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ICAR-CENTRAL PLANTATION CROPS RESEARCH INSTITUTE
Kasaragod, Kerala - 671 124
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From the Director's Desk

International collaboration on coconut tissue culture

In coconut, tissue culture, particularly *via* somatic embryogenesis, offers novel avenues for large scale clonal multiplication of elite germplasm. Years of research in many laboratories from across the globe have resulted in plantlet regeneration from a repertoire of explants like plumule, immature inflorescence, anthers, and unfertilized ovaries. However, the protocols reported so far have certain limitations that must be addressed to allow for large-scale propagation of elite palms. There is an urgent need to identify critical determinants/factors that contribute to the success of the coconut tissue culture system. Selection of elite genotypes, which respond well to *in vitro* interventions, the physiological stage of the donor plant, the explant source and type, the age and size of explants, the endogenous levels of plant growth regulators, explant position in donor plant and explant density also are some of the important determinants. In addition to plumules, immature inflorescences of size ranging from 4 cm to 10 cm are the most responsive to in vitro conditions as they produce multiple buds. *In vitro* conditions, such as the composition of the culture media, the type of growth regulator used, and the size and type of culture containers, have also been reported to influence *in vitro* development. Morpho-histological, physiological, biochemical, molecular biology and bioinformatics studies have also contributed to improving coconut tissue culture protocols. The establishment of cell suspension cultures of friable embryogenic calli in coconut could realize the enhanced multiplication rate. The recent report on the feasibility of direct multiple shoots organogenesis from *in vitro* grown plantlets looks promising. A well-planned strategy and close monitoring are necessary for *ex vitro* establishment of tissue culture plantlets. It is imperative to develop an international core team that will work with utmost perseverance and spearhead the global coconut tissue culture development initiatives. Such a team will work single-mindedly on solution-mode by garnering the existing developments and converging of ongoing efforts to harness the perfect synergy that will pave the prosperous road map for the coconut sector. With this copious expectation, the Institute hosted ICC-COGENT Coconut Tissue Culture Workshop during 16-20 May 2022.

CONTENTS

SPECTRUM

Variations in fat content among arecanut germplasm from North-East region

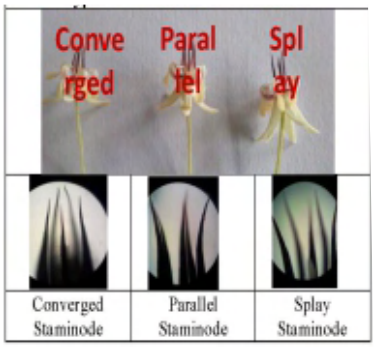
The nuts of fifteen Assamese arecanut accessions, including Saragoan, Chaygoan-II, Moralpara, Shell Shella, Bongera, Kahikuchi-I, Borihat, Kamalpur, K & J Hills, Auniati-I, Auniati-II, Birubari, Dauki Hills-I, Dauki Hills-II, and Badarpur, were evaluated for the fat content of the nuts. Fat content varied from 10% to 34% among these samples. The region with the highest fat content, 34%, was Borihat, followed by Badarpur (29.5%), and the region with the lowest fat content, 10%, was Bongera.

Sl. No.	Germplasm	Fat content (%)
1	Saragoan	13.0
2	Chaygoan II	13.0
3	Moralpara	11.5
4	Shell Shella	13.5
5	Bongera	10.0
6	Kahikuchi I	11.5
7	Borihat	34.0
8	Kamalpur	14.0
9	K & J Hills	11.0
10	Auniati I	11.5
11	Auniati II	14.5
12	Birubari	13.0
13	Dawki/ dauki Hills-I	14.0
14	Dawki/ dauki Hills-II	20.5
15	Badarpur	29.5
	C.D.	5.075
	SE(m)	1.668
	SE(d)	2.359
	C.V.	15.092

N.R. Nagaraja and G. Thanuja

Diversity in staminodes of cocoa flowers

The cocoa flower is a compact cyme with ten stamens in two whorls, five of which are fertile and are known as "staminodes"; the remaining five stamens are completely infertile. Although pollinating midges are drawn to the pigmention in staminodes and the guidelined petals, cocoa flowers are thought to be less adapted for self-pollination by natural means since the fertile stamens are enclosed by this ring of staminodes. Different forms of staminodes are discovered among the 12 clones at Vittal when the blooms are inspected for the intensity of natural set to check their compatibility reaction. They are of the convergent, parallel, and splay varieties and are only present in trees with no fruit set, partial fruit set, or full fruit set, respectively. Therefore, it is possible that floral structure, in addition to the genetic element involved in self-incompatibility, also has some impact on insect entry and natural fruit setting.



S. Elain Apshara

Performance of marigold varieties in coconut gardens for income generation

Field experiments conducted at ICAR-CPCRI, Regional Station, Kayamkulam during 2020-22 for evaluating marigold indicated that Pusa Basanti Gainda and Periyakulam Yellow can be grown as potential intercrop (25% area) in newly planted coconut gardens. It produced a yield of 57.9 q/ha and 57.6 q/ha fetching an additional income of Rs. 1.59 lakhs and Rs.1.52 lakhs with BCR 2.18 and 2.13 respectively.

K. Nihad and A. Abdul Haris

Humic acid in combination with farm yard manure for better nutrient release in sandy soil

A factorial experiment with five levels of humic acid (0, 1%, 5%, 10% and 20%) and three levels of farmyard manure (0, 25 and 50 kg/palm) was conducted to understand the release pattern of nutrients in sandy soils. The synergistic interaction between the two components is necessary for ensuring better nutrient release. Release of nutrients were maximum between the 60th and the 75th day of incubation. Farm yard manure @25 kg/palm in combination with humic acid (10%) and humic acid (20%) can facilitate the slow release of nutrient ions.

Jeena Mathew, A. Abdul Haris and Ravi Bhat

Field survey on yellow leaf disease and nutrient disorders in arecanut gardens

In order to determine the prevalence of nutritional disorders, pests, and diseases, a random field survey was conducted in three arecanut-growing taluks of the Dakshina Kannada districts, namely Bantwal, Kadaba, and Puttur, which are closer to Sullia. The neighbouring taluks of Sullia, Kadaba and Puttur, both had incidences of YLD symptoms of 0.87 and 0.80 percent, respectively. The disease incidence in the Bantwal taluk was 0.074%. Crown choking, crown bending, and/or cross nodes are nutrient disorders that are becoming more prevalent in arecanut gardens, particularly in high yielding types with poor nutrient management. During the field survey, zinc deficiency was observed in 30% of the arecanut gardens. About 3.4-3.81% of the palms were having zinc deficiency symptom in different taluks.

Jose C.T., Bhavishya, R. Thava Prakasa Pandian

Spread of palm whitefly

The non-native palm whitefly, *Aleurotrachelus atratus* Hempel (Aleyrodidae: Hemiptera) was recorded from the villages of Pulingome and Cherupuzha (Kannur district) and Bayar (Kasaragod district) from Kerala, India. Nymphs of palm whitefly were found predated by *Cybocephalus* sp, and in certain cases an orange velvety entomopathogenic fungus. *Aschersonia* sp. was found infected all over the body of the nymphal stages inducing natural suppression and this forms the first report of the entomopathogen on palm whitefly. *A. atratus* was found to co-exist with Bondar's nesting whitefly and arecanut whitefly from Kidu, Karnataka.

Jilu V. Sajan, P.S. Prathibha., Y. Diwakar, and A. Joseph Rajkumar

Diagnosis of nut crinkler coreid bug and identification of *Anastatus dasyni*, Ferr. (Eupelmidae: Hymenoptera), a potential egg parasitoid

Gummosis and extensive deformation of nuts are other commonly observed symptoms and nut yield loss as high as 66.4% was recorded. About 30-40% of the eggs of coreid bug observed on the leaf of *Annona muricata* were parasitized by the eupelmid, *Anastatus dasyni*. Parasitoids emerge at least 10 days after the emergence of coreid nymphs and parasitized eggs turn yellowish prior to the emergence of the parasitoid. Parasitoids emerge from an irregular exit hole whereas it is perfectly oval when nymphs of coreid bug emerged. Mass production strategies are being attempted for the egg parasitoid using eggs from other hosts.

