

From the Director's Desk



It has been nearly five years since I took over as Director of this prestigious national Institute under ICAR and it is with great sense of satisfaction that I am laying down my office. During this momentous occasion, I wish to express my sincere gratitude to the ICAR for giving me the opportunity to serve in this position and would also like to thank one and all at ICAR-IISR for the cooperation, outstanding support and

constructive criticisms. Thanks for lending your ear when I had issues to navigate and it is due to our collective efforts and insights that I was able to take important decisions.

I remember the words “let us make our technologies visible”, the visibility of the Institute and its technologies have increased several folds. Thanks to the farmers and entrepreneurs who have taken the technologies and benefitted. There were times when I have pushed you away from your comfort zone, but such actions were not based on self-interest but based on the larger interests of the institute in mind. It is because of such unbiased actions that I was able to push the boundaries to new levels. Each one of you will remain the heart, soul and future of the institute and your collective experience, knowledge, commitment and expertise are bound to make ICAR-IISR an incredibly strong organization with formidable achievements.

I once again reiterate that I feel honoured to have served as Director of this wonderful Institute, which has given me so much and for that reason I will be always grateful. It has been a great privilege working with you and the experience has allowed me to grow as an individual. ‘Inherit, Enhance, Entrust’ - These have been my watchwords and while I have enhanced the capacities of this institute beyond what I inherited, I sincerely



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hope that the reins will be taken over by a capable and dynamic leader who will bring his vast experience and expertise to the fore, thereby helping the institute achieve more robust growth and success.

I just want you all to know this isn't a final goodbye, and I sincerely believe that we will keep meeting in future occasions when we can share our hopes and dreams for the future.

Thank you all once again!



M Anandaraj

Research update

Whole genome sequencing of Cucumber mosaic virus infecting black pepper

The complete genome of *Cucumber mosaic virus* (CMV) infecting black pepper was sequenced and compared with 27 CMV isolates reported worldwide from subgroups I and II. The total genome length was 8615 bp long. Percent identity and phylogenetic analysis indicated that the current isolate belongs to subgroup IB. Sequence analysis showed the presence of a rare deletion of nine nucleotides in the putative methyltransferase domain of 1a gene. The level of gene conservation among the subgroups was highest in coat protein and lowest in 2b. The values of nucleotide diversity studies were further consistent with the above data. The ratio of non-synonymous to the synonymous substitution of these genes is in the order 2a>2b>3a>3b>1a and this ratio is nearly equal to one in the case of 2a and less than one for other genes, hence 2a is undergoing neutral selection while the others are subjected to negative selection. These clearly reflect that RNA2 is highly tolerant to amino acid changes followed by RNA3 and RNA1.

Actinomycetes consortia for disease free planting material production

Experiments on disease free planting material production using biocontrol agents such as *Trichoderma harzianum* with *Pochonia chlamydosporia*, consortia of actinomycetes and chemicals showed that actinomycetes consortia is as effective as *T. harzianum* with *P. chlamydosporia* combination when compared to chemical treatments in obtaining healthy disease free rooted cuttings of black pepper by serpentine method.

Cardamom breeding

In Preliminary evaluation trial (PET III), 23 inter-varietal F1 hybrids were evaluated for morphological and yield characters. The hybrid Mudigere 2 x IISR Avinash recorded highest plant height (89.20 cm) with more number of leaves (48.80) whereas the hybrid Mudigere 2 x Appangala 1 registered more number of capsules with highest fresh weight of the capsules. The intensity of leaf blight and rhizome rot diseases ranged between 3.33-43.33% and 0-8.88%, respectively in these hybrids.

Organic farming in cardamom

Organic composts such as vermicompost (VC), FYM and neem cake (NC) combinations were evaluated at ICAR-IISR, Regional Station, Appangala for their efficacy. Among

the treatments, FYM alone recorded maximum number of shoots bearing panicles which was statistically at par with combination of NC+VC, while minimum was recorded with combination of FYM+NC+VC.

Evaluation of inter-varietal hybrids of turmeric

Evaluation based on pot culture indicated that three inter-varietal hybrids of turmeric derived from the cross between SLP 389/1 x Suranjana have higher multiplication rate as well as high dry recovery. Multiplication rate in Hybrid-1, Hybrid-2 and Hybrid-3 were 22.34, 21.10 and 19.47 times respectively. Dry recovery in Hybrid-1, Hybrid-2 and Hybrid-3 were 23.63, 22.85 and 26.5% respectively. The data needs further validation with field trials.

