



IIHR

IIHR



NEWS

Volume 34, No.2

www.iihr.ernet.in

APRIL-JUNE, 2013

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From Director's Desk

The impact of climate change on our ecosystem and all its components has become obvious. The rise in average temperature has increased by 0.7°C within the last hundred years globally and an average temperature rise of 6.3 °C by the year 2100 has been predicted. This will dramatically affect the interactions between host plants, plant pathogens and their vectors. Climate change may affect both host plant and insect vector populations, thereby affecting the spread of plant viruses. Unlike animal viruses, many of which can depend upon host mobility for transmission, most plant viruses are transmitted by vectors, the majority by insects. The most important vectors are aphids, whitefly, thrips and leafhoppers which are responsible for transmission and spread of viruses and phytoplasma. The climate changes specially the temperature and moisture conditions interacting with seasonal phenology, and stress on host determine the infection severity and distribution. For example aphids are expected to react strongly to environmental changes because of their short generation time, low developmental threshold temperatures and ability to survive mild winters without winter forms. An increase in the numbers of insect vectors will inevitably lead to a higher risk for viral infection of plants. The biological changes involved include introduction of new, more efficient virus-vector species and circumvention of host defenses introduced and established crops. An outcome of the recently held 12th International Symposium on Plant Viruses in Tanzania indicates that one of the likely effects of a raise in temperature is the increase in virus titer and earlier symptom expression. The need of the hour to combat the potential consequences of climate change is to develop weather based models of high precision to predict the severity of disease occurrences and gear up to minimize the losses. The Institute has been addressing this issue through both internal and externally funded projects. The Institute has made tremendous progress in diagnostics of plant viruses. In XII plan, the Institute has been recognized as the leader for the Plant Virus Diagnostics Platform and Outreach Program on Sucking Pests. I am hopeful, sooner the technologies are available to face the challenges posed by the climate change induced outbreaks of plant viruses of horticultural importance.

(Amrik Singh Sidhu)

EVENTS

National Seminar on Horticultural Biotechnology – NSHB 2013

The Division of Biotechnology of the Institute organised a National Seminar on Horticultural Biotechnology – NSHB 2013 on June 14, 2013 at its campus Hesraghatta, Bengaluru under the aegis of Society for Promotion of Horticulture (SPH), to review the current research and draw a roadmap for future thrusts in biotechnological research in horticulture in the country. Dr. N. K. Krishna Kumar, DDG(Hort.), ICAR, New Delhi inaugurated and spearheaded the deliberations under 7 theme areas, viz., molecular markers, transgenic technology, allele mining & gene cloning, molecular diagnostics, and regeneration systems. Dr. A. S. Sidhu, Director, IIHR, Bengaluru, presided over the seminar. Leading biotechnologists of the country from ICAR fraternity flagged important issues for long-term strategic planning. More than 50 scientists from National Agriculture Research System participated in the deliberations. The seminar was coordinated by Dr. C. Aswath, Head, Division of Biotechnology of the Institute.



Dr. N.K. Krishna Kumar, DDG (Hort.) releasing the compendium

National Workshop on Conservation of RET Medicinal Plants

The Division of Plant Genetic Resources of the Institute organized a National Workshop on Conservation of RET Medicinal Plants in collaboration with FRLHT, Bengaluru during June 19-20, 2013 at its campus, Hesaraghatta, Bengaluru. The objective of the Workshop was to create awareness among the various stake holders on the importance of conservation of RET medicinal plants. Shri D. K. Ved, Advisor, FRLHT, Bengaluru, the Chief Guest, inaugurated the Workshop. Delivering the key note address, Shri Ved presented the scenario of RET medicinal plants in India and FRLHT's contribution in the conservation of RET medicinal plants. Dr. K. Ramakrishnappa, Executive Director, Karnataka State Horticulture Development Agency (KSHDA) was the Guest of Honor and Dr. R. Chithiraichelvan, Acting Director, IIHR chaired the inaugural session. Deliberations were held

in three technical sessions viz., diversity and distribution, conservation case studies and characterization, evaluation, biotechnology, IPR and technology development in which 18 invited presentations were made by the subject matter specialists. A field visit to IIHR and FRLHT was arranged for the benefit of the participants. More than one hundred participants from research institutes, universities, state department of horticulture and NGOs participated in the deliberations. The concluding session was conducted by a panel consisting Dr. Haridasan, Dr. Kareem and Dr. P.E. Rajasekharan to get the feedback from the participants and the way forward.



Shri. D. K. Ved, Advisor, FRLHT delivering the Key note address

7th CAC Meeting of NAIP Sub-project

The 7th CAC meeting of NAIP sub project 'Understanding mechanism of variation in status of a few nutritionally important micronutrients in some important food crops and the mechanism of micronutrient enrichment in plant parts, was arranged at IIHR, Hesraghatta on June 28-29, 2013 to review the progress made by the cooperating centres. The first meeting of the network partners of 'Micronutrient management for enhancing yield nutrient content & quality of Horticultural crops' was held on June 29, 2013 in which Dr. A. N. Ganeshamurthy, Head, Division of Soil Science and Agricultural Chemistry, presented the network proposal along with the technical programme envisaged for different cooperating centres. Dr. P. N. Takker, INSA, Senior Scientist and Dr. A. K. Shukla, PC, Micro & secondary nutrients & pollutant elements, were present on the occasion.



