

Research Update

Black pepper germplasm

Germplasm explorations were conducted in Kodagu district, Karnataka and Arunachal Pradesh for collecting cultivar diversity of black pepper. 31 cultivar accessions were collected during the year from Kodagu district out of which six were unique accessions. The unique accessions collected are:

- A black pepper accession with very long spike (about 30 cm long) from SLN Plantations, Madikeri.
- An accession having male, female and bisexual flowers in the same vine.
- A black pepper accession with very less pungent berries.
- A black pepper variant resembling the triploid variety "Vadakkan" but with elongated leaves.
- Two wild accessions from Arunachal Pradesh.

High yield of black pepper at alternative germplasm site in Chettalli

The alternative black pepper germplasm block at Chettalli consisting of four year old accessions recorded good yield during 2016-17. The accession 975 registered highest dry weight of berries (2654 g per vine) followed by the accession 937 with dry weight of 2330 g. Among the 34 black pepper cultivars maintained at Chettalli, the cultivar OPKM recorded maximum fresh (12700 g) and dry (3489 g) yield per vine followed by the cultivar Sreekara with fresh (9417 g) and dry (2802 g) yield per vine respectively.



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An unique wild Piper species collected from Arunachal Pradesh



Spike setting of different accessions/cultivars at Chettalli

Elimination of *Piper yellow mottle virus* (PYMoV) from black pepper through somatic embryogenesis

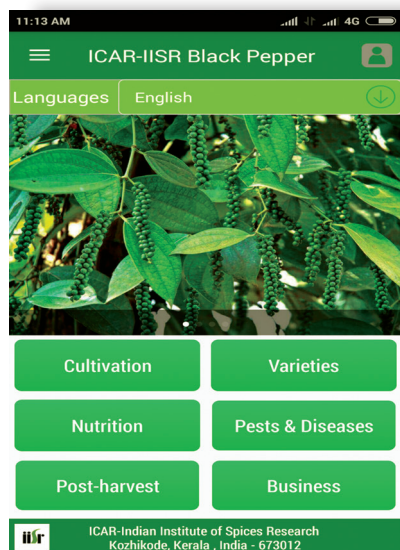
Cyclic somatic embryo obtained from the micropylar region of matured seeds obtained from PYMoV infected black pepper plants of six varieties namely, IISR-Malabar Excel, IISR-Shakthi, IISR-Thevam, Panniyur 1, Sreekara and Subhakara were regenerated and hardened in green house. When total DNA isolated from 227 somatic embryo-derived plants belonging to six varieties were subjected to PCR, 65 plants showed positive reaction indicating that 28% of plants are infected with PYMoV while rest of the plants (72%) were free from PYMoV. Variety wise data indicated 55 to 100% virus elimination in different varieties. Complete elimination of PYMoV from black pepper could be achieved when somatic embryogenesis was combined with treatment with antiviral agent, ribavirin.



Virus free somatic embryogenesis derived plantlets of black pepper

A farmer friendly mobile app for black pepper farmers

ICAR Black pepper, a mobile app has been developed to help farmers by providing relevant information on black pepper farming. The android version of the app can be downloaded from the Google Play store.



Association of *Neopestalotiopsis clavispora* with leaf blight of cardamom

Six symptomatological variants were identified based on the manifestation of foliar symptoms in cardamom morphotypes viz. Malabar, Mysore and Vazhukka and designated as SV 1 to SV 6. Subsequent isolations from the symptomatological variants yielded whitish colonies with honey-brown colour on the reverse side. Profuse blackish exudations were produced randomly on the colony surface. The conidia were fusiform, 4 septate, with three median versicoloured cells and two hyaline cells. Apical cells had 2 to 3 flexuous, unbranched appendages and basal appendages were single, tubular and unbranched. Pathogenicity test was performed on Malabar and Mysore morphotypes which resulted in the development of symptoms 15 days after inoculation. Molecular characterization was carried out employing internal transcribed spacer (ITS) of rDNA region partial β -tubulin (TUB), translation elongation factor 1 alpha (TEF) and large subunit (28S) of the nrRNA genes respectively. The pathogen was identified as *Neopestalotiopsis clavispora* based on nucleotide blast search query in NCBI.