Jilu V. Sajan, A. Joseph Rajkumar, Merin Babu and K.M. Anes

Participatory integrated plant parasitic nematodes management in the intercrops of coconut

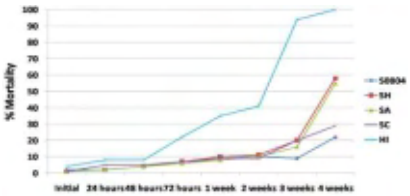
Awareness was created among the farming community in the different villages of Alappuzha district regarding the importance of plant parasitic nematodes as well as the measures to be followed for their effective management. Integrated nematode management strategies like field sanitation, soil solarization, use of nematode free planting materials, use of *Trichoderma harzianum* and *Pochonia chlamydosporia* enriched neem cake and organic manures and crop rotation with least preferred host plants like tapioca were demonstrated in the farmers' fields at Pathiyoor, Krishnapuram and Vallikunnam Panchayaths. Significant reduction in the nematode infestation (up to 70% to 100%) was realized in the demonstration plots as compared to the neighboring farmers.

K.M. Anes, Merin Babu and A. Joseph Rajkumar

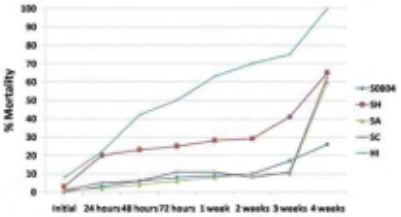
Influence of pesticides on the survival of EPN

In a lab experiment, it was found that Hexaconazole caused more mortality of the entomopathogenic nematodes (EPNs) than Imidacloprid. *Steinernema hermaphroditum* and

Heterorhabditis indica were the two species shown to be most vulnerable to both pesticides. *Steinernema* sp. CPCRIS0804, the superior EPN isolate, with death rates of only 22% and 26% after one month of exposure to imidacloprid and hexaconazole, respectively, was discovered to be the most pesticide-tolerant EPN.



Effect of Imidacloprid 17.8% SL on the survival of EPN



Effect of Hexaconazole 5% EC on the survival of EPN

K.M. Anes, Merin Babu and A. Joseph Rajkumar

IMPORTANT EVENTS

Study Visit of the Parliamentary Standing Committee on Agriculture, Animal Husbandry and Food Processing

Director, ICAR-CPCRI along with HoDs and other senior officials interacted with the members of PSC on Agriculture, Animal Husbandry and Food Processing under the chairmanship of Shri. P. C. Gaddigoudar during their study visit in Gangtok, Siliguri and Guwahati during 20-25 May 2022. On 23 May 2022, the PSC visited Siliguri and held discussions. Delegations accompanying the PSC including Dr. Subrata Gupta, Principal Secretary, Dept. of Agric, Govt. of West Bengal, Smt. Gita Rani, Joint Secretary, MIDH, Dr. Samuel Rai, Director, Dept. of Cinchona and Medicinal Aromatic plants, Govt. of West Bengal, others official of Horticulture Dept. Govt of West Bengal, Dr. Bhaskar, ADG (CS), and Dr. B.K. Pandey, ADG (Hort-II), ICAR visited Mohitnagar on 23 May 2022. Director made a presentation on programmes conducted by ICAR-CPCRI Research Centers at Mohitnagar and Kahikuchi on 24 May 2022 at Guwahati and submitted the detailed report to the Chairperson, PSC.

Director welcoming Chairman, PSC in the meeting held at Guwahati

Dr. Subrata Gupta, Principal Secretary, Dept. of Agric, Govt. of West Bengal, and Smt. Gita Rani, Joint Secretary, MIDH during their visit to ICAR-CPCRI RC, Mohitnagar

ICC-COGENT Coconut Tissue Culture Workshop

It was conducted during 16-20 May 2022 with a participation of researchers from ten countries: India, Sri Lanka, Indonesia, Malaysia, Belgium, France, Côte d'Ivoire, Vietnam, Papua New Guinea, and the Philippines. The Workshop was inaugurated by Dr. A. K. Singh, Deputy Director General (Horticulture Science), ICAR, New Delhi on 16 May 2022 at The LaLiT Resort & Spa, Bekal, Kasaragod. Dr. Singh mooted the need for an international collaborative network research programme under the aegis of ICC to improve the success of coconut tissue culture. During the inaugural session, an overview of COGENT as ICC programme was presented by Dr. Jelfina C. Alouw, Executive Director, ICC. A presentation on coconut conservation strategy was made by Mrs. Erlene Manohar, Coordinator, COGENT. The keynote address on 'Research Achievements in Biotechnology at ICAR-CPCRI' was given by Dr. Anitha Karun, Director, ICAR-CPCRI. The

Dr. A. K. Singh, Deputy Director General (Horticulture Science), ICAR, New Delhi delivering inaugural address

technical sessions and demonstrations were conducted in the Institute. Dr. Anitha Karun (Director, ICAR-CPCRI), Dr. Cristeta Cueto (Philippine Coconut Authority, the Philippines), Dr. Sundar Kalaipandian (University of Queensland, Australia), Dr. Quang Nguyen (Vietnam National University, Vietnam), Dr. Vijitha Vidhanaarachchi (Coconut Research Institute, Sri Lanka), Dr. Bart Panis (Alliance Bioversity and CIAT, Belgium), Dr. M.K. Rajesh (ICAR-CPCRI) and Dr. Shareefa M. (ICAR-CPCRI) handled the training sessions and demonstration classes. The Workshop was followed by project formulation activities and country presentations on coconut tissue culture and cryopreservation, which were moderated by Mr. Vincent Johnson (ICC-COGENT). The Workshop was conducted in collaboration with International Coconut Community (ICC), International Coconut Genetic Resource Network (COGENT); Australian Centre for International Agricultural Research (ACIAR); and Coconut Development Board (CDB).

Training session of the workshop

ICC- COGENT Appraisal of the International coconut genebank for South Asia and Middle East (ICG-SAME)

Appraisals of the five international coconut genebanks (ICGs), located in different coconut growing regions of the world, is underway under the aegis of the International Coconut Community and International Coconut Genetic Resources Network (ICC-COGENT) held at ICAR-CPCRI on 21st May 2022.

COGENT Appraisal team visiting CPCRI, Research Centre, Kidu

The International Coconut Genebank - South Asia (ICG-SA), hosted by India, presently designated as International Coconut Genebank - South Asia and Middle East (ICG-SAME), is located at ICAR-CPCRI, Research Centre, Kidu, Karnataka. ICG-SAME conserves about 49 designated germplasm, which are regenerated from Indian germplasm through controlled pollination and also accessions from regional member countries *viz*., Bangladesh (10 accessions) and Sri Lanka (four accessions). Further, representative germplasm from the Indian Ocean Islands collected through prospection from Mauritius, Seychelles, Madagascar, Maldives, Comoros and Reunion are also conserved in the ICG-SAME.

The ICG appraisal team visited ICAR-CPCRI Kasaragod as well as CPCRI Research Centre Kidu and interacted with the Director, Heads of Divisions, researchers and senior officials/staff of the institute. Dr. Anitha Karun, Director, ICAR-CPCRI, Kasaragod, made a brief presentation about the status and achievements of the Institute. Dr. V. Niral, Principal Scientist, ICAR-CPCRI and Curator, ICG-SAME made a brief presentation on the Current status of ICG-SAME hosted by India at ICAR-CPCRI Research centre Kidu, Karnataka.

Rural India Business Conclave

Rural India Business Conclave 2022 (RIBC 2.0) was organised during 9-13 June 2022 by the Kalpa Agri-Business Incubator, ICAR-CPCRI Kasaragod jointly with Kerala Startup Mission with the perspective to transfer rural areas to more developed environment and favourable for livelihood and entrepreneurship. The programme was conducted with multiple events collaborating with different partners. The formal inauguration of RIBC was held on 11 June 2022 at ICAR-CPCRI. Shri Rajmohan Unnithan, Hon'ble MP, Kasaragod was the chief guest to inaugurate the conclave. The session was chaired by Shri N.A. Nellikunnu, Hon'ble MLA, Kasaragod. Prof. H. Venkateshwarulu, Vice Chancellor, Central University of Kerala was the guest of honour. Dr. Anitha Karun, Director, ICAR-CPCRI welcomed the gathering. Mr. Mohammed Riyas, Project Director, Kerala Startup Mission; Mrs. Deepti Nair, Deputy Director, Coconut Development Board,

Shri Rajmohan Unnithan, Hon'ble MP, Kasaragod inaugurating the Conclave

Kochi and Mr. Ashok Kurien, Kerala Startup Mission offered felicitations. Dr. K. Muralidharan, Head (Acting), Div. Social Science, presented a brief account of RIBC 2.0.

