

## From Director's Desk



External experts interacting with Scientists during IRC meeting

Keeping in view the ICAR slogan "Farmer First" the institute made a vow about a year ago 'To make the technologies visible'. Subsequently, during the Institute Research Council Meeting held in April, a session with extension agencies was arranged and debated on the technologies ready for adoption in the field, viz., PGPR for growth promotion, nutrient mixtures for alleviating micronutrient deficiencies etc. It is now gratifying to note that IISR has made giant strides by developing technologies that are ready for licensing. Of course, the ball was set rolling when we successfully licensed our spice varieties. Due to intellectual property right (IPR) related issues, protection of technologies and varieties are a matter of great concern. IPRs are of course vital in a knowledge-based economy, because

they confer exclusive legal rights that can be used to prevent others from simply copying a technological innovation and free-riding on the back of someone else's research and development efforts. This was one major reason why ICAR constituted the Institute Technology Management Unit (ITMU) for the effective implementation of intellectual property protection of technologies developed at each of the ICAR institutes, with an Agricultural Technology Management Committee (ATMC) at New Delhi. Our foray into the world of commercialization and licensing of technologies would further inspire us to develop new and exciting technologies that benefit both the developer and the end user. The paradox about new technologies is that it will allow us to make more breakthroughs at a faster pace. Things that were once considered fiction are now becoming mundane occurrences. But what matters is whether our products stand the test of time. Normally this can be ensured by either making small tweaks to the existing product/process or by improvising the existing technology to meet the ever increasing demand of the users. Tweaking an available product shows creativity, while a new product that changes the way farmers cultivate spices is both creative and innovative. Every new development, every new step up the scientific ladder leads to breakthroughs that make a technology sustain and evolve into new avatars that are tailor-made to meet specific conditions. Though it would appear clichéd, I once again reiterate that when we propose new projects we may keep in mind the possibility of developing new technologies/ products/ processes that are commercially viable and can be licensed to third parties. We are living in an exciting and exhilarating world of science and technology. So let us spawn new technologies and make product improvements with commercial implications that are game-changing.



(M Anandaraj)

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## Research Update

### Effect of flowering on yield and quality of turmeric

Studies conducted in eleven varieties of turmeric viz., BSR-2, Duggirala Red, IISR Alleppey Supreme, IISR Kedharam, IISR Prathibha, Megha Turmeric-1, Narendra Haldi-1, Rajendra Sonia, Resmi, Roma and Suranjana during 2008-11, indicated that flowering did not have any influence on its yield and quality.

### Breeding cardamom for high yield and disease resistance

One hundred and fifty F2 mapping populations are being screened against *Katte* disease under glass house conditions.

### Location of *Piper yellow mottle virus* (PYMoV) in black pepper seeds

Studies conducted to know the location of *Piper yellow mottle virus* (PYMoV) in different parts of black pepper seed showed the presence of PYMoV in embryo, endosperm and perisperm in all the four varieties tested and the concentration of viral DNA was found to be almost same in all these parts.

### Transcriptome analysis of *C. amada* - *R. solanacearum* pathosystem

The transcriptome has been sequenced from rhizome tissue samples of *Curcuma amada* and *Zingiber officinale* after challenge inoculation with *Ralstonia solanacearum* using next generation technologies for short read (Illumina platform). It involves analysis of GC content, repeat content, putative functions, gene families, transcription factor encoding genes and comparative analysis between *C. amada* and *Z. officinale*. Several candidate genes coding for proteins related to stress and defense responses, such as glutathione-S-transferase, peroxidase, heat shock proteins, and lipoxygenase, that may underline the difference between *C. amada* and *Z. officinale* with regard to resistance to *R. solanacearum* have been identified.

### Digitization of *Garcinia* germplasm

Specimens of different species of *Garcinia*, available at National Herbarium, at Botanical Survey of India, Sibpur, Kolkata was digitized and was deposited at IISR Library.

## Personalia

### Deputation abroad

#### John Zachariah T

Expert Member, *International Pepper Community Committee on Quality*, PPMB, Jakarta, Indonesia, 4-5 June 2012.

### Awards/ Honours/ Recognitions

#### Jayashree E

Member, Task force committee on Nutmeg constituted by Spices Board, Kochi.

Attended the meeting at Kochi, Koorachundu and Kottayam on 17<sup>th</sup> and 21<sup>st</sup> April and 2<sup>nd</sup> May respectively.