Management of bacterial wilt using apoplastic bacteria

Solarization of sick soil followed by ginger seed treatment and soil application of apoplastic bacteria, *Bacillus licheniformis* (IISR GAB 107) (seed treatment and soil application at the time of planting and at 30, 45 and 60 days interval) for the management of bacterial wilt resulted in 100% inhibition of bacterial wilt in the sick field as well as 81.73% inhibition of bacterial wilt under challenge inoculated conditions indicating the potential of GAB 107 for bacterial wilt management.



Ginger plants untreated (left) and treated (right) with apoplastic bacteria





Personalia

Awards / Honours / Recognitions

Aiswarya K K received the best poster award under Protection technologies session of the IInd KVK symposium – 2017 held at TNAU, Coimbatore during 7-8 March 2017.

Jayashree E, John Zachariah T & Nirmal Babu K was awarded the best poster award for the research article entitled ‘Effect of high temperature storage on culinary and medicinal properties of black pepper powder (*Piper nigrum*)’ during National Conference on Spices: Challenges and Opportunities (NCS-17) held at CSIR-CFTRI, Mysuru during 2-3 February 2017.

Suseela Bhai R, Subila K P, Reshma A, Eapen S J, Pervez R, Ishwara Bhat A & Srinivasan V was awarded the best research paper award for the research paper entitled ‘Production of healthy and disease-free planting material in black pepper: Insight on a non-chemical, bio-intensive management strategy’ in the National Seminar on Natural resource management of horticultural crops under changing climatic conditions held at CWRDM, Kozhikode during 16-17 March 2017.

Thankamani C K, Srinivasan V, Dinesh R, Hamza S, John Zachariah T & Kandiannan K was awarded best oral research paper award entitled ‘Yield and economics, ginger influences by different management systems ‘in the National seminar on Natural resource management for horticultural crops under changing climatic conditions held at CWRDM, Kozhikode during 16-17 March 2017.

Neetu U V an apprentice trainee of the institute won **Bronze Medal in Badminton Championship in the 21st National Games for the Deaf held during 28-31 March, 2017 at Chennai.**



Ms. Neetu with her Bronze Medal at the 21st National Games of the Deaf

Ishwara Bhat A

Expert, Assessment Committee for CAS for considering career promotion of ARS scientists at ICAR-CPCRI, Kasaragod, 18 January 2017.

John Zachariah T

Expert Member, Assessment Committee of Scientist Biochemistry at ICAR-CPCRI, Kasaragod, 18 January 2017.

Manoj P S

Expert Member, VDP award committee of NWDPR, Kozhikode district.

Santhosh J Eapen

Chairman, Session on Genomics & plant microbe interactions, National symposium on Climate smart agriculture for nematode management, CICAR, Goa, 11-13 January 2017.

Examiner, Ph.D. thesis, ICAR-IARI, New Delhi.

Member, Doctoral Committee, Singhania University, Jhunjhunu, Rajasthan, 29 January 2017.

Senthil Kumar C M

Examiner, M.Sc (Agri. Ento.) Thesis Viva-voce, Kerala Agricultural University, Thiruvananthapuram

Suseela Bhai R

Evaluator for Ph.D. thesis, Kerala Agricultural University, Jawaharlal Nehru Technological University Hyderabad, University of Mysore and Mahatma Gandhi University.

Examiner, Ph.D. Thesis Viva-voce, Kerala Agricultural University.

Reviewer, European Journal of Plant Pathology, Scientia Horticulturae and Biological Control.

Radio talk

Ankegowda S J

Scientific cultivation practices in black pepper, 6 January 2017.



Scientific cultivation practices in cardamom, 20 January 2017.

Thankamani C K

Harvesting & storage of spices (black pepper, ginger and tree spices)-Interview, AIR, Kozhikode, 15 January 2017.

Extension activities

Ankegowda S J

Visited several black pepper plantations located at Sagar, Kadu, Sorab, Sirsi and gave necessary advice to the planters.

Jayashree E

Organized In-plant training for the first batch of final year B.Tech. (Ag. Engg.) students of KCAET, Tavanur at ICAR-IISR, Peruvannamuzhi, 1-10 March 2017.

Suseela Bhai R

Attended farmers training programme on Pest and disease management in black pepper, organized by ICRI Myladumpara and ICAR-IISR Kozhikode, 28 March 2017.

