



ICAR-Indian Institute of Spices Research
Marikunnu (P.O.), Kozhikode, Kerala, India

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Turmeric Fest held at ICAR-IISR

The ICAR-Indian Institute of Spices Research, Kozhikode organized and hosted two day district level seminar sponsored by Mission for Integrated Development of Horticulture (MIDH) through Directorate of Arecanut and Spices Development (DASD), Kozhikode with special focus on Turmeric during 19-20 January, 2018. Shri V S Sunil Kumar, Honourable Agricultural Minister, Government of Kerala inaugurated the Turmeric Fest held at the ICAR-Indian Institute of Spices Research, Kozhikode on 20 January 2018. Inaugurating the event he reflected on the loss of ethnic crops like millets, pulses and spices from Kerala and stressed the need for cooperation between the state and central institutes and other allied departments to regain the lost glory of Kerala as the spice bowl of the world. He also stressed that spices crops are losing their luster in Kerala and reiterated the importance of value addition to enhance the profitability of this sector. Earlier, the institute organized an awareness programme on Provisions of the Protection of Plant Varieties and Farmers Right Act on 19 January 2018 to provide an effective system for protection of plant varieties, the rights of farmers and plant breeders and to encourage the development of new varieties of plants. Besides, technical sessions on turmeric varietal wealth, processing and value addition and organic production of turmeric were also held as a part of the seminar. The minister felicitated Dr B Sasikumar, the man behind several spices varieties and also granted non-exclusive licenses for new technologies of ICAR-IISR to start-ups and entrepreneurs for commercialization.

Inauguration of 'Turmeric fest' by Shri V S Sunil Kumar,
Hon. Agriculture Minister, Govt. of Kerala



A view of the exhibition at ICAR-IISR

A major highlight of the fest was the mega exhibition which allowed the farmers and participants to experience the grandeur of what the world calls the biggest repository of spices germplasm. More than 100 farmers from across the state attended the event. Dr K Nirmal Babu, Director, ICAR-IISR welcomed the gathering, while the presidential address was delivered by Dr BNS Murthy, Horticulture Commissioner, Government of India. Also present were Dr M Anandaraj, Former Director, ICAR-IISR, Dr Homey Cherian, Director, DASD, Kozhikode and Dr A B Remashree, Director (Research), ICRI, Myladumpara.

RESEARCH UPDATE

Spiking intensity in black pepper

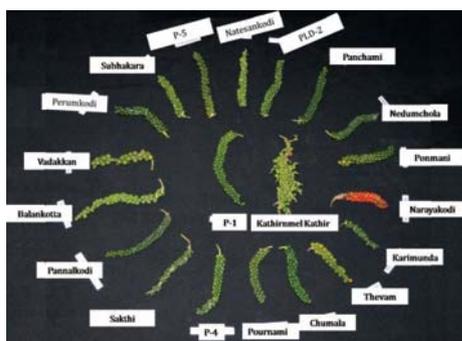
Spiking intensity and berry setting was recorded in 20 plantations in different locations. Spike intensity ranged from 15 to 71.11 per 0.5 square meter canopy area with mean of 31.55/0.5 m². Berry set percentage ranged from 26.14 to 89.1 with a mean of 63.83 %. Low berry set percentage was recorded in low rainfall area and less managed plantations.

Evaluation of antitranspirants for black pepper and cardamom

Antitranspirants such as kaolin 2 %, kaolin 2 % + 0.5 % MOP, spray lime 1.5 %, spray lime 1.5 % + 0.5 % MOP, Miracle 3 ml/l were tested in black pepper and cardamom under field conditions in Shukravarsanthe and Wayanad. Among them, lime (1.5 %) sprayed plants showed higher photosynthetic rate while maintaining lower leaf temperature.

