institutes like AIIMS, CCMB etc, and preparing a project proposal that will be submitted to the Ministry immediately.

## Meeting on 'Multi-institutional project on arecanut and human health'

The meeting was held at Krishi Bhavan, New Delhi, with Sushri Shobha Karandlaje, Minister of State for Agriculture and Farmer Welfare, Government of India, on 8th February, 2024 at 11.30 a.m. A detailed discussion was held on the arecanut in India, including the proposed 'Multi-institutional project on arecanut and human health'. Dr. Balachandra Hebbar, Director, ICAR-CPCRI, Kasaragod, put forward the merits and demerits of arecanut on human health. He also highlighted historical aspects of research carried out on arecanut and submitted the project proposal. The Hon'ble Minister spoke about the importance of this study to educate the general public on arecanut use. She said arecanut consumption should be treated similarly to the consumption of coffee and tea, for which she urged the scientific committee to undertake evidence-based research to bring facts to the public. Shri Rakesh Ranjan (Special Secretary), Dr. Prabhath Kumar (Horticulture Commissioner), Shri Priya Ranjan (Joint Secretary-MIDH), Dr. Naveen Kumar Patle (Additional Commissioner, Hort.), Dr. Balachandra Hebbar (Director, CPCRI, Kasaragod), Dr. Homey Cheriyan (Director, DASD, Calicut), Dr. K. Satyamoorthy (Director of Research, SDM University, Dharwad), Dr. Ramesh S.V. (CPCRI, Kasaragod) attended the meeting and Principal Investigators from all the collaborating centres attended the meeting online and delivered their views on the importance of arecanut and its use. The officers stressed upon the awareness to be created for the causes to human health by arecanut, since it is widely produced and consumed in India.

Dr. Prabhat Kumar mentioned the health issues associated with the consumption of arecanut and stressed the need for systematic studies to evolve evidence-based research in India.

Dr. K. Balachandra Hebbar briefed the participants that about 20 million people are dependent on arecanut for their livelihood. Arecanut is produced from about 9 lakh ha in India and its value is about Rs. 44,000 crores. He also highlighted the deliberations of the multi-institutional meeting held at Kasaragod on 14th of November 2023.

Dr. Satyamoorthy presented briefly the various proposals submitted by the institutions across India on arecanut research. These were broadly classified into the following categories: a) clinical epidemiology; b) metabolisms and metabolites of various cultivars of arecanut; c) cancer-related studies; and d) neuropsychiatric studies.

The house recommended the project and gave their consent to proceed forward.

## Horticulture Fair at ICAR-CPCRI, RS, Vittal

A one-day Horticulture Fair funded by the Directorate of Cashew nut and Cocoa Development (DCCD) was organized at ICAR- CPCRI, Regional Station, Vittal, Karnataka on 28.02.2024 in commemoration of National Science Day. Padmashri. Sathyanarayana Beleri was the chief guest. About 650 farmers, department officials, students and 126 women participated. Lectures, discussions, demonstrations and exhibitions were held on coconut, arecanut, cocoa, cashew and pepper.

# TECHNOLOGY HIGHLIGHTS

## Potassium dynamics in cocoa pod husk biochar

Addition of cocoa pod husk biochar had a direct relationship with the water extractable, exchangeable, available, non-exchangeable, $HNO_3$ extractable, lattice (fixed) and total K. The particle size had a reverse relation with the potassium fractions after each interval of incubation except the lattice K. Lattice K had an inverse trend only on the first day after incubation and afterward its relation was directly proportional to the size of biochar particle. The non-exchangeable fraction of potassium had a continuous improvement throughout the incubation period irrespective of the rate of biochar up to 90 days. Also with the increase in biochar rate, the percentage of each fraction to the total also improved except in the case of lattice K. The per cent of lattice K to total K was found to decrease with increase in addition of cocoa pod husk biochar. Hence, to get the full benefits of addition of CPHB for potassium availability, it is advised to use the cocoa pod husk biochar in a powdered form of less than 1 mm particle size.

## Micronutrient profiling of cocoa beans

The recommended fertilizer dose of 100:40:140 g NPK is being applied in all cocoa growing regions for a long time and also widely studied for their uptake and availability in the plants. But genotypic variability of micronutrients in cocoa beans in different environments was never studied. In this background, around 12 cocoa genotypes comprised of parental clones and hybrids from Karnataka, Kerala, TN and AP were analysed over three years for their micronutrient status with respect to Fe, Zn and Cu contents. The range of nutrient status in cocoa nibs varied among all four states and among genotypes. Specifically cocoa varieties VTLCH 1 and VTLCH 2 showed beneficial level of micronutrients, 24.3- 31.5 & 18.6- 43.3 ppm Fe, 22.0- 58.8 & 27.9- 60.7 ppm Zn and 17.9- 29.6 & 18.2- 30.5 ppm Cu, respectively. This micronutrient profiling information generated from the multi-location trials will be helpful in the development of biofortified cocoa varieties.

| Micronutrients | Karnataka | Kerala | TN | AP |
|---|---|---|---|---|
| |  |  |  |  |
| **Fe** | 13.0- 35.7 ppm | 25.2- 102.1 ppm | 24.3- 45.4 ppm | 24.3- 43.3 ppm |
| **Zn** | 27.9- 33.6 ppm | 14.8- 72.4 ppm | 46.2- 60.7 ppm | 49.8- 51.7 ppm |
| **Cu** | 26.0- 32.3 ppm | 11.5- 27.5 ppm | 20.0- 27.3 ppm | 21.1- 29.5 ppm |

## Standardisation of water and nutrients for early flowering and tendernut harvest

The study is taken up since October 2019 for standardizing fertigation scheduling for tender nut production in sandy loam soils of root (wilt) disease prone areas in a dwarf variety COD released by ICAR-CPCRI for tender nut production. The major objective of the study is to assess the combined effect of water and nutrients on growth and yield of dwarf coconut and standardizing a cost effective fertigation schedule for tender nut production. The experiment was laid out in FRBD with nine treatments and one control (C: 100% STBNR (530:150:1200 NPK) as soil application in four splits + 66%PE drip irrigation). The treatments comprised of three levels of irrigation (66%,100%,133%) and three levels of nutrition (C+1/3C, C+2/3C and C+C). The nutrients were supplied in 20 equal splits at fortnightly intervals during August to May. The average number of days for scheduling irrigation was 128 days/year. The study revealed that 100% PE irrigation and 200% nutrients resulted in early flowering and harvest of tender nuts. The palms

produced an average of 133 tender nuts/ palm during the first year of harvest with an average production of 12 bunches. The tender nuts recorded good tender nut water content (336 ml/nut) with higher potassium content (2689.5 ppm) and TSS (5.2% brix).