Training on NMSA staff organized by Department of Agriculture, Kalpetta, 20 February 2017.

Training on black pepper cultivation, Koorachundu Sugandhavila Karshaka Samiti 14 March 2017.

News and Events

Student-Scientist interface meet held

A one day interactive Student-Scientist interface on “New Vistas in Invertebrate Research” was held at ICAR-Indian Institute of Spices Research, Kozhikode on 25 January 2017. More than 85 post graduate Zoology students representing different colleges in Kozhikode district participated in the meet. The interface was planned to bring together students and scientific communities working on various aspects of insects, nematodes and other invertebrates, to discuss current developments in the area of invertebrate research and to inspire young minds to take up challenges in frontier areas of invertebrate research. The specific aim of the meeting was to introduce the student community to the state-of-the-art in various areas of research

on invertebrates. The programme was inaugurated by Dr. K. Nirmal Babu, Director of the Institute. The meeting had sessions on topics like biodiversity, taxonomy, chemical ecology, biological control, endosymbionts, plant-based pesticides, vector management and forensic entomology. Dr. S. Devasahayam, Dr. C.A. Jayaprakash, Dr. Sabu K. Thomas, Dr. Sachin James and Dr. Bhaskara Rao delivered talks on these aspects and interacted with the students. In his plenary talk, Dr. Abraham Verghese, Former Director of ICAR-NBAIR emphasized the conservation of insectivorous birds. Students were given first-hand information on the various research and career opportunities in entomology after post-graduation.

Celebration of Productivity Week (12-18 February 2017)

The productivity week celebration was inaugurated by Dr. B. Sasikumar, Head, Division of Crop Improvement and Biotechnology on 13 February 2017 by harvesting tomato fruits from vegetable garden at ICAR-IISR, Kozhikode. On 14, a group of volunteers visited Mental Health Centre, Kuthiravattom and undertaken aftercare operations in the banana plantation by weeding and applying vermicompost. On 15, staff members involved in weeding the organic vegetable garden at main campus. Subsequently, vermicompost was applied to the plants and neem oil was sprayed to deter the insect pests. On 16, demonstration programmes on compost production and vermiwash preparation was organized at ICAR-IISR



A glimpse of the inaugural function





dairy unit. A demonstration on blanching of black pepper was also organized to create awareness among the general public and staff to convey the message of the practice in order to improve the appearance, increase the shelf-life and to reduce the microbial load in black pepper. On 18, during the valedictory function, a lecture on organic spices production and summer care was delivered by Dr. C.K. Thankamani, Principal Scientist, which was attended by about 120 farmers and institute staff members.

Two days District Level Seminar on Spices held at ICAR-IISR, Kozhikode

Two days seminar on spices highlighting various aspects of summer care in spice crops was held at ICAR-IISR. Dr. M. Tamil Selvan, Additional Commissioner (Horticulture), Government of India inaugurated the seminar on 18 February 2017. Dr. Tamil Selvan pointed out the low productivity in many spices and stressed on the importance of scientific crop management in optimizing the yield and farm profitability. More than 100 farmers from various parts of the district took part in the seminar, which was sponsored by the Directorate of Arecanut and Spices Development, Kozhikode. Dr. K. Nirmal Babu, Director ICAR-IISR and Dr. Homey Cheriyan, Director, Directorate of Arecanut and Spices Development also spoke on the occasion. The seminar had sessions on diverse aspects of water management, crop production and crop protection which were handled by Dr. K. Madhavachandran, Dr. R. Suseela Bhai and Dr. C.K. Thankamani. The participants were provided with planting material of black pepper, allspice and long pepper. As a part of the seminar the participants visited the fields of progressive farmers on 19 February 2017 to interact with them and gain experience on the range of summer management practices adopted in these farms.



Dr. M. Tamil Selvan, Additional Commissioner (Hort.) inaugurating the seminar on spices



Distribution of spice saplings to farmers during district level seminar

National Science Day

In tune with the National Science Day theme-Science and Technology for the differently abled, twenty differently abled students of Rahmaniya Higher Secondary School, Kozhikode were given a study visit, motivational talk besides administering a quiz (test) at ICAR-IISR Kozhikode on 25 February 2017. The active participation of the two differently abled persons in the pay roll of the Institute added additional value to the program.