#### Utpala Parthasarathy

Fellow, National Academy of Biological Sciences.

### Participation in Symposia/ Seminars/ Workshops/ Conferences/ Meetings

#### Anandaraj M

#### Leela N K

#### Zachariah T J

Group Meeting on *High Value Compounds/ Phytochemicals*, DMAPR, Anand, 3-4 May, 2012

#### Anandaraj M

#### John Zachariah T

Horticultural Division Meeting, NAAS Complex, New Delhi, 5-7 May 2012.

Horticultural Division Meeting under the Chairmanship of DG, ICAR, New Delhi, 7 May 2012.

First Meeting of Institute QRT with DDG (Hort.), and the Chairman and Members of QRT, KAB-II, ICAR, New Delhi, 9 May 2012.

Consortia Platform Meeting on *High Value Compounds and Health Foods*, NAAS complex, New Delhi, 24-25 May 2012.

#### Anandaraj M

#### Nirmal Babu K

#### Rajeev P

Global conference on *Horticulture for food, nutrition and livelihood*, OUAT, Bhubaneswar, 28-31 May 2012.

#### Anandaraj M

#### Ankegowda S J

XXIII Meeting of ICAR Regional Committee No. VIII, TNAU, Coimbatore, 15-16 June 2012.

#### Anandaraj M

XII Annual Group Meeting of *AICRP on Tuber Crops*, MPUAT, Udaipur, 18-19 June 2012.

**Ankegowda S J**

National Seminar on *Plant genetic research for Eastern and North Eastern India*, ICAR Research Complex for NEH Region, Umiam, Shillong, Meghalaya, 11-12 May 2012.

Seminar on *Scientific cultivation practices in black pepper*, Rotary Hall, Saklespur, 28 May 2012.

Seminar on *Scientific cultivation practices in black pepper and nutmeg*, Koppa, Chikmagalur, 29 May 2012.

Workshop on *Spices production and processing*, Sameti Hall, Ela, Old Goa, 21 June 2012.

Meeting on *Package of practices for horticultural crops*, IIHR, Bengaluru, 25-26 June 2012.

Training programme on *Intensive cultivation of Black pepper and Nutmeg* for farmers and Officers of Department of Horticulture, Karnataka, CRC, Appangala, 27-28 June 2012.

**Devasahayam S****Eapen S J****Jacob T K**

ISPC Brainstorming Meeting on *Crop Protection in Spices and Plantation Crops*, Spices Board, Kochi, 20 June 2012.

**Eapen S J****Jayarajan K**

State Level Workshop on *National Knowledge Network*, NIIST, Thiruvananthapuram, 9-10 May 2012.

**Hamza S**

Review meeting of the Kerala Govt. Planning Board sponsored *Project Soil Based nutrient management plan for Agro ecological zones of Kerala*, Soil Testing Laboratory, Parotukonam, Thiruvananthapuram, 17 April 2012.

**Hamza S****Jacob T K**

One day Workshop and Soil Health card distribution function, Thirunelli Krishi Bhavan, 15 June 2012.

**Hamza S****Srinivasan V**

Zonal Technology Management Unit, South Zone Meeting, CIFT Kochi, 5 April 2012.

**Jacob T K**

Action plan meeting of *Sugandhi Project*, Ambalavayal, Wayanad, 9 April 2012.

**Jayarajan K**

Workshop on *SAS software packages*, UAS, GKVK, Bengaluru, 20 June 2012.

**Leela N K**

National Conference on *Olfaction and E-Nose*, PESIT, Bengaluru, 20-21 April 2012.

**Srinivasan V****Suseela Bhai R**

One day Workshop and Soil Health card distribution function at Poothadi Krishi Bhavan, 14 June 2012.

**Thankamani C K**

Biennial Conference of Indian Society of Weed Science on *Weed threat to Agriculture, Biodiversity and Environment*, KAU, Thrissur, 19-20 April 2012. Midterm evaluation of *Pepper replanting/ Rejuvenation programme* in Idukki, College of Horticulture, KAU, Vellanikkara, 8 May 2012.

## News and events

### **Dr Nirmal Babu takes charge as Project Coordinator**

Dr K Nirmal Babu, Principal Scientist, Crop Improvement & Biotechnology has taken over charge as Project Coordinator, AICRP (Spices), w.e.f. 16 May 2012. A doctorate from University of Calicut, Dr Nirmal Babu did Postdoctoral work in Molecular Biology at the University of California, Davis. He has more than 28 years of research experience in the areas of genetic resources conservation including *in vitro* conservation, crop improvement and biotechnology of spices. He succeeds Dr M Anandaraj, Director, IISR, Kozhikode, who worked in this capacity during 2006-2012.