## Cocoa fermenter

Traditionally, cocoa beans undergo box fermentation and sun-drying, resulting in inconsistent quality, contamination risks, weather dependency, and limited control over processing. Therefore, study was undertaken to optimize different fermentation methods, utilizing a fermenter unit developed at ICAR-CPCRI and the traditional box fermentation method to comprehend the biochemical transformations at each stage and their collective impact on the overall quality of final products. In the case of box fermentation, pH decreased significantly from 5.8 to 3.74, while in the CPCRI fermenter unit, it decreased from 5.8 to 3.78. Notably, cocoa beans from the CPCRI fermenter unit exhibited higher values for bulk density (434 kg/m$^3$), percentage shell mass (16.6%), and percentage nib mass (86.4%). Biochemical analyses, encompassing fat, protein, carbohydrate, ash, moisture, total phenol, and antioxidant activity, were conducted on both fermented and dried cocoa bean samples. Cocoa beans from the CPCRI fermenter unit displayed elevated values for carbohydrate (28.94%), ash (3.64%), moisture (7.17%), total phenol content (4.67 mg GAE/100g), and FRAP (3.23 mg TE/100g). In sensory evaluation, chocolates crafted from cocoa beans processed in the CPCRI fermenter unit garnered higher preference compared to those from the traditional box fermentation method.

## Occurrence of Mealybug complex in cocoa

Mealybug *Planococcus lilacinus* is regarded as responsible for causing significant damage in cocoa so far and it was found from Kasaragod, Kidu and Vittal plots. Last year, the pest incidence was recorded to be 6.8%, and hence the species diversity of mealybug was studied. Interestingly, apart from the dominant species, *P. lilacinus*, minor species such as *Ferrisia virgata* and *Crissicoccus hirsutus* were also found to be associated and infesting cocoa. The nursery seedlings were highly susceptible to mealybug attack causing wilting and drying. Mealy bug colonizes the tender parts of the cocoa plant such as growing tips, terminal bud, flower cushions, young cherelles and mature pods as well. Damage to tender apical shoots lead to deformation into slender brush like process. Colonization of flower cushion results in cushion abortion, withering and drying up. Feeding on pods results in irregular cracks and roughening of pod surface.

Wilting and drying of terminal bud

Cushion withering, pod damage, cracks & roughening of pod surface

## Biodiversity driven pest management in coconut

The two stage-specific parasitoids *viz.*, *Goniozus nephantidis* and *Bracon brevicornis* @ 20 or 30 parasitoids per palm infested by the black head caterpillar, *Opisina arenosella* proved effective in the bio-suppression of the pest. Systematic health management of the pest-infested palms in synergy with the timely release of the stage-specific parasitoids reduced the pest incidence to more than 95% in a period of one year and rejuvenated the palm health in two years period.

## Tender Coconut Punching Machine

Tender coconut water is a nutritionally superior drink and has gained worldwide attention. The extraction of water from the tender coconut is quite a difficult task. Street vendors initially cut through the thick fibrous husk to expose a part of the shell. This is done by chopping the husk in bits with a heavy machete. The exposed shell is then punched. The existing facilities, mainly traditional tools used are unsafe, messy and need skill and training. The risk of getting injured is also high. There are some manually operated tools that exist to punch a hole and split it open but it is time consuming and hard to operate continuously. To

increase the production and to reduce the human drudgery, the semi-automatic coconut punching machine has been developed. It is working based on the principal of slider crank mechanism. The developed machine consists of a stand to hold the machine, platform to place the sample, slider crank punching unit, drive motor, and gear reduction assembly along with a limit switch. The speed of the penetration bit was 61.5 mm/s. This invention will assure the quick and efficient punching processing of 300 tender coconuts/h.

## Dynamics of exotic whiteflies on coconut

Among the five non-native whiteflies on coconut system, the Bondar's nesting whitefly *Paraleyrodes bondari* was found dominant (1.5 live colonies/ leaflet) exceeding the rugose spiralling whitefly population. Palm whitefly, *Aleurotrachelus atratus* was restricted in isolsated gardens at a very low level. The nesting whitefly, *Paraleyrodes minei* and the indigenous whitefly, *Aleurocanthus arecae* were competitively displaced from the system, which failed to withstand the invasive aggressiveness of other non-native species.

## Influence of low temperature treatment on pollen germination and tube length

The fresh coconut pollen extracted from the flowers of West Coast Tall (WCT) were treated with temperatures 50°C and -20°C for 5 and 10 minutes respectively and observed *in vitro* pollen germination and tube length of both the treatments in comparison to control (kept at room temperature i.e. ± 28°C) at different temperature ranges (15°C, 20°C, 25°C, 30°C, 35°C, 40°C, 45°C) to check the treatment effects on pollen performance. Highest germination and tube length were observed with 25°C as compared with the other tested temperature range in all treatments. Pollen treated with 50°C and -20°C found to give better germination (55.55±3.36%; 54.47±2.85%) over the control (38±3.26%). While tube length values were maximum in cold temperature treated pollen and control (466.69±42.06 to 620.05±28.29 µm and 466.92±17.86 to 622.50±55.74 µm) over high temperature treated pollen (350.792±23.18 to 574.258±61.99 µm). Cold temperature treated pollen showed a germination of 8.25% even at high temperature i.e. 40°C whereas in control and heat treatments the germination at 40°C found to be nil.

## Screening and optimization of germination media for cocoa pollen germination and storage

We applied numerous media by mixing the different concentrations of sucrose (10%, 20%, 30% and 40%), $H_3Bo_3$ (10ppm and 20 ppm), $CaCl_2$ (10ppm and 20 ppm), KCl (10 ppm, 20 ppm), $MgSo_4$ and PEG (10%, 20%, 30% and 40%) to screen and identify the initial medium and to optimise the medium components. The most effective liquid medium for in vitro cocoa pollen germination contained 20 g/L sucrose, 30 g/L PEG (PEG 4000), 10 ppm $H_3Bo_3$, 20ppm $CaCl_2$, 20ppm KCl, 20 ppm $MgSo_4$ with pH = 6.0. The optimum growth temperature for pollen development in cocoa was from 25 to 30 °C.

## Soft scale on *Gliricidia sepium* in coconut system

A new distribution record of the scale insect, *Trijuba oculata* was reported on *Gliricidia sepium*, a green leaf manure in coconut system from Pollachi, Tamil Nadu. The scale insect had severely infested *G. sepium* from the under surface of the leaf as well as twigs with extensive sooty mould deposit on the upper leaf surface. Dorsum of the scale insect has three parallel rows of conspicuous setae with quadrate anal plates. In addition, the median stigmatic spine is longer than the lateral spines. Previously, *G. sepium* was also infested by the non-native whitefly, *Tetraleurodes acaciae*.