National Science day celebration at ICAR-IISR



Seminar and Agriculture Farmer's Innovation Meet- 2017

An awareness programme on “Black pepper, ginger and turmeric cultivation and their summer care practices” was organized on 28 March 2017 under the LEAD project funded by NABARD. Along with that an Agriculture Farmer's Innovation Meet cum Exhibition was organized to display thirteen different innovations. It includes grow bag cultivation of red ginger, stingless bee colony multiplication, making dry flowers using arecanut sheath, seed production of pearl spot fish, interspecific grafting of pepper, real kasthuri turmeric production and modified coconut tree climber were some which attracted more visitors. The household level interventions like domestic low cost mushroom spawn production technology, rainwater filters, storable ginger squash preparation and innovative fresh honey marketing were displayed with demonstrations and products. In addition, a new theme of spiritual farming was explained to the participants to build the link between yoga and farming.

News from Bioinformatics Centre

The Bioinformatics Centre (DISC) organized a short-term training on “Bioinformatics for Transcriptome Analysis” during 22-25 March 2017. Sixteen participants from various ICAR institutes, agricultural universities and other institutions participated in this



Participants of the Short-term training programme with ICAR-IISR faculty

Externally aided projects

Title of project	Investigators	Funding agency	Period	Outlay (₹ Lakhs)
Identification, characterization and development of diagnostics for unknown viruses associated with cardamom and ginger	A.I. Bhat & C.N. Biju	Science and Engineering Research Board (SERB), DST, Govt. of India	February 2017 to February 2020	31.53602

four day programme. Apart from the Institute faculty, experts from Central University of Kerala, Xcelris Labs Ltd., Ahmedabad and NCBS, Bengaluru handled various classes. Dr. Alagu Manickavelu, Head, Dept. of Genomic Sciences at Central University of Kerala was the chief guest of the valedictory function held on 25 March 2017.

News from Women Cell

International Women's Day

International women's day was celebrated on 8 March 2017. Dr. Khadija Mumthaz, a noted Malayalam author and a medical practitioner graced the event as chief guest. A Mini Spice Park and a Mushroom Production Unit were inaugurated during the occasion. A progressive women farmer from Wayanad district was honoured during the function.



Chief Guest, Dr. Khadija Mumthaz interacting with the audience during International women's day function

Consultancy Processing Cell

Biju C N

Visited P.A.K. Estate, Kannanvayal, Cherambadi, Nilgiris, Tamil Nadu on 17 January 2017.

News from Library

17 full text articles were supplied against document delivery request under CeRA consortium. Three issues of 'AGRI tit bits' were published. Purchased 5 books and added 14 other publications to stock. Received 58 publications on Exchange. Library services were utilized by 124 internal and two external users. Order placed for 39 journals and three databases.





Hindi News

Hindi Workshop

A Hindi workshop was conducted at ICAR-IISR, Kozhikode, to popularize official language during which a lecture was delivered on “Noting and drafting” by Mrs. Mini Agastin, Manager (OL), Canara Bank, Zonal office, Kozhikode on 22 February 2017.

Official Language Implementation Committee meeting / TOLIC Meeting

Quarterly meeting of Official Language Implementation

Committee was held on 28 February 2017 under chairmanship of Dr. K. Nirmal Babu, Director and reviewed the official language implementation activities of the institute.

Publications

During this period Masala Samachar (October-December 2016) issue and extension bulletin Long (clove) has been published by Hindi Cell. Two scientific popular articles in Hindi were also published in Phal Aur Phool (ICAR) and Spice India (Hindi).

Transfer of Technology

Technology inputs and Advisory services from ATIC

A total of 588 farmers visited ATIC to avail various information, advisories and diagnostic services. A total of 903 students from various educational institutions visited the institute on study tour. A total income of ₹ 12,87,161/- was generated through the sale of technology inputs from ATIC. Eight short duration on-campus training courses were organized. The institute participated in eight out-reach/exhibition programmes.

Participation in Exhibitions

Training workshop on turmeric production and processing at Turmeric Research Station, Kamrapally

A training workshop was organized in collaboration with AICRPS centre, Turmeric Research Station, Kamrapally, Telangana in which 200 farmers participated. A meeting with Horticulture Commissioner, Telangana was also conducted for presentation of recent improved technologies for turmeric cultivation and processing.