A view of the Meeting in progress

National Consultation Meeting on Jackfruit

The PC Unit, AICRP on Tropical Fruits, IIHR, Bengaluru organised A National Consultation Meeting on Jackfruit at Banana Research Station, Kannara (KAU, Thrissur) on June 01, 2013. The meeting was aimed at developing the future road map for effective utilization of jackfruit. Dr. N. K. Krishna Kumar, DDG (Hort.), ICAR, New Delhi inaugurated the Meet. The status of jackfruit research was discussed in five technical sessions (jackfruit an emerging fruit crop - national and international scenario, genetic resources and production of jackfruit, role of jackfruit in nutrition and health, post-harvest technology and marketing and an open session to interact with various farmers and entrepreneurs) and came out with action points for follow up.



Dr. T. R. Gopalakrishnan, Director of Research, KAU delivering the welcome address

Interface Meeting of Scientists, Horticulture Officers and Farmers

The Central Horticultural Experiment Station, Bhubaneswar organised an Interface Meeting of scientists, horticulture officers and farmers during April 02-03, 2013. An expert team of ICAR scientists, viz. Dr. G. S. Prakash, former Head, Division of Fruit Crops, IIHR, Bengaluru, Dr. H. S. Singh, Head, CHES, Bhubaneswar, Dr. R.A. Marathe, Principal Scientist, NRC for Pomegranate, Sholapur, Dr. S. D. Pandey, Principal Scientist, NRC for Litchi, Mujaffarpur, Dr. Reju M. Kurian, Principal Scientist, CHES, Bhubaneswar, Dr. A. D. Huchche, Principal Scientist, NRC for Citrus, Nagpur along with Deputy Director of Horticulture (DDH), Rayagada, Odisha and six progressive farmers conducted a joint visit to Kashipur area on April 02 - 03, 2013 in different pockets of the region to oversee the existing mango, pomegranate and orange plantations, ongoing canopy management practices and to assess the scope of fruit crop diversification in the area. Subsequently, an interface meeting was arranged on April 03, 2013 under the chairmanship of Dr. G. S. Prakash at Rayagada. The team took into account the fruit diversification as per the suitability of local climate, canopy management, mite management in litchi, and introduction of kinnow, oranges, pomegranate and grapes. Summarising the deliberations the Chairman stated that there is a lot of potential for growth of horticulture in the region owing to the good soil, rainfall, climate, continuous water steams etc., through skill development and capacity building of tribal communities. Further, the committee recommended that CHES, Bhubaneswar in consultation with Directorate of Horticulture and local farmers society viz. HARPAL may

prepare a comprehensive action plan to address the horticultural needs of the area.



The expert team during the field visit at Rayagada, Odisha

World Veterinary Day Celebration

Krishi Vigyan Kendra, Gonikoppal celebrated the World Veterinary Day on the theme of 'Vaccination to Prevent and Protect' on April 27, 2013. Dr. Alexander, Chief Executive Officer, Taluk Panchayat inaugurated the program, presided over by Dr. P C Tripathi, Head, CHES, Chettalli. Addressing the gathering on the occasion Dr. Alexander emphasised the importance of vaccination and controlling the spread of diseases in animals. Dr. K P Aiyappa, Deputy Director, Department of AH&VS, Dr. K P Chinnappa, President, Kodagu Kennel Club, Pollibetta were the other guests on the occasion. About 52 veterinarians from in and around Gonikoppal participated in the programme.

World Environment Day Celebration

KVK, Hirehalli celebrated World Environment Day on June 04-05, 2013 to commemorate the theme of the year 'Think-Eat-Save'. Dr. T. Vasanth Kumar Principal Scientist, IIHR, Bengaluru addressed the gathering. Dr. K. Hima Bindu, Principal Scientist, Dr. M. A. Surayanarayana, Sr. Scientist, IIHR Bengaluru, the Subject Matter Specialist of KVK, Hirehalli, students and trainees were present on the occasion and participated in the deliberations. KVK, Hirehalli also organized World Environment Day at Hebbur, Pre University College premises on June 05, 2013 during which *Amla* saplings were planted.

The CHES, Bhubaneswar celebrated World Environment Day on June 05, 2013 to commemorate the theme of the year 'Think-Eat-Save'. Dr. S. K. Srivastava, Principal Scientist, Directorate of Research Women in Agriculture, Bhubaneswar and the Chief Guest inaugurated the program and Dr. H. S. Singh, Head, CHES, Bhubaneswar presided over the function. The staff members, students and trainees of the Station participated in the celebration.



Dr. H. S. Singh addressing the gathering during the World Environment Day celebration

Welfare Activities

The Women Cell of the Institute organised the following health camps for the benefit IIHR employees:

- A cardiac care screening camp on June 06, 2013 in association with Saphthagiri Hospital, Bengaluru. Special screening was arranged for women with women technical staff for echo-cardiograph and ECG Blood sugar levels were also monitored.
- A cancer screening camp with emphasis on breast and cervical cancers of women on June 13, 2013 in association with HCG group of Cancer Speciality Hospital, Bengaluru. Dr. Murali and Dr. Nirmala, Oncologists from HCG Hospital conducted the camp.
- An ophthalmic screening camp for all the employees of IIHR on May 28, 2013 in association with Agarwal's Eye Care Hospital. Fifty five women employees were benefitted from this camp.