# TECHNOLOGY COMMERCIALIZATION

During the period from January-March 2024, 23 technologies were commercialized and an amount of Rs. 4,72,500/- was collected as technology transfer fees. Details are given below:

| Technology Commercialized | Date of MOU | Value(In INR) | To Whom Commercialized |
|---|---|---|---|
| Aqua formulation of EPN Kalpa EPN (CPCRI- Sc1) | 05-01-2024 | 5,000 | Mr. Jaiju M. Bernerdose, Muttath, Mudrady post, Hebri taluk, Udupi district, Karnataka,576112 |
| Trichoderma Coir Pith Cake | 05-01-2024 | 5,000 | M/s Ecophytocare India Pvt. Ltd., 185/A, Gaddige Road, Bogadi, Mysuru - 570026, Karnataka |
| Know-how on utilization of *Metarhizium anisopliae* culture | 05-01-2024 | 5,000 | M/s Ecophytocare India Pvt. Ltd., 185/A, Gaddige Road, Bogadi, Mysuru - 570026, Karnataka |

| | | | |
|---|---|---|---|
| Technology for mass production of *Trichoderma harzianum* using arecanut leaf sheath | 05-01-2024 | 5,000 | M/s Ecophytocare India Pvt. Ltd., 185/A, Gaddige Road, Bogadi, Mysuru - 570026, Karnataka |
| Preservation of coconut gratings | 05-01-2024 | 10,000 | M/s. Geeta Foods, 18-117/1, Ramalayam street, Mogalturu mandalam, West Godavari, Andhra Pradesh – 534281 |
| Bacterium –*Bacillus cereus* | 05-01-2024 | - | National Institute of Technology Karnataka, Srinivasnagar PO, Surathkal, Mangalore, Karnataka 575025 |
| Bacterium –*Bacillus licheniformis* | 05-01-2024 | - | National Institute of Technology Karnataka, Srinivasnagar PO, Surathkal, Mangalore, Karnataka 575025 |
| Bacterium –*Bacillus pumilus* | 05-01-2024 | - | National Institute of Technology Karnataka, Srinivasnagar PO, Surathkal, Mangalore, Karnataka 575025 |
| Bacterium –*Bacillus safensis* | 05-01-2024 | - | National Institute of Technology Karnataka, Srinivasnagar PO, Surathkal, Mangalore, Karnataka 575025 |
| Foam mat dried coconut milk powder | 08-01-2024 | 10,000 | Saptasagar Mahila Bachat Gat, Vengurle – 416516, Sindhudurg, Maharashtra |
| Preservation of coconut gratings | 17-01-2024 | 10,000 | Ms. Shali A, Meppanattil (H), Makkada (PO), Kakkodi (via), Kozhikode (Dist), 673611 (Pin), Kerala |
| Technology for mass production of *Trichoderma harzianum* using arecanut leaf sheath | 09-02-2024 | 5,000 | Ms Thejasri K.P., Lalithamma Nilaya, Ramdas Nagar P.O., Vivekananda Nagar, Kudlu, Kasaragod, Kerala |
| Technical Knowhow of production of Coconut Chips | 09-02-2024 | 25,000 | Mrs. Ambika, W/o Sivaraja, 2-201A, Mariamman Kovil Street, Appanthiruppathi Post, Mathur Village, Madurai District, Tamil Nadu – 625301 |
| Matured coconut water based value added products | 09-02-2024 | Complementary with Chips | Mrs. Ambika, W/o Sivaraja, 2-201A, Mariamman Kovil Street, Appanthiruppathi Post, Mathur Village, Madurai District, Tamil Nadu – 62530 |
| Matured coconut water based value added products | 12-02-2024 | Complementary with VCO | M/s DMS Industries, Industrial Area Plot No 23A1 and 23A2 B Kattihalli, Hassan, Karnataka |
| Matured coconut water based value added products | 12-02-2024 | Complementary with VCO | Sri Venkateshwara Industries, Ground Floor, 22 23 26, Peenya II Stage, Bengaluru (Bangalore), Urban, Karnataka, 560058 |
| Technical knowhow and machineries for the production of Virgin Coconut Oil (VCO) | 12-02-2024 | 40,000 | M/s DMS Industries, Industrial Area Plot No 23A1 and 23A2 B Kattihalli, Hassan, Karnataka |
| Technical knowhow and machineries for the production of Virgin Coconut Oil (VCO) | 12-02-2024 | 40,000 | Sri Venkateshwara Industries, Ground Floor, 22 23 26, Peenya II Stage, Bengaluru (Bangalore), Urban, Karnataka, 560058 |
| Machineries (Renewal of MoA signed on 29-02-2016) | 12-02-2024 | 30,000 | M/s Pro B Products, No.20/3B, 2nd Phase, KIADB Main Road, Opp. BWSSB, Peenya 1st Stage, Bengaluru – 560058, Karnataka |
| Preservation protocol for trimmed tender coconut | 21-02-2024 | 15,000 | The Secretary, Kodotty Block Karshaka Sangham FPO, Kuruppath Post, Pin-673638, Kondotty Taluk, Malappuram District, Kerala |
| Snowball Tender Nut Machine | 21-02-2024 | 2500 | The Secretary, Kodotty Block Karshaka Sangham FPO, Kuruppath Post, Pin-673638, Kondotty Taluk, Malappuram District, Kerala |
| Frozen Coconut Delicacy | 01-03-2024 | 25000 | Mrs Kavitha Balakrishnan, 35 Arum Lily, Kalapatti, Coimbatore - 641048, Tamil Nadu |
| Technical Knowhow of production Of Coconut Chips | 05-03-2024 | 25000 | Mr Praveen R, 82, West Kudi Street, Devanaluur, Selampalayam Post, Dharapuram (tk), Tirupur District, Tamil Nadu – 638672 |
| Matured coconut water based value added products | 05-03-2024 | Complementary with Chips | Mr Praveen R, 82, West Kudi Street, Devanaluur, Selampalayam Post, Dharapuram (tk), Tirupur District, Tamil Nadu – 638672 |
| 'Kera Probio', 'Kera Probio+', 'Cocoa Probio' and '*Ker*AM' | 05-03-2024 | 25000 | M/s Ecophytocare India Pvt. Ltd., 185/A, Gaddige Road, Bogadi, Mysuru - 570026, Karnataka |
| Kalpa Soil Care - *Coir pith composting (urea free) technology'* | 05-03-2024 | 15000 | The Managing Director, Gramalakshmi Marketing Producer Company Limited, Udayapuram P.O. Kodothe, Anandasrem, Kasaragod, Kerala |
| Collection of fresh and hygienic Kalparasa and production of natural coconut sugar | 05-03-2024 | 100000 | M/s Ramanagara Zilla Mango and Coconut Crop Farmer Producer Company Limited (R), APMC Market, Ramanagara – 562159, Ramanagara Dist, Karnataka |
| Modified ground pollination technique for hybridization in coconut | 11-03-2024 | 25000 | YGP Coconut Farmers Producer Company Limited, Avaragere Davanagere Davangere Karnataka- 577003 |
| Kalpa Organic Gold - Coconut Leaf Vermicomposting | 11-03-2024 | 25000 | South Canara Coconut Farmers Producer Company Limited, 1/101, Near Mangala Mantapa CPCRI, Vittal, Dakshina Kannada, Karnataka – 574243 |
| Matured coconut water based value added products | 18-03-2024 | Complementary with Chips | Mrs. T.M. Annamma, Bless Farm Flave, MP/15/81, Parakkatta, P.O. R.D. Nagar, Kasaragod – 671124, Kerala |
| Technical Knowhow of production of Coconut Chips | 18-03-2024 | 25000 | Mrs. T.M. Annamma, Bless Farm Flave, MP/15/81, Parakkatta, P.O. R.D. Nagar, Kasaragod – 671124, Kerala |
| | **Total** | **4,72,500** | |