The prime event of RIBC 2.0 was the Rural-Agri Tech Hackathon in which 19 teams participated. The 30 hour hackathon was supported by 15 mentors, 12 startup founders and 10 scientists from ICAR-CPCRI. The team from Christ College of Engineering, Thrissur was adjudged as the winners to receive a cash prize of Rs.50,000 given by the Kerala Startup Mission.

During the conference, five startup founders, Sri Mathew Joseph, Co-Founder & CEO, Fresh to Home, Sri Kishore Indukuri, Founder & CEO, Sid's Farm, Sri Mohammed Hisamudheen, Co-Founder & CEO, Entri App, Er. Abhishek Burman, Founder & CEO, General Aeronautics and Sri Manjunath Marappan, CEO, Happy Hens, addressed the delegates and

Dr. Anitha Karun inaugurating the Rural-Agri Tech Hackathon

delivered Founder's Talks.

There were five expert talks by Dr. C. Thamban, Principal Scientist, CPCRI, Dr. Elain Apshara, Principal Scientist, CPCRI, Shri Rupesh Kumar K., Coordinator, Responsive Tourism Mission, Kerala and Shri K.T. Thomas, Director, ESAF beside the online address by Dr. Saji Gopinath, Hon'ble Vice Chancellor, Digital University of Kerala.

Two MoUs were exchanged during the inaugural programme: One with Arable Labs India (P) Ltd, Bangalore for incubation at CPCRI for developing sensor applications. The other was with Amitav Rural Empowerment Charitable

Participants at the 30 hour non-stop hackathon venue

Agricultural and Religious Trust, Punalur for jointly conducting activities under SCSP in Thiruvananthapuram district.

There were three panel discussions during the programme. A Startup Pitch conducted by Social Alpha in which five startups participated. An interactive meeting with scientist of ICAR-CPCRI and Kerala startup mission was also conducted on 11 June 2022. A meeting was hosted by Hon'ble Vice Chancellor, Central University of Kerala for the business men participated in the Conclave. Vice Chancellor Prof. H. Venkateshwarlu, remarked that the University is open to entrepreneurs for making the best use of business knowledge.

Dream Big Kalpa

The 2022 edition of Dream Big Kalpa was held on 12th June 2022 the presentations on ICAR technologies from seven ICAR institutes (CTCRI, CIFT, IISR, SBI, DCR, IIHR and CPCRI)on 12 June 2022. It was inaugurated by Dr. K. Sreenivas, ADG (IPTM), ICAR, New Delhi. Dr. Anitha Karun, Director (Acting), ICAR-CPCRI presided over the function and Dr.Sudha Mysore, CEO, Agrinnovate India was the moderator. Er. Abhishek Burman, Founder & CEO, General, Aeronautics, Bangalore was felicitated in the function for the success of the company in entering to defence applications as part of Adani Defence. ICAR-CPCRI is a partner of General Aeronautics for developing UAV applications in plantation sector.

Dr. K. Srinivas, ADG (IPTM), ICAR, inaugurating Dream Big Kalpa

Inauguration of Kalpa Vajra

ICAR-CPCRI Regional Station Krishnapuram, Kayamkulam launched a year long programs as part of its Platinum Jubilee celebrations on 24-04-2022, inaugurated by Shri P. Prasad, Hon'ble Minister for Agriculture, Govt. of Kerala. Adv A.M Arif, Hon'ble Member of Parliament, Alappuzha stressed the importance of improving the productivity of coconut and bringing our innovations and processing avenues of coconut, coir and other industrial products from coconut besides food security through coconut and homestead farming systems. Smt. P Sasikala, Chairperson, Kayamkulam Municipality released the coffee table book on "ICAR-CPCRI, Regional Station, Kayamkulam @75-Serving Coconut Farmers since 1947", highlighting the historical science journey and technological solutions offered to coconut farmers.

Dr. P. Anithakumari, Head (Acting), ICAR-CPCRI, Regional Station, Kayamkulam welcomed the gathering and highlighted the

significant accomplishments of the station. In her introductory remarks, Dr. Anitha Karun, Director (Acting), ICAR-CPCRI, Kasaragod emphasized on the science journey of the institute since 1947 serving the coconut community and released the coffee table book on "*ICAR-CPCRI, Regional Station, Kayamkulam @75-Serving Coconut Farmers since 1947*", highlighting the historical science journey and technological solutions offered to coconut farmers.An exhibition was conducted with participation of different Government agencies. as well as the Farmer's group under the Farmer-FIRST programme, Mera Gaun Mera Gaurav (MGMG) marking smart technological display for effective dissemination. Sri. Shani Kurumbolil, President, Krishnapuram Grama Panchayat honoured Sri. P.M. Mathew, *Kera Kesari* Award Winner from Agali, Palakkad District and planted the tissue culture coconut seedling in the experimental plot at Kayamkulam and offered felicitations. Dr. Regi Jacob Thomas, Principal Scientist and Chairman, Programme Committee proposed vote of thanks.

A farmers' seminar was also organized on the occasion chaired by Dr. George V. Thomas, Director (Retired), ICAR-CPCRI. In the technical session Mr. P.M. Mathew, *Kera Kesari* Award winner, Mrs. Leenamol M.A., Market Promotion Officer, CDB, Kochi, Mrs. Renu P. Viswam, Statistical Investigator, CDB, Dr. S. Radhakrishnan, Senior Scientific Officer, CCRI, Kalavoor, Dr. A. Abdul Haris, Principal Scientist, ICAR-CPCRI, RS, Kayamkulam and Dr. P. Subramanian, Principal Scientist, ICAR-CPCRI, Kasaragod gave lectures on various topics. More than 750 farmers, women farmers, extension officials and entrepreneurs participated in the program.

Lighting lamp for Kalpa Vajra

Kisan Bhagidari Prathmikta Hamari campaign

Kisan Bhagidari Prathmikta Hamari campaing was organized on 26th April 2022 in collaboration with ATMA Kasaragod and the Department of Agriculture Development and Farmers Welfare. The Kisan Mela was inaugurated by Shri N.A. Nellikkunnu, Hon. MLA, Kasaragod. The agricultural exhibition was inaugurated by District Panchayat President, Smt Baby Balakrishnan. Dr. Anitha Karun, Director, ICAR-CPCRI delivered the keynote address and Smt. Veena Rani, Principal Agricultural Officer explained the central schemes to the farmers. An agricultural exhibition comprising of 20 stalls were organized as part of the exhibition in which various government departments, companies and entrepreneurs demonstrated latest technologies for improving the production and productivity in crops. During the event four state level award winning farmers and two innovative farmers from the Kasaragod district were felicitated. Shri Sivananda, from Kumbla (Best farmer award), Shri Manu Joy (Integrated farming), Shri Sudheesh Kumar A., Munnad (Soil and water conservation), Aleyamma Siby (Bee keeping) , Gopalakrishna Sharma (Innovative farmer) and Krishnan Prakkodal (Agripreneur) were honoured for their outstanding achievements and contributions to the farming community. A seminar on nutrigarden by Shri Shijo, Agricultural Officer, Nileshwar was also organized during the meeting. The Farmer – Scientist interface was convened by Dr. C. Thamban, Principal Scientist, ICAR CPCRI, Kasaragod. An animal health camp was also organized as part of the event. The meeting was attended by more than 500 farmers and farm women.