Dr Nirmal Babu along with the QRT team under the Chairmanship of Dr M Mahadevappa, visited Pepper Research Centre, Panniyur and reviewed last five years' progress of the Centre.



### **Institute Research Committee Meeting**

The Institute Research Committee Meeting of IISR was held under the chairmanship of Director, IISR, Kozhikode, during 19-20 April 2012. External experts Dr D Balasimha, Head, CPCRI, Regional Station, Vittal, Dr R Chandramohanam, Head, Division of Crop Protection, CPCRI and Dr C Thamban, Sr. Scientist, CPCRI reviewed the progress and suggested future action plans in the ongoing research programmes. Ten

technologies developed from various projects during the year was discussed and approved for passing on to the extension agencies for further adoption.

### Human Resource Development

Summer Training on 'Techniques in Biochemistry, Biotechnology & Bioinformatics' was organized during 8 May-6 June 2012. Dr Shamina A & Dr Sheeja T E served as the Course Coordinators.

### Quinquennial Review Team

Quinquennial Review Team (QRT) comprising of Padmasree Dr M Mahadevappa, Former Chairman, ASRB & Former Vice Chancellor, UAS, Dharwad as Chairman and Dr. D S Cheema, Dean, College of Agriculture, PAU, Ludhiana; Dr. G S R Murti, Former acting Director, IIHR, Bengaluru; Dr. Madhuban Gopal, National Fellow, IARI, New Delhi; Dr. S N Pandey, Former ADG (Hort.), ICAR, New Delhi and Dr. K K Jindal, Former Director, Directorate of Research, YSPUHF, Solan as Members reviewed the activities of IISR, Kozhikode for the period, 2007-12. The QRT interacted with the scientists on 7 June and also with the Institute Management Committee. The team visited Pepper Research Station, Panniyur and CRC Appangala, during 8-9 June 2012.



Director with QRT members

### ITMU

IISR entered into Non-exclusive License Agreements for cultivation and commercialization of the turmeric varieties, *IISR Alleppey Supreme* and *IISR Pratibha* and the ginger variety, *IISR Varada*, with NHRDF and Katra Phyto Chem. Pvt. Ltd.

During April-June 2012, Rs. 2.09 lakhs was generated through the consultancy activities viz., by licensing ginger and turmeric varieties, summer training to the M.Sc students and from analysis of soil and manure samples.

### Bioinformatics Centre

The Bioinformatics Centre conducted studies on *Phytophthora* genome annotation, identification of deleterious SNPs in *Phytophthora* genome, genome mining of endophytic bacteria for nematicidal and anti-oomycete compounds. Four Bioinformatics students carried out their M Sc project work under the guidance of Dr Santhosh J Eapen and were awarded DBT studentship.

### Library

Three issues of the electronic version of 'AGRI titbits' were published during April-June 2012. Twenty five publications were added to the institutional repository *DSpice* and 43 CeRA requests were catered online. Twenty eight books, 7 technical reports and 5 project reports were added to the library stock.

## हिन्दी अनुभाग

### नराकास राजभाषा शील्ड 2011

संस्थान को वर्ष 2010-11 के लिये राजभाषा कार्यान्वयन हेतु नगर राजभाषा कार्यान्वयन समिति, कोषिककोड द्वारा नराकास राजभाषा शील्ड 2011 पुरस्कार प्राप्त हुआ। यह द्वितीय अवसर है जब संस्थान को यह पुरस्कार प्राप्त हुआ है इससे पहले 2009-10 के लिये भी संस्थान को राजभाषा कार्यान्वयन पुरस्कार 2010 मिला था। नराकास की 49 वीं अर्ध वार्षिक बैठक में डा. एस. देवसहायम, अध्यक्ष, फसल संरक्षण प्रभाग एवं डा. राशिद परवेज़, वरिष्ठ वैज्ञानिक एवं हिन्दी अधिकारी ने यह पुरस्कार ग्रहण किया।



चित्र: नराकास राजभाषा शील्ड 2011 को प्राप्त करते डा. एस. देवसहायम एवं डा. राशिद परवेज़