Pre-planting diagnostic tool for on-farm testing for bacterial wilt

Real Time LAMP for detection of *Ralstonia solanacearum* race 4 biovar 3 strain was validated with farmer samples of ginger soil and rhizome and is confirmed as an effective pre-planting diagnostic tool for on-farm testing for bacterial wilt pathogen of ginger.

Adulteration detection in traded nutmeg mace using DNA barcoding

Nutmeg (*Myristica fragrans* H.) mace, an economically important traded spice is being adulterated with mace of *M. malabarica*, a closely related species. Identification of the genuine mace from its adulterant is difficult owing to the loss of diagnostic morphological characters on drying and storage.



M. fragrans mace



M. malabarica mace

Four DNA barcoding loci viz., rbcL, matK, psbA-trnH and ITS were compared to analyze *M. malabarica* adulteration in traded *M. fragrans* mace samples. Amplification and sequencing success, high interspecific than intra specific variation as well as high degree of polymorphism established the potential of psbA-trnH as the best barcode over other loci in authentication of *M. fragrans* mace. Sixty polymorphic sites and the 9 indel regions in





psbA-trnH locus specific to *M. malabarica* were found in three out of the five market samples studied thereby confirming the adulteration of traded *M. fragrans* mace with *M. malabarica*.

Personalia

Awards / Honours / Recognitions

Deputation abroad

Dr M. Andandaraj, Director was deputed to attend the V meeting of International Pepper Community committee on R & D held at Balikpapan, Indonesia, during 14-16 March 2016. He also made a presentation on column method of propagation and soil less culture to prevent soil borne pathogens being introduced to field inadvertently through soil.

PPV & FRA awards Certificate of Appreciation to Dr M. Anandaraj

Protection of Plant Varieties & Farmers' Right Authority issued Certificate of Appreciation to Dr M. Anandaraj for his valuable contributions to Agricultural Research, especially for his services in formulating DUS testing guidelines and also developing first farmers' variety in spices which will contribute to meeting the growing demand for spices.

Dr T. John Zachariah assumes charge as Acting Director of ICAR-IISR

Up on retirement of Dr. M. Anandaraj, Director, ICAR-IISR, Kozhikode from Council's service with effect from 31-03-2016 (AN), the Competent Authority in the Council has decided that Dr. T. John Zachariah, Head, Division of Crop Production & PHT shall hold the charge of Acting Director, ICAR-IISR, Kozhikode.

Dr Rashid Pervez wins Dr M.R. Siddiqi Medal

Dr Rashid Pervez, Senior Scientist (Nematology) bagged Dr. M. R. Siddiqi Medal for contribution in Nematology in 18th Indian Agricultural Scientists and Farmers' Congress on 'Prospects of Skill Development in Agriculture and Rural Development - A step towards make in India' held at Allahabad during 20-21 February 2016.

Ms V.P. Swetha bags Dr. Alwar Memorial Award

Ms. V.P. Swetha, Ph.D. student won Dr. Alwar Memorial Award of SARANI Recreation Club of ICAR-IISR for the best Senior Research Fellow for the year 2015.

IARI Innovative Farmer Award

Mr. Mathew Sebastian, the farmer partner of ICAR-IISR, Kozhikode in evolving the nutmeg variety IISR-Keralasree, nominated by ICAR-KVK, Peruvannamuzhi, bagged

the IARI Innovative Farmer Award in the recently concluded Krishi Unnati at New Delhi.



Mr. Mathew Sebastian receiving the Award from the Union Minister of Agriculture and Farmer's Welfare, Sri. Radha Mohan Singh

Ishwara Bhat A

Member, Team to prepare action plan for producing TC plantlets of black pepper, 11 January 2016.

External Examiner for evaluation of M.Sc. (Integrated) Biotechnology thesis of Kerala Agricultural University.

Member, PhD pre-thesis submission presentation at the Department of Biotechnology and Microbiology, Kannur University.

Kandiannan K

Nominated to serve as a Nodal Officer for conducting ICAR All India Entrance Examination for Agriculture 2016-17 at Kozhikode Centre.

Co-Chairman, Technical session on Agriculture and food sciences during XXVIII Kerala Science Congress held at University of Calicut, Malappuram, 29 February 2016.

Member, Committee constituted by DASD, Kozhikode for Accreditation of spices nurseries in Kerala, 29 February to 3 March 2016.