Inaugural function and a view of the programme held at ICAR-CPCRI, Kasaragod

Parliamentary Standing Committee Visit

Parliamentary Standing Committee consisting Smt. Gita Rani, Joint Secretary, MIDH, Govt. of India, Dr. Subrata Gupta, Principal Secretary, Dept. of Agric, Govt. of West Bengal, Director, Dept. of Food processing and Horticulture, Dr. Samuel Rai, Director, Dept. of Cinchona and Medicinal Aromatic plants, Govt. of West Bengal, others official of Horticulture Dept. Govt of West Bengal along with Dr. Bhaskar, ADG (CS), Dr. B.K. Pandey, ADG (Hort-II), ICAR, Dr. Anitha Karun, Director, ICAR-CPCRI, Dr. K. Muralidharan, The Head, Social Science and Dr. Vinayaka Hegde, The Head, Plant Protection, ICAR-CPCRI visited ICAR-CPCRI, RC, Mohitnagar on 20th June, 2022.

HUMAN RESOURCES DEVELOPMENT

Trainings within India

Rajeev M.S., SMS attended online training programme on 'Natural farming for sustainable agriculture' organized by EEE, Southern region, Hyderabad during 19-22 April 2022.

Awards / Honours

Dr. S. Elain Apshara, Principal Scientist (Hort.), CPCRI, RS, Vittal bagged the best oral presentation award in the session on Technological Challenges and Approaches for Climate Resilient Development of Horticulture for the paper 'Cocoa- the agro forestry crop and its resilience to palm based cropping systems' presented in the National Conference on Climate Resilient and Sustainable Development of Horticulture 28-31 May, 2022 CSAUA & T, Kanpur, UP.

Best Poster paper award for the paper titled 'Direct organogenesis from immature inflorescence explants of coconut (*Cocos nucifera* L.) for production of true-to-type plants' by Shareefa, M., Sreelekshmi, J.S., Thomas R.J., Rajesh, M.K. and Anitha Karun presented at 2nd *Tissue Culture Symposium 2022'* conducted by ICC and COGENT 4-6 May 2022. This award money of 300 US Dollars was presented to Dr. M. Shareefa at ICAR-CPCRI, Kasaragod.

Dr. Rajkumar, Scientist was awarded "Best Poster Presentation" for his poster presentation on "Field evaluation of EPN based formulation against lepidopteron caterpillars infesting cauliflower and cabbage grown as intercropped with coconut cropping system" in the National e - conference on 'Biotic stress management strategies for achieving sustainable crop production and climate resilience' held at ICAR - NRCIPM, New Delhi, during 19 - 21 May, 2022.

PUBLICATIONS

Research papers

Alagar M., Srinivasan, T., Rajamanickam, K., Josephrajkumar A., Yasmin A., Chinnadurai, S., Sivakumar, V., Praneetha, S. and Maheswarappa, H.P. 2022. Efficacy of botanical formulations against coconut rhinoceros beetle, *Oryctes rhinoceros*. *Indian Journal of Entomology e-21213*. DoI.: 10.55446/IJE.2021.381

Beegum, P.S., Pandiselvam, R., Ramesh, S.V., Sugatha, P., Nooh, A., Neenu, S., Gupta, A., Varghese, E., Balasubramanian, D., Apshara, S.E. and Manikantan, M.R., 2022. Sensorial, textural and nutritional attributes of coconut sugar and cocoa solids based 'bean to bar'dark chocolate. *Journal of Texture Studies*.

Beegum, P.S., Pandiselvam, R., Ramesh, S.V., Thube, S.H., Pandian, T.P., Khanashyam, A.C., Manikantan, M.R. and Hebbar, K.B., 2022. A critical appraisal on the antimicrobial, oral protective, and anti-diabetic functions of coconut and its derivatives. *Quality Assurance and Safety of Crops & Foods*, *14*(2), pp.86-100.

Hebbar, K.B., Abhin, P.S., Sanjo Jose, V., Neethu, P., Santhosh, A., Shil, S. and Prasad, P.V., 2022. Predicting the Potential Suitable Climate for Coconut (*Cocos nucifera* L.) Cultivation in India under Climate Change Scenarios Using the MaxEnt Model. *Plants*, *11*(6), p.731.

Hebbar, K.B., Kannan, S., Neenu, S. and Ramesh, S.V., 2022. Season and genotype effect on whole plant water use efficiency of coconut (*Cocos nucifera* L.) seedlings grown in a hydroponic system. *Scientia Horticulturae*, *303*, p.111198.

Hegde, V., Merin Babu and Josephrajkumar, A. 2022. Global scenario on Phytoplasmal diseases on palms. *Indian Journal of Entomology e-22034*. DoI.: 10.55446/IJE.2022.451

Josephrajkumar, A., Evans, G.A., Chandrika Mohan, Merin Babu, Anes, K.M., Alagar, M and Hegde, V. 2022. Morphological and Molecular Identification of the woolly whitefly, *Aleurothrixus floccosus* (Maskell). *Int. J. Trop. Insect Sci.* **42** (3): 2493–2500. https://doi.org/10.1007/s42690-022-00777-8

Neema, M., Aparna, V. and Chandran, K.P., 2022. Contrast analysis recommends flame sterilization for surface depuration in coconut (*Cocos nucifera*) meristem culture. *Current Horticulture*, **10**(1), pp.41-44.

Pandiselvam, R., Kaavya, R., Martinez Monteagudo, S.I., Divya, V., Jain, S., Khanashyam, A.C., Kothakota, A., Prasath, V.A., Ramesh, S.V., Sruthi, N.U. and Kumar, M., 2022. Contemporary Developments and Emerging Trends in the Application of Spectroscopy Techniques: A Particular Reference to Coconut (*Cocos nucifera* L.). *Molecules*, *27*(10), p.3250.

Rajeev, M.S. and Muralidharan, P. 2022. Effect of high yielding variety and improved practices on yield of sesamum in Onattukara tracts of Alappuzha district. *Journal of Krishi Vigyan* **10**(2):94-97

Ravi. S., Muralidharan, P. and Arathy, J. 2022. Impact of adoption of climate resilient practices in goat farming in Kuttanad region of Kerala. *Journal of Krishi Vigyan*. **10**(2):198-203.

Sujithra M., Rajkumar M., Vinayaka Hegde, Subramanian P & Guru-Pirasanna-Pandi G. 2022. Nylon nets: a simple pest exclusion barrier technique to manage rhinoceros beetle menace in coconut plantations, International Journal of Pest Management, DOI: 10.1080/09670874.2022. 2046297.

Sujithra, M.; Prathibha, H.V.; Rajkumar, M.; Guru-Pirasanna-Pandi, G.; Senthil-Nathan, S.; Hegde, V. Entomopathogenic Potential of *Simplicillium lanosoniveum* Native Strain in Suppressing Invasive Whitefly, *Aleurodicus rugioperculatus* Martin (Hemiptera: Aleyrodidae), Infesting Coconut. *J. Fungi* **2021**, *7*, 964. https://doi.org/10.3390/jof7110964.

Conference/Workshop/Seminar papers

Aparna Veluru, Devakumar, K. Neema, Muralikrishna, K.S. Rajesh, M.K. and Anitha Karun 2022. Effects of light-emitting diodes on somatic embryogenesis and tissue cultured plantlet growth of arecanut (*Areca catechu* L.). *In:* Proc. of 2nd Indian Horticulture Summit-2022, 27-29 April 2022, Navsari (Gujarat), India, 123-124p.

Elain Apshara, S. 2022. Cocoa- the agro forestry crop and its resilience to palm based cropping systems. In: Abstracts of National Conference on Climate Resilient and Sustainable Development of Horticulture 28-31 May, 2022 CSAUA & T, Kanpur, UP. p. 14-15.

Mathew, J., Anithakumari, P., Chandran, K., Haris, A.A. and Bhat, R. 2022. Participatory approach towards sustainable soil health management in a humid tropical entisol for livelihood security. In: *WEM-2022 International Conference on Water and Environmental Management* (Abstracts) 22-24 June 2022. KSCSTE-Centre for Water Resources Development and Management, Kozhikode, Kerala pp 297-298.

Neema M., Aparna V., Chandran K. P., Ramesh S. V., Anitha Karun, 2022, Attenuation of phenolic interference in *Cocos nucifera* L. suspension culture utilizing charcoal impregnated calcium alginate spherules, 43rd Annual Meeting of PTCA(I) & International Symposium on "Advances in Plant Biotechnology and Nutrational security" APBNS-2022, April 28-30, 2022 P285.

