



KALPA

CPCRI Newsletter

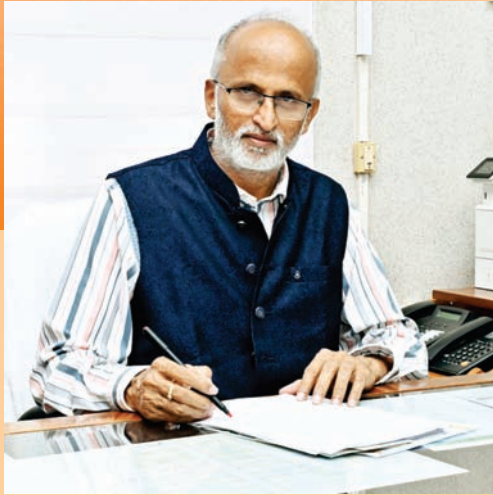
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ICAR-CENTRAL PLANTATION CROPS RESEARCH INSTITUTE

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From the Director's Desk

Consumer driven developments

Quality improvement efforts are important as far as global competitiveness is concerned. When the products are marketed from their production centres to consumption points around the world, high-quality maintenance and quality control are crucial for sustainable value chains. For this, we have regulations under FSSAI, ISO, AGMARK, Gold Standard, etc.

Consumers are price-conscious to suit their spending capacity and at the same time, consumers are also looking for value. Our country stands strong as far as the plantation crop sector is concerned, due to the favourable climate and high production. However, due to price advantage the ports and borders are vulnerable to low-quality imports of raw materials.

One of the greatest impediments to growth is the adulteration of the products for short-term economic gains. Now, due to increasing awareness, consumers realise the ill-effects of spurious products and the health hazards due to harmful mixtures. Such product manufacturers are deceiving consumers with fake-quality products, flouting the quality guidelines.

Research efforts are now focused on two aspects for the benefit of consumers. One is developing a methodology to detect adulteration in mixtures such as VCO. Another is product diversification to cater to modern consumers. There are concerted efforts from the researchers to develop various ready-to-serve products.

Now, there is also an added thrust towards the industrialization of product manufacturing. At the institute level, there are efforts to do pilot-level production, which is initially taken up to the entrepreneurial level. With the collaborative upscaling of technology, the mass production arena will open to highly economic consumer-level packaging.

Continuous and concerted efforts to deliver high-value products at economic prices are the essence of sustainable value chains. Progress on these lines will certainly give greater hope to the plantation crop stakeholders in the country.

K. Balachandra Hebbar

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SPOTLIGHT

Neera infused coconut flakes

A protocol and methodology for a ready to serve coconut flakes was developed. Use of alternative drying systems involving an osmotic process based on coconut inflorescence sap concentrate (neera syrup: 50°Brix) for infusion not only enhances the nutritional value but also contribute to sensory

profile of flakes improving the overall taste, flavour, and colour. Coconut flakes dried at 65°C using infrared-assisted hot air (IRHAD) exhibited an outstanding nutritional and physical profile, featuring a hausner ratio of 1.04 and a carrs index of 4.22, a rehydration ratio of 2.377%, a

hygroscopicity of 1.68%, a bulk density of 0.552 g/ml, a tapped density of 0.610 g/ml, protein content of 3.92%, carbohydrate 33.86%, fat 34.29%, ash 1.92%, total phenolic content of 105.38 mg GA/100g, DPPH activity of 88.81%, and FRAP 0.00893 mg TE/100g.

Drying kinetics of coconut for copra production

The initial moisture content of coconut kernels at 50-55% (wb), is significantly reduced to 6-8% (wb) during the drying. Traditional methods, including 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 discolored copra. Hence, the

independent and combined effects of infrared and hot air drying techniques in enhancing the copra quality was analysed. Optimal results were obtained in Infrared-assisted hot air drying (IRAHAD) 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 Infrared drying and Hot air

drying. Based on the highest R2 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 to be the best fit for HAD and IRAHAD, respectively.



GLOBAL ISSUES

The Cabinet Committee on Economic Affairs of the Government of India has approved the minimum support prices (MSPs) for copra for 2024. It is Rs. 11,160 per quintal for milling copra and Rs. 12,000 per quintal for ball copra. A margin of 51.84% for milling copra and 63.26% for ball

copra, which are more than 1.5 times the average cost of production. This is Rs. 300 for milling copra and Rs. 250 for ball copra, per quintal, over the previous year. It is also noteworthy that, in 2023, the government has procured a record amount of more than 1.33 lakh metric tonnes of

copra at the cost of Rs. 1,493 crore, benefiting around 90,000 farmers.

The Central Arecanut and Cocoa Marketing and Processing Cooperative (CAMPCO) Ltd. has appealed to the Prime Minister and the Commerce Minister to address the issues related to the illegal import of arecanut into India.



TIPS AND GUIDANCES

Millet intercropping under coconut

Participatory assessment of little millet var. DHLM 36 3, DHPM 27 69, Sorghum M 35 1, as coconut intercropping in Onattukara sandy loam soils was recorded as suitable and generating potential output. The crop stand was good as anticipated and millet food fest was organized for popularizing millets in diet.



Fig. 1. Finger millet intercropping along with coconut based farming system

Farm management to double farm income

Coconut-based heterogenous landscaping with crop pluralism, bird perch, fish pond, honey bees, in situ biomass recycling, eco-feast

plants generating continuous farm-income, pest-regressive, climate-smart, ecosystem well-being, microbiome conservation

and accomplished sustainable development goals.

Cocoa mother tree and seed pod standards

Indian Minimum Seed Certification Standards Part II- 2023:

- Forastero and Trinitario type of cocoa with green or red pods.
- Bearing: 80-100 pods/tree/year at twelve years of age.
- Pod type: Smooth surface,

shallow furrows without prominent constriction at the neck.