Rashid Pervez

External Examiner for the thesis of Mahloro Serepa entitled 'Is *Serratia marcescens* strain MCB an entomopathogenic bacterium?: a focus on genomics' for the degree of Doctor of Philosophy, Faculty of Science, University of the Witwatersrand, Johannesburg, South Africa.

Ratha Krishnan P

External examiner for "Wood Anatomy" course for B.Sc (Horticulture) and "Introductory Agroforestry" course of B.Sc (Forestry) students of College of Agriculture, Jala-war, Rajasthan on 04-01-2016.

Senthil Kumar C M

External examiner for qualifying viva-voce for M.Sc (Agric. Entomology) students, KAU, Padannakkad on 5 February 2016.



News and events

ICAR-IISR bids adieu to Dr M. Anandaraj

Dr. Muthuswamy Anandaraj who was holding the Directorship of ICAR-Indian Institute of Spices Research, Kozhikode for the last five years has laid down his office on superannuation on 31-03-2016. He joined ICAR service at CPCRI Regional Station, Vittal, Karnataka during 1978. Since 1982 he was with IISR and occupied several coveted posts at ICAR-IISR like Head, Division of Crop Protection (2005-06), Project Coordinator, AICRP on Spices (2006-11) and Director (2011-16). He was also holding the additional responsibility of Director, ICAR-IIHR, Bengaluru for a brief spell during 2015-16. He is well known for his research on epidemiology of *Phytophthora* diseases, their management using biocontrol agents like *Trichoderma* and *Pseudomonas fluorescens*. He was the national coordinator for PhytoFuRa, a country wide network research project on *Phytophthora*, *Fusarium* and *Ralstonia*. He was known for his decisive leadership, progressive governance and deep commitment. He has also served as the president of several professional societies like Indian Society for Spices, Indian Society for Plantation Crops, Indian Phytopathological Society and was a member of the Executive Council of Kerala Agricultural University, Spices Board and is the current Chairman of the R&D Committee of International Pepper Community, Jakarta. Staff at ICAR-IISR salutes him for the devoted service and undying commitment at ICAR-IISR over three decades, as a down to earth Plant Pathologist, an inspiring Head of Division, an untiring Project Coordinator and an outstanding Director. IISR family wishes him a happy, prosperous and peaceful retired life.



Dr M. Anandaraj (second from right) and Mrs Sunanda Anandaraj receiving Sarani memento from Dr S.K. Chakrabarthi, Director, ICAR-CPRI, Shimla

Judge for the technical session on Agriculture & Food Sciences, 28th Kerala Science Congress held at Calicut University during 28-30 January 2016.

Training attended

Jayarajan K

IV National knowledge network annual workshop, JNTU, Hyderabad, 21-22 January 2016.

Jayashree E and Sheeja T E

Training programme on Managing technology value chains, ASCI, Hyderabad, 22-26 February 2016.

Kandiannan K

Training on Role of scientists in natural resources and environment management, IIFM, Bhopal, 8-12 February 2016.

Mariya Dainy M S

Training on Profitable production processing and marketing mechanisms in coconut” held at CPCRI, Kasargod during 5- 6 February 2016.

Senthil Kumar C M

Orientation workshop and training program for ABI units, 21-22 March, 2016, NAARM, Hyderabad.

Sivaranjani R

Training at ICAR-DMAPR, Anand, Gujarat on Phytochemical analysis of biologically active compounds from leaves and bark of *Saraca asoca* during 16 November 2015 to 31 January 2016.

Training at ICAR-NRCG, Pune, Maharashtra on Multiresidue analysis of black pepper, cardamom and cinnamon using GC-MS/MS and LC-MS/MS during 01-15 February 2016.

Professional attachment training

Dr. Priyank Hanuman Mhatre, Scientist, ICAR-CPRI, Shimla was trained for three months (16 November 2015 to 16 February 2016) under Dr Santhosh J Eapen, Head, Crop Protection as part of the professional attachment training. During the period he worked on endophytic bacteria associated with *Piper colubrinum*, *Pasteuria* from spice soils, and histopathology of black pepper and *P. colubrinum* infected with nematodes.