Rajkumar, Sujithra M., Rashid Pervez and Surekha 2022. Field evaluation of EPN based formulation against lepidopteron caterpillars infesting cauliflower and cabbage grown as intercropped with coconut cropping system" in the National e - conference on 'Biotic stress management strategies for achieving sustainable crop production and climate resilience' held at ICAR - National Research Centre of Integrated Pest management, New Delhi ,India during 19 - 21 May, 2022.p164

Shareefa, M., Thomas R.J., Sreelekshmi, J.S., Rajesh, M.K. and Anitha Karun 2022. Effect of culture vessels and type of gelling agents on *in vitro* culture of coconut. In: *International Symposium on 'Advances in Plant Biotechnology & Nutritional Security'* 28-30th April 2022. National Institute for Plant Biotechnology, New Delhi pp 312-313.

Popular articles

Anithakumari P., Thomas, R.J., Josephrajkumar A., Abdul Haris A., Anes, K.M., Merin Babu, Shareefa M., Nihad K., Jeena Mathew and Indhuja S. 2022. ICAR-CPCRI, Regional Station, Kayamkulam @75-Serving Coconut Farmers since 1947. ICAR-CPCRI Publication No. 302, 52p.

Anithakumari P., Thomas, R.J., Josephrajkumar A., Haris, A.A., Anes, K.M., Merin Babu 2022. Evolution and Functions of ICAR-Central Plantation Crops Research Institute, Regional Station, Kayamkulam. *Indian Coconut Journal* **64**(10): 25-29.

Anithakumari P., Thomas, R.J., Josephrajkumar, A., Haris, A.A., Anes, K.M., Merin Babu. 2022. Central Plantation Crops Research Institute, Kayamkulam @75 (*In Malayalam*). *Indian Naleekara Journal* **13**(4): 6-10.

Anithakumari, P. and Shaju, J. 2022. Intercrop cafeteria in coconut gardens. *Indian Nalikera Journal* **14**(6): 9-12.

Anithakumari,P. 2022. Manage rhinoceros beetle and red palm weevil of coconut as community approach. *Karshakasree* **28**(4): 36-37.

Bhavishya and Pandian, R.T.P. 2022. Indina chukke, naleya hemmari? *Adike Patrike* 34(4): 10-11.

Bhavishya, Nayana, H., Priya, U. K., Sujatha, S. and Ravi Bhat. 2021. Micronutrient management in arecanut-cocoa ecosystem. *Indian J. Arecanut spices and medicinal plants* 23(4):11-15.

Jissy George. 2022. Vegetables can be processed. *Karshakashree.* **28**(6): 31.

Muralikrishna, H., Anju Philip, T., Induja, M.S., Ankita Saha, Sileesh Mullasseri, Ravindra Jadav and Aneesh Kumar, K.V. 2022. Current science reports. *Current Science*, **122** (10): 1117-1120.

Muralikrishna, H., Induja, M.S., Meera, K.M., Anju Philip, T., Aneesh Kumar, K.V., Pranita Bhatele, Nalini, J., Ravi Mishra and Sileesh Mullasseri. 2022. Current science reports. *Current Scienc*e, **122** (12): 1361-1364.

Prathibha, P. S., Jilu, V. S. and Shivaji, H. T. 2022. Root grub: A manace to arecanut cultivation (*Verutheenippuzhukkal kamukinu bheeshani*). *Karshakashree* **28**(6):30 (*In Malayalam*).

Priya, U.K., Neenu, S., Bhavishya, Jose, C.T. and Elain Apshara, S. 2022. The necessity of soil testing in plantation crops (Malayalam). *Karshakan* 30(8): 44-45.

Shareefa, M., Mayalekshmi, Mohammed, H., Anandha Narayanan and Thomas, R.J. 2022. Successful establishment of coconut garden-tips and techniques *Indian Coconut Journal* **64**(12): 16-19.

Sivakumar, T. 2022.Morris sir and Prathibha. *Indian Nalikera Journal*. **13**(4): 26-27.

Sivakumar, T. 2022.Stingless bees in homesteads. *Indian Nalikera Journal*. **14**(6):13-14.

Book chapters

Elain Apshara, S. 2022. Cocoa Improvement and Production Technology. *In:* E-manual on Kalpa Graduate Readiness Programme-II for Agri/ Horti UG students 17.09.2021 to 28.03.2022, ICAR- CPCRI, Kasaragod. pp. 67-82.

Nihad, K.2022. Cultivation practices of coconut. In: '*Kerasamskruthi*' *Compilation of study material* of *Farmers' Seminar held at Ettumanoorappan College* (Ed. Harikrishnan, N). Department of Printing and Publishing, Mahatma Gandhi University, Kottayam, Kerala, pp 28-32. ISBN 978-93-80419-58-9 p.208.

Thomas, R.J. and Joseph Rajkumar, A. 2022. Insect pollination in coconut. In: *Ecosystem service analysis: concepts and applications in diversified coconut and arecanut gardens* (Eds. Arunachalam, V., Paramesha, V., Uthappa, A. R. and Parveen Kumar) ICAR-Central Coastal Agricultural Research Institute, Ela, Goa. ISBN: 978-81-956638-2-8.

Sujithra, M., Rajkumar, M., Pai, S., Selvaraj, K. (2022). Prospects and Advances in the Management of Coconut Wood Borers. In: Sundararaj, R. (eds) Science of Wood Degradation and its Protection. Springer Nature, Singapore. https://doi.org/10.1007/978-981-16-8797-6_7. pp 227 - 256.

Books

Anes, K.M., Nihad, K., Anithakumari, P. and Nageeb, P.H. 2022 *Compendium of Lecture Notes, Diploma in Agricultural Extension Services for Input Dealers* (DAESI) ICAR-CPCRI, RS, Kayamkulam. 128p.

Nihad, K. 2022. *Heliconia - Vismayapushpangal*. Kerala Bhasha Institute, Government of Kerala 57p. ISBN 978-93-91328-97-9

Technical Bulletin

Anithakumari, P., Thomas, R.J., Josephrajkumar, A., Haris, A.A., Anes, K.M., Babu, M., Shareefa, M., Nihad, K., Mathew, J. and Indhuja, S. 2022. ICAR-CPCRI, Regional Station, Kayamkulam@75: Serving Coconut Farmers since 1947. ICAR-CPCRI, Kasaragod, Kerala *Technical Bulletin No. 302*. 52p.

Elain Apshara, S., Arun Kumar Sit and Sandip Shil. 2022. *Ready reckoner on cocoa, coconut and arecanut (English and Bengali)*. Ready Reckoner No. 2, CPCRI, Kasaragod, p. 44.

Chapters in Training Manual

Josephrajkumar, A., Sajan, J.V., Anes, K. M. and Merin Babu. 2022. Managing Coconut Pests Intelligently. *In*: Training manual on 'Diagnosis and Management of Pests and Diseases in Coconut' (Eds. Anes, K. M., Merin Babu, Sajan, J.V., Josephrajkumar, A. and Anithakumari, P.). ICAR-CPCRI, Regional Station, Kayamkulam, pp. 3-8.

Merin Babu, Sajan, J.V.and Indhuja S. 2022. Diagnosis and management of coconut diseases. *In*: Training manual on 'Diagnosis and Management of Pests and Diseases in Coconut' (Eds. Anes, K. M., Merin Babu, Sajan, J.V., Josephrajkumar, A. and Anithakumari, P.). ICAR-CPCRI, Regional Station, Kayamkulam, pp. 9-18.

Sajan, J.V., Prathibha, P. S., Daliyamol, Indhuja, S., Anes, K. M. and Josephrajkumar, A. 2022. Biological control agents for pest and disease management. *In*: Training manual on 'Diagnosis and Management of Pests and Diseases in Coconut' (Eds. Anes, K. M., Merin Babu, Sajan, J.V., Josephrajkumar, A. and Anithakumari, P.). ICAR-CPCRI, Regional Station, Kayamkulam, pp. 23- 28.

Training Manual

Anes, K. M., Merin Babu, Jilu V. Sajan, Josephrajkumar, A. and Anithakumari, P. 2022. Training manual on 'Diagnosis and Management of Pests and Diseases in Coconut, ICAR-CPCRI, Regional Station, Kayamkulam, p.33.

Josephrajkumar A., Merin Babu and Anes, K.M. 2022. Incursion Management of Invasive Pests on Coconut. pp-181-187. In: *E-manual: Kalpa Graduate Readiness Programme-II*. (Eds. Jayasekhar, S. and Neema, M.) 17.9.2021 to 28.3.2022 ICAR-CPCRI, Kasaragod 276p.