RESEARCH

Introgression of ToLCV resistant genes from *Solanum habrochaites* in tomato

In tomato BC1F1 derived from an inter-specific hybrid (SH-1 x 15SBSB) was raised. Marker Assisted Selection (MAS) was employed and twenty one plants were heterozygous for Ty2 and Ty3. Five plants viz., 2013 BC1F1-8, 16, 58, 122, 124 and 128 were resistant to ToLCV.



BC1F1 plants introgressed with ToLCV resistant genes

Development of Advanced breeding line with triple disease resistance to ToLCV+BW+EB in tomato

In tomato, Individual Plant Selection (BC1F1-26-9-2-35-5-3-7-5) was made in Arka Vikas background with triple disease resistance to ToLCV+BW+EB. Resistance to ToLCV and BW was also confirmed by molecular markers (Ty2 and BW) linked to both the diseases respectively.



Advanced breeding line with triple disease resistance to ToLCV+BW+EB

Breeding okra for resistance to Yellow Vein Mosaic Virus (YVMV)

Forty five wild accessions comprising eight species, six advanced lines and local checks were screened for YVMV in hot spot area of CHES, Bhubaneswar during April -June (summer) 2013. Among the wild species, six accessions of *Abelmoschus angulosus* var. *grantiflorus* viz., IC-203832, IC-203833, IC-203834, IC-203863, IC-213314 and IC-470751 were highly resistant to YVMV (0% incidence). Three advanced lines viz., IIHR-285-4-6-3-5-2, IIHR-294-54-8-4 and IIHR-294-1-10-11-595 showed 0% incidence of YVMV whereas, local checks showed 100% incidence of YVMV.

Breeding French bean for resistance to Mungbean Yellow Mosaic Virus (MYMV)

Out of eight breeding lines evaluated during April to June 2013, IC 525260 x IC 525283-07-1-6-5 with yield potential of 18.0 t/ha and 45 pods /plant was selected for further evaluation. PDI was < 2% in resistant breeding lines whereas check IC 525258 was 100% susceptible. The pods were round, smooth and string less.



IC 525260 x IC 525283- 07-1-6-5 resistant to MYMV (left)

Breeding peas for high temperature tolerance

Peas midseason advance breeding line, IIHR 18 x Oregon 1-2 was found to be tolerant to high temperature during the summer season (March to May), 2013 with a pod yield of 5.5 t/ha in 90 days.

A fertile inter-specific hybrid between spine gourd (diploid) and teasel gourd (tetraploid)

The Central Horticultural Experiment Station, Bhubaneswar has developed a new fertile inter-specific hybrid of spine gourd and teasel gourd by raising the ploidy of diploid species (spine gourd) and hybridization with the natural tetraploid species (teasel gourd). The F₁ hybrid combines the desirable attributes of spine gourd and teasel gourd. The plant morphology of the hybrid plant is intermediate between the parental species. For example, anthesis of spine gourd takes place during evening hour (5-7 PM) and teasel gourd at morning (4-6 AM) while the synthetic species at mid night (12.30-1.00 AM). The fruit weight of spine gourd is < 20g and that of teasel gourd is >40g while the fruit weight of the hybrid is 30-45g. A wide range of variation was observed among the hybrid plants in fruit and plant traits. As the plant can effectively be multiplied through stem and root cuttings, elite and high yielding plants can be selected and used for commercial cultivation. The new hybrid combines the excellence of both the species which can be propagated easily through stem cutting with ratoon potential and root cutting.



Fruits set naturally (>90% fruit set) due to natural pollination. It has extended harvesting period (April to November) with high yield (5-7 kg/plant) potential. The reason for the natural fruit set is due to insect visits (honey bees) cued by strong musky scent which is inherited from *M. dioica*. This particular hybrid is expected to revolutionize teasel gourd cultivation by saving labour and spine gourd cultivation by better propagation efficiency.

Promising selections of Kokum (*Garcinia indica*)

The Central Horticultural Experiment Station, Chettalli has identified two promising lines of Kokum (*Garcinia indica*) from the seedling population collected from Western Ghats of Karnataka. The details of these lines are ;

GI-VIII-5: It is a high yielding seedling selection. The tree is spreading, medium sized. Fruits ripen during May -June. The average fruit weight ranges between 50-60 g. Fruits are juicy and acid sweet, dull red in colour, with dark red rind, white flesh, 8 segments containing 6-7 seeds/fruit attached to flesh. The rind recovery is 59.5 per cent. The fruit contains 14.1⁰ Brix total soluble solids, 64 mg vitamin C per 100 g pulp. The average yield is 1000-1200 fruits per tree.