# HUMAN RESOURCES DEVELOPMENT

Dr. Jeena Mathew, Sr. Scientist has successfully completed the online short course on patents (AgriIP 2024) jointly organized by IP&TM, ICAR, New Delhi and Zonal technology Management Agri Business Incubation centre, ICAR-CIFT from 15/1/2024 to 15/2/2024.

Dr Ravi Bhat, Principal Scientist (Agron) and SIC, PME attended the online short course on patents (AgriIP 2024) jointly organized by IP&TM, ICAR, New Delhi and Zonal technology Management Agri Business Incubation centre, ICAR-CIFT from 15/1/2024 to 15/2/2024.

Dr. Rajkumar, Senior Scientist (Nematology) attended three days training programme SRIJAN: Empowering ZTMCs/ITMUs of ICAR institutes at NAASC complex, Pusa, New Delhi from 17-19th January 2024.

Dr. Suchithra M., Scientist undergone 21days winter school training on 'Phenotyping horticultural crops for abiotic stress tolerance to enhance resilience under climate change' from February 1st to 21st at Indian Institute of Horticulture Research, Bengaluru.

Dr. Chaithra M., Scientist, RS, Vittal had attended 21 days CAFT Training on 'Influence of microbiome and native biota on conservation of genetic resources of important horticulture GI crops and their inherent qualities' organized by UHS Bagalkot from 05.01.2024 to 25.01.2024 at collage of Horticulture, Mysore campus.

Dr. S. Elain Apshara, Principal Scientist (Hort.) attended online short course on 'AgrIP: Patents in Agriculture' organised by ICAR-IPTMU and ZTMU, ICAR-CIFT, Kochi from 15.01.2024 to 15.02.2024.

Dr S. Elain Apshara, Principal Scientist (Hort.) attended as Resource person in Dream Big Kalpa-Small level cocoa management and farm level value addition ICAR-CPCRI, 05.03.2024

**Ph. D. Awarded**

Ph. D degree was awarded to Dr. M. Suchithra, Scientist (SPM&AP), for her thesis, Identification of genetic stock for drought tolerance and candidate gene analysis in cocoa (*Theobroma cacao* L) under the guidance of Dr. Suma B. from Kerala Agricultural University Thrissur on 21.09.2023.

**Recognition**

Dr. R. Pandiselvam featured in world top 2% scientist list published by Stanford University, USA and Elsevier.

# PUBLICATIONS

## Research articles


Balanagouda Patil, Shankarappa Sridhara, Thava Prakasa Pandian, R. Shivaji Hausrao Thube, Nandeesha C V, Pruthviraj, Ryan Casini, Fahed A. Almana & Hosam O. Elansary 2024. Evaluation of oomycete-specific fungicides and application strategies for controlling fruit rot disease on arecanut (*Areca catechu* L.), *Cogent Food & Agriculture*, **10**:1, 2314227, DOI: 10.1080/23311932.2024.2314227.

Bhavishya, Bhat Ravi, Elain Apshara, S., Pushpa, T. N., Srikanta Prasad, D., Nayana, H., Thube, S. H., Pandian, R. T. P. and Ramesh, S. V. 2024. Genotypic variation in flowering, fruit set, and cherelle wilt, and their relationship with leaf nutrient status in cocoa (*Theobroma cacao* L.) grown in humid tropics of India. Innovations in Agriculture **7**: 1–5. doi: 10.3897/ia.2024.124253.

Bhavishya, Subramanian, K. S., Gopal, M., Bhat Ravi, Nair, S. S., Radhakrishnan, M., and Rajesh, M. K. 2024. Nano-potassium intercalated composted coir pith: A slow-release fertilizer suitable for laterite soils of humid tropics of India. *Biocatalysis and Agricultural Biotechnology*. **57**: 103054. https://doi.org/10.1016/j.bcab.2024.103054

Sar, P., Gupta, S., Behera, M., Chakraborty, K., Ngangkham, U., Verma, B.C., Banerjee, A., Hanjagi, P.S., Bhaduri, D., Shil, S. and Kumar, J., 2024. Exploring Genetic Diversity within aus Rice Germplasm: Insights into the Variations in Agro-morphological Traits. *Rice*, **17**(1), p.20.

Sunny Thomas, V.P. Joy and Abdul Haris. 2024.Weather forecasting and equipments (In Malayalam) *Indian Naleekera Journal*.**16**(2) p.5-7

Thava Prakasa Pandian, R., Shivaji Hausrao Thube, Bhavishya, Merin babu, H. Rajashekara, T.N. Madhu, Y. Diwakar, P. Santhoshkumar, B.J. Nirmalkumar, Balanagouda Patil and V. Hegde 2024. *Colletotrichum kahawae* subsp. cigarro causing leaf spot disease on arecanut, *Areca catechu* L. in India: A first report. *Crop Protection*. **179**: 106607. https://doi.org/10.1016/j.cropro.2024.106607.


## Popular Articles


Anithakumari, P., Akhilesh P.K, Anju Krishnan and S. Bhavya. 2024. A coastal model of integrated farming system. *Kerala Karshakan*. **69**(2): 28-30.