Yield of black pepper in alternate germplasm site at Chettali

During 2017-18 highest fresh and dry weight of berries was recorded in the accession 921 (6.6 kg/vine and 2.13 kg/vine, respectively) followed by the Acc. 898 (5.3 kg/vine and 1.69 kg/vine) at Chettali. In the DUS block consisting of 34 cultivars, highest fresh and dry weight of berries was recorded by Panalkodi (6.7 kg/vine and 2.05 kg/vine, respectively) followed by Panchami (5.88 kg/vine and 1.47 kg/vine, respectively).

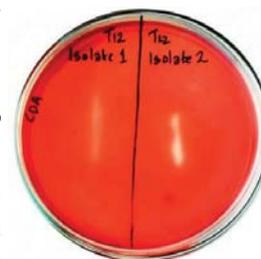


Nutmeg

The pooled analysis of the three year data (2014-2017) of the pruning experiment on nutmeg trees (detopped at 17 ft height) at Appangala revealed that three years after pruning, the tree in which side branches pruned at 2 m length produced more fresh (3136 g) and dry (1286 g) weight of nuts, fresh (536 g) and dry (548.50 g) weight of mace and number of fruits (205.37) over control. Hence, de-topping nutmeg at a height of 17 ft combined with pruning plagiotropic side branches at a width of 2 m from the main stem resulted in increase of 150 % in dry weight of nuts and 80 % in dry weight of mace.

Screening cellulose degrading bacteria for composting of agricultural wastes

Eleven cellulose degrading bacteria were isolated for composting of agricultural wastes and their ability was tested by streaking on the cellulose Congo-Red agar media. Among the isolates CDB2 showed maximum cellulose degrading ability under *in vitro* conditions.



Clearing zone around the colonies confirms the secretion of extracellular cellulase after 48 hrs of incubation.

PERSONALIA

Awards/Honours/Recognitions Alagupalamuthirsolai M

Award of Excellence in Research by Genesis Urban and Rural Development Society during International Conference on Advances in Agriculture and Allied Science Technologies for Sustainable development (ICAAASTSD-2018) held at Osmania University, Hyderabad, India during 10-11 February, 2018.

Best poster award for the paper entitled "Factors determining the midday depression of photosynthesis in small cardamom (*Elettaria cardamomum* Maton) under summer climate" authored by Alagupalamuthirsolai M, Ankegowda S J & Sharon Aravind during International Conference on Advances in Agriculture and Allied Science Technologies for Sustainable Development (ICAAASTSD-2018) held at Osmania University, Hyderabad during 10-11 February, 2018.

Co-Coordinator for the Farmers Training programme (DASD sponsored) on recent advances in production and processing of major spices (Black Pepper, Cardamom, Ginger) at ICAR-IISR RS Appangala on 27 February 2018.

Evaluated M.Sc. thesis (Tamil Nadu Agricultural University, Coimbatore).

Jan - March 2018





Ankegowda S J

Member, Black pepper crop estimation of Research Farm of CCRI, Sub Station, Chettalli, 02 January 2018.

Member, Accreditation of spices nursery in Karnataka by DASD, Kozhikode, 2018.

Ishwara Bhat A

Member (DG's nominee), Assessment Committee under CAS for scientists at ICAR-CTCRI, Thiruvananthapuram for promotion of scientists, 31 January 2018.

Mohammed Faisal Peeran

H S Mehta Best Research paper (Poster) award for the paper entitled "Isolation, characterization and evaluation of fungal endophytes against major diseases of small cardamom" authored by Mohammed Faisal Peeran, Biju C N & Praveena R during Symposium on Spices and Aromatic Crops (SYMSAC IX) held at SASRD, NU, Medziphema, Nagaland during 15-17 March 2018.

Praveena R

Resource person, Scientist Farmers Interface meeting held during SYMSAC-IX on Spices for doubling farmer's income at SASRD, Nagaland University, Medziphema, 16 March 2018.

Resource person, Meeting on Strategies to expand area under turmeric and exploring the possibilities of post harvest addition organized by Alagappanagar Cooperative Consortium at Amballur, Thrissur, 09 January 2018.