रिपोर्टधीन काल में राजभाषा कार्यान्वयन समिति की तिमाही बैठक डा. एम. आनन्दराज, निदेशक की अध्यक्षता में दिनांक 11 मई 2012 को संपन्न हुई। संस्थान के अधिकारियों एवं कर्मचारियों को हिन्दी के प्रति रूचि पैदा करने के लिये दिनांक 23 मई 2012 को एक हिन्दी कार्यशाला का आयोजन किया। कार्यशाला में श्रीमती श्रीकला श्रीकुमार, वरिष्ठ प्रबन्धक (राजभाषा), कैनरा बैंक, कोषिकोड ने राजभाषा नीति एवं टिप्पणी एवं मसौदा लेखन के बारे में व्याख्यान दिया। दिनांक 18 अप्रैल 2012 को नगर राजभाषा कार्यान्वयन समिति की उपसमिति की बैठक में श्रीमती एन. प्रसन्नकुमारी तथा डा. राशिद परवेज ने भाग लिया तथा दिनांक 25 अप्रैल 2012 को नगर राजभाषा कार्यान्वयन समिति की उनचासवीं अर्धवार्षिक बैठक में डा. एस. देवसहायम, डा. राशिद परवेज तथा सुश्री एन. प्रसन्नकुमारी ने भाग लिया। गत तिमाही में “मसाला समाचार (जुलाई-दिसंबर 2011) का अंक (3&4) तथा “राष्ट्र की उन्नति में मसालों का योगदान” को हिन्दी में प्रकाशित किया। राजभाषा कार्यान्वयन सम्बन्धी तिमाही रिपोर्ट एवं वार्षिक रिपोर्ट तैयार कर के भारतीय कृषि अनुसंधान परिषद, नई दिल्ली, नगर राजभाषा कार्यान्वयन समिति, कोषिकोड तथा उप निदेशक (कार्यान्वयन), क्षेत्रीय कार्यान्वयन कार्यालय, कोचिन को प्रेषित की गयी। राजभाषा कार्यान्वयन सम्बन्धी अर्धवार्षिक रिपोर्ट तैयार करके नगर राजभाषा कार्यान्वयन समिति, कोषिकोड को प्रेषित की गयी।

### Other Events

Institute Management Committee

Meeting: 7 June 2012

Institute Joint Council Meeting: 29 June 2012

## Transfer of Technology

### Technology inputs and Advisory services from ATIC

Two hundred and eleven farmers including 33 from other states visited the centre and availed advisory services on spices cultivation. A total of Rs 39140 was the revenue generated through sale of technology inputs and information services.

### Training of extension functionaries

A training programme on Intensive cultivation of black pepper and Nutmeg for 100 participants including farmers and officers of Department of Horticulture, Karnataka was organized at CRC, Appangala during 27-28 June 2012.

## Krishi Vigyan Kendra

XIV Meeting of Scientific Advisory Committee of the Kendra was held on 20 June 2012 under the chairmanship of the Director, IISR, Kozhikode. During April-June, the centre conducted 21 training programmes in which 648 personnels participated. A Video-CD on *Coconut Palm Climbing* was also released.

### Front Line Demonstration

- Cage culture of pearl spot in brakish water area
- Quality seed production of turmeric and ginger
- Fertility in anoestrus cows following CIDR treatment

### On Farm Testing trials in progress

- Management of foot rot of black pepper
- Use of biofertilizers and probiotics in maintaining water quality of ornamental fish culture tanks.

## Publications

### Research Papers

Anandaraj M, Dinesh R, Srinivasan V, Hamza S 2012 Nanotechnology in agriculture: The use of novel materials and environmental issues, *The Botanica* 59-61: 22-34.

Aravind R, Kumar A & Eapen S J 2012 Pre-plant bacterisation: a strategy for delivery of beneficial endophytic bacteria and production of disease-free plantlets of black pepper (*Piper nigrum* L.), *Archives of Phytopathology and Plant Protection* 45: 1115-1126.

Bhat A I, Siljo A & Devasahayam S 2012 Occurrence of symptomless source of *Piper yellow mottle virus* in black pepper (*Piper nigrum* L.) varieties and a wild *Piper* species. *Archives of Phytopathology and Plant Protection*, DOI:10.1080/03235408.2011.591121.

Dinesh R, Srinivasan V, Hamza S, Manjusha A & Sanjay Kumar P 2012 Short-term effects of nutrient management regimes on biochemical and microbial properties in soils under rainfed ginger (*Zingiber officinale* Rosc.), *Geoderma* (Elsevier) 173-174: 192-198.