Radio talk

K M Prakash

Plant protection of organic vegetable garden, 09 February 2016





Third meeting of the VII Research Advisory Committee held

The third meeting of the VII RAC was held from 04-05 March 2016 at ICAR-IISR, Kozhikode under the Chairmanship of Prof. K V Peter, (Director, World Noni Research Foundation, Chennai and Former Vice Chancellor, Kerala Agricultural University). The RAC members consisted of Dr M R Sudharshan, Former Director (Research), Spices Board, Kochi; Dr M N Venugopal, Former Head, IISR Regional Station, Appangala; Dr K. K. Sharma, National Coordinator, AINP on Pesticide Residues, IARI, New Delhi; Dr R Visvanathan, Professor (Agricultural Processing), Anbil Dharmalingam Agricultural College and Research Institute, Thiruchirappalli; Shri. Philip Kuruvilla, Chairman, World Spices Organization, Kochi, Dr M Anandaraj, Director, ICAR-IISR and Dr R Dinesh, Principal Scientist, ICAR- IISR as the Member Secretary. During the meeting, the salient findings of 10 Megaprojects comprising of 41 subprojects were reviewed by the RAC. Subsequently, eight major recommendations were made, which has been submitted to the DDG (Hort. Science) for approval.



RAC team interacting with the scientists

Mera gaon mera gourav field visits conducted

Bench mark survey covering about 3000 farm households in 10 wards in Kattippara Grama Panchayath was completed in collaboration with MSW students of LISA College, Thamarassery. Three diagnostic field visits were carried out by a team of scientists on 11 January, 8 February and 22 March 2016 to provide advisory services to farmers.

Prof. R. R. Hanchinal visits IISR RS Appangala

The Chairman of PPV & FRA, Prof. R. Hanchinal visited ICAR-IISR RS Appangala on 25 March 2016. He interacted with the scientists of the station and visited the DUS block of cardamom and black pepper in the field.



Prof. R.R. Hanchinal visiting DUS block with Dr M. Anandaraj and other scientists of Appangala

National Science Day observed

The National Science Day was observed at the Institute on 26 February 2016 in Silver Jubilee Hall at 10.30 am. All staff members attended the meeting. Dr. K. Sujathan, Associate Professor, Regional Cancer Centre, Thiruvananthapuram delivered a lecture on “Recent Developments on Control and Prevention of Cervical cancer and Breast cancer”. The meeting was presided over by Dr. T J. Zachariah, Director (Acting) and Dr. N.K.Leela, Principal scientist proposed vote of thanks.



A snap shot of National Science Day observation

International Womens Day celebrated

International Womens Day was celebrated at the institute on 8 March 2016. Dr. Priya Nair Rajeev, Associate Professor, IIM Kozhikode was the Chief Guest for the function and she delivered a special lecture during the meeting. Dr. J. Rema, Vice Chairperson, Committee for Gender Based Issue welcomed the gathering. Dr. M. Anandaraj, Director, ICAR-IISR delivered the presidential address and Ms. P. V. Sali, Secretary, Committee for Gender Based Issue proposed vote of thanks.





A scene from International Womens Day celebration

News from Bioinformatics Centre

A training programme on 'Bioinformatics for whole genome sequencing' was organized from 27-30 January 2016. There were 15 participants from various ICAR/CSIR institutions and universities. Faculty included experts from M/s. Bionivid, Bengaluru and ICAR-IISR. The training program was inaugurated by Dr. T. Janakiram, ADG (Hort. Science), ICAR, New Delhi and the keynote address was delivered by Dr. K.A. Abdul Nazeer, Head, Department of Computer Science & Engineering, NIT, Kozhikode.



ADG (Hort. Science) Dr T. Janakiram delivering the inaugural address

Hindi News

Hindi Workshop

A Hindi workshop was organized at ICAR-IISR, Kozhikode, to popularize official language on 10th March 2016. Mr. K. Ravi, Manager (OL), State Bank of Travancore and secretary, TOLIC, Kozhikode delivered a lecture on Hindi Noting and Drafting.

Publication

During this quarter Hindi Cell has published Adrak, Haldi and Masala Samachar issue 26 (4) (October - December 2015).

News from SARANI

Sarani members contributed an amount of Rs. 25000/- to Shri Kunhayyappan, Ex-supporting staff of IISR who is seriously ill. Farewell functions were arranged to Dr Utpala Parthasarathy and Dr M. Anandaraj who were superannuated from service on 29.2.16 and 31.3.16 respectively. General Body meeting of the Sarani was held on 10.3.16 to elect new office bearers. Dr. Santhosh J. Eapen was elected as the new Vice-President and Smt. P.V. Sali was elected as the new Secretary.



Farewell to Dr Utpala Parthasarathy

Transfer of Technology

Technology inputs and Advisory services from ATIC

Agricultural technology information centre provided visitor advisory services to 562 stakeholders during January- March 2016. The educational exposure visit on agricultural research activities were extended to 158 students from different schools and colleges. The total revenue generated from the sale of technology and information products was Rs. 4,23,595 during the period.