Coordinator for Certificate course on Vermicompost producer sponsored by Agriculture Skill Council of India and National Skill Development Corporation, 19 February to 20 March 2018.

Santhosh J. Eapen

Nodal officer, ASRB online examination for recruiting Lower Division Clerks.

Reviewer, Microbial Ecology, World Journal of Microbiology, BMC Plant Biology, Applied Biological Research.

Senthil Kumar C M

Best oral presentation award for the paper entitled, "Multifarious plant growth promotion by an entomopathogenic fungus, *Lecanicillium psalliotae*" authored by Senthil Kumar C M, Jacob T K, Devasahayam S, Stephy Thomas & Geethu C during International conference on biocontrol and sustainable insect pest management, AC & RI, TNAU, Killikulam, 29-31 January 2018.

Thankamani C K

Member, Organizing committee, Silver Jubilee Celebrations, KVK, 12 January 2018.

Member, Organizing committee, Turmeric Fest, ICAR-IISR, Kozhikode, 19-20 February 2018.

Participation in Symposia/Seminars/ Workshops/Conferences/Meetings

All Scientists

Turmeric Fest - District Level Seminar and Field Day, 19-20 January 2018, ICAR-IISR, Kozhikode.

Alagupalamuthirsolai M

International conference on Advances in agriculture and allied science technologies for sustainable development (ICAAASTSD-2018), Osmania University, Hyderabad, 10-11 February 2018.

Ankegowda, S. J., Biju C N, Jayashree E, John Zachariah T, Kandiannan K, Krishnamurthy K S, Leela N K, Mohammed Faisal Peeran, Mohammed Nissar V A, Nirmal Babu K, Prasath D, Praveena R, Santhosh J Eapen, Sharon A, Shivakumar M S, Sivaranjani R, Srinivasan V, Suseela Bhai R & Thankamani C K

National Symposium on Spices and Aromatic Crops (SYMSAC-IX) on Spices for doubling farmer's income at SASRD, Nagaland University, Medziphema, 15-17 March 2018.

Ishwara Bhat A

IMC meeting, ICAR-CPCRI, Kasaragod, 2 March 2018.

XXX Kerala Science Congress on Viruses and infectious diseases, Government Brennen College, Thalassery, 28-30 January 2018.

Recent advances in biotechnology and molecular biology, Kannur University, Kannur, 14-16 March 2018.

John Zachariah T

Two days seminar on Black pepper, Thekkady, 29-30 January 2018. General body meeting of SHM Kerala, Thiruvananthapuram, 14 February 2018.

Kandiannan K

Area scientific conference, UPASI TRF - RC, Meppadi, 6 March 2018. Area scientific conference at TRA - North Bengal Regional R & D Centre, Nagarkata, 19-20 March 2018.

Nirmal Babu K

Inauguration of summer school on BPD, CIPT, Cochin, 05 January 2018.

Visited AICRPS Centre and MSSRF, Ambalavayal, 11 January 2018.

International symposium SAFARI-2, CMFRI, Cochin, 15 January 2018.

Kerala Science Congress, Tellicherry, 29 January 2018.

Visited AICRPS centre, Jobner, 03 February 2018.

International Spice Conference, Jaipur, 04-06 February 2018.

Advisory Committee meeting, KAU, Trichur, 17 February 2018.

PLACROSYM Standing Committee meeting, ICAR-CPCRI, Kasaragod, 21 February 2018.

Directors' Conference, 08-09 March 2018.

Pradeep B

Sensitization workshop on profitable technologies in brackish

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water aquaculture for doubling of farmers income, ICAR-IISR, Kozhikode, 15-16 January 2018.

Awareness programme on River conservation and pollution problems, Kadalundi, 19 March 2018.

Ramakrishnan Nair R

II National conference on Genetics and Cytogenetic, UAS, Dharwad, 01-02 February 2018.