- Pod size: Medium to large pods of not less than 350 g weight.
- Pod value: No. of pods required to produce 1 kg beans to be not

>12.

- Husk thickness: 1 cm and above (for pest and disease tolerance).
- No. of beans: >35/ pod (bold beans from middle of pods).
- Bean weight: Wet: 3 g, Dry: 1 g and above.



IMPORTANT EVENTS

Multi institutional meeting on Arecanut and human health

A Multi-institutional meeting on 'Arecanut and Human Health' was jointly organized by ICAR-Central Plantation Crops Research Institute (ICAR-CPCRI), Kasaragod and Directorate of Arecanut and Spices Development (DASD), Kozhikode at ICAR-CPCRI, Kasaragod on 14 November, 2023. The purpose of

the event was the establishment of role of the arecanut on human health based on scientific evidences involving researchers from reputed national organizations, like AIIMS, CSIR-CCMB, CSIR-CIMAP, CSIR-CFTRI, CSIR-NBRI, IISc, KMC, NITTE University, and SDM University,

among others.



Fig. 2. Horticulture Commissioner addressing delegates of meeting

World Soil Day

ICAR-CPCRI, Kasaragod, celebrated World Soil Day on 5th December, 2023. Dr. P.R. Suresh (former Dean, College of Agriculture, Padannakkad) while inaugurating the programme stressed on importance of soil and water conservation for sustaining the life.

Dr. Ramesha B., Professor and Head, Extension Training Centre, Vorkady, Manjeshwar called upon farmers to adopt technologies developed by ICAR-CPCRI, for conserving soil and water.

A technical session on the theme of the year 2023, 'Soil and Water: A Source for Life' was handled by Dr. P.R. Suresh, Dr. Ramesha B., Dr. Thamban, C., Dr. P. Subramanian, Dr. Neenu, S., and Dr. V. Selvamani.

During the event soil health cards were issued to 35 farmers from Badiadka, Muliya and

Manjeshwar, Kasaragod, district.

About thirty farmers of Kasaragod district actively participated in the technical session. Students of KV-2 CPCRI, Kasaragod took part in poster competitions held as a part of World Soil Day 2023.

A workshop was also conducted at ICAR-CPCRI, Regional Station, Kayamkulam on 5th December



Fig. 3. Dr. K. B. Hebbar Director, ICAR-CPCRI, delivering presidential address

2023, as part of the celebrations. Dr. A. Abdul Haris, Principal Scientist delivered a lecture on the topic 'Soil and water in synergy for sustainable plant health'. The

lecture session was followed by a quiz for enriching the knowledge base of the farmers on aspects pertaining to soil and water relations in plant growth. Dr. Jeena Mathew, Senior Scientist interacted with farmers during the quiz programme covering various aspects of soil health and plant nutrition. The programme was attended by fifty farmers from the district.

World soil day was celebrated at ICAR-CPCRI, Research Centre, Mohitnagar on 05 December, 23.



Fig. 4. World Soil Day celebrations at ICAR CPCRI, Regional Station, Kayamkulam

A total of 85 school students attended the programme. A total of

100 coconut seedlings were distributed among 50 farmers

belonging tribal community.

State Agriculture Minister launched the KVK activities at Karappuram

Sri. P. Prasad, Hon. Minister for Agriculture, Government of Kerala officially launched the activities of KVK for 2023-24 in the operational villages of Muhamma and Thanneermukkom on 20th October, 2023. The villages represent Karappuram, a larger agro-ecological area in Alappuzha district, known for its past glory in agricultural and allied activities. The Minister emphasized the importance of environmentally

safe technologies for improving the health as well as income of farmers and appreciated the efforts taken by the KVK for doubling the farmer's income through various interventions in agriculture, animal husbandry, processing and value addition. Dr. P. Muralidharan, Principal Scientist and Head, KVK briefed the programmes proposed to be implemented during 2023-24.



Fig. 5. Inauguration of the programme by Sri. P. Prasad, Hon. Minister for Agriculture, Kerala

Cocoa training

Training on good horticultural practices for cocoa and bean to bar chocolate making was conducted on 20-21 Dec. 2023 at



Fig. 6. Demo in cocoa nursery

Fig. 7. Bean to bar chocolate making

CPCRI RS Vittal and Kasaragod with the support of DCCD . 65 trainees participated.

Skill Development Program- Nursery worker/ owner' training under SCSP was organized from Sept.- Nov.2023 at CPCRI, RS,

Vittal, Karnataka. Six trainees including 4 boys and 2 girls learnt the skill. They gained expertise in nursery raising of plantation crops, fruits and spices.



Fig. 8. SCSP trainees undergoing training at Vittal

A Three Days Training Programme on Processing of Cocoa was organised for Assam and Mizoram Farmers from 28th-

30th November, 2023 at ICAR-CPCRI, RC, Kahikuchi. A total of fifteen farmers from Mizoram and farmers from different districts of Assam participated in the training programme.



Fig. 9. Experts handling the sessions during the training programme at Kahikuchi

Scientific coconut cultivation in Kerala

Training programme was organised for the hundred coconut farmers of Oachira, Krishnapuram, Chettikulangara,

Pathiyoor and Bharanicauvu on 'Scientific coconut cultivation' from 27th October 2023 to 31st October 2023 at ICAR CPCRI,

Regional Station Kayamkulam as part of the CDB funded project Demonstration of Kalpa Vardhini as component of INM in coconut.