Extension folder

Jerard, B.A., Josephrajkumar, A., Damodaran, V., Zamir Ahmed, S.K., Jaisankar, I. and Chakurkar, E.B. 2022. Management of invasive whiteflies on coconut palms. *Extension Folder*, ICAR-CIARI, Port Blair, Andaman and Nicobar Islands, India

Rajkumar, Shivaji H. Thube, Sujithra M., Joseph Rajkumar and Vinayaka Hegde 2022. Entomopthogenic nematode (EPN) for the management of root grub in arecanut. ICAR-CPCRI, Kasaragoad. p2.

E-Publications

Abdul Haris A, 2022, Irrigation and fertigation management in plantation crops, 135-151 pp.

Alka Gupta and Murali Gopal, 2022, Biofertilizers – Isolation and utilization of bioinoculants, 114-122 pp.

Anitha Karun, Rajesh MK, Neema M, Aparna V and Muralikrishna KS, 2022, In Vitro Propagation Of Coconut And Arecanut, 30-43 pp.

Anithakumari. P, 2022, Innovative extension approaches for technology transfer among coconut communities, 217-221 pp.

Chandran K P, 2022, Fundamental of statistical techniques, 232-239 pp.

Chandrika Mohan, 2022, Pest management in coconut, 175-180 pp.

Elain Apshara S., 2022, Cocoa improvement and production technology, 67-82 pp.

Jayasekhar S, 2022, Plantation sector in India: Scenario, issues, challenges and strategies, 222-231 pp.

Jayasekhar, S. and Neema, M. 2022. E-manual – Kalpa Graduate Readiness Programme-II, ICAR-CPCRI, Kasaragod p. 276.

Jeena Mathew, 2022, Soil health management practices for sustained palm productivity, 152-158 pp.

Josephrajkumar A, Merin Babu and Anes K.M, 2022, Incursion management of invasive pests on coconut, 181-187 pp.

Manikantan, M.R. Pandiselvam, R., Shameena Beegum and Hebbar, K.B. 2022, Post harvest technology in coconut, 252-256 pp.

Mathew, AC 2022, Soil and water techniques in hilly agro-ecosystems, 125-134 pp.

Murali Gopal, 2022, Recycling farm wastes for enhancing soil and plant health, 123-124 pp.

Nagaraja N.R., 2022, Arecanut, 83-100 pp.

Niral, V. 2022, Coconut improvement, 50-55 pp.

Rajesh MK and Ramesh SV, 2022, Use of molecular biology and biotechnology tools for improvement of coconut, 44-49 pp.

Sandip Shil, Arun Kumar Sit, Chandran KP And Neema M, 2022, The undergraduate guide to R and its usage in agricultural research data analysis, 240-251 pp

Shivaji Hausrao Thube, Thava Prakasa Pandian R., and Saneera, E. K., 2022, Integrated pest management in arecanut, 195-202 pp.

Shivaji Hausrao Thube, Thava Prakasa Pandian R., andSaneera, E. K., Integrated pest management in cocoa, 2022, 188-194 pp.

Subramanian P., Surekha R. and Ravi Bhat, Production technology in coconut, 2022, 101-113 pp.

Sudha R, Neema M, Aparna V. And Samsudeen K., 2022, Coconut nursery – An emerging enterprise, 56-66 pp.

Thamban C., 2022, Extension approaches for sustainable development of plantation crops, 203-216 pp.

Thava Prakasa Pandian R, Shivaji Hausrao Thube, Chaithra M, and Vinayaka Hegde, 2022, Arecanut Diseases and Management, 159-165 pp.

Thava Prakasa Pandian R, Shivaji Hausrao Thube, Chaithra, M, and Vinayaka Hegde, 2022, Cocoa Diseases and Management, 166-174 pp.

Vinayaka Hegde, Diseases of Coconut: Diagnosis and Management, 2022, 257-276 pp.

Video

Rajkumar, Shivaji H. Thube, Nagaraja N. R., Bhavishya and Surekha. 2022. You tube video on white grub management using EPN and other arecanut pests (In Kannada. (https://youtu.be/tL6CxsLf9E)

TRANSFER OF TECHNOLOGY

Training programmes

Training Programme on Neera Tapping

Training programme on "Value added products and Neera Tapping in Coconut" was conducted at ICAR-CPCRI Research Centre, Kidu on 13.4.2022. Sh. Prasad Shetty, President, South Canara Coconut Farmers Producers Company Limited, Vittal inaugurated the programme. Dr. Hebbar, K. B. Head, Division of Physiology, Biochemistry and PHT presided over the function. The

Dr. K.B. Hebbar, Head (Acting), PB&PHT, ICAR-CPCRI handling training session

programme was attended by about 69 participants.

A training programe on 'Crop diversification in plantation garden with black pepper' was conducted in collaboration with Jalpaiguri FPC and District Collectorate as a part of Utkarsh Bangla, Paschim Banga Society for Skill Development (PBSSD) at Gangadebi, Kranti Block, Jalpaiguri from 15th June, 2022 to 20th June, 2022.

Three off-campus training programme on scientific cultivation of coconut, arecanut and arecanut based cropping system were conducted by ICAR-CPCRI, RC, Mohitnagar.

Webinar on 'Organic farming in arecanut and cocoa' was organized by ICAR-CPCRI, Regional Station, Vittal in connection with Azadi Ka Amrith Mahothsav under the campaign 'Annadhata Devo Bhava' on 23.04.2022.

A Field day on EPN was conducted at Bajagoli village, Karkala Taluk on 24 June 2022 in collaboration with Horticultural Department, Karkala, Farmers Producer Company and Grama Panchyath of Karkala.

Scientists from ICAR-CPCRI, RS, Vittal visited arecanut gardens in Miyapadavu, Vorkady and Pavoor villages of Manjeshwara, Kasaragod. Visits were also made to Savanuru, Belandooru and Dholpadi villages of Kadaba taluk, Karnataka. Nutrient disorder due to imbalanced nutrient application, crown rot and inflorescence die-back disease were observed. Integrated nutrient and disease management practices were suggested.

Scientists from ICAR-CPCRI, RS, Vittal also visited arecanut garden in Koppa taluk, Karnataka. Severe yellowing of leaves followed by necrosis was observed due to boron toxicity. Suitable management practices were suggested to the farmer.

Yellowing and necrosis of the leaves due to boron toxicity

A scientific team visited the coconut gardens around Eruthempathy, Palakkad on 26.04.2022 and found the prevalence of root (wilt) superimposed with leaf rot disease in the region. A farmer-scientist interface was also conducted with local farmers and appraised on the significance of palm health management.

Establishing demonstration plots of arecanut

Demonstration plots on arecanut based multispecies cropping system at Bantwal, Puttur and Belthangady Taluks of Dakshina Kannada District was established. Demonstration plots of arecanut dwarf hybrids were established at Sarve, Puttur Tk. and at Ubaradka Mithoor Post, Sullia Tk., Dakshina Kannada Dt., Karnataka. Technical advice and inputs were provided to the beneficiaies.

Demonstration plot on arecanut based multispecies cropping system

Demonstration plots on arecanut dwarf hybrids

The other exposure visits to the Institute include the following:

Affiliation	Visitors	Place
Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, Karnatak	3 staffs and 45 students	ICAR-CPCRI, Regional Station, Vittal on 23.05.2022
Shikaripura, Shivamogga Dt., Karnataka	4 farmers	ICAR-CPCRI, Regional Station, Vittal on 30.05.2022
Keladi Shivappa Nayaka University of Agricultural and Horticultural Sciences, Shivamogga, Karnataka	staffs and PG students	ICAR-CPCRI, Regional Station, Vittal on 09.06.2022
Dept. of Agriculture, Maharastra	15 farmers	ICAR-CPCRI, RS, Vittal on 19.04.2022
Dept. of Horticulture and Krishika Samaja, Moodabidre	30 farmers	ICAR-CPCRI, RS, Vittal on 23.04.2022

Plantation based Technologies were demonstrated and elaborated with the input dealers visited to the Research Centre, Mohitnagar.