Symposium on Biodiversity of medicinal plants & orchids: Emerging trends and challenges, ANU, Guntur, 09-11 February 2018.

Ratha Krishnan P

International workshop on integrated water resources management, CWRDM, Kozhikode, 27 February 2018.

X National conference of KVKs, ICAR-IARI, New Delhi, 16-17 March 2018.

Annual Action Plan - 2018 meeting of Zone VIII, Gonikoppal, Karnataka, 22-24 March 2018.

Santhosh J. Eapen

Executive Committee meeting, Bioinformatics Centre, 23 January 2018, JN-Tropical Botanical Garden & Research Institute, Thiruvananthapuram

29th Annual Bioinformatics Review cum Coordinators Meeting, 03-04 February 2018, Manonmaniam Sundaranar University, Tirunelveli, Tamil Nadu.

KVK Silver Jubilee Celebrations, 12 February 2018, Krishi Vigyan Kendra, Peruvannamuzhi

Institute Management Committee meeting, 05 March 2018, ICAR-National Bureau of Agricultural Insect Resources, Bengaluru

Senthil Kumar C M

International conference on biocontrol and sustainable insect pest management, AC & RI, TNAU, Killikulam, 29-31 January 2018.

Saji K V & Shivakumar M S

Science academie's lecture workshop on Plant taxonomy, MBG & IPS, Kozhikode, 01-02 March 2018.

Training Attended

Aarthi S, Akshitha H J & Sivaranjani R

Scientific writing and publishing skills for scientists, ICAR-CPCRI, Kasaragod, 07-09 March 2018.

Subramanian R N & Muraleedharan P

Refresher course on Administration and finance management for section officers, AAOs, AFAOs & Assistants', ICAR-NAARM, Hyderabad, 18-23 January 2018.

Prakash T D S

Administration and finance management for Under Secretaries, Sr. Admn Officers, SFAOs, AOs, FAOs, ICAR-NAARM, Hyderabad, 01-07 February 2018.

Ramesh Kumar M P

KOHA for Library staff of ICAR, ICAR-NAARM, Hyderabad, 05-09 February 2018.

Sarathambal C

Microbiological analysis of spices/spice products, Spices Board, Cochin, 29 January to 02 February 2018.

Sivaranjani R

Purification of natural products and their characterization using QTOF-LCMS/MS, CSIR-CDRI, Lucknow, 15 January to 02 February 2018.

RADIO TALK

Ankegowda S J

Live phone in programme on black pepper cultivation, AIR, Madikeri, 08 January 2018.

Spices cultivation during Kissan Day 2018, AIR, Madikeri, 15 February 2018.

Pradeep B

Aquaponics: Feasibility and techniques – Farm and home, AIR, Kozhikode, 11 January 2018.

Thankamani C K

Composting of biodegradable waste-Interview, AIR, Kozhikode, 10 January 2018.

Extension activities

Alagupalamuthirsolai M

Visit to black pepper estate for drought management practice at Sukravarsanthe, Kodagu, 01 January 2018.

Ankegowda S J

Visited Maruthy nursery, Ankihalli, Bikode and black pepper mother block of Panniyur-1 along with Dr. J. Venkatesh, Chairman, Accreditation of spices nursery in Karnataka along with Dr. Thipesh, UAHS, Shimogga and Dr. Femina, Deputy Director, DASD, Kozhikode, 31 January 2018.

Kandiannan K

Visited AICRPS Centre, AAU- Horticultural Research Centre, Kahikuchi, 21-22 March 2018.