Scientific coconut palm cultivation in North Bengal

An off campus training programme on 'How to cultivate coconut palm' was organized on 09 November, 2023 among the tribal people at Moulani, Kranti Block, Jalpaiguri. A total of 50 tribal farmers attended the training programme. An on farm training programme on "Good Agricultural

Practices for plantation crops" was organized at ICAR,-CPCRI, Research Centre, Mohitnagar for the stakeholder (DAESI trainees of KVK, Jalpaiguri) on 30 November, 23. A total of 32 DAESI trainees attended the programme. An on farm training programme on "Good Agricultural Practices for

coconut for better livelihood" was organized at ICAR,-CPCRI, Research Centre, Mohitnagar for the stakeholder (DAESI trainees of ATC, Coochbehar) on 06 November, 23. A total of 36 DAESI trainees attended the programme.

Integrated disease management in cocoa

A district level awareness seminar on 'Integrated Disease Management in Cocoa with special reference to Vascular Streak Dieback (VSD)' was held on 05-12-2023 at Manimala, Kottayam with special reference to prevalence of the debilitating Vascular Streak Dieback (VSD) in the region. The seminar was inaugurated by Dr. N. Jayaraj, Hon. MLA Kanjirappally. He urged the farmers to promote the export of cocoa beans and value-added product as 'Manimala Cocoa' brand. Dr. Regi J Thomas, Head,

ICAR- CPCRI Regional Station Kayamkulam highlighted the scope of cocoa farming in the region. Mr. Dadasaheb Desai, Deputy Director, Directorate of Cashew and Cocoa Development, Kochi served as the guest of honour.

In the afternoon, a Farmer-Scientist interface was convened and Dr. A. Joseph Rajkumar, Principal Scientist, ICAR- CPCRI Regional Station Kayamkulam served as the moderator. He described on various pests of cocoa and their management strategies.

Queries on scientific cocoa cultivation viz., spacing, manuring, irrigation etc including pests and disease management were raised by farmers and remedies were suggested by the experts. More than 150 farmers participated in the seminar.



Fig. 10. Release of extension pamphlet during the programme

Training under STC component

Scientific mushroom cultivation training and tuber crops management for 64 Tribal Farmers of Pottamavu tribal settlement, Thiruvananthapuram has been conducted in two batches.

A training on 'Recent Advances in Plant Protection in Coconut' was

scheduled tribe community from different parts of the Kasaragod District attended the training.



Fig. 12. Trunk painting of biocontrol agents



Fig. 13. Distribution of polybag coconut seedling



Fig. 11. Coconut plant protection workshop

organized under the scheduled tribe component scheme for coconut climbers at ICAR-CPCRI on December 22, 2023. Thirty climber trainees belonging to the

A training programme under the Scheduled Tribe Component (STC) scheme of ICAR-CPCRI on 'Scientific Coconut Cultivation and Quality Seedling Production' for selected Scheduled Tribe farmers was conducted in collaboration with Ranipuram Farmers Producer Company on December 19, 2023, at Panathady. Dr. K.B. Hebbar,



Fig. 14. Dr. K. B. Hebbar, director addressing the gathering

Director, of ICAR-CPCRI, inaugurated the training program and distributed coconut seedlings to the selected Scheduled Tribe farmers.

Upskilling and entrepreneurship development programme under SCSP

Upskilling and Entrepreneurship Development Programme was organized at ICAR-CPCRI Regional Station, Kayamkulam for SC farmers from Bharanikkavu and Devikulangara Grama Panchayath

during 20th November to 19th December 2023. The farmers were empowered by theory-laced hands-on practical sessions on scientific aspects of coconut cultivation including varietal

wealth, hybridization cum nursery management, palm agro-techniques, water and nutrient management, bioinoculants, systems-approach, pest and disease diagnosis, management

and mass production of bioagents. Awareness sessions on schemes for Scheduled Caste youths, preparation of bankable agricultural projects and financial management were handled by experts. One-day study tour cum exposure visit was undertaken to ICAR-CTCRI, Sreekariyam and State Soil Museum and State Soil



Fig. 15. Coconut hybrid nursery management skill training at Kayamkulam

Information Centre, Parottukonam near Thiruvananthapuram. Agricultural inputs such as disease tolerant coconut seedlings, vegetable seeds, spade, prong hoe, neem cake, vermicompost, fertilizers, Kalpa Poshak, Kera Probio, Metarhizium majusetc. were distributed to the trainees.

Layer chicks provided to scheduled caste farmers under SCSP programme

Fifty SC farm women from Muhamma panchayath were identified and given training by the

KVK, Alappuzha. Among them 25 farmers having poultry cages were provided 50 days old vaccinated

Gramasree layer chicks on 16 November, 2023.

FPO Workshop

As a part of KAU-NAHEP-CAAST-Sub project on 'Profile Analysis of Farmer Producer Companies in India' a workshop was conducted on 'Farmers Producer Companies in India' at Horticulture Research Station, AAU, Kahikuchi, Assam on 22 November, 2023. The



Fig. 16. FPO workshop at Kahikuchi

workshop was conducted with a participation of 19 farmers representing 8 FPCs across the state of Assam by ICAR-CPCRI, Research Centre, Kahikuchi in collaboration with HRS, AAU, Kahikuchi, Assam.

Training programme on 'Varietal wealth and integrated pest and disease management in arecanut'

Training Programme on 'Varietal Wealth and Integrated Pest and Disease Management in Arecanut' sponsored by Directorate of

Arecanut and Spices Development, Calicut, was organized on 8th November, 2023 at ICAR-CPCRI, Regional Station, Vittal, Bantwal

Tk., Dakshina Kannada Dt., Karnataka. The event witnessed more than 252 participants.