Jayashree E & Visvanathan R 2012 Thin layer drying of ginger (*Zingiber officinale*) in a multi-rack type solar tunnel drier, *Indian Journal of Agricultural Sciences* 82(4): 351-355.

Rosana O B, Dinsha M, Shamina A, Eapen S J 2012 Virtual screening and *in vitro* assay of potential drug like inhibitors from spices against Glutathione-S-Transferase of *Meloidogyne incognita*. *Bioinformation* (online) 8(7): 319-325.

Sangeetha K, Rosana O B & Eapen S J 2012 EST secretome analysis of *Radopholus similis* nematode, Journal of Bioinformatics (online) 13(1): 103-119.

Shamina Azeez, Rajagopal Vellamoor, Jayarama Pai T & Arunachalam Vadivel 2012 A comparison between the effects of coconut oil and other vegetable oils on human health, with emphasis on heart disease, Journal of Plantation Crops 40(1): 16-22.

Shamina A, Rosana O B, Riju A, Reena N 2012 Virtual screening and *in vitro* assay of potential drug like inhibitors from spices against glutathione-S-transferase of filarial nematodes, Journal of Molecular Modeling 18(1): 151-163.

Simi Mohan, Utpala Parthasarathy & Nirmal Babu K 2012 *In vitro* and *in vivo* adventitious bud differentiation from mature seeds of three *Garcinia* spp., Indian Journal of Natural Products and Resources Vol. 3(1): 65-72.

Srinivasan V, Maheswarappa H P, Lal R 2012 Long term effects of topsoil depth and amendments on particulate and non particulate carbon fractions in a Miamian soil of Central Ohio, Soil & Tillage Research 121: 10-17.

**Papers presented in symposia/ seminars/ workshops/ conferences**  
Exploratory study on quality estimation of cardamom by Electronic nose system. In: Abstracts of *National Conference on Olfaction and E-Nose*, PESIT, Bengaluru, 20-21 April 2012 (Ghosh D, Mukherjee S, Sarkar S, Bhattacharyya N, Leela N K & Krishnamurthy V).

Flavour profile of Spices- a boon for developing E-Nose, In: Abstracts of *National Conference on Olfaction and E-Nose*, PESIT, Bengaluru, 20-21 April 2012 (Leela N K, Zachariah T J & Chempakam B).  
Screening of small cardamom genotypes for drought tolerance, In: *National Seminar on Plant genetic research for Eastern and North Eastern India*, ICAR Research Complex for NEH Region, Umiam, Shillong, Meghalaya, 11-12 May 2012 (Ankegowda S J & Krishnamurthy K S).

Soil based nutrient management plans for Kozhikode District (Kerala) In: *National Workshop on Soil Fertility Management—Project Outputs and Way forward*, Hotel Mascot, Thiruvananthapuram, 24-25 May 2012 (Dinesh R).

### Extension pamphlets

Deepthi A 2012 *Value added products from Nutmeg rind*, Director, IISR, Kozhikode, 12p.

Pervez R & Parsanakumari N 2012 *Rashtre ki unnatee mein masaloon ka yogdan*, IISR, Kozhikode, 21p.

Pradeep B 2012 *Fresh water fish culture*, Director, IISR, Kozhikode, 8p.

### Popular Article

Deepthi A 2012 *Jathithondu Pazhvasthuvalla*, *Karshakan* 20(6): 56-58.

### Books

Singh H P, Parthasarathy V A, Kandiannan K, Krishnamurthy K S (Eds) 2012 *Zingiberaceae Crops—Present and Future—Cardamom, Ginger, Turmeric and Others*, 514p, Westville Publishing House, New Delhi.  
Singh H P, Parthasarathy V A, Srinivasan V & Saji K V 2012 *Piperaceae Crops— Production and utilization—Black pepper, Betelvine and Others*, 272p, Westville Publishing House, New Delhi.

### Lectures delivered

#### Ankegowda S J

*Scientific cultivation practices in black pepper*, Crop seminar, Mangalore Chemicals and Fertilizers, Rotary hall, Saklespur, Hassan, 28 May 2012.

*Scientific cultivation practices in black pepper and nutmeg*, Mangalore Chemicals and Fertilizers, Chikmagalur, 29 May 2012.

*Scientific cultivation practices in black pepper cultivation*, Workshop on Spices production and processing, Sameti Hall, Ela, Old Goa, 21 June 2012.