Training on advanced technology for black pepper production

A special one day training programme was conducted for members of agro-service centre, Kaniambetta, Wayanad in collaboration with Farmers Training Centre, Vengeri on 27th February 2016. The training was provided for 13 members of the agro-service centre to enhance their skills in black pepper production management and crop protection.

Training programme on current trends in black pepper production technology

ICAR-IISR organized a customized training programme for 22 field level supervisory personnel from AVT Plantations





Pvt. Ltd. during 16-17 March 2016. The training included various sessions on plant establishment, nursery management, crop varietal selection, agronomic management, disease identification, integrated pest and disease management strategies etc. The latest technologies for enhancing black pepper production and economic evaluation of technology feasibility were also taught to the trainees.



Dr B. Sasikumar, HD, Crop improvement distributing certificates to the participants

Functional Skill Development programme for Skilled Supporting Staff

A functional skill development training programme was organized for the skilled supporting staff of ICAR-IISR. The programme was held at IISR Regional Station Appangala on 14th March and at ICAR-IISR Headquarters on 18th March. The programme was aimed at enhancing the technical capabilities and efficiency of the skilled supporting staff in their diverse roles and responsibilities within the organization.



Director Dr M. Anandaraj distributing the certificates to trainees

Interactive meeting on spices: Farmers rights and varietal protection

An interactive meeting focusing on farmer's rights and varietal protection with special focus on spice crops was held at ICAR-IISR on 26th March 2016. More than 80 farmers from Kozhikode and nearby districts attended the meeting. Prof. R.R. Hanchinal, Chairperson of PPV

& FRA, Govt. of India, inaugurated the meeting. The meeting provided an opportunity for the farmers to discuss the current status of farmer's varieties in various spice crops and express their concerns regarding varietal diversity, its conservation and efforts for protection of plant varietal wealth in spice crops.



Prof. R.R. Hanchinal (right) planting IISR Keralasree nutmeg graft at IISR, Chelavoor

Participation in Exhibitions

IISR participated in Organic Agri Summit

ICAR-IISR participated in the mega exhibition held in connection with the First national ATMA-SAMETI Organic Agriculture Summit at Adlux International Convention Centre, Angamaly during 7-8 January 2016. The IISR stall attracted huge interest among the delegates from various states and the general public.



Minister of Agriculture, Govt. of Kerala, at ICAR-IISR pavilion during Organic Agri Summit

National Exhibition on Science and Technology

ICAR-IISR stall was one of the major attractant in the National Exhibition on Science and technology organized in connection with Kerala Science Congress during 27-31 January 2016 at Calicut University. The stall won accolades from several visitors including dignitaries and general public.



Extension activities

Ankegowda S J & Kandiannan K

Visited Mr. Sudhakar Esturi's field to study on feasibility of black pepper cultivation at Doddakittadha Halli, Maddahakere Post, Hosdurga, Taluk, Chitradurga district, Karnataka, 15 March 2016.

Visited Merryland Estate, Kunnalady, The Nilgiris district in Tamil Nadu to assess the pepper and cardamom health and suggestions for yield improvement, 16 March 2016.

Biju C N

As a member of Joint Inspection team for ensuring the quality of planting material of black pepper under the programme on PPM of black pepper, Department of Agriculture, Kerala visited black pepper plantations of Kozhikode during 7-8 January 2016.

As a member of Multi-disciplinary diagnostic team, visited four black pepper plantations of Chakkupallam and Kanchiyar panchayaths of Kattappana block, Idukki with officials of Department of Agriculture, Kerala to diagnose field problems on 16 February 2016.

As a member of Multi-disciplinary diagnostic team, visited three black pepper plantations of Senapathy and Konnathady panchayaths of Idukki with officials of Department of Agriculture, Kerala to diagnose field problems on 15 March 2016.

Santhosh J Eapen

Visited farmers plots at Aadichira, Cheeyambam, Wayanad district, 9 January 2016.

Suseela Bhai R

Conducted farmers awareness training programmes at Pulpally, Wayanad on 08 January 2016, at Thamarassery on 17 February 2016 and at Rajakkad, Idukki on 16 March 2016.