Activities of ITM-BPD Unit

Technology commercialization

Two non-exclusive license agreements have been signed with M/s Nature Agro producers and Mr. Pidikiti Chandrasekhar Azad, Guntur, Andhra Pradesh for the newly released turmeric variety, IISR-Pragati, a high yielding, short duration (180 days) variety with average yield of 38 t/ha (fresh rhizomes) with stable yield for curcumin (5.02%) across locations and moderately resistant to root knot nematode. The yield can go upto 52 t/ha under favourable conditions. It has 30% and 34% yield increase over national and local turmeric varieties respectively.

A license agreement has been signed with Campco Ltd., Mangalore for utilization of Spice Processing Unit at Peruvannamuzhi for processing of black and white pepper. A new planting material production nursery “IISR KRISHIDHAN” was established under ITM-BPD Unit for elite varieties of spices, ornamentals, fruit and plantation crops.

Signing of MoU for commercialization of IISR technologies



M/s. Nature agro producers, on 2 Feb 2017
For IISRPragati



Mr. P Chandrasekhar Azad, on 15 Feb 2017
For IISR Pragati



Signing of MoU with CAMPCO for commercial production of spice powders



Success story

Jojo cares, Varada fares!

Mr. Jojo Jacob, a beneficiary of ICAR-IISR KVK mentoring who grows Varada ginger in grow bags organically, harvests about 2.6-3.0 kg fresh ginger from one bag (cattle feed bag, 22 × 22 inches). And from a kg of Varada, he makes a whopping ₹ 3000-4000 by way of selling bagged plants. Mr. Jojo makes 25-30 g pieces of Varada rhizome and replants in small grow bags (14 × 14 inches) and care for 3-4 months and then sells @ ₹ 100 per bag. From 1 kg rhizome, about 40, 25 g pieces can be made. Assuming a minimum of 30 plants survives, 1 kg ginger = ₹ 3000/- (30 × 100) for Mr. Jojo Jacob! There are many customers for his bagged plants.

Varada, a ginger variety released by the ICAR-IISR, Kozhikode is a very popular and well acclaimed variety. High yield, good quality and wide adaptability are the hallmarks of Varada. Varada is the favourite ginger variety of Mr. Jojo too. As he follows mainly organic farming practices, there are not many pests in his garden.



Mr. Jojo Jacob with his harvested Varada Ginger



Krishi Vigyan Kendra

XVIII SAC meeting

The Eighteenth Scientific Advisory Committee (SAC) meeting of ICAR-Krishi Vigyan Kendra (ICAR-IISR, Kozhikode), Peruvannamuzhi was held on 27 January 2017, under the Chairmanship of Dr. K. Nirmal Babu, Director, ICAR-IISR, Kozhikode. Dr. S. Estelitta, Director of Extension, KAU, Thrissur and Dr. C.V. Sairam, Principal Scientist & Nodal Officer of Kerala KVKs, ATARI, Zone VIII, Bengaluru and thirty two members attended the meeting.

On Farm Testing

During this period the following seven OFTs were conducted.

- Performance evaluation of grafted black pepper (continuing- third year).
- Assessment of production performance of different breeds of poultry under homesteads.
- Scientific farming of milkfish (*Chanos chanos*) in brackish water ponds.
- Assessing the performance of yardlong bean varieties Lola, Vellayani Jyothika and Githika in Kozhikode district.
- Assessment of 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.
- Evaluation of different techniques for the production of dehydrated banana.



OFT on milk fish farming

Front Line Demonstration

Following FLDs were conducted during the period.

1. Performance evaluation of rooted top shoots of high yielding varieties of black pepper.
2. Demonstration of Java long pepper (*Piper chaba*) as a mixed crop in arecanut /coconut gardens.
3. Demonstration on integrated management of Tanjore wilt of coconut.
4. Demonstration on feeding anionic mixture to prevent milk fever in cows.
5. Culture of fishes using formulated floating feed.
6. Demonstration of soil application of banana micro-nutrient mixture viz. AYAR in Nendran banana for higher yield.
7. Demonstration of hydroponics method of fodder production for dairy.
8. Management of pseudostem weevil in banana using the entomopathogenic fungus *Beauveria bassiana*.