Anithakumari, P.,s 2024. Artificial

Intelligence in Agriculture - threat or potential? Yojana. **32**(7):23-29.

Jissy George 2024. Drying of ginger and turmeric. *Karshakasree Farm Dairy*. 70 -71.

Mayalekshmi, M. Shareefa, and Regi J. Thomas. 2024. Special edible coconut types (in Malayalam). *Indian Nalikera Journal*, **16**(1):20-22.

Ravi, S. 2024. Composting of Carcass. *Karshakasree Farm Dairy*. 78-79.

### Book Chapter

Bhat Ravi, Surekha Rajkumar, Neenu Satyaseelan and Periasamy Subramanian 2024. Management Practices for Coconut Production. In: The Coconut: Botany, Production and Uses. (Eds. Stephen W Adkins, Julianne M. Biddle, Amirhossein Bazrafshan, Sundaravelpandian Kalaipandian). pp. 31-45. CAB International, Nosworthy Way, Wallingford, Oxfordshire OX10 8DE, UK. P. 237.

Hebbar, K.B., Ramesh, S.V., Kalaipandian, S. and Adkins, S.W. 2024. Coconut Production under a Changing Climate. In: The Coconut: Botany, Production and Uses. (Eds. Stephen W Adkins, Julianne M. Biddle, Amirhossein Bazrafshan, Sundaravelpandian Kalaipandian). pp. 46-57. CAB International, Nosworthy Way, Wallingford, Oxfordshire OX10 8DE, UK. P. 237.

Pandiselvam, R., Khanashyam, A.C., Dakshayani, R., Beveridge, F.C., Karouw, S. and Manikantan, M.R. 2024. Harvest and Postharvest Management of Coconut. In: The Coconut: Botany, Production and Uses. (Eds. Stephen W Adkins, Julianne M. Biddle, Amirhossein Bazrafshan, Sundaravelpandian Kalaipandian). pp. 99-110. CAB International, Nosworthy Way, Wallingford, Oxfordshire OX10 8DE, UK. P. 237.

Rajkumar 2024. Entomopathogenic nematodes for bio-management of coconut pests. *In* Ready to use manual for SC & ST youths in 'Scientific cultivation of coconut and entrepreneurship development', Neenu S., Rajkumar, Sudha R., Surekha and Samsudeen K (Eds) . ICAR- CPCRI, Kasaragod.p34-36.

Rajkumar 2024. Nematode diseases of palms and their management. *In* Ready to use manual for SC & ST youths in 'Scientific cultivation of coconut and entrepreneurship development', Neenu S., Rajkumar, Sudha R., Surekha and Samsudeen K (Eds). ICAR- CPCRI, Kasaragod.p30-33.

Ramesh, S.V., Hebbar, K.B., Bhat, R., Subramanian, P., Sukumar, P.A., Kalaipandian, S. and Adkins, S.W. 2024. Physiological and Nutritional Disorders of Coconut. In: The Coconut: Botany, Production and Uses. (Eds. Stephen W Adkins, Julianne M. Biddle, Amirhossein Bazrafshan, Sundaravelpandian Kalaipandian). pp. 83-98. CAB International, Nosworthy Way, Wallingford, Oxfordshire OX10 8DE, UK. P. 237.

### Extension Folders

Anithakumari, P., Anju Krishnan and Bhavya, S. 2024. Millet cultivation as inter crops in coconut gardens. Extension booklet (In Malayalam).

Shareefa, M., Regi Jacob Thomas and Samusudheen K. 2024. Planting material production and Nursery raising in coconut. Extension folder No.332. ICAR- CPCRI, Kasargod.

### Training Manuals

Muralidharan, P., Sivakumar, T., and Sajnanath, K. 2024. Course Companion to DAESI. ICAR – KVK – Alappuzha. 125p.

Neenu S., Rajkumar, Sudha R., Surekha and Samsudeen, K. 2024. Ready to use manual for Scheduled Caste and Scheduled Tribe youths in 'Scientific cultivation of coconut and entrepreneurship development. ICAR- CPCRI, Kasaragod.p64.

Sivakumar, T., Rajeev, M.S. and Muralidharan, P. 2024. Training manual on "Friends of Coconut" ICAR – KVK – Alappuzha 20p.

## IMPORTANT EVENTS CONDUCTED

### Training of officials of ATMA from Madhya Pradesh

Two teams of officials representing ATMA from the state of Madhya Pradesh as part of their exposure visits underwent a training on different aspects of coconut cultivation on 05.02.2024 (ATMA District -Burhanpur (M. P.)), and on 19.02.2024 (ATMA District - Khandwa (M. P.)).

### Sponsored training on "Cultivation and Processing of Arecanut and Cinnamon"

ICAR-CPCRI, Kasaragod organised a training programme on Cultivation and Processing of Arecanut and Cinnamon from 20.02.2024 to 24.02.2024 for eight horticulture officials of Arunachal Pradesh Government. They have been trained on Arecanut for first 3 days at Regional Station, Vittal and on cinnamon for next two days at Kasaragod. The objective of the training was to promote Arecanut and cinnamon in a scientific way in Arunachal Pradesh.

## Training Programme on Coconut Cultivation and Value Addition

An interstate exposure visit cum training programme on 'Coconut cultivation and value addition' was conducted during 22.01.2024 to 24.01.2024 at ICAR-CPCRI Kasaragod. The Department of Agriculture, Tamil Nadu, Agricultural Technology Management Agency (ATMA), and Support to State Extension Programmes for Extension Reforms Scheme (SSEPERS) sponsored the programme for progressive farmers of Marungapuri block of Tiruchirappalli and Kaveripattinam block of Krishnagiri, Tamil Nadu. The programme involved lectures, demonstrations, and field and laboratory visits related to the topic. On the final day, Dr. K. Balachandra Hebbar, Director, ICAR-CPCRI, chaired the valedictory session and highlighted the importance of coconut research and progress in the sector, emphasising its significance for the livelihood of the farming community. A total of 40 progressive farmers attended the programme. The event was coordinated by Dr. S. Paulraj, Senior Scientist, and Dr. K. Ponnusamy, Head of Division (Social Sciences), ICAR-CPCRI, Kasaragod.

Dr. K. B. Hebbar, Director addressing the visiting farmers at Kasaragod

## Entrepreneurship Development on Cocoa Processing

An entrepreneurship development-training programme on "cocoa processing" was organised as part of the Agri Business Incubation activity at ICAR-CPCRI from March 13 to 15, 2024. The curriculum with scientific cultivation practices, harvest and post-harvest processing, value addition, and business plan creation for cocoa along with hands-on training on bean-to-bar chocolate processing were the highlights of the programme. The programme was attended by participants from Tamil Nadu, Kerala, and Karnataka. Dr. K. Muralidharan, Principal Investigator, ABI, presented the certificates to the participants. Dr. Shameena Beegum, P.P., was the coordinator for the programme.