Date	Participants	Institute	Participants
04.05.2022	Input Dealers under DAESI programme	KVK, Jalpaiguri	37
30.06.2022	Students of M.Sc. Hort. UBKV, Pundibari	UBKB	15
07.07.2022	Do	KVK, Jalpaiguri	38
14.07.2022	Do	KVK, N. Dinajpur	39

Tribal Sub-Plan

ICAR - CPCRI in collaboration with Kalpabrukhya foundation distributed ten thousand West Coast Tall (WCT) coconut seed nuts among tribal farmers during March 2022 to establish small scale coconut nursery in their respective villages in scheduled tribe dominating villages of Sadaksahi, Radhakrishnapur, Radhakishorepur and Raja Athagarh in Cuttack district for earning their livelihood and providing nutritional security to the communities in the region. The other villages covered were Juangasahi, , Bhagabanpur, Word No.18, Kathagada, Govindpur, Kalikaprasad, Bandana, Kujimahal, Chandaka in Dhenanal and Khordha district of Odisha under Tribal Sub Plan (TSP) scheme.

Radio talks/ TV programme broadcas

Dr. T. Sivakumar, SMS, KVK, Alappuzha delivered on 'Management of rainy season pests and diseases in coconut' broadcast on 13.6.22 by AIR, Thiruvananthapuram.

Coconut seed distribution and nursery raised in the farm

Mera Gaon – Mera Gaurav

Training on 'Turmeric cultivation practices' to MGMG farmers of Velanchira on 06.05.2022 in collaboration with Kandalloor Panchayath.

Field visit to Nadakkavu, Menampally, Koipally Karaima and Chettikulangara MGMG villages in Chettikulangara Panchayath on 02.06.2022

KRISHI VIGYAN KENDRAS

ICAR - Krishi Vigyan Kendra – Kasaragod

Various OFT's and FLD's, training programmes and extension activities were carried out as given below:

OFT's and FLD's

The Annual Review Meeting 2021-22 was held at KAU Trissur in which the work during the period has been presented. Initiated the OFT's on 'Assessment of black pepper varieties suitable for mid and high ranges of Kasaragod' and 'Assessment of foam mat drying for fruits pulps. Another FLD's on 'High yielding varieties of cassava, Sri Jaya and high density planting in cashew were initiated.

Training Programmes

The KVK has carried out 20 training programmes which include 17 on campus training programmes with a participation of 61 men and 77 women and 3 off campus training programmes with a participation of 18 women farmers.

Extension Activities

Gareeb Kalyan Sammelan

ICAR KVK Kasaragod organized Gareeb Kalyan Sammelan on 31st May 2022 in which 50 farmers participated and another 500 attended online. In this programme various developmental programmes of the Central Govt. were explained to the beneficiary farmers. The interaction of Hon'ble Prime Minister with farmers was conducted through web casting which was part of the Nation-wide campaign.

Scientists visiting cashew plot

ICAR - Krishi Vigyan Kendra - Alappuzha

'Kisan Bhageedari Prathamikatha Hamari'-Kisan Mela and Seminar

KVK-Alappuzha organized a Kisan Mela in connection with Azadi Ka Amrut Mahotsav and Kisan Bhageeethari Prathamikatha Hamari campaign of Govt. of India. The programme was held as a joint venture with ATMA-Alappuzha. The programme on 26th April was inaugurated online by Sri.P. Prasad, Hon. Minister of Agriculture, Govt. of Kerala, in the online presence of Sri. A.M. Arif. Hon. MP, Alappuzha. People's representatives and district level officials of various line departments and development agencies were present on the occasion. Various farmer benefitting schemes of GOI

were deliberated in the seminar attended by more than 500 farmers from different blocks of Alappuzha district. An Exhibition on various technologies and products also was arranged which attracted the participants.

Inauguration of Kisan mela at Kayamkulam

World Bee Day celebrated

World bee day' was celebra'ted with different activities by KVK-Alappuzha on 20.5.2022. Quiz programme on bees and a talk on 'Bee diversity and beekeeping systems' by Dr. T. Sivakumar, SMS, KVK were organized in collaboration with Bishop Moore College, Mavelikkara. Dr.Ranjith Mathew Abraham (Vice-Principal, Bishop Moore College) presided over the valedictory function in which Dr.P.Muralidharan, PS and Head, KVK-Alappuzha delivered the keynote address and distributed the prizes. Dr. G.R. Deepthi (HoD, Zoology Dept.) and Dr. K. Sajnanath (SMS, KVK) assisted in coordinating the programme.

Distribution of prizes during World Honeybee Day

Awareness Programme on 'Balanced Use of Fertilizers'

As part of "Azadi ka Amrut Mahotsav' celebrations of the Govt. of India, an awareness programme on 'Balanced Use of Fertilizers' was organized by the ICAR-Krishi Vigyan Kendra –Alappuzha in association with Department of Agricultural Development and Farmers' Welfare on 21st June, 22. The relevance of balanced nutrition to crops, following good agricultural practices, and maintaining natural resources in healthy condition for a healthy society was conveyed to about 60 farmers. Kandallur Grama Panchayath. Smt. Radhika Murali, Grama panchayath ward member, inaugurated the programme in the presence of other ward members and the Agricultural Officer.

Awareness programme on balanced nutrition to crops at Kandallur, Alapuzha

World Environment Day Celebrated

KVK–Alappuzha in collaboration with NSS Unit, MSM College, Kayamkulam organized the World Environment Day celebrations in the college campus on 6th June 2022. Dr. K. Sajnanath, SMS, KVK gave an awareness talk on 'Good farming practices for environmental protection' highlighting the relevance of conserving natural resources through different agricultural practices. Later, the NSS Volunteers planted vegetable seedlings for a campus vegetable garden. Dr.A.Muhammad Thaha, Principal, MSM College, Prof.T.Nishad, NSS Programme Officer, Mr. Avant Sen P.S. and Ms. Nafia S. Secretaries, NSS Unit attended and addressed about 75 students who actively participated in the function.

Planting of seedlings during Environment Day

Training programmes

During the period 23 training programmes were organized benefitting a total number of 883 farmers/rural youths. The details of the training programmes were as follows:

Training	No. of Programmes	Participants		
		Men	Women	Total
On campus	7	89	86	175
Off campus	7	144	311	455
Online	9	148	105	253
Total	**23**	**381**	**502**	**883**

CELEBRATIONS

World Environment Day celebrated on 6 June 2022 at ICAR- CPCRI, RS, Kayamkulam.

Yoga Day Celebration on 21 June 2022: A lecture-cum-demonstration session on yoga was conducted by Smt. Kala Damodar, renowned yoga instructor at Kasaragod. At ICAR-CPCRI, RC Kidu a yoga session was organized under the expert guidance of Master Sh. Vijesh Kumar.

At ICAR-CPCRI, Regional Station, Kayamkulam lecture on 'Yoga in Human Development' and a practical demonstration were held. It was also celebrated at Mohitnagar and Vittal.



Yoga Day Celebrations at different centres of ICAR-CPCRI

COMMERCIALIZATION OF TECHNOLOGY

During the period from April to June 2022, 11 technologies were commercialized by the Institute to entrepreneurs through MoA as per the details given below, an amount of Rs. 1,20,000 /- have been collected as technology transfer fees.