#### Biju C N

*Integrated Pest and Disease Management in Black pepper*, Training programme on Comprehensive Horticulture Development Scheme on black pepper and nutmeg, CRC, Appangala, 27 June 2012.

#### Eapen S J

*Towards a paperless office*, Training for newly recruited AOs and FAOs, IISR, Kozhikode, 20 April 2012.

*Black pepper: Pests and diseases*, Sugandhi Farmers' Seminar, KVK, Ambalavayal, 29 May 2012.

*Next Generation Sequencing*, Summer Training Programme on Biochemistry, Biotechnology & Bioinformatics, IISR, Kozhikode, 30 May 2012.

*Black pepper: Pests and diseases*, Farmers Meet and Awareness Programme, RARS, Ambalavayal, 27 June 2012.

#### Jacob T K

*Mushroom spawn production*, Kozhikode, 21 May 2012.

*Pest and disease management in black pepper nurseries*, Kalpetta, 8 June 2012.

*Pest and disease management in black pepper*, Thirunelli, Wayanad, 15 June 2012.

**Jayashree E**

*Value addition of Ginger and Turmeric*, KVK, Peruvannamuzhi, 2 June 2012.

**Leela N K**

*Bioactive phytochemicals in spices*, Summer Training Programme on Techniques in Biochemistry, Biotechnology & Bioinformatics, IISR, Kozhikode, 15 May 2012.

*Molecular characterization of entomopathogenic nematodes*, Summer Training Programme on Techniques in Biochemistry, Biotechnology and Bioinformatics, IISR, Kozhikode, 2 June 2012.

**Praveena R**

*Agronomy of Black Pepper and Integrated Pest and Disease Management in Black pepper*, CRC, Appangala, 25 June 2012.

**Rajeev P**

*Technologies developed by IISR*, VIII Zonal KVK Review meeting, Chennai Veterinary College, 7 June 2012.

**Thankamani C K**

*Nursery management practices for Black pepper cultivation*, MS Swaminathan Research Foundation, Putturvayal, Kalpetta, 8 June 2012.

**Radio Talk**

*Integrated Pest and Disease management in black pepper*, AIR, Kozhikode, 18 April 2012 (Biju C N).

*Integrated Pest and Disease management in cardamom*, AIR, Kozhikode, 18 April 2012 (Praveena R).

*Cultivation practices in cardamom and black pepper in rainy season*, AIR, Madikeri, 1 May 2012 (Ankegowda S J).

*Banned pesticides*, AIR, Kozhikode, 8 May 2012 (Eapen S J).

*Participatory seed production*, AIR, Kozhikode, 11 June 2012 (Rajeev P).

**TV Programme**

*Scientific cultivation practices in black pepper*, Doordarsan, Bengaluru, 19 June 2012 (Ankegowda S J).

**Ph D awarded**

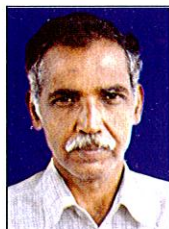
Name	Title of thesis	University	Guide
Ms Mary Jiby Varghese	<i>Agrobacterium</i> Mediated transformation of black pepper using sequences from <i>Cucumber mosaic virus</i> and <i>Piper yellow mottle virus</i>	Mangalore University	A I Bhat

**New Appointment**

Name	Designation	Date of Joining
Dr C M Senthil Kumar	Senior Scientist (Agricultural Entomology)	04.04.2012
Sri V L Jacob	Finance & Accounts Officer	11.05.2012

**Resignation**

Name	Designation	w.e.f
Sri A Chandrasekar	Research Associate	19.06.2012

**Superannuation**

**Sri P Padmanabhan**  
Technical Officer (T-5)  
30-04-2012



**Sri V Sankaran**  
Skilled Support Staff  
30-06-2012

Events at a glance



AO's & FAO's Training (top)  
SAC Meeting of KVK (bottom)

Hindi Workshop (top)  
Summer Training (bottom)



भारत अनुप  
ICAR



हर कदम, हर डगर  
किसानों का हमसफर  
भारतीय कृषि अनुसंधान परिषद

*Agrisearch with a human touch*

**SPICES NEWS**

A newsletter of Indian Institute of Spices Research  
An Institution of Indian Council of Agricultural Research (ICAR)  
Marikunnu P.O., Kozhikode (Calicut) - 673 012, Kerala, India  
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**Editors**

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