## Upskilling of SCSP farmers

A training program on Upskilling and Entrepreneurship Development Programme for Schedule Caste youths was conducted at ICAR Central Plantation Crops Research Institute, Regional Station Kayamkulam, from 02/1/2024-1/2/2024 as part of the Scheduled Caste Sub Plan. Participants with entrepreneurship potential were selected from Kandalloor, Oachira, Krishnapuram and Kayamkulam municipality.

Empowered about 90 SCSP trainees on the mass production of bioagents used in pest suppression during the one-day upskilling programme held on 20-02-2024. Farm inputs were also distributed to the SCSP farmers as part of technology familiarization and field level adoption.

'Skill Development Program-Nursery worker/ owner' training under SCSP was organized during March 2024 at CPCRI, RS, Vittal, Karnataka. Eight trainees including 6 boys and 2 girls benefitted from the training. They gained expertise in nursery raising of plantation crops and spices.

Another training on preparation of biocontrol agents was organized from 1.03.2024 to 31.03.2024 at ICAR-CPCRI, RS, Vittal under SCSP scheme. Local unemployed rural women from the SC/ST community have participated. Dr. Chaithra M., Scientist, RS, Vittal was the coordinator.

## RWD training for horticulture officials from Tamil Nadu

A CDB-sponsored training programme on root (wilt) disease identification and management was conducted at Kayamkulam during March 4-6, 2024 for 30 horticulture officials from Tamil Nadu. The training included theory classes studded with on-field practical exposure on disease assessment and management approaches.

## Valedictory programme of skill development training programme under SCSP/TSP

The valedictory function of skill development training programme under SCSP/TSP was organized on 26.03.2024 at ICAR – CPCRI, Kasaragod. The training was conducted during 01.08.2023 to 31.03.2024 for the benefit of 19 Scheduled Caste and Scheduled Tribe community's youths to upgrade their skills and expertise in scientific cultivation of coconut and entrepreneurship development.

Certificates were distributed by Director, ICAR – CPCRI, Kasaragod, to the participants. Dr. Rajkumar, Dr. Surekha and Dr. K. Samsudeen were course coordinators of the training programme.


Dr. K. B. Hebbar, Director delivering certificates to successful trainees

SCSP skill trainees with experts at ICAR – CPCRI Kasaragod

## Programmes under SCSP and TSP at RC, Mohitnagar

One hundred numbers of coconut seedlings were distributed to 50 beneficiaries belonging to scheduled caste community on 11.01.24 at Daspara, Jalpaiguri.

Knapsack sprayers (25 numbers) were distributed to 25 numbers of beneficiaries belonging to Scheduled caste community on 11.03.24 at RC, Mohitnagar.

Piglets were distributed to 60 beneficiaries belonging to tribal community on 12.03.24 at Nathuahat, Jalpaiguri.

## Exhibition

ICAR-CPCRI has participated in the exhibition at Malom, Vellarikundu taluk, Kasaragod district on the occasion of Thaliru Karshika Fest 2024 from 12.01.2024 to 21.01.2024 organised by Mahatma Gandhi Charitable Trust to showcase the technologies and products.

ICAR-CPCRI and ICAR-KVK, Kasaragod have participated in the 36th Kerala Science Congress organised by KSCSTE, Thiruvananthapuram held at Government College, Kasaragod from 8-11th February 2024.



ICAR-CPCRI and CPCRI-KVK exhibition stalls at the Kerala Science Congress venue

# ICAR-KRISHI VIGYAN KENDRAS

## ICAR-Krishi Vigyan Kendra, Kasaragod

The ICAR- Krishi Vigyan Kendra, Kasaragod has initiated 2 OFTs, 4 frontline demonstrations, one nutri garden programme, SCSP and various extension activities during January to March 2024.

## Scientific Advisory Meeting of KVK Kasaragod organised

The XXVIth Scientific advisory committee meeting of KVK Kasaragod was organised on 20th March 2024 at CPCRI, Kasaragod. The meeting was chaired by Dr. K. Balachandra Hebbar, Director, ICAR-CPCRI, Kasaragod. Dr. D.V.S. Reddy, Principal Scientist, ATARI attended the meeting. A total of 37 officers from the developmental departments and invited guests participated in the meeting. The newly developed website of ICAR-KVK Kasaragod https://kvkkasaragod.in/ was also launched during the meeting.

## Honouring Shri Satyanarayana Beleri

During the SAC meeting of KVK Kasaragod, Shri Satyanarayana Belleri, Padma Shri awardee Bellur, Kasaragod district was honoured. He also addressed the gathering and offered his remarks for furthering the cause of the farmers especially in rice cultivation.

Dr. K.B. Hebbar, Director honouring Shri Satyanarayana Beleri, Padma Shri awardee

## Assessment of different varieties of Amaranthus in Kasaragod

Performance evaluation of two varieties of Amaranthus namely Vaika & Vlathankara were carried out in farmer's fields of Kasaragod and Kanhangad block of Kasaragod. Both the varieties have significant vegetative growth than the local varieties. Due to the bright red colour and good taste Vlathankara variety got more market demand and market value. It attained an average height of 43.6 cm during harvest after 28th days of sowing and yielded 115 kg/ cent area.

## Assessment of different varieties of HY Mosaic resistant variety of Okra

Assessment of two okra high yielding and yellow vein resistant varieties of Okra (*Abelmoschus esculentus* L. Moench) Anjitha and Phule Vimukta were conducted in farmers fields of Kasaragod and Kanhangad block of Kasaragod. The demonstrated improved varieties recorded significant improvement in growth and yield parameters over the local adopted check variety. Both the varieties are free from yellow vein mosaic disease in the field condition.

## Demonstration of Nauroji Novel Organic liquid nutrients in vegetables

A banana pseudostem based organic liquid nutrients invented by scientists of NAU, Navsari, known as "Nauroji Novel Organic Liquid Nutrient" along with natural plant extracts were demonstrated in two crops Okra and Amaranthus as per the recommendations in farmers' fields of Kasaragod and Kanhangad block of Kasaragod. A higher yield of 160.2q/ha compared to 141.2q/ha which is an increase of 13.5 percent was observed in Okra.

## Introduction of Mosaic virus resistant cassava var. Sreeraksha

The mosaic disease in cassava is a major threat in cassava cultivation and it causes 25-80% yield reduction. The FLD laid out with ICAR-CTCRI released high yielding mosaic resistant variety Sree Raksha in 1 acre of land belonging to 10 farmers in Kodom-Belur panchayat resulted in mosaic virus disease free crop of 36.8 t/ha compared to 28.6 t/ha for local verities which is an increase of 28 percent.