GI-V-4: It is a high yielding seedling selection. The trees are spreading type, medium sized, 3-4 m height, 4-5 m tree spread. The fruits ripen during May -June. The fruit weight ranges between 45 to 50g. Fruits ripen during May - June. The average fruit weight ranges between 50-60 g. Fruits are juicy and acid sweet, dull red in colour, with dark red rind, white flesh, 8 segments containing 6-7 seeds/fruit attached to flesh. The rind recovery is 48 per cent. The fruit contains 14.5⁰ Brix total soluble solids and 36 mg vitamin C /100g pulp. The average yield is 1000-1250 fruits per tree.



Mushroom

A new culinary medicinal mushroom *Hericium erinaceus* was brought to fructification on both sawdust and paddy straw as substrates. This is an excellent edible and medicinal mushroom not yet cultivated in India due to lack of cultivation technology and availability of suitable strains. IIHR will very soon be developing the commercial cultivation technology which will add one more new mushroom to the culinary basket of Indian mushroom consumers.

Others

- A methodology based on Bootstrapping (a resampling procedure) was suggested wherein samples of different

sizes were generated to arrive at the optimum sample size required for leaf area estimation in fig (cv. Deanna) using non-destructive sampling procedure. Bootstrap samples of various sizes starting from n=50 till n=500 (with an increment of 10) were generated using the original sample (size of n=100) corresponding to petiole length, length of middle vein and two sides veins along with leaf area. Every time, using the sample size generated, statistical models were constructed and mean square error (MSE) were computed. Finally, a model (with length of middle vein as the sole predictor) having minimum MSE (0.327) (hence high R²= 0.87) and the corresponding sample size of n=120 was identified as optimum.

- Based on the PRA results and feedback from the stakeholders/participants the following research programmes initiated/ technological refinements were undertaken by the Division of Extension and Training;

1. Grafting in vegetable crops was initiated in coloured capsicum to identify the suitable combination of root stock varieties/ crops and their compatibility with the commercially cultivated capsicum varieties grown in poly house/ net-house

2. Refinement in designing and fabrication of onion drum seeder (bullock drawn and tractor driven) for sowing of onion seeds in dry land condition under raised bed cultivation. The new drum seeder was demonstrated in farmer's fields of Kadur taluk in Chikmangalore district.



The new onion drum seeder being demonstrated in the farmer's field

HUMAN RESOURCE DEVELOPMENT

Post Graduate Education

PG Guide

The following scientists of the institute have been identified as PG guides:

- Dr. Sudhakar Rao, D.V. - PG Guide in the subject of Post Harvest Technology by Jain University, Bengaluru.
- Dr. Anuradha Sane - PG Guide in horticulture by Jain University, Bengaluru.

- Dr. Rajiv Kumar - PG Guide in Ornamental Crops by Jain University, Bengaluru.
- Dr. Venugopalan, R. - Research Supervisor at Jain University, Bengaluru.

PG Examiner

- Dr. Hima Bindu, K acted as external examiner for Ph.D. student of Department of Genetics and Plant Breeding, University of Agricultural Sciences, Dharwad.
- Dr. Rajasekharan, P.E. acted as external examiner to conduct the viva of M. Tech students of Biotechnology at VIT University, May 23-24, 13.

Deputation Abroad

Dr. Prakash Patil was deputed to Bali, Indonesia to participate in the Annual Technical Review and Planning meeting and Regional Project Steering Committee meeting of UNEP/GEF TFTGR project entitled Conservation and Sustainable Use of Cultivated and Wild Tropical Fruit Diversity: Promoting Sustainable Livelihoods, Food Security and Ecosystem Services during May 20-24, 2013.

Training of IIHR Staff

- Mrs. Padmavathy, M. K. was deputed to undergo training on 'Leadership skills for women executives' at MANAGE, Hyderabad, May 06-10, 2013.

Participation in Seminar/Symposium/Conferences/Meetings etc.

The following scientists were deputed to participate in national and international conference /seminar/symposium/workshop/meeting etc.

- Dr. Shivashankar, S. and Dr. Sukanya, D.H. - Network Project Meeting on High Value Chemicals, IISR, Calicut, April 02, 2013.
- Dr. Singh, H.S. - Inaugural Ceremony of training programme on sustainable livelihood through tubers, vegetables and fruit crops, RC-CTCRI, Bhubaneswar, April 04, 2013.
- Dr. Sadashiva, A. T. - 2nd meeting of PMC, Hyderabad, April 04-05, 2013.
- Dr. Sudha Mysore - Meeting of O&M Program Committee of NAIP, PIU-NAIP, KAB-II, New Delhi, April 11-12, 2013.
- Dr. Hima Bindu, K. and Dr. Suryanarayana, M.A. - Interaction meeting with Dr. Manoj Srivastava, Registrar, PPVFRA, New Delhi at IIHR, Bengaluru, April 18, 2013.
- Dr. Hima Bindu, K. - UHS, ZHREC meeting, south zone, Bengaluru, April 18, 2013.
- Drs. Aghora, T. S., Madhavi Reddy, Varalakshmi, B. and Sreenivasa Rao, E. - RHREA & PF Workshop for Southern Zone of UHS, Bagalkot, Regional Horticultural Research and Extension Centre, UHS Campus, Bengaluru, April 18, 2013.