Training Programmes

A total of 21 on-campus and off-campus training programmes were organized for farmers, students, rural youth including women and 838 persons attended these trainings. It includes, KVK and ICAR-CTCRI, Thiruvananthapuram, collaborative training on “Tapioca based pest management in banana”; DCCD, Cochin sponsored training on “Cocoa cultivation and value addition”; NABARD funded LEAD project training on “Improved production technologies of fruits, vegetables and spices”; other training programmes on bee keeping, artificial insemination and pregnant animal management including indigenous medicine in animal treatments for para-veterinarians, ornamental fish culture, basics of plant propagation, organic vegetable cultivation, value added products from jack fruit, and KVK and ATMA collaborated technology week lectures at Peruvayal were also conducted during this period.



Publications

Research papers

Anusree Thampi & Suseela Bhai R 2017 Rhizosphere actinobacteria for combating *Phytophthora capsici* and *Sclerotium rolfsii*, the major soil-borne pathogens of black pepper (*Piper nigrum* L.). *Biological Control* 109: 01-13.

Biju C N, Praveena R, Mohammed Faisal Peeran, Darshana C N, Jashmi C K & Ankegowda S J 2017 Significance of microsclerotia in the epidemiology of black pepper anthracnose and an approach for disease management in nurseries. *Journal of Phytopathology* 165: 342-353.

Johnson George K, Neema Malik, Vijesh Kumar I P & Krishnamurthy K S 2017 Gene expression analysis in black pepper (*Piper nigrum* L.) in response to water deficit stress. *Acta Physiologiae Plantarum* 39:104 DOI 10.1007/s11738-017-2398-5.

Johnson George K, Rosana Babu O, Vijesh Kumar I P, Santhosh Eapen J & Anandaraj M 2016 Interplay of genes in plant-pathogen interactions: *In planta* expression and docking studies of a glucanase inhibitor gene from *Phytophthora capsici* and beta 1,3 glucanase gene from *Piper colubrinum*. *Physiology and Molecular Biology of Plants* DOI 10.1007/s12298-016-0378-7.

Kumar A, Munjal V, Sheoran N, Prameela T P, Suseela Bhai R, Aggarwal R, Jain R K & Eapen S J 2017 Draft genome sequence of highly virulent race 4/biovar 3 of *Ralstonia solanacearum* CaRs_Mep causing bacterial wilt in Zingiberaceae plants in India. *Genome Announcements* 5: e01420-16. <https://doi.org/10.1128/genomeA.01420-16>.

Pervez R & Eapen S J 2016 Community structure of plant parasitic nematodes associated with black pepper in Idukki district (Kerala), India. *Current Nematology* 27(1): 73-76.

Pervez R, Eapen S J, Devasahayam S & Jacob T K 2016 Eco-friendly management of cardamom root grub (*Basilepta fulvicorne* Jacoby). *Indian Phytopathology* 69(4): 260-265.

Pervez R, Eapen S J, Devasahayam S & Jacob T K 2016 Eco-friendly management of shoot borer *Conogethes punctiferalis* (Guenee) infesting ginger (*Zingiber officinale* Rosc.) through entomopathogenic nematodes. *Current Nematology* 27(1): 23-27.

Swetha V P, Parvathy V A, Sheeja T E & Sasikumar B

2017 Authentication of *Myristica fragrans* Houtt. using DNA barcoding. *Food Control* 73: 1010-1015.

Umadevi P, Anandaraj M & Benjamin S 2017 Endophytic interactions of *Trichoderma harzianum* in a tropical perennial rhizo-ecosystem. *Research Journal of Biotechnology* 12(3): 22-30.

Book chapters

Kandiannan K, Dinesh R, Srinivasan V, Thankamani C K & Hamza S 2017 Spices based cropping systems. In: Ramesh K, Biswas A K, Lakaria B, Srivastava S & Patra A K (Eds.), *Enhancing nutrient use efficiency*. New India Publishing Agency, New Delhi, pp. 419-454.

Ratha Krishnan P 2017 Quality planting material production options and potential towards drought mitigation. In: Suresh Kumar S P S, Tanwar & Akath Singh (Eds.), *Drought mitigation and management*. Scientific Publishers (India), Jodhpur, pp. 218-228.