Innovation in ginger cultivation-Success story

Mrs. Omana Kaithakkulath, popularly known as 'Ginger Woman' in Chempanoda village of Perambra block, Kozhikode district, Kerala has a special interest for ginger cultivation. Four years ago, she stepped in to the field with the technical support provided by ICAR-Krishi Vigyan Kendra, Peruvannamuzhi in Kozhikode district. She grows ginger in gunny bags by using the methods of organic agriculture. She keeps gunny bags on a patch

of land, spreading over 2.5 cents, which would have been otherwise a waste land. According to Mrs. Omana, pro-tray (filled with coir-pith, dry cow dung and *Trichoderma*) raised seedlings by using cut rhizomes of 5 gram weight with one sprout is a good seed material to start with. Plentiful availability of sunlight, irrigation water and timely application of manures are the prime reasons for the better growth of ginger. She could harvest 108 kg fresh ginger (IISR Varada) from 4 kg planting material during this season. To her, field level training, periodic visits, quality planting materials and marketing support of scientists from KVK helps in successful harvest of ginger. Now, she has become a trainer also at KVK for fellow farmers. She also cultivates black pepper, various intercrops, fruit trees *etc.* Mrs. Omana is maintaining and culturing ornamental fishes, earthworms and series of birds as per guidance and suggestion of KVK, Kozhikode. She has developed, "nutmeg rind candy", "Garcinia rind paste" and "dry ginger", innovative and successful value added spice products.

Success story of Mrs. Omana Deavasia (Omana Kaithakulath) appeared in ICAR home page (www.icar.org.in).



Mrs Omana Deavasia with her ginger plants

Activities of ITM-BPD Unit

Commercialization of technology

ICAR-IISR has entered into a Memorandum of Understanding (MoU) with Codagu Agritech, Kushalnagar, Karnataka on 25th January 2016 for commercialization of Biocapsule, Microbial consortium in black pepper and *Trichoderma harzianum* technologies. One of the elite ginger varieties "IISR Mahima" was licensed to Mr. S. Shashikant Patil, Medak district of Telangana. ICAR-IISR has also issued three licenses to Mr. Jigar Dipakbhai Patel, Ahmedabad, Gujarat for the com-





mercialization of turmeric varieties, IISR Prathibha & IISR Alleppey Supreme and ginger variety, IISR Rejatha.



Signing of MoU for Biocapsule technology with Codagu Agritech Pvt. Ltd.

Market launch of spices products by M/s Abiruchi Food Products

M/s Abiruchi Food Products, a unit of Kudumbasree, Kozhikode and an incubatee of ICAR-IISR, launched six different spice products, processed and manufactured at the Spice Processing Facility of ICAR- IISR, Peruvannamuzhi during the launch ceremony held at Chakkittappara Grama Panchayath Hall on 16 February 2016. The products were launched by Dr. M Anandaraj, Director, ICAR-IISR in the presence of Smt. A.C. Sathi, President, Perambra Block Panchayath, Mr. Muhammed Basheer, DMC, Kozhikode, Mr. Sayed Akbar Badhushah Khan, ADMC, Kozhikode and others. About 200 representatives from Kudumbasree and officials from ICAR-IISR participated in the programme.



Dr M. Anandaraj, Director, ICAR-IISR launching M/s Abhiruchi Spice Products

South Horticulture ZTMC Annual Review Meeting

ICAR-IISR participated and exhibited the technologies in the South Horticulture ZTMC “Annual Review Meeting” held on 8th February 2016 at Bengaluru, organized by ICAR-Indian Institute of Horticultural Research, Bengaluru.

Establishment of Agri-Business Incubation (ABI) Centre

ICAR, New Delhi has sanctioned a new project for establishment of “Agri-Business Incubation (ABI) Center” under XII Plan Scheme for National Agriculture Innovation Fund (NAIF) at ICAR-IISR, Kozhikode. Under this new project, a total of 79.15 lakh has been sanctioned. ICAR-IISR is planning to establish a food processing facility especially to encourage entrepreneurship development among rural women and youth under this project.

Krishi Vigyan Kendra

On Farm Testing

During the period seven OFTs were conducted by KVK. OFT on performance evaluation of IISR nutrient mix on yield of black pepper showed an average pepper yield of 620 kg/ha with B:C ratio of 2.48 which is significantly higher than farmers practice followed by recommended cultural practices of pepper.

Front Line Demonstration

Nine FLDs were conducted during the period. The three FLDs on ginger viz., demonstration of pro-tray technique of ginger, demonstration of use of PGRR encapsulated bio-capsules for management of soft rot of ginger and demonstration of IISR Power mix for higher yield and quality in ginger has been successfully demonstrated in 30 farmers fields.