- Dr. Sudha Mysore - Entrepreneurs Meet on Plant Health Management, IIHR, Bengaluru, April 18, 2013.
- Drs. Nita Khandekar, Balakrishna, B., Saju Gorge and Narayanaswamy, B. - Brainstorming Session on Improving Research in Agricultural Extension organized by Zonal Project Director, ZPD, Zone-VIII at office of Vice Chancellor, UAS, GKVK, Bengaluru, April 26, 2013.
- Drs. Sadashiva, A. T., Madhavi Reddy, K., Varalakshmi, B., Pitchaimuthu, Sreenivasa Rao, E., Aghora, T. S., Mohan, N., Hebbar, S. S., Kashinath, B.L., Singh, H.S., Bharathi, L.K. and Ranganath, H. R. - XXXI AICRP (VC) Group Meeting, CSK HPKV, Palampur, Himachal Pradesh, May 02-05, 2013.
- Dr. Reju M Kurian - Horticulture & Food Processing Conclave 2013 organized by State Horticulture Mission, Government of Odisha and Indian Chamber of Commerce, Bhubaneswar, May 09, 2013.
- Dr. Gajanana, T. M. - Technical Review and Planning Meeting of the UNEP/GEF TFT Project - 'Conservation and Sustainable Use of Cultivated and Wild Tropical Fruit Diversity: Promoting Sustainable Livelihoods, Food Security and Ecosystem Services' at Chittoor, Andhra Pradesh, May 10, 2013.
- Dr. Dhananjaya, M.V. and Dr. Rajiv Kumar - International Conference on Impact of Technological Tools on Food Security under Global Warming Scenario (ITTFS-2012), Shobhit University, Modipuram, Meerut, May 11-12, 2013.
- Dr. Dinesh, - M.R. Technical Review and Planning Meeting of the UNEP/GEF TFT Project - 'Conservation and Sustainable Use of Cultivated and Wild Tropical Fruit Diversity: Promoting Sustainable Livelihoods, Food Security and Ecosystem Service at Chittoor, Andhra Pradesh on May 10, 2013, followed by a Field Visit on May 11, 2013 and the Eighth National Project Steering Committee (NPSC) meeting of the above project, May 12, 2013.
- Dr. Singh, H.S. - 7th State Level Extension Council Meeting, OUAT, Bhubaneswar, May 16-18, 2013.
- Drs. Sadashiva, A. T., Veeragowda, R., Madhavi Reddy, K., Varalakshmi, B., Pitchai muthu, Sreenivasa Rao, E., Aghora, T. S., Mohan, N., Hebbar, S. S., - IIHR vegetable demonstration and field day organized at Shri. Bose Mandannas farm at Sontekoppa, Coorg, district, May 17, 2013.
- Dr. Rajasekharan, P. E. - Preventing extinction and improving conservation status of threatened plants using biotechnological tools, Sikkim University, Gangtok, May 17, 2013.
- Drs. Sadashiva, A. T., Ravishankar, K.V., Shivashankar, K.S. and Rao, V.K. - Third PMC meeting of DBT on metabolomics at IIHR, Bengaluru, May 20, 2013.

- Dr. Singh, H.S. - State Level Research Council Meeting, OUAT, Bhubaneswar, May 20, 2013.
- Dr. Srinivas, P - State level Seminar on Organic Farming for Horticultural Crops organized by Office of the Director of Horticulture & Secretary: Orissa Horticulture Development Society, May 20, 2013.
- Dr. Krishnamoorthy, A. and Dr. Ganga Visalakshy, PN. - XXII AICRP on Biological Control Crop Pests and Weeds, NBAII, Bengaluru, May 24-25, 2013.
- Dr. Rajasekharan, P.E. - Thompson Innovation User Group Meeting, ITC Windsor, Bengaluru, May 28, 2013.
- Dr. Vasantha Kumar, T. - 3rd Apple Network Programme, New Delhi, May 29, 2013.
- Mrs. Jayanthi Mala B.R. - One day Workshop on Value Chains, Certification and Conservation of Butterflies in Coffee Farming Systems, Hotel Coorg International, Madikeri, organized by Institute for Social and Economic Change (ISEC), Bengaluru, Norwegian Institute of International Affairs (NUPI), UAS, Bengaluru and Agricultural Scientist Forum of Kodak(ASFK), SWASTHA, Kodak and Chai Kauai, May 30, 2013.
- Dr. Chithiraichelvan, R. and Dr. Karunakaran, G - National Consultation Meeting on jackfruit organised by BRS, Kerala Agricultural University, Thrissur, Kerala, June 1, 2013.
- Dr. Sudha Mysore - Workshop on NCAP Network Programme on Market Intelligence, NCAP, New Delhi, June 07, 2013.
- Drs. Bhatt, R.M., Ravindra, V. and Laxman, R. H. - NICRA Horticulture Review Meeting chaired by DDG (Hort.), CRIDA, Hyderabad, June 07, 2013.
- Drs. Yogeesh, H. S., Bhanuprakash, K., Vasugi, C., Hebbar, S. S., Pannerselvam, P. and Naik, L.B. - XII National Seed Seminar on Innovations in Seed Research and Development, Bengaluru, June 08-10, 2013.
- Dr. Balakrishna, B. - Farmers training program on Banana and Onion cultivation organized by Department of Horticulture ZP, Kollegal Taluk, Chamaraja Nagara district under NHM Scheme, June 11, 2013.
- Drs. Sadashiva, A. T., Veeregowda, R., Madhavi Reddy, K., Varalakshmi, B., Pitchai muthu, Sreenivasa Rao, E., Aghora, T. S., Mohan, N., Hebbar, S. S., Dinesh, M.R., Murthy, B.N.S., Shivashankara, K.S. and Laxman, R. H. - National Seminar on Horticultural Biotechnology, IIHR, Bengaluru, June 14, 2013.
- Drs. Sadashiva, A. T., Veeregowda, R., Madhavi Reddy, K., Varalakshmi, B., Pitchai muthu, Sreenivasa Rao, E., Aghora, T. S., Mohan, N., Hima Bindu, K. and Suryanarayana, M.A. - Interaction meeting with Dr. Agarwal, R.C. Registrar, PPVFRA, New Delhi, June 17, 2013.
- Drs. Reddy, F. V. R., Sridhar, V., Bhatt, R.M., Ravindra, V. and Laxman, F. H. - 2nd Annual Workshop of the NICRA project, IARI, New Delhi, June 17-19, 2013.
- Drs. Narayanaswamy, B., Sukanya, D.H., Hima Bindu, K. and Suryanarayana, M.A. - National Workshop on Conservation of RET Medicinal Plants, Bengaluru (IIHR & FRLHT), June 19-20, 2013.
- Dr. Sudha Mysore - NAIP-BPD Training Program by ABI-ICRISAT with Asia Pacific Incubator Network (APIN) – Info Dev, TNAU, Coimbatore, June 18-21, 2013.
- Mr. Devaiah, K. A., Mr. Prabhakara, B. and Mr. Veerendra Kumar, K. V. - Seminar on Climate Change organized by Department of Agriculture, DATC, Kudige, June 21, 2013.
- Dr. Dinesh, M.R. - Status review meeting of Tree Encyclopaedia Project – Sultanate of Oman under the Chairmanship of DDG(Hort.), ICAR, New Delhi, June 21, 2013.