NEWS AND EVENTS

DASD sponsored Farmers training programme

ICAR-Indian Institute of Spices Research Regional Station, Appangala organized one day farmers training programme on "Recent advances in production and processing of major spices (Black Pepper, Cardamom & Ginger)" on 27.02.2018 sponsored by Directorate of Arecanut and Spices Development, Kozhikode. The programme was inaugurated by Sh. Bose Mandanna, Former Vice-Chairman, Coffee Board in the presence of other dignitaries Sh. S. B. Jayaraj, Planter, Murugarajendra Estate, Madapura; Sh. Madhu Nair, Research Officer, DASD, Kozhikode and Dr. K. Kandiannan, Principal Scientist, ICAR-IISR, Kozhikode. Dr. S. J. Ankegowda, Head of the Station presided over the programme. During the occasion revised version of black pepper package of practices in Kannada and an e-manual of lecture notes of training programme were released.

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Lectures on varietal wealth, quality planting material production, agronomy and physiological interventions, pest and disease management and post harvest processing of spices were delivered during the programme. Progressive planters from various agro-climatic regions shared their experiences in black pepper cultivation. An exhibition was also arranged for the benefit of farmers; more than 120 farmers from different regions of Karnataka attended the training programme.



Release of publication during the training programme

Trainings conducted at ICAR-IISR

A training programme on implementation of PFMS in Central Sector Schemes was organized for the officials of Kerala Veterinary and Animal Sciences University. Mr. Sayed Mohammed V.V., Assistant handled the training session on 23 January 2018.



Training on PFMS

Ten days in-plant training programme on various aspects of spice and spice processing for students from Kellappaji College of Agricultural Engineering & Technology, Tavanur was conducted during 26 February to 07 March 2018 and 09-17 March 2018 for two batches comprising 14 students.

Bioinformatics training for college teachers

A two-day Workshop on bioinformatics basics was organized by the Bioinformatics Centre for college teachers and PhD scholars during 20-21 March 2018 at St. Joseph College, Devagiri, Kozhikode in collaboration with the Department of Zoology for PG and Doctoral Studies. Around 40 participants from various colleges and institutions participated.

NEWS FROM AICRPS

The Project Coordinator visited ICAR-AICRPS centres SKNAU, Jobner and KAU Thrissur. Scientists from PC Cell visited HRS Pechiparai and AAU, Kahikuchi for monitoring the experiments.

AICRPS centre at SKLTSHU, Kammarpally centre organized a massive Turmeric Festival on 2 February 2018 in which about 250 farmers participated. 50 prominent turmeric varieties were exhibited in the festival.

Farmers rally was conducted by AICRPS centre at Dr. BSKVV, Dapoli in different villages of Maharashtra like Asond, Vanand, Asud, Usgaon, Agarwayangani and Shirawane from 7 to 20 March 2018. Various topics like Spices cultivation and processing, role and importance of soil testing, Demonstration on Bordeaux mixture preparation and grafting technique of black pepper and nutmeg were covered benefitting 308 farmers.



Farmers training at Dapoli



Turmeric festival at SKLTSHU, Kammarpally

Externally aided projects

Title of project	Investigators	Funding agency	Period	Outlay (Rs. Lakhs)
Characterization of endogenous and episomal pararetroviruses in black pepper	A Ishwara Bhat & K S Krishnamurthy	DBT, Govt. of India	27-03-2018 to 26-03-2021	48.964

HINDI NEWS

Hindi Workshop

A Hindi workshop was organized at ICAR-IISR, Kozhikode on 7 February 2018. Smt. Mridula C, Assistant Director (OL), BSNL delivered a lecture on Hindi Noting and Drafting.

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OLIC meeting

The Official Language Implementation Committee meeting was held on 20 February 2018 under the chairmanship of Dr. K. Nirmal Babu, Director.

TOLIC Meetings

Ms. Seema M., Upper Division Clerk attended Hindi Workshop Conducted by Town Official Language Implementation Committee, Kozhikode.

TRANSFER OF TECHNOLOGY

Activities of ITM-BPD Unit

Pochonia technology licensed

The technology of "Talc formulation of *Pochonia chlamydosporia*-the nematode biocontrol agent" was licensed to M/s Codagu Agritech, Mysuru for commercialization. An agreement towards this was signed on 22 January 2018 between ICAR-IISR and representatives of the above firm.