Name of Technology Commercialized	Date of Signing MOU	Value (In INR)	To Whom Commercialized
Technology for mass production of *Trichoderma harzianum* using arecanut leaf sheath	06-04-2022	5000	Mrs Asha Rai K., 1-132, Kalai House, Punchappady Post and Village, Kadaba Taluk - 574202, Dakshina Kannada District, Karnataka
Technology for mass production of *Trichoderma harzianum* using arecanut leaf sheath	06-04-2022	5000	Mr. B. Balakrishna Poojary, Manager, Agriculture Division, Sri Kshethra Dharmasthala Temple, Dakshina Kannada District, Karnataka
Trichoderma Coir Pith Cake.	21-04-2022	5000	M/s Deejay Coconut Farm Pvt. Ltd., 3rd floor, St Patricks Complex Brigade Rd, Bangalore – 560025
Know-How on utilization of *Metarhizium anisopliae* culture	21-04-2022	5000	M/s Deejay Coconut Farm Pvt. Ltd., 3rd floor, St Patricks Complex Brigade Rd, Bangalore – 560025
Knowhow for production of bean to bite chocolate	28-04-2022	10000	Mr. Bobby Mookanthottathil, Chairman, Hill Grown Farmers Producer Company Ltd., Chathangottunada P.O., Kavilumpara – 673513, Kerala
Kalpa Poshak and Kalpa Vardhini	10-05-2022	15000	ESAF Swasraya Producers Company Ltd., TC/10/121/1, Santhi Nagar, Ollukkara, Mannuthy, Thrissur – 680651, Kerala
Technology for mass production of *Trichoderma harzianum* using arecanut leaf sheath	11-05-2022	5000	M/s Deejay Coconut Farm Pvt. Ltd., 3rd floor, St Patricks Complex Brigade Rd, Bangalore – 560025
Coconut Chips	19-05-2022	25000	Mr. Abdul Gafoor Chalil, M/s GJ Enterprises, Ground 16/330, Palapetty, Perumpadappu – 679579, Malappuram, Kerala
Coconut Chips	20-05-2022	25000	Raam Mohan N.U., 4/22, Umapathy coconut hybrid Nasuvanpalayam, Pollachi Road, Venkittapuram Post, Palladam (TK), Tirupur, Tamil Nadu
Trichoderma harzianum (CPTD – 28) culture	13-06-2022	5000	Mr. Raju P, S/o R. Ponnudurai, 31/24, Balasubramanian street, K.K. Pudur, Coimbatore – 36, Tamil Nadu
Preservation protocol for trimmed tender coconut	16-06-2022	15000	Mr. Shafeeque V. , C/o. Wadi Zamzam Tender Coconut, Karoth Thazhath (H), Vaidyarangadi (PO), Ramanattukara, Calicut – 673633, Kerala
	Total	1,20,000	

Participation in national seminars/ symposia/ conferences/ workshops
(online also)

Scientists	Conference/Workshop	Place and Date
Dr. A. Joseph Rajkumar, Principal Scientist	Annadata Devo Bava lecture on 'Bioagents in coconut pest management' (online)	ICAR-CPCRI, RS, Kayamkulam 25 April 2022
Dr. Aparna Veluru, Scientist	2nd Indian Horticulture Summit-2022	Navsari, Gujarat 27-29 April 2022
Dr. M. Shareefa Senior Scientist and Dr. Neema M., Scientist	International Symposium on "Advances in Plant Biotechnology and Nutritional security" APBNS-2022	ICAR-NIPB, New Delhi-110012 28-30 April, 2022
Dr. M. Shareefa Senior Scientist, Dr. Aparna Veluru and Dr. Neema M., Scientists	2nd Tissue Culture Symposium 2022	ICC and COGENT, Jakarta, Indonesia (Online) 4-6th May 2022
Dr. M. Shareefa, Senior Scientist, Dr. Aparna Veluru and Dr. Neema M., Scientists	ICC-COGENT International Coconut Tissue Culture Workshop	ICAR-CPCRI, Kasaragod 16th to 20th May 2022
Dr. Regi Jacob Thomas Principal Scientist	ICC-COGENT Tissue Culture Workshop and delivered lecture on 'Farmer Participatory Pollen Conservation'	ICAR-CPCRI Kasaragod 17-18 May 2022
Dr. Rajkumar, Scientist	National e - conference on 'Biotic stress management strategies for achieving sustainable crop production and climate resilience'	ICAR-NARCIPM, New Delhi 19 - 21 May, 2022
Dr. S. Elain Apshara, Principal Scientist (Hort.)	Webinar on prospects of Varieties/ Crops Developed through Genome Editing (regulatory framework, technologies and experience)	PPV & FRA, New Delhi, 24th May 2022
Dr. Rajkumar, Scientist	Crop life India virtual Symposium on" Roadmap for sustainable management of empty pesticides containers (EPC) in India	New Delhi 25 May 2022
Dr. Sandip Shil, Scientist	National Seminar on 'Horticulture for sustainable development, nutritional and livelihood security'.	UBKV, Pundibari, West Bengal 26-27 May 2022
Dr. K.M. Anes, Scientist	Regional conference of Cluster Based Business Organizations (CBBOs) & Farmer Producer Organizations (FPOs)	GKVK Campus, UAS Bengaluru 27 May 2022
Dr. Anitha Karun, Director (Acting), Dr. Muralidharan K. and Dr. K B Hebbar, Principal Scientists & Heads (Acting) and Dr. S. Elain Apshara, Principal Scientist (Hort.)	National Conference on Climate Resilient and Sustainable Development of Horticulture	CSAUA & T, Kanpur, Uttar Pradesh 28-31 May 2022
Dr. P. Muralidharan, Head, KVK	ICAR-National Conference of KVKs	YSPUHF, Solan, Himachal Pradesh 1st to 3rd June, 2022
Dr. P. Muralidharan, Head, KVK	Annual Zonal Workshop of ATARI, Zone XI	UAS, Dharwad 19th -22nd June, 2022
Ms. Chaithra M, Scientist	6th Dr. Y. R. Sharma Memorial Lecture	ICAR-IISR, Kozhikode 20th June 2022.
Dr. Jeena Mathew, Sr. Scientist	International conference on water and environmental management	CWRDM, Kozhikode 22nd -24th June, 2022

PERSONALIA

PROMOTIONS

Name of the staff	From (Designation)	To (Designation)	w.e.f.
Dr. Mayalekshmi	Sr. Technical Assistant (T-4)	Technical Officer (T-5)	11.05.2022
Shri Pratap Kumar Sarkar	Sr. Technical Assistant (T-4)	Technical Officer (T-5)	19-11-2021
Shri Jagadish Roy	Sr. Technical Assistant (T-4)	Technical Officer (T-5)	29-06-2022
Shri A.K. Ramadas	Sr. Technical Assistant (T-4)	Technical Officer (T-5)	29.06.2021
Shri K.N. Pankajakshan	Sr. Technical Assistant (T-4)	Technical Officer (T-5)	29.06.2021
Shri Gopinath Malakar	Sr. Technical Assistant (T-4)	Technical Officer (T-5)	29.06.2021
Shri V. Chandrashekhara Shetty	Sr. Technical Assistant (T-4)	Technical Officer (T-5)	29.06.2021
Shri Jadadish Roy	Sr. Technical Assistant (T-4)	Technical Officer (T-5)	29.06.2021
Shri Dayanandan Unnithan	Sr. Technical Assistant (T-4)	Technical Officer (T-5)	29.06.2021
Smt K. Narayani	Private Secretary	Principal Private Secretary	03.08.2022
Shri Satheesan A.V.	Technical Assistant	Senior Technical Assistant	21.09.2021
Shri Tharanath B.	Technical Assistant	Senior Technical Assistant	14.09.2021
Shri A.O. Varghese	Senior Technician	Technical Assistant	30.03.2022
Shri A. Divakaran	Senior Technician	Technical Assistant	30.03.2022

TRANSFERS

Name of the staff	From (Place)	To (Place)	w.e.f.
Dr. Jilu V. Sajan Scientist (Agrl. Entomology)	ICAR-CPCRI, Kasaragod	ICAR-CPCRI, RS, Kayamkulam	23.4.2022
Dr. Priya, U.K., Scientist (Soil Science)	ICAR-CPCRI, RS, Vittal	ICAR-CPCRI, RS, Kayamkulam	17.5.2022
Sri. K.N. Sajeev, LDC	ICAR-CPCRI, RS, Kayamkulam	ICAR-CPCRI, RS, Vittal	23.05.2022
Shri K. Ajith Kumar, Technical Officer (Civil Engg.)	ICAR-CPCRI, Kasaragod	ICAR-CPCRI, RS, Vittal	04.06.2022

RETIREMENTS

Name	Designation	Place	Date
Sri. R. Raveendran	Skilled Supporting Staff	ICAR-CPCRI, RS, Kayamkulam	30.06.2022
Smt U. Sarojini	Technician	ICAR-CPCRI, Kasaragod	30.04.2022
Shri M. Shankara	Technician	ICAR-CPCRI, Kasaragod	30.04.2022

Front cover image: COGENT experts stand besides Spikata Dwarf coconut palm at Kidu.

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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: ; Facebook: cpcrikasaragod.kerala; YouTube: ICAR-CPCRI