Lectures Delivered

- Dr. N. Mohan delivered a lecture on 'Varieties and production technologies in French bean, cowpea and dolichos during the training programme conducted for the horticulture officers of Trichur district, Kerala, June 01, 2013.
- Dr. R. Chithiraichelvan delivered a lecture on 'Role of jackfruit in nutrition and health' at the 'National Consultation Meeting on Jack Fruit', Banana Research Station, Kannara, Kerala Agricultural University, June 01, 2013.
- Dr. Singh, H.S. delivered a guest lecture in Summer School on 'Cluster approach for horticulture development: a success story in tribal area of Odisha', June 03, 2013.
- Dr. Padmini, K. delivered a lecture on 'Effect of temperature during crossing on pollen germination and hybrid seed yield in watermelon (*Citrullus lanatus* Thunb) in XIII National Seed Seminar, GKVK, Bengaluru, June 08, 2013.
- Dr. P. Srinivas delivered a lecture on 'Vermicomposting' during training programme conducted by PPL, Bhubaneswar on June 12, 2013.
- Dr. V.K. Rao delivered a lecture on 'Chemical characterization of medicinal plants' in National Workshop on RET Medicinal Plants Conservation, IIHR and FRLHT, Bengaluru, June 19-20, 2013.
- Dr. Rajasekharan, P.E. delivered a lecture on IPR in biological sciences at the Jain University IPR the WTO

& IPR Relay Cell, Vishveshvaraiiah Trade Promotion Centre (VTPC) organised by Department of Industries & Commerce, Government of Karnataka in association with the Jain University, JC Road campus during an academia sensitization program on Introduction to IPRs and its use in business & research.

TRANSFER OF TECHNOLOGY

Training

At Hessaraghatta, Bengaluru

- The Division of Extension and Training organised the following sponsored training programs.

Programme	Date	No
1. Management of important horticultural crops for the farmers of Madhepura (Bihar)	April 05-08, 2013	18
2. Floriculture – improved production practices for the farmers of Kolhapur (Maharashtra)	April 25-26, 2013	18
3. Improved vegetable production technologies for the farmers and officers of Thrissur, Kerala	June 01-04, 2013	19
4. Training rural women on mushroom cultivation for economic and nutritional upliftment for rural women	June 22-23, 2013	115
5. Training rural women on mushroom cultivation for economic and nutritional upliftment	June 26-27, 2013	17

- The Division of Extension and Training organised the following farmer's trainings programs at various places on different technologies of the Institute.

Programme title	Place, Date and No. of Participants
1. Use of onion drum seeders (tractor and bullock drawn) and cultivation of IIHR onion varieties using improved production packages of IIHR	IIHR, Bengaluru, May 17, 2013, 15 farmers
2. Use of onion drum seeders (tractor and bullock drawn) and cultivation of IIHR onion varieties using improved production packages of IIHR	Giriyapura, Kadur, June 01, 2013, 15 farmers
3. Banana and onion cultivation organised by SADH (ZP), Department of Horticulture, under NHM Scheme	Kollegal Taluk, Chamrajanagara, June 11, 2013

- The Mushroom laboratory conducted two training programs on 'Entrepreneurship development on spawn production' and 'Entrepreneurship development on mushroom cultivation' during June 13-15 and June 17-21, 2013 respectively and a total of 12 entrepreneurs were trained.