Handing over of license agreement to M/s Codagu Agritech by Shri V S Sunil Kumar, Hon. Agricultural Minister, Government of Kerala

Success story

New technology for managing ginger bacterial wilt

Bacterial wilt caused by *Ralstonia pseudosolanacearum* is widely prevalent in many ginger growing countries. However, controlling bacterial wilt under field conditions, is a difficult task till date. There are several reports on the role of fertilizers in reducing bacterial wilt. Field studies were undertaken to prove the efficacy of calcium chloride (CaCl_2) and an apoplastic bacterium, *Bacillus licheniformis* which were earlier found to suppress *R. pseudosolanacearum* under laboratory conditions. Both these treatments significantly suppressed the soil inoculum of ginger wilt pathogen on combining with pre-sowing soil solarization for 40-50 days. The IDM strategy thus developed was successfully demonstrated in two farmers' plots in Wayanad with the financial support of DASD, Kozhikode. for mitigating bacterial wilt. The package includes solarizing the soil before sowing of ginger for 50 days using polythene sheet of 100-micron thickness, applying 0.3% calcium chloride or *B. licheniformis* at the time of planting and at 30, 45, 60 and 90 days intervals. No wilt or soft rot incidence was noticed in both the plots whereas the control and adjacent plots showed >50% disease incidence. Absolute

disease-free rhizomes were obtained at the time of harvest from both the plots. The average yield in calcium chloride treated plots ranged from 13.90 – 15.19 kg (fresh)/bed while it was 8.26 – 10.37 kg (fresh)/bed in *B. licheniformis* treated plots. The technology is being further demonstrated through KVK and AICRPS centres.



A view of the CaCl_2 treated ginger plot in Wayanad

KRISHI VIGYAN KENDRA

XIX SAC meeting

The Nineteenth Scientific Advisory Committee (SAC) meeting of ICAR-Krishi Vigyan Kendra (ICAR-IISR, Kozhikode), Peruvannamuzhi was held on 23 February 2018 in the Silver Jubilee Hall of ICAR-Indian Institute of Spices Research, Kozhikode under the Chairmanship of Dr. K. Nirmal Babu, Director, ICAR-IISR, Kozhikode. Dr. D.V.S. Reddy, Principal Scientist, Agricultural Technology Application Research Institute, Zone VIII, Bengaluru represented Director, ATARI, Bangalore. Dr. Jiju P. Alex, Director of Extension, KAU, Thrissur and Dr. S. Edison, Former-Director, ICAR-CTCRI, Trivandrum attended the meeting. Besides scientists from ICAR-IISR, District level officials from agriculture departments also attended the meeting

On Farm Testing

During the period nine OFTs with 54 trials were conducted. Of which, performance evaluation of yard long bean varieties lola, vellayani jyothika and githika in Kozhikode district, comparative performance of tissue culture plants and suckers of nendran banana under high density planting, assessment of organic management practices against sigatoka leaf spot in banana, organic methods for pseudo stem weevil management in banana, scientific farming of milkfish (*Chanos chanos*) in brackish water ponds, techniques for the production of dehydrated banana and quality testing of Jack fruit Jam were concluded.

Front Line Demonstration

Thirteen FLDs with 94 demonstrations were conducted by KVK. Some of them include, demonstrations on introduction of a HYV of turmeric viz., IISR Pragati, management of pseudo stem weevil in banana using the entomopathogenic fungus *Beauveria bassiana*, production of healthy ginger seeds, integrated pest and disease management in bitter melon, cage culture of pearlspot fish (*Etroplus suratensis*), hydroponic fodder production for dairy cattle, EDP on homemade ration for dairy cattle etc.



Training Programmes

KVK is imparting regular training programmes of various durations in agriculture and allied fields for farmers, farm women, rural youth and extension functionaries. The Kendra conducted fourteen training programmes in various disciplines, benefitting 528 participants.