Training programmes

A total of 21 training programmes were organized for farmers, rural youth and extension functionaries. About 750 persons were trained by these programmes. Among them training on “Rural Women Entrepreneurship Development Programme” was organized under the sponsorship of Canara Bank and ten days residential training on “Planting material production” was sponsored by Balussery block Panchayath and three trainings on spices production technology were sponsored by Mission on Integrated Development of Horticulture (MIDH).





Participants of MIDH sponsored training programme on spices production technology

Scientific Advisory Committee meeting

The seventeenth Scientific Advisory Committee (SAC) meeting of ICAR-Krishi Vigyan Kendra (ICAR-IISR, Kozhikode), Peruvannamuzhi was held on 6.2.2016 in the Silver Jubilee Hall of ICAR-IISR, Kozhikode under the Chairmanship of Dr. T. John Zachariah, Director (Acting) & Head, Division of Crop Production & Post Harvest Technology, ICAR-Indian Institute of Spices Research, Kozhikode. Dr. C.V. Sairam, Principal Scientist & Nodal Officer of Kerala KVKs, Agricultural Technology Application Research Institute, Zone VIII, Bengaluru participated in the meeting. The programme Coordinator and Subject Matter Specialists presented reports on achievements for the period 2015-16 and targets for 2016-17. About 35 members participated in the meeting.



SAC meeting in progress

Technology week

Technology week “Paatavum Paadavum” was organized at KVK Peruvannamuzhi in collaboration with Agriculture Technology Management Agency (ATMA), Kozhikode from 29 February to 2 March 2016. The programme was inaugurated by K. Sunil Kumar, Vice President of Chakkittapara Panchayath. The programmes covered seminars on various aspects of agriculture and allied sectors and a specific seminar on spices handled by

the scientists from ICAR- IISR, College of Agriculture, Mannuthi, ICAR –Krishi Vigyan Kendra, Peruvannamuzhi and Wayanad. A farmer - scientist interface was also organised. KVK and other 16 research institutions/development organizations put up their stalls in exhibition at KVK premises showcasing the recent innovative technologies in agriculture and allied fields. The technology week was attended by about 500 farmers.



Prof. K.V. Peter distributing certificates during valedictory function of Technology Week

Publications

Research papers

Nair R R 2016 Variation in pollen fertility and chromosome number among germplasm collections of ginger (*Zingiber officinale* Rosc.). *Caryologia* 69: 73-81.

Neelam S, Kumar A, Vibhuti M, Agisha V N & Eapen S J 2016 *Pseudomonas putida* BP25 alters root phenotype and triggers salicylic acid signaling as a feedback loop in regulating endophytic colonization in *Arabidopsis thaliana*. *Physiological and Molecular Plant Pathology* 93: 99-111. doi:10.1016/j.pmpp.2016.01.008

Pradeep B, Manoj P S and Lijo Thomas 2016 Role of institutional extension efforts in spreading grassroot innovations: A study of ornamental fish culture in Kerala. *Indian Research Journal of Extension Education* 16 (1): 134- 138

Rosana O B, Eapen S J & Krishna P B 2016 Cloning and characterization of genes encoding two detoxifying enzymes, glutathione s-transferase and carboxylesterase, from burrowing nematode (*Radopholus similis*). *International Journal of Parasitology Research* 8: 173-183.

Srinivasan V, Thankamani C K, Dinesh R, Kandiannan K, Zachariah T J, Leela N K, Hamza S, Shajina O & Ansha O 2016 Nutrient management systems in turmeric:





Effects on soil quality, rhizome yield and quality. *Industrial Crops and Products* 85: 241-250.

Sruthi D & John Zachariah T 2015 Chemo profiling, in vitro antioxidant activity and cytotoxicity of essential oil from selected *Piper* species. *International Journal of Advances in Pharmaceutical Research* 6: 284-295.

Thankamani C K, Srinivasan V, Kandiannan K & Krishnamurthy K S 2014 Intercropping vegetables and pulses in black pepper (*Piper nigrum* L.). *Journal of Medicinal and Aromatic Plant Sciences* 36: 34-37.

Book chapters

Eapen S J 2015 Spice Bioinformatics. In: Kesavachandran R & Raji Radhakrishnan S (Eds.) *Agricultural Bioinformatics*. New India Publishing Agency, New Delhi, pp.271-281.

Popular article

Nine popular articles and one extension pamphlet were published during the period.