At CHES, Bhubaneswar

The Station conducted a three days training program on 'Commercial vegetable cultivation' in collaboration with Harsha Trust, Bhubaneswar, for field staff of Pragati agriculture and non-timber forest produce (NTFP) co-operative during June 05-07, 2013.

At KVK, Gonikoppal

The KVK conducted eight training programs in different disciplines and 307 participants (168 farmers and 139 farm women) were benefited from these need based trainings.

Discipline	No. of trainings	No. of Participants		Total
		Male	Female	
Horticulture	01	35	15	50
Home Science	03	9	74	83
Livestock	03	55	45	100
Plant protection	02	69	05	74
Total	08	168	139	307

- The KVK conducted three vocational training programs for district Bhoochetana Farmers Facilitators on 'Integrated crop management on prevailing crops in Kodagu' for 30 of Virajpet taluk on May 15-19, 2013, 30 of Somwarpet taluk on May 21-25, 2013 and 28 of Madikeri taluk on May 28-June 01, 2013. The training programs were conducted in collaboration with the Department of Agriculture, Govt. of Karnataka and ICRISAT, Hyderabad.

At KVK, Hirehalli

The KVK, Hirehalli, Tumkur, Karnataka organized the following trainings.

Name of the programme	No. of participants
Potential of IIHR varieties in horticulture crops	13
Processing & value addition to <i>Aonla</i>	25
Fruit orchard management	15
Nematode management in banana	35
Advanced production technologies in fruit crops	31
Soil & water conservation	53
Use of micronutrients and group approach	63
Use of bio-fertilizers	54

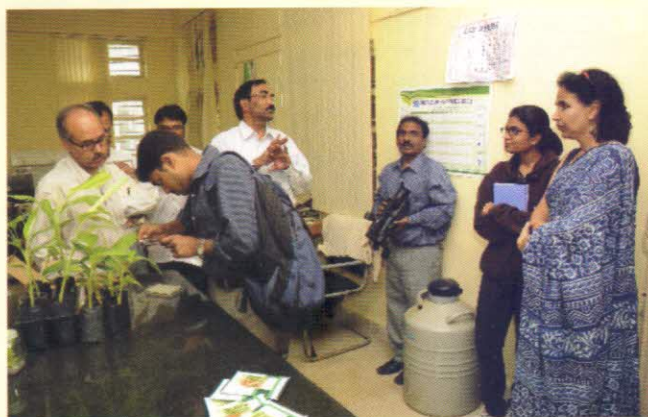
Name of the programme	No. of participants
Integrated nutrient management	56
Group approach and soil rejuvenation	58
Processing of fruits & vegetables	32
KVK activities- integrated farming system	24
Soil water conservation & dry land horticulture	26
Integrated agricultural practices-red gram cultivation	17
KVK activities, hi-tech horticulture	23
Importance of mushroom cultivation	28
Improved practices for groundnut cultivation	28
Red gram cultivation	24
Processing & value addition to <i>Aonla</i>	29
Improved cultivation practices & importance of medicinal plants	20

Media Events

Media Meet and Exposure Visit

The Institute organized a Media Meet and Exposure Visit of media persons under the NAIP Sub project "Mobilizing Mass Media Support for Sharing Agro Information" on June 14, 2013. Ten Media Persons representing print and electronic media visited 'The National Facility for Quarantine Testing and Certification of Seed and Planting Material of Horticultural Crops' of the Division of Plant Pathology which has been certified by Govt. of India through a Gazette notification for the benefit of the clients at large and 'Pesticide Residue Research Laboratory' of Division of Soil Science and Agricultural Chemistry which has been accredited in accordance with the standard ISO/IEC 17025:2005 in the field of chemical testing by NABL (National Accreditation Board for Testing and Calibration Laboratories), Department of Science and Technology, Govt. of India w.e.f. 16.10.2012.

Dr. M. Krishna Reddy, Head Division of Plant Pathology addressed the media persons and explained the objective of



Dr. Krishna Reddy addressing the media persons

establishing national facility for Quarantine Testing and Certification of Seed and Planting Material of Horticultural Crops and explained the benefits to the end users. Dr. S. Mahopatra and Dr. Debi Sharma explained the facilities available in the Pesticide Residue Research Laboratory and the objectives of establishing the accredited laboratory. The media meet was facilitated by Dr. Nita Khandekar, P.B. Gaddagimath and Chandesh, C. under the leadership of Dr. Amrik Singh Sidhu, Director of the Institute.

Media Meet at KVK, Hirehalli

The Institute organized a 'Media Meet' at Krishi Vigyan Kendra, Hirehalli on June 25, 2013 under the NAIP project - Mobilizing Mass Media Support for Sharing Agro Information to showcase the activities and achievements of KVK, Hirehalli. Dr. L.B. Naik, Program Coordinator, KVK, Hirehalli made a brief presentation of various facility's available and research and extension work conducted in KVK, Hirehalli. Concluding his presentation Dr. Naik explained about mushroom spawn production unit, tissue culture unit, importance of micro nutrient formulations, nursery unit and post harvest technology unit.