Mushroom cultivation training



CIBA Chennai and KVK, IISR collaborative training on Brackish water aquaculture for Subject Matter Specialists of KVKs

KVK Silver Jubilee Celebration

Hon'ble Member of Parliament Shri Mullappally Ramachandran inaugurated the ICAR- KVK Silver Jubilee celebrations on 12 February 2018. The programme was presided by Dr. K. Nirmal Babu, Director, ICAR-IISR, Kozhikode. The event also honoured the previous Directors of IISR and Programme Coordinators of KVK. Dr. K.V. Peter, Dr. P.N. Ravindran, Dr. V.A. Parthasarathy, Dr. S. Devasahayam, Dr. T. John Zachariah, Dr. T. K. Jacob and Dr. T. Arumuganathan were felicitated. The programme was also attended by Shri K. Sunil, Vice president, Chhakkittapara Grama Panchayat, Smt. P. Premaja, Principal Agriculture Officer; Dr. P. Ratha Krishnan, Programme Coordinator and Mr. George Thomas, a progressive farmer from Kurachandu and about five hundred participants including staff of ICAR-IISR and Agriculture Department, farmers, etc.



KVK Silver Jubilee inauguration

Technology Week 2017-18

KVK observed Technology Week from 12-17 February 2018 for farmers, students and visitors. DASD sponsored seminar on cultivation and value addition of turmeric, workshop on ginger cultivation, seminars on scientific and traditional dairy management, poultry rearing, trainings on aquaponics, pest and disease management in vegetables, spices, plant propagation, mushroom cultivation and processing was also conducted during the week. A total of about 1500 farmers and 600 students visited and participated in the events.



Technology week – 2018 inauguration

Live telecast of PM address during Krishi Unnati Mela- 2018

Live telecast of Hon'ble Prime Minister Shri Narendra Modi address during Krishi Unnati Mela, IARI, New Delhi was held at KVK, Peruvannamuzhi on 17 March 2018. The programme was inaugurated by Shri K. Sunil, Vice president, Chhakkittapara Grama Panchayat and attended by about 320 participants including farmers, extension functionaries, Scientists etc.



Inauguration of Krishi Unnati Mela

PUBLICATIONS

Research papers

Aarthi S, Suresh J & Prasath D 2018 Variability and association analysis of curcumin content with yield components in turmeric (*Curcuma longa L.*). Electronic Journal of Plant Breeding 9: 295-303.

Agisha VN, Eapen SJ, Suseelabhai R and Kumar A 2017. Detecting and monitoring endophytic colonization by *Pseudomonas putida* BP25 in black pepper (*Piper nigrum L.*) using quantitative real-time PCR. Journal of Spices and Aromatic Crops 26(1): 1-7.

Alagupalamuthirsolai M, Ankegowda S J, Mohammed Faisal Peeran, Akshitha H J, Balaji Rajkumar & Narendra Chaudhary 2018 Effect of natural growth enhancer on growth, physiological and biochemical attributes in black pepper (*Piper nigrum L.*). International Journal of Current Microbiology and Applied Science 6: 2857-2866.

Alagupalamuthirsolai M, Ankegowda S J & Sharon Aravind 2018 Factors determining the midday depression of photosynthesis

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in small cardamom (*Elettaria cardamomum* Maton) under summer climate. *Multilogic in Science* 7: 525-528.

Bhat A I, Pamitha N S, Gopika A & Biju C N 2018 Complete genome sequencing of *Banana bract mosaic virus* isolate infecting cardamom revealed its closeness to banana infecting isolate from India. *Virus Disease* 29: 212-215.

Blessy M. Baby, Eapen, S.J., Agath Martin and Rosana, O.B. 2017. Radobase – A database on burrowing nematodes infesting tropical and sub-tropical crops. *Indian Journal of Nematology* 47: 197-200.