Papers presented in symposia/ seminars/ workshops /conferences

Sixth International Conference on Plant, Pathogens and People: Challenges in Plant Pathology to benefit humankind, organized by Indian Phytopathological Society, New Delhi during 23-27 February, New Delhi.

Agisha V N, Neelam S, Vibhuti M, Eapen S J, Suseela Bhai R & Kumar A, Microbial volatile organic compounds (MVOCs) from endophytic bacterium *Pseudomonas putida* BP 25R inhibit a broad spectrum of plant pathogens.

Anandaraj M, Dinesh Singh, Eapen S J, Gopalakrishnan C, Krishna Reddy M, Prameela T P, Ramesh R, Rosana O B, Singh B P, Sundaresha S, Suseela Bhai R & Vivek Srivastava, Comparative genomics of *Ralstonia solanacearum* strains from India reveals their phyletic profiles and diverse effectomes.

Eapen S J, Agath Martin, Blessy M B & Rosana O B, RA-DOBASE – A database on burrowing nematodes infesting tropical and subtropical crops.

Eapen S J, Krishna P B, Ishwara Bhat A & Rosana O B, A real time PCR based diagnostic tool for detecting *Radopholus similis* in soil samples.

Keerthana Umapathy, Praveena R & Anandaraj M, Characterization of some isolates of *Phytophthora* infecting spices and plantation crops.

Pervez R & Eapen S J, Nematicidal activity of new generation pesticide molecules and field management of slow decline disease in black pepper.

Pervez R, Eapen S J, Devasahayam S, Jacob T K, Ali M A & Thyagarajan P, *Oscheius* spp. as an alternative to *Heterorhabditis* spp. for ecofriendly management of cardamom root grub (*Basilepta fulvicorne* Jacoby).

Prameela T P & Suseela Bhai R, Apoplastic bacteria from ginger- a prelude to the biological control of *R. solanacearum* race 4 biovar 3.

Praveena R & Biju C N, Promising alternative fungicides for the management of rhizome and root rot diseases in small cardamom.

Rashid Pervez, Eapen S J & Ahamed Shabeer T P, Nematicidal activity of new generation pesticide molecules and field management of slow decline disease in black pepper.

Rashid Pervez, Eapen S J, Devasahayam S, Jacob T K, Ansar Ali M & Thyagarajan P, *Oscheius* spp. as an alternative to *Heterorhabditis* spp. for eco-friendly management of cardamom root grub (*Basilepta fulvicorne* Jacoby).

Revathy K A & Bhat A I, Complete genome sequencing of Cucumber mosaic virus from black pepper revealed rare deletion in the methyltransferase domain of 1a gene.

Rosana O B, Blessy M B & Eapen S J, Exposure to salicylic acid and syringaldehyde alters gene expression in burrowing nematode, *Radopholus similis*.

Rosana O B, Krishna P B & Eapen S J, Identification of FMRF amide-related neuropeptides, flp-16 and flp-22, targeting neuropeptide signalling systems of *Radopholus similis*.

VIII GCRA International conference on Innovative digital applications for sustainable development, UAS, Bengaluru, 5-7 January 2016

Rajeev P, John & Riyaz K P, Content development and management for visual media –Experiences of the project on mobilising mass media support for sharing agro information.

International symposium on Phytochemistry & Dr. Hisham Endowment Award Ceremony 2016, Malabar Botanical Garden and Institute for Plant Sciences, Kozhikode

Srinivasan V, Thankamani C K, Hamza S, Dinesh R & John Zachariah T, Influence of crop management practices on quality of ginger, turmeric and black pepper.



Promotion

Name	Promoted as	Date
Dr. Santhosh J. Eapen	Head, Division of Crop Protection	14-01-2016
Ms. Karthika N	Senior Technician	19-07-2015

Retirement



Dr M Anandaraj, Director (31.3.16)



Dr Utpala Parthasarathy, CTO (29.2.16)



Smt B.L. Seethu, SSS (29.2.16)

Resignation

Name	Post held	Date
Mr. Vivek Srivastav	Junior Research Fellow (Bioinformatics)	01-01-2016
Ms. Sharon D'Silva	Senior Research Fellow	31-03-2016
Mr. Salish J Menachery	Technician	12-02-2016

PhD awarded

Mrs. E. Radha	<i>In vitro</i> multiplication through direct and indirect somatic embryogenesis and long term conservation studies in arecanut (<i>Areca catechu</i> L.)	Mangalore University	Dr Anitha karun ICAR-CPCRI, Kasaragod
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