Dr. Nita Khandekar, PI of the NAIP project extended welcome to media persons and Mr. P. B. Gaddagimath, Co-PI of the project gave a brief introduction about the objectives of the Media Meet and appealed to the media persons to cover the activities and services being offered to farmers by the KVK in their media reports.

The media persons were taken to mushroom spawn production lab, agriculture machinery unit, *aonla* juice production unit, micro nutrient production unit, seed production plots and various fruit and other crops plots.

More than 25 media persons from print and electronic media from Tumkur district participated in the media meet and covered the profile of KVK, Hirehalli in their media report.



Dr. L. B. Naik addressing the media persons

Field Days

Vegetable Field Day

The CHES, Chettalli in collaboration with Division of Vegetable Crops, IIHR, Bengaluru organised a Vegetable Field Day at Subramanya Estate of Sri. Bose Mandanna, Suntikopa, and KVK, Gonikoppal on May 17, 2013 to demonstrate the

successful vegetable cultivation in Kodagu region and create awareness. More than 60 participants including farmers from Kodagu, scientists of Division of Vegetable Crops, IIHR, Bengaluru, CHES, Chettalli and KVK, Gonikoppal participated in the program. The participants were taken round the demonstration plots of vegetables and witnessed various vegetables successfully grown in the farm. Addressing the farmers Dr. A. S. Sidhu, Director IIHR, Bengaluru emphasized that vegetable cultivation is now becoming a profession as lot of entrepreneur are entering the sphere and appealed to the farmers to diversify their cultivation with vegetables as good number of vegetable varieties/hybrids have been developed by IIHR, Bengaluru which perform well in Kodagu region. Shri Bose Mandana, progressive Grower sharing his experience, expressed that vegetable cultivation is not only successful in Kodagu but also profitable as the produce comes in the market during summer season and thanked the scientists of IIHR, Bengaluru and CHES, Chettalli for their encouragement and guidance. Dr. A.T. Sadashiva, Principal Scientist and Head, Division of Vegetable Crops, IIHR, Bengaluru explained about successful vegetable cultivation in the region and assured the farmers of all technical support for more demonstrations in the region. Dr. P. C. Tripathi, Head, CHES, Chettalli, Dr. Madhavi Reddy, Dr. T. S. Aghora, Dr. S. S. Hebber, Dr. T.H. Singh from IIHR, Bengaluru and other scientists from CHES, Chettalli also shared their experience. Dr T. Manjunath Rao Principal Scientist and Head, Division of Floriculture described about the possible of expansion of flower cultivation in the region. Later, a field visit was organised to the vegetable demonstration block at CHES Chettalli. In the afternoon another programme was conducted at KVK, Gonikoppal where the vegetables were grown under drip irrigation and mulching for efficient water use and weed control. A scientists'-farmers' interaction was organised for the benefit of the farmers.



Mr. Bose Mandanna explaining performance of IIHR vegetable varieties in his farm.

Chilli Field Day

The KVK, Gonikoppal organised a Field Day on Chilli at KVKs demonstration farm at Athur on May 31, 2013. The chilli varieties viz., Arka Swetha, Arka Meghana, Arka Kyathi, Arka

Suphal and Arka Harith developed by IIHR, Bengaluru were demonstrated in the farm. The main objective of the field day was to identify chilli varieties suitable for cultivation in different regions of Kodagu. Farmers from different chilli growing areas of Kodagu region were invited to participate in the field day.



A view of the chilli field

The farmers were taken to the demonstration plots of chilli to witness the crop and get first-hand information about the different chilli varieties and their performance in the field. A total of 90 farmers from different regions of Kodagu participated in the field day. A Scientists'-Farmers' interaction program was conducted at the main office campus at Gonikoppal during which Mr. Sathish Devaiah, progressive farmer, Kottageri emphasized the importance of chilli cultivation in Kodagu region and expressed that chilli cultivation was not only successful in Kodagu but also profitable as the produce comes to the market during summer season. Dr. G.C. Satisha, Scientist-in-charge, KVK, Gonikoppal presided over the program. Dr. K. Madhavi Reddy, Dr. A. K. Nair and Dr. T. H. Singh, Division of Vegetable Crops, IIHR, Bengaluru, Dr. V. Shankar and Dr. T. M. Reddy from CHES, Chettalli and Mr. Prabhakara, Mr. K. A. Devaiah, Mr. Veerendra Kumar, Dr. Suresh S.C, Mr. Vasantha Kumar, Mr. B. Bopaiah and Mrs. M. K. Padmavathy from KVK, Gonikoppal were the resource persons who interacted with the farmers and replied to their queries during program.

Soil Health Campaign

The KVK, Gonikoppal organised Soil Health Campaigns on April 03, April 08, 2013 at Bittangala and Bhagamandala villages respectively under ATMA programme in collaboration with the Kodagu District Co-operative Union, Madikeri. The importance of soil sampling, soil testing, amendments and judicious application of fertilizers on soil test based approaches were briefed to the gathered 75 farmers.

Animal Health Campaign

The KVK, Gonikoppal organised a