Celebration of Swachhta Pakhwada

The Swachhta Pakhwada programme from 16–31 December, 2023 was organized at the headquarters, regional stations and research centres with a series of initiatives aimed at fostering cleanliness and awareness within the community. Activities kicked off with the display of banners, followed by staff members taking the Swachhta pledge and committing to upholding cleanliness standards. Throughout the fortnight, various awareness and cleaning activities were undertaken in the campuses



Fig. 17. Cleanliness activities as a part of Swachhata Pakhwada at Kasaragod



extending to cleaning of public places, promoting cleanliness in residential quarters and adopted village. As part of community

engagement, Kisan Diwas was celebrated on 23rd December 2023.

Workshop on Agri-Clinic and Agri-Business Centre (ACABC) conducted

KVK in association with NABARD conducted a one day workshop on Agri-Clinic and Agri-Business Centre (ACABC) programme of MANAGE, Hyderabad on 17 November, 2023 in order to create awareness among the targeted group of

diploma holders and graduates in Agriculture on the potential of the programme and scope of technical enterprises by them. Sri. T. K. Premkumar, DDM, NABARD gave an orientation on the ACABC scheme and highlighted the advantages of availing the same.



Fig. 18. Awareness workshop being conducted at KVK, Alappuzha

Farmer Field School on 'Integrated management of juvenile coconut palms' commenced

A six months long Farmer Field School (FFS) on 'Integrated management of juvenile coconut palms' is planned by the KVK during 2023-24 to enhance the capacity of selected master farmers to identify different pests and diseases on coconut, nutrient deficiency symptoms, and take up



Fig. 19. Inauguration of FFS at Thanneermukkom

the management practices in field situations. FFS kits were distributed to participants in the inaugural function on 16 November, 23.

Vikasit Bharath Sankalp Yathra commenced

Resource persons from the Krishi Vigyan Kendra, Alappuzha actively participated in the Vikasit Bharat

Sankalp Yathra (VBSY) organized by Govt. of India in different panchayaths/Municipalities of

Alappuzha district which commenced on 4 December, 2023.

Horticulture based industrial placement course

Horticulture Based Industrial (HBI) placement course for IV B.Sc. (Hort.) students from College of Horticulture, Mudigere, Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences (KSNUAHS), Shivamogga, Karnataka, was organized from 20 December,



Fig. 20. Inauguration of training course at Vittal

2023 to 04.01.2024 at ICAR-CPCRI, Regional Station, Vittal.

World Food Day celebration

Conducted World food day celebrations and Swachata campaign on 16th October at VHSE, Elippakulam. A training on millet cultivation and its importance on diet was conducted in association with KVK, Alappuzha. More than 100 students along with the staff of ICAR-CPCRI, RS, Kayamkulam completed the land preparations

for starting a millet cafeteria in the school campus.

KVK-Alappuzha organized forty-one trainings on different topics during this period, out of which twenty four were conducted at various locations in the district. Among the total 907 trainees attended these trainings, 57 per cent were female participants.



Fig. 21. Off-campus activities as a part of World Food Day at Elippakulam



TECHNOLOGY HIGHLIGHTS

Cocoa pod husk biochar

Cocoa pod husk biochar of different particle size was mixed with soil @ 1% and 2%, and incubated for a period of 90 days and estimated the various

potassium fractions after the incubation period. Based on observations, it is found to increase potassium availability to roots and advised to use the cocoa pod husk

biochar in a fine powdered form of less than 1 mm particle size.

Water and nutrients for early flowering of coconut

Experiments conducted at ICAR-CPCRI, RS, Kayamkulam with irrigation at 100% pan evaporation and 200% nutrients resulted in early flowering and

harvest of tender nuts in Chowghat Orange Dwarf variety of coconuts. The palms yielded 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).

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 isolated 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 on pollen germination and pollen 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. $\pm 28^\circ\text{C}$) 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 \pm 3.36%; 54.47 \pm 2.85%)

over the control (38 \pm 3.26%). While tube length values were

574.258 \pm 61.99 μm). Cold temperature treated pollen showed

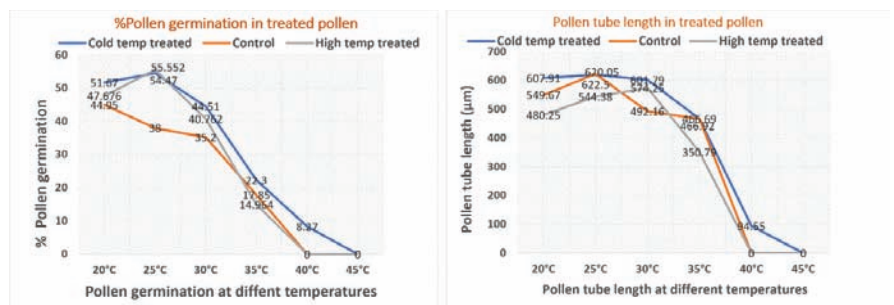


Fig. 22. Influence of temperature on pollen germination and tube length at different temperature ranges

maximum in cold temperature treated pollen and control (466.69 \pm 42.06 to 620.05 \pm 28.29 μm and 466.92 \pm 17.86 to 622.50 \pm 55.74 μm) over high temperature treated pollen (350.792 \pm 23.18 to

a germination of 8.25% even at high temperature i.e. 40°C whereas in control and heat treatments the germination at 40°C could not be initiated.

Testing nano-boron for enhancing the pollen fertility of coconut

Five types of nano boron particles were prepared using planetary ball milling procedure

using 1mm and 3mm balls with the processing period of 2,4,6 and 8 hours. The effects of prepared

nanoparticles were tested to check the pollen germination potential of coconut pollen. The in vitro

germination assay was performed in three different lines of coconut cv. WCT (West Coast Tall) pollen using nano boron particles. The results on germination percentage and pollen tube lengths were calculated for all the treatments including control. The particles grinded with 3 mm ball size for 8

hours were found to give better germination (44-61%) and tube length (724-969 nm) over control (36-52%; 430-550nm) and other treatments of nano boron.