## Apiary skill training under SCSP activity

Skill training on Apiary was imparted to eleven SC beneficiaries belonging to Badiadka and Muliyar Panchayats at KVK Kasaragod. A total of 52 units of bee box with colonies (including 27 units of melliponiculture units) and tool kits were distributed.

Exposure visits and off campus trainings were imparted subsequently to equip the trainees on handling of the colonies and its maintenance. After 2 months around 3 - 4 Kgs of honey is extracted from ideally maintained colonies. Also, the beneficiaries have further started dividing the colonies for upscaling the same.

Glimpses of SCSP training at KVK, Kasaragod

## Economic empowerment through goat rearing

The KVK had taken up various activities under SCSP for the development of underprivileged communities and as part of 'Socially Responsible Affirmative Action by KVK Kasaragod', six goat kids were distributed to three 'Widowed ladies in the middle age group' for economic empowerment and nutritional security.

Dr. K.B. Hebbar, Director distributing lambs to SCSP beneficiaries

## Capacity Development Programmes

KVK Kasaragod organized 8 on campus trainings with a participation of 100 farmers and rural youth (19 M, 81F) and 4 off campus trainings with a participation 106 farmers (37M, 69 F) during January to March 2024.

## Livelihood enhancement of SC communities through backyard poultry

ICAR-KVK, Kasaragod initiated a programme under SCSP scheme for the Livelihood enhancement of SC communities through backyard poultry. Ninety six-layer chick breed "Gramasree" were distributed to 19 SC families in Badiadka Panchayat of Kasaragod on 5th February 2024. Along with distribution, a technical training was organised on scientific rearing of layer chicks by veterinary surgeon, Badiadka.

Poultry distribution under SCSP

# Krishi Vigyan Kendra, Apappuzha

## Viksit Bharat Sankalp Yathra

KVK actively participated in the Viksit Bharat Sankalp Yathra (VBSY), the nationwide campaign to bring awareness about various welfare schemes of Government of India among the citizens, conducted in Alappuzha district from 4th December, 23 to 24th January, 24 covering all the 72 Grama panchayaths and 6 municipalities in the district. The campaign was conducted with the objectives of spreading awareness about the programmes like PMKSN, PMFME, PMFBY, e-NAM, Soil health card scheme, KCC, PMKSY, Natural Farming, AIF, PM Pranam etc. The programme was taken up in the district with the support and active involvement of various agencies of Government of India and State Governments organizations. Officials of the KVK who participated in the VBSY programme explained about the activities of KVKs and various government schemes implemented by government of India for the benefit of farmers.

## Foliar nutrition in paddy fields of NICRA village using drone

As part of the technology demonstration on 'Climate resilient practices for paddy in Kuttanad region' under the NICRA project, foliar nutrition of multi-nutrient mixture 'KAU-Sampoorna' was carried out using drone in 16 ha paddy fields of Vayalattumali Padasekharam of Thalavady Grama Panchayath on 15.02.24.

## Friends of Coconut Tree (FoCT) programme conducted

KVK-Alappuzha in collaboration with Coconut Development Board, Kochi organized the six days long capacity building program on Friends of Coconut Tree (FoCT) for twenty participants from Muhamma and Thanneermukkom panchayats during 12th to 20th February 2024. The skill set for learning included climbing coconut tree using machine, scientific coconut cultivation practices like selection of mother palm, seed nut collection, coconut nursery raising, selection of seedlings, nutrients, pests, and disease management of coconut palms, identification of maturity of nuts, harvesting etc. In addition to these technical sessions, trainees were empowered on soft skills like better communication skills, positive thinking, and personality development. They were also exposed to different social security measures, insurance, banking aspects, thrift savings, safety measures and first aid. Climbing machines and accident insurance coverage worth Rs. Five lakhs were provided to all the participants.

## SCSP programme launched

Identified 150 beneficiaries belonging to Scheduled Caste were provided improved breeds of poultry birds (10 each), fruit plants (mango, jack, and sapota grafts, and curry leaf and bush pepper plants) and vegetable seed kit (comprising of six types of vegetable seeds, bio pesticide Nanma, yellow sticky trap, and micronutrient mix sampoorna) under the Scheduled Caste Sub Plan (SCSP) Programme of the KVK in a function organized at Bharanikkavu panchayat community hall on 05.03.2024. About 100 farmers participated in the programme and availed the benefits. The interventions are intended to enhance the nutritional security of the scheduled caste families in the area.

## Participated in the Zonal Women Agri-preneur Conclave-2024

Ten women entrepreneurs from Alappuzha district along with Smt. Jissy George, SMS (Home Science) participated in the two day Zonal Women Agri-preneur Conclave organized at University Auditorium, Vellanikkara by ICAR-ATARI, Bengaluru and KAU, Vellanikkara on 20th and 21st January 2024. Hon. Union Minister of State for Agriculture and Farmers' Welfare Ms. Shobha Karanthalaje inaugurated the conclave and visited the stalls arranged by the entrepreneurs promoted by the KVKs of Kerala and Karnataka and interacted with them. Dr. P. Muralidharan, Head, KVK-Alappuzha was the co-chairman of the first technical session in which PMFME schemes, Opportunities and challenges of Women Agripreneures, Services of KAU Agri Business Incubator and Kissan Kart were presented by learned speakers. The sessions were useful to the participants for expanding their present ventures.

## Rural Agricultural Work Experience Programme for B Sc (Ag) students

Five weeks duration programme was organized for B Sc (Ag) final year students of Lovely Professional University, Punjab from 1st February to 7th March 2024 in the KVK.

Three weeks duration programme was organized for B Sc (Ag) final year students of Amrita School of Agricultural Sciences, Coimbatore from 6th March to 28th March.

## Field day

Field day of the Front Line Demonstration on 'Short duration variety of turmeric – IISR-Pragati' was conducted on 20.02.2024 at Muhamma panchayath with the participation of partner farmers along with farmers, officials and LSG representatives of the locality.

## Training programmes

KVK – Alappuzha organized thirty-four training programmes on different topics during the period in which eight hundred and thirty six trainees participated.