Sasikumar B, Swetha V P, Parvathy V A & Sheeja T E 2016 Advances in adulteration and authenticity testing of herbs and spices. In: *Advances in Food Authenticity Testing – Improving quality throughout the food chain*. Woodhead Publishing, UK, pp. 585-624.

Thankamani C K, Srinivasan V & Hamza S 2017 Organic farming in spices. In: Krishnakumar V & Chowdappa P (Eds.), *Organic farming in plantation crops*. Daya Publishing House, Astral International Pvt. Ltd., New Delhi, pp. 215-248.

Technical bulletin

Eapen S J 2017 Genome mining of plant-associated endophytic bacteria for natural products - Final report of research project. ICAR- IISR, Kozhikode, India, 46p.

Srinivasan V, Thankamani C K, Hamza S, John Zachariah T, Dinesh R & Praveena R (January 2017) Organic spices production, ICAR-IISR, Kozhikode, Kerala, 44p.

Thankamani C K, Hamza S, Srinivasan V, Dinesh R, John Zachariah T & Praveena R (January 2017) Jaiva kurumulagu (Malayalam), ICAR-IISR, Kozhikode, Kerala, 28p.

Thankamani C K, Hamza S, Srinivasan V, Dinesh R, John Zachariah T & Praveena R (January 2017) Jaiva manjal (Malayalam), ICAR-IISR, Kozhikode, Kerala, 16p.

Thankamani C K, Hamza S, Srinivasan V, Dinesh R, John Zachariah T & Praveena R (January 2017) Jaiva inchi (Malayalam), ICAR-IISR, Kozhikode, Kerala, 16p.





Folders

Deepthi A 2017 Chakkavibhavangal (Malayalam), ICAR-KVK, IISR, Kozhikode, 6p.

Pradeep B & Neethu V S 2017 Shudhajala alankaramat-syangalum prathividhikalum (Malayalam), ICAR-KVK, ICAR-IISR, Kozhikode, 8p.

Ratha Krishnan P & Manoj P S 2017 Krishi Vigyan Kendra, Kozhikode- Otta Nottathil (Malayalam), ICAR-KVK, ICAR-IISR, Kozhikode, 6p.

Popular articles

Deepthi A 2017 Kamaneyyam Kera bouquet. Kerala Karshakan (Malayalam), January, pp.64.

Deepthi A 2017 Success stories: Empowerment through value addition in ginger, nutmeg, Kasthuri turmeric. Kerala Karshakan, (Malayalam) March, pp.57-61.

Sasikumar B 2017 Nursery nurturing a farmer. Spice India 30(2): 18.

Papers presented in symposia/ seminars/ workshops /conferences

During the period, 10 research papers were presented by the scientists and research scholars of the institute in various national seminars/symposia.

New Appointment

Name	Post	Date of joining
Mr. M. Sreenath	JRF (Computer Science), DISC	13-01-2017

Promotion

Name	Promoted as	w.e.f
Mrs. Shyna Deepesh	Personal Assistant	10-03-2017
Ms. A. Deepthi	SMS (Home Science) T-7-8	08-03-2015
Dr. B. Pradeep	SMS (Fisheries) T-7-8	30-03-2015
Dr. K.K. Aiswariya	SMS (Plant Protection) T-7-8	26-04-2015

Transfer

Name		From & To	Date of joining
Ms. H.J. Akshitha	Scientist	From ICAR-IISR, Kozhikode to ICAR-IISR, Regional Station, Appangala	06-03-2017
Dr. Sharon Aravind	Scientist	From ICAR-IISR, Regional Station, Appangala to ICAR-IISR, Kozhikode	20-03-2017



Retirement



Dr. S. DEVASAHAYAM
Principal Scientist
31.01.2017



Mr. K. ANANDA
Technical Officer
31.01.2017

Resignation

Name	Post	Date
Mr. A.M. Muneeb	SRF under HVC	15-3-2017
Dr. (Mrs.) J. Linet Rose	SRF under HVC	31-3-2017

A PDF version of the newsletter is also available at : <http://www.spices.res.in/newsletter/index.php>



SPICES NEWS

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