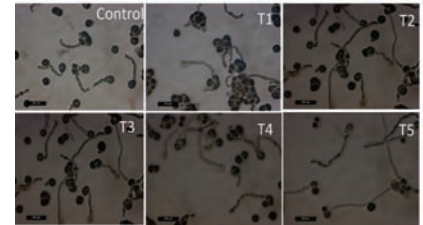


Fig. 23. Effect of nano boron particles on coconut pollen germination and tube length

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

Various media by mixing the different concentrations of sucrose were supplied (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

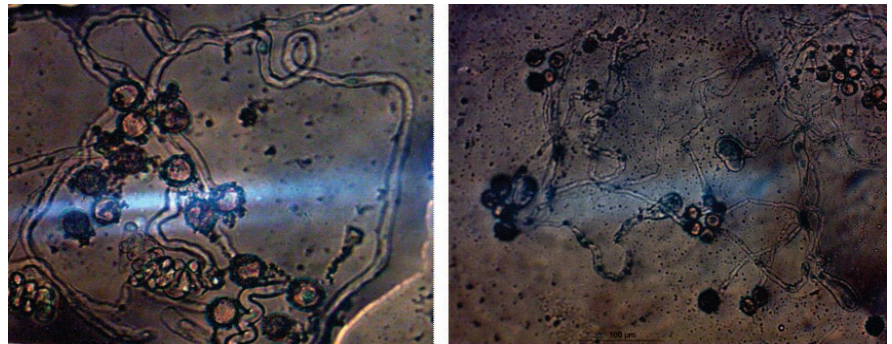


Fig. 24. In vitro germination of cocoa pollen on standardized germination media

optimum growth temperature for pollen development in cocoa was

from 25 to 30 °C.



AWARDS/RECOGNITIONS

Dr. Regi Jacob Thomas, Principal Scientist (Hort.) was awarded Fellow of ISPC during the 25th PLACROSYM held at ICAR-IIOPR, Pedavegi, Andhra Pradesh.

Pandiselvam, R., M. R. Manikantan, and A.C. Mathew received a second prize for the oral presentation for the paper 'Design, Development and Evaluation of Tender Coconut Punching Machine' at 57th Annual Convention of Indian Society of Agricultural Engineers and International Symposium on Engineering Interventions for Making Millets a Global Food" held at University of Agricultural Sciences, Raichur, India during 6-8 November, 2023.

Dr. Jilu V. Sajan, Dr. Josephraj Kumar A., Dr. Merin Babu, Dr. Prathibha P. S. and Dr. Anes, K. M. received Best paper award for the paper titled "New record of collateral hosts of coreid

bug, *Paradasynus rostratus* Distant (Hemiptera: Coreidae) infesting coconut" in Third International Scientific Conference on Environmental Research: Issues, Challenges and Strategies for Sustainable Development organized by Eurasian Academy of Environmental Science during 1-2 December 2023 at Karwar, Karnataka.

Dr. Rajkumar, Senior Scientist (Nematology) received Dr. Muthuswamy Anandraj Award for best original research paper entitled "Ecofriendly management of slow decline in black pepper under arecanut – A success story" at PLACROSYM 25 (National Symposium on Plantation Crops) organized jointly by Indian Society for Plantation Crops and ICAR-IIOPR, Pedavegi, A.P. from 12-14 December, 2023.

Dr V. H. Parthibha, Senior Scientist (Plant Pathology) received Best

Poster Presentation Award for the research paper. Occurrence of fruit rot in soursop caused by *Lasiodiplodia theobromae* in India presented in International Seminar on Exotic and underutilized Horticultural Crops: Priorities and Emerging trends held during 17-19 October, 2023 at ICAR-IIHR, Bengaluru.

Plant Protection Association of India conferred the Best Poster Presentation Award to V. H. Prathibha, N. R. Nagaraja, M. K. Rajesh, Daliyamol, M. Sujithra, K. P. Thejasri, C. Sneha and Vinayaka Hegde, for the research paper entitled 'Rapid, cost effective and efficient technique for screening arecanut against *Phytophthora meadii*' at the International Conference on Plant Health Management ICPHM 2023-Innovation and Sustainability held during November 15th to 18th, 2023 at Hyderabad, Telangana.