# PERSONALIA

### TRANSFERS

| Name of the staff | From (Place) | To (Place) | w.e.f. |
|---|---|---|---|
| Sri Ibrahim K. P.<br>LDC | ICAR-CPCRI, Kasaragod | ICAR-CMFRI Kochi | 31.01.2024 (on deputation) |
| Sri Saji T. J.<br>Assistant | ICAR-CPCRI, RC, Kahikuchi | ICAR-CPCRI Kasaragod | 18.03.2024 |

### PROMOTIONS

| Name of the staff | From (designation) | To (designation) | w.e.f. |
|---|---|---|---|
| Ms Bijila P. V | STO | ACTO | 04.02.2023 |
| Sri Ansary K. M | STO | ACTO | 11.01.2023 |
| Dr. C.G Narayanan Namboodiri | ACTO | CTO | 27.03.2023 |
| Sri Avrajyoti Ghosh | ACTO | CTO | 24.11.2022 |

### RETIREMENTS

| Name of the staff | Designation | Place | Date |
|---|---|---|---|
| Sri Krishnakutty | SSS | ICAR-CPCRI Kasaragod | 31.01.2024 |
| Smt. Sulochana Nair | PS | ICAR-CPCRI Kasaragod | 31.03.2024 |

# FACILITIES CREATED

### Smart Class Room at Kasaragod

Smart class room with interactive panel has been created at ATIC, Kasaragod.

### YLD doagnostic laboratory at Vittal

A diagnostic laboratory on Yellow leaf disease (YLD) funded by Department of Horticulture, Karnataka was recently established at ICAR-CPCRI Regional Station, Vittal, Karnataka under Special grant for research on YLD of arecanut and promotion of alternate crops in YLD affected areas under Comprehensive Horticulture Development (CHD) Scheme (Budget: Rs. 50 Lakhs)

### Water Storage Tank:

A New Water Storage Tank with 20-lakh liters capacity was commissioned at ICAR-CPCRI Research Centre, Kidu by Sushri. Shobha Karandlaje, Hon'ble Union Agriculture Minister for State, MoA&FW, GoI. This state-of-the-art tank is set to enhance the Centre's irrigation infrastructure, enabling the gravitational irrigation of a significant portion of the farm area. As a result, it will significantly reduce the Centre's fuel consumption and enable the centre's capacity to simultaneously irrigate more number of plots in a unit time.

### Pump House:

At ICAR-CPCRI Research Centre Kidu, a new pump house has been constructed to accommodate the installation of modern pump sets. These pump sets are intended to pump water to the recently built water storage tank.

### John Deer 57 Hp Tractor:

A new 57 HP John Deere tractor has been acquired at the ICAR-CPCRI Research Centre in Kidu. This versatile tractor with multiple functions empowers the Center to efficiently carry out a wide range of field operations within scheduled timelines.

# UPCOMING EVENTS

SCSP- Training cum input distribution TSP- training cum input distribution FOCT training to unemployed youth Seedling distribution to NE states Training of grafting techniques to forest personal.

Community coconut nursery - sale of 2200 bio primed poly bag WCT coconut seedlings from disease free mother palms.

Assessment and demonstration of HYV of groundnut (Kadiri Lepakshi-APAU) and Finger Millet ( ATL 1 and CO 15 - TNAU) in 100 acres each in eight panchayats under ICAR CPCRI FFP as intercrops in coconut gardens of Onattukara region.

National Seminar on 'Climate smart agriculture for sustainable soil and plant health in plantation crops at ICAR-CPCRI RS, Kayamkulam during 13-14th June 2024.

# NEW PROJECTS INITIATED

'Laying out demonstration plots for demonstration of technologies for integrated management of root (wilt) disease of coconut' was sanctioned by Coconut Development Board (CDB), Kochi to be implemented in an area of 100 hectare in Tenkasi District, Tamil Nadu with an outlay of Rs.17.50 lakhs. The scheme was sanctioned during March 2024 to Dr. Regi J. Thomas, Head, CPCRI, RS, Kayamkulam.

'Natural farming in coconut based farming system – An analysis of farmers experiences and impact' was sanctioned by CDB, Kochi with an outlay of Rs. 39.40 lakhs to Dr. C. Thamban, CPCRI, Kasaragod.

Another project on 'Coconut based enterprises in Lakshadweep Island: Present status, outlook and development of a revamped strategic framework' was sanctioned by CDB, Kochi with an outlay of Rs. 10 lakhs to Dr. C. Thamban, CPCRI, Kasaragod.

# NATIONAL / INTERNATIONAL LEVEL SEMINARS/ SYMPOSIA ATTENDED

| Name and designation | Title of the programme | Place and date |
|---|---|---|
| Dr. Regi Jacob Thomas,<br>Principal Scientist & Head | International Seminar on 'Sustainable Urban Agriculture Practices & Community resilient cities | KAU, Vellayani<br>22-23rd March 2024 |
| Dr. Jeena Mathew,<br>Senior Scientist | International Webinar on 'Functional Phenomics for Improved Climate Resilience in Tropical Agriculture | ICAR-CTCRI, Thiruvananthapuram<br>04 January 2024 |

# VISIT OF DIGNITORIES

## Visit of Dr. Sanjay Kumar Singh, DDG (Horticultural Science) to ICAR-CPCRI

Dr. Sanjay Kumar Singh, DDG (Horticultural Science), ICAR, New Delhi, visited ICAR-CPCRI, Research Centre, Kidu, Karnataka and ICAR-CPCRI, Regional Station, Vittal, on 11.03.2024. He participated in Kisan Sammelan at Kidu and inaugurated two insect proof net houses constructed recently at Vittal on 11.03.2024. He also visited ICAR-CPCRI, headquarters at Kasaragod, Kerala on 12.03.2024 and had interacted with scientists during a meeting. Dr. K.B. Hebbar, Director, ICAR-CPCRI, Kasaragod, accompanied him during the visit. Dr. S.K. Singh also carried out ceremonial planting in the three locations. He also visited the fields, coconut, arecanut and cocoa nurseries, tissue culture lab and cocoa processing units. The Hon'ble DDG (Hort. Sci.) also visited the field experiments at ICAR-CPCRI headquarters at Kasaragod, on 12.03.2024.Shri G.P. Sharma, Joint Secretary (Finance), ICAR, New Delhi visited ICAR-CPCRI, Kasaragod on 18.01.2024 and addressed the staff on the occasion.

Dr. S. K. Singh, DDG (HS) inaugurating insect proof net house

Dr S. K. Singh. DDG(HS) plating seedling at Kidu

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Compiled and edited by: Dr. Ravi Bhat, Shri H. Muralikrishna, Dr. K. Balachandra Hebbar
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: director.cpcri@icar.gov.in, cpcrinews@gmail.com
Website: https://cpcri.icar.gov.in; Facebook: cpcrikasaragod.kerala
Digital layout at: Mrs. Prajna C.S., PME Cell, CPCRI, Kasaragod

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