Biju C N, Mohammed Faisal Peeran & Rajan Gowri 2018 Identification and characterization of *Neopestalotiopsis clavispora* associated with leaf blight of small cardamom (*Elettaria cardamomum* Maton). *Journal of Phytopathology* 166: 532-546.

Dinesh R, Srinivasan V, Hamza S, Sarathambal C, Ankegowda S J, Ganeshamurthy A N, Gupta S B, Aparna Nair V, Subila K P, Lijina A & Divya V C 2018 Isolation and characterization of potential Zn solubilizing bacteria from soil and its effects on soil Zn release rates, soil available Zn and plant Zn content. *Geoderma* 321: 173-186.

Faisal M P, Biju C N, Praveena R, Gowri R & Ankegowda S J 2018 Isolation, characterization and antagonistic efficacy of fungal endosymbionts from allied genera of cardamom. *Journal of Plantation Crops* 46: 1-7.

Mohammed Faisal Peeran, Lakshman Prasad & Deeba Kamil 2018 Characterization of secondary metabolites from *Rhizopus oryzae* and its effect on plant pathogens. *International Journal of Current Microbiology and Applied Science* 7: 705-710.

Peeran M F, Kamil D & Prasad L 2018 Extracellular mycosynthesis of silver nanoparticles from *Trichoderma virens* and *Metarhizium anisopliae*. *Journal of Mycology and Plant Pathology* 47: 424-429.

Prasath D, Santhosh J Eapen, Sasikumar B, Akshitha H J, Leela N K, Chitra R, Mahender B, Chandrasekhara Rao C, Swargaonkar S L & Nirmal Babu K 2017 A new short duration turmeric variety, IISR Pragati – a boon to Indian farmers. *International Journal of Innovative Horticulture* 6(1): 89-92.

Thankamani C K, Muthamil Selvan M, Annamalai S J K & Jayashree E 2017 Influence of machine generated potting mixture in the growth of black pepper (*Piper nigrum* L.) cuttings and nutmeg (*Myristica fragrans* Hoult.) seedlings in nursery. *Journal of Plantation Crops* 45: 206-209..

Book chapters

Eapen S J and Pandey R 2018. Nematode parasites of spices and medicinal plants. In: Sikora R A, Coyne D L, Hallmann J & Timper P (Eds.), *Plant Parasitic Nematodes in Subtropical and Tropical Agriculture*, 3rd Edition. CAB International, Oxfordshire, UK, pp. 755-794.

Jayashree E 2018 Spice processing and value addition – Opportunities for start-up entrepreneurs. In: Sudheer K P & Indra V (Eds.), *Entrepreneurship and Skill Development in Horticultural Processing*, New India Publishing Agency, New Delhi, pp.215-235.

Technical bulletin/ Popular articles/ E-manual/ Training manual/ Folders

During this period, 5 technical bulletins, 18 popular articles, one e-manual and a training manual and two folders were published.

Ph.D. Awarded

Student	Topic	University	Guide
Ms. Parvathy Viswanath. A	Detection of plantbased adulterants in selected market samples of spices using DNA barcoding	University of Calicut	Dr. B. Sasikumar

Retirement

Name	Post	Date
Dr. B. Sasikumar 	Head, Division of Crop Improvement & Biotechnology	31.01.2018



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

SPICES NEWS

A newsletter of ICAR-Indian Institute of Spices Research
An Institution of Indian Council of Agricultural Research (ICAR),
Marikunnu P.O., Kozhikode-673 012, Kerala, India.
Phone : 0495-2731410, Fax: 0495-2731187

Publisher
Director
ICAR-IISR
Kozhikode

Editors
Senthil Kumar C M
Biju C N, Akshitha H J
Ramesh Kumar M P

Cover Design and Layout
Arun Kumar,
PrintExpress

Photo Credit
Sudhakaran A
Type Setting
Deepthi P