TECHNOLOGY COMMERCIALIZATION

Sl. No.	Name of Technology Commercialized	Date of MOA	Value (In INR)	To Whom Commercialized
1	Collection of fresh and hygienic Kalparasa and production of natural coconut sugar	02-11-2023	1,00,000	M/s SVM Organic Palm Products, Bhattiprolu, Bapatla Dist, PIN – 522256, Andhra Pradesh.
2	Technical knowhow of production of virgin coconut oil (VCO)	15-11-2023	40,000	M/s Hotballoon Foods Pvt. Ltd. Panangangara, Puzhakkattiri (P.O.), Pin – 679321, Malappuram Dist, Kerala
3	Technical Knowhow of production of coconut chips	15-11-2023	25,000	M/s Hotballoon Foods Pvt. Ltd., Puzhakkattiri (P.O.), 679321, Malappuram Dist, Kerala
4	Preservation of Carbonated Tender Coconut Water	07-12-2023	25,000	Mr. Najeeb Muhammed, United Agro Foods and Beverages, Kinfra Textile Centre, Pallivayal (PO), Taliparamba – 670142, Kerala.
5	Modified ground pollination technique for production in coconut	03-11-2023	25,000	M/s Silpa Clonal Nursery, Pendalanka (village), Bapatla Dist, PIN – 522257, Andhra Pradesh.
6	Preservation protocol for trimmed tender coconut	04-10-2023	15,000	M/s Coconut Delight, Hanumakonda, Warangal Urban Telangana - 506001.
7	Knowhow for production of bean to bite chocolate	15-11-2023	10,000	M/s Hotballoon Foods Pvt. Ltd., Panangangara, Puzhakkattiri (P.O.), Pin – 679321, Malappuram Dist, Kerala
8	Technology for mass production of <i>Trichoderma harzianum</i> using arecanut leaf sheath	10-11-2023	5,000	Ms Navaneetha Gowda K.N., Ivarnadu post, Sullia taluk, Dakshina Kannada (dist) Karnataka-574239
9	Trichoderma Coir Pith Cake	07-12-2023	5,000	Krishi Vigyan Kendra, ICAR–IISR, Peruvannamuzhi P.O., Kozhikode- 673528, Kerala
10	Snowball Tender Nut Machine	04-10-2023	2,500	M/s Coconut Delight Hanumakonda, Warangal Urban Telangana - 506001.
		31-10-2023	2,500	Mr Vasamsetti Lakshmi Prsanneswara Rao, Nedunuru Pedapalem, Andhra Pradesh – 533241
11	Matured coconut water based value added products	15-11-2023	Complementary with VCO/ chips	M/s Hotballoon Foods Pvt. Ltd., Panangangara, Puzhakkattiri (P.O.), Pin – 679321, Malappuram Dist, Kerala M/s Hotballoon Foods Pvt. Ltd., Panangangara, Puzhakkattiri (P.O.), Pin – 679321, Malappuram Dist, Kerala
Total Rs.			2,55,000	



FACILITIES CREATED

A new laboratory for measuring physiological parameters was established at ICAR-CPCRI, RS, Kayamkulam with the funding of RKVY with an outlay of Rs. 54.40 Lakhs. Portable photosynthesis system, hand held chlorophyll

fluorometer, digital pressure chamber, leaf porometer, plant canopy analyzer, hot air oven and double distillation unit were installed to analysis of the photosynthetic parameters.



Fig. 25. Laboratory for plant physiological observations at kayamkulam.



UPCOMING EVENTS

CDB sponsored training, "Profitability enhancement through processing and value addition of neera and coconut-based value-added products" for Tamil Nadu based FPO's during 05-07 January 2024

DCCD funded Horticulture Fair- Science Day- 28th February 2024

at RS, Vittal.

National Science Day 2024 to be celebrated at ICAR-CPCRI RS, Kayamkulam on 28 February 2024 with a special talk on 'Climate change scenarios: implications for the plantation sector' by Dr. M. Murugan, Professor and Head,

Cardamom Research Station, Pampadumpara, Idukki District

DCCD funded District level seminar on cocoa- Naari Shakthi Mela- International Women's Day- 8 March 2024 at RS, Vittal.



OTHER INFORMATION

ICAR-CPCRI participated in World Food India International Exhibition organized by FICCI and Ministry of Food Processing Industries, Government of India at Pragati Maidan, New Delhi during 3-5 November 2023.

ICAR-CPCRI, Research Centre, Kahikuchi participated in stall exhibition during the 10th Indian Horticulture Congress at

Khanapara, Guwahati, Assam from 6th-9th November, 2023.

Dr. M.R. Manikantan served as expert member for finalizing the technical specifications of machinery required for the establishment of coconut processing unit for Kuthiathode Farmers Producers Company under Assistant Director of Agriculture, Kuthiathode.



Fig. 26. Director along with scientists from Kahikunchi during the exhibition

Radio talk

Dr. T. Sivakumar, SMS (Ent) participated in an interview on

'FFS- Importance and activities', broadcasted by AIR,

Thiruvananthapuram on 18 October, 23.

Field Day

Field day of the FLD on 'Leaf rot disease management in coconut' was conducted by KVK, Alappuzha at Puliur on 21 November, 23 with the participation of partner farmers along with farmers, officials and LSG representatives of the locality.



PUBLICATIONS

Research Articles

Anithakumari, P., Indhuja, S. and Shareefa, M. 2023. Community farm school approach for coconut seedlings/juveniles through collaborative social actions.

Journal of Plantation Crops, 51 (2): 77 - 88, doi:10.25081/jpc.2023.v51.i2.8669 (NAAS Rating 4.66)

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Harikrishnan, M. P., Vishnu, V.,

October-December, 2023

- Kothakota, A., Pandiselvam, R., Venkatesh, T., Pillai, S. and Manikantan, M. R. 2023. Impact of integrated ultra violet-ozone treatment on textural and structural properties of dough made of natural fiber based agro residues. *Journal of Natural Fibers* **20** (1): 2161690. (NAAS Rating: 9.50)
- Jacob, A., Sudagar, I. P., Pandiselvam, R., Rajkumar, P. and Rajavel, M. 2023. Effect of packaging materials and storage temperature on the physico-chemical and microbial properties of ultrasonicated mature coconut water during storage. *Food Control*, **149**: 109693. (NAAS Rating: 12)
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- Nihad, K., Haris, A. A., Subramanian, P., Jeena Mathew, Indhuja, S., Neenu, S., Ravi Bhat and Sandip Shil 2023. Efficient nutrient recycling strategy through integrated nutrient management in hybrid napier within a coconut-based system. *Indian Journal of Agricultural Sciences*, **93** (6): 647 - 652. <https://doi.org/10.56093/ijas.v93i6.136165> (NAAS Rating 6.37)
- Pandiselvam, R., Akshay, A. T., Manikantan, M. R., Ramesh, S. V., Patil, H. and Gopal, M. 2023. Synergetic effect of fermented coconut inflorescence sap for the production of virgin coconut oil. *Journal of Food Biochemistry*. <https://doi.org/10.1155/2023/7125810> (NAAS Rating: 10)
- Pandiselvam, R., Akshay, A.T., Manikantan, M. R., Ramesh, S.V., Patil, Hrishikesh, Gopal, Murali and Sandip Shil. 2023. Influence of skimmed coconut milk starter on the fermentation rate and biochemical quality attributes of virgin coconut oil. *Biomass Conversion and Biorefinery*, <https://doi.org/10.1007/s13399-023-04894-3> (NAAS Rating 10.05)
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- Sarika M., Nalini R., Venkatesan T., Suresh K., Ananthan M. and Josephraj Kumar A. 2023. Distribution of woolly whitefly, *Aleurothrixus floccosus* Maskell on Guava from Tamil Nadu. *Indian Journal of Entomology*, Online published Ref. No. e23546
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- Vishnu Priya, V., Balakrishnan, M., Karthikeyan, S., Rajkumar, P., Manikantan, M. R., Gurusamy, K. and Pandiselvam, R. 2023. Evaluation of effect of tapping frequency and lime coating on the biochemical changes and fermentation rate of coconut inflorescence sap. *Sugar Tech*, 1-10. (NAAS Rating: 7.9)
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Book Chapters

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- Hegde, V., Prathibha V.H., Daliyamal and A. Josephraj Kumar. 2023. Biotic stresses in palms. In: Souvenir, International Seminar on Exotic and Underutilized Horticultural Crops - Priorities and Emerging Trends, 17-19, October, 2023, ICAR-IIHR, Bengaluru, pp. 476-487.
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- Karthika, K.S., Rashmi, I., Neenu, S. and Prabha Susan Philip 2023. Agronomic biofortification: An

effective tool for alleviating nutrient deficiency in plants and human diet. In: Mineral Biofortification in Crop Plants for Ensuring Food Security. DOI: [10.1007/978-981-99-4090-5_1](https://doi.org/10.1007/978-981-99-4090-5_1).

- Srinivasu P, Kalpana M and Aparna V 2023. Commercialization of waste utilization in plantation crops. In book: Current Advances in Horticulture, Royal Book Publishing pp. 109-119.
- Nagaraja, N.R., Jayasekhar, S., Rajesh, M.K., Ravi Bhat and Hebbar, K.B. 2023. Arecanut improvement in India: Present status, emerging challenges and prospects. 25th PLACROSYM-2023, Status of Plantation Crops In India. ICAR-Indian Institute of Oil Palm Research, Pedavegi, 12-14 December 2023. Pp. 93-102.
- Rashid Pervez, Rajkumar and Olabiyi 2023. Nematode problems in major spice crops and their sustainable management. In: Nematode diseases of crops and their spice crops and their sustainable management. pp. 4 9 7 - 5 1 4 . <https://doi.org/10.1016/B978-0-323-91226-6.00025-0>.
- Rajkumar, Prathibha V.H. and Surekha 2023. Entomopathogenic nematodes (EPN) for soil cryptic pests and Trichoderma for root-knot nematode management in coconut cropping system. In: Training manual on 'Scientific Cultivation Practices of Coconut', Surekha, Rajkumar and Prathibha V.H. (Eds). ICAR – CPCRI, Kasaragod. P55-65.

Extension folders

- Merin Babu, Anes, K.M., Shareefa, M., Josephraj Kumar, A., Sajjan, J.V., Thomas, R.J. 2023. Vascular Streak Die-Back. Extension Folder No. 328. ICAR-CPCRI, Regional Station, Kayamkulam.
- Merin Babu, Regi, J. Thomas, Anes, K. M., Shareefa, M., Josephraj Kumar, A. and Jilu, V. Sajjan 2023. Vascular streak die back in cocoa. Extension folder No. 328. ICAR-CPCRI, RS Kayamkulam. (In Malayalam)

Ready reckoner

- Ready reckoner for millets prepared in Malayalam for ICAR CPCRI FFP participants, ICAR-CPCRI, RS, Kayamkulam.

Training Manual

- Jeena Mathew, Indhuja, S. and Haris, A.A. 2023. Training manual on 'Scientific coconut cultivation'. ICAR Central Plantation Crops Research Institute, Regional Station Kayamkulam, 27 to 31 October 2024, p54.
- Surekha, Rajkumar and Prathibha, V.H. 2023. Training manual on 'Scientific Cultivation Practices of Coconut'. ICAR – CPCRI, Kasaragod. 63 p.

E-publications

- Rajkumar, Surekha, R. and Prathibha, V.H. 2023. YouTube about CPCRI institute, service of farmers and coconut value addition (in Telugu) (<https://youtu.be/n4bv-wZ5eC8>).

HRD Training Attended

Dr. Chaithra M., Scientist (Plant Pathology), RC, Kahikuchi, attended Professional Attachment Training during 21 October, 2023 to 21 November, 2023 at IIHR, Bangalore.

Participation in Conferences/Meetings/Workshops/Symposia/Webinars

Participations Abroad

Name & designation	Title	Place & date
Dr. K.B. Hebbar, Director	International Seminar on "Harnessing Coconut Potential for Offsetting Carbon Emission: Integrating Science and Economy for a Sustainable Future"	Manado North Sulawesi, Indonesia 12-13 October 2023
Dr. K.B. Hebbar, Director and Dr. Niral V., Principal Scientist	Fist International Scientific Conference on Conservation, valorization and exchange of resources and germplasm for economic development of the coconut industry (I-CONVERGED)	Los Baños, Laguna, Philippines, from 27 to 30 November, 2023

Participations Within India

Name & designation	Title	Place and date
Dr. M.R. Manikantan, Principal Scientist	International Workshop on Food loss and waste prevention	NASC Complex, New Delhi, 30.09.2023 to 01.10.2023
Dr. P. Muralidharan, Principal Scientist and Head Dr. Shareefa M, Sr. Scientist Mrs. Ranjini T.N., Scientist	XVIth Agricultural Science Congress	NAAS and ICAR-CMFRI at Kochi from 10th to 13th October, 2023.
Dr. P. Muralidharan, Principal Scientist and Head Mr. M.S. Rajeev, SMS (Agronomy)	Zonal workshop on P PV&FR Act	PPV&FR Authority, ICAR-ATARI, Bengaluru and KVK-Kottayam on 14th October, 2023.
Dr. Vinayaka Hegde, Principal Scientist and Head Dr. Prathibha V.H., Dr. K.M. Anes Dr. Ramesh S.V., Senior Scientists Dr. Suchithra M., Dr. Panjavarnam, Scientists	International Seminar on Exotic and Underutilized Horticultural Crops: Priorities and Emerging Trends	Bengaluru 17-19, October 2023,
Dr. M.R. Manikantan, Principal Scientist	World Food India International Exhibition	Pragati Maidan, New Delhi 3-5 November, 2023
Dr. K.B. Hebbar, Director , Dr. B. Augustine Jerard, Project Coordinator (Palms), Dr. V. Niral, Dr. P. Subramanian, Dr. Vinayaka Hegde, Dr. Murali Gopal, Principal Scientists & Heads Dr. K. Muralidharan, Dr. M.K. Rajesh, Dr. Ravi Bhat, Principal Scientists, Dr. N.R. Nagaraja, Dr. Ramesh S.V., Sr. Scientists	Multi-institutional meeting on arecanut and human health'	ICAR-CPCRI, Kasaragod, on 14th November, 2023
Dr Prathibha VH, Dr Sujithra M., Sr. Scientists, Dr Daliyamol, Scientist	International conference on plant health management ICPHM 2023-Innovation and sustainability	Hyderabad 15-18th November 2023
Dr. Regi Jacob Thomas, Head, Dr. Abdul Haris A, Dr. C. Thamban, Dr. Joseph Rajkumar A, Dr. Ramesh S.V., Dr Prathiba VH., Dr Sujithra M., Dr Rajkumar, Dr. Nihad K, Dr. Jeena Mathew, Dr. R Sudha, Dr. Prathibha P S, Dr. Neenu S., Sr. Scientists, Dr. Surekha, Dr. Diwakar, Scientist, Dr. Panjavarnam G., Dr. Jilu V. Sajjan, Dr Indhuja, S., Scientists	Fist International Scientific Conference on Conservation, valorization and exchange of resources and germplasm for economic development of the coconut industry (I-CONVERGED) (Attended online)	Los Baños, Laguna, Philippines, 27 to 30November, 2023
Dr. Merin Babu, Sr. Scientist	International Conference on "Emerging Trends and Innovations in Biotechnology' 2023	Mar Athanasios College for Advanced Studies, Tiruvalla 30 November 2023 to 3 December 2023.
Dr. Abdul Haris, Principal Scientist, Dr. Nihad K., Dr. Neenu S., Dr Prathibha PS., Sr. Scientists, Dr. Jilu V. Sajjan, Scientist,	Third International Scientific Conference on Environmental Research: Issues, Challenges and Strategies for Sustainable Development and Livelihood Security	SGM College and CISSA, Karwar, Karnataka 1-2 December 2023
Vinayaka Hegde, Principal Scientists Heads	VIROCON-2023; Virology Conference on Advancement in Global Virus Research Towards One Health	ICAR-NRCB Tiruchirappalli, Tamil Nadu 1-3 December, 2023
Dr A. Joseph Rajkumar, Pr. Scientist	National Seminar on Advances in Molecular Taxonomy and Phylogenetics	Government College, Nattakom, Kottayam 12 December, 2023
Dr. Niral V., Dr. Regi Jacob Thomas, Dr. M.K. Rajesh, Principal Scientist & Heads, Dr. Thamban C, Dr. Ravi Bhat Dr. Elain Apshara, Dr. Chandran K.P, Dr. S. Jayasekhar, Principal Scientists, Dr. Sandip Shil and Dr Prathibha PS, Dr Rajkumar, Dr.Suchithra M., Dr. Neenu S., Sr. Scientists	25th Biennial Symposium on Plantation Crops (PLACROSYM 25)	ICAR-IIOPR, Pedavegi, 12-14, December 2023
Dr. K. Sajjanath, SMS (Soil Science)	Workshop on Natural Farming for KVK Scientists'	ICAR-KVK-Shivamogga 19-23 December, 2023



PERSONALIA

APPOINTMENTS

Name of the staff	Designation	Place	w.e.f.
Dr. Regi Jacob Thomas	Head	ICAR-CPCRI, Regional Station, Kayamkulam	10.11.2023
Dr. K. Ponnuswamy	HoD (Social Science)	ICAR-CPCRI, Kasaragod	22.12.2023

PROMOTIONS

Name of the staff	From (designation)	To (designation)	w.e.f.
Smt. Prasanna Sarngan	Personal Assistant	Private Secretary	09.11.2023
K. Panduranga	Technical Assistant (F/F)	Senior Technical Assistant	07.12.2022

RETIREMENTS

Name of the staff	Designation	Place	Date
Sri V.P. Joy	Senior Technical Assistant (Field/Farm)	ICAR-CPCRI, Regional Station, Kayamkulam	31.12.2023
Smt. G. Kamala	Skilled Support Staff	ICAR-CPCRI, Kasaragod	31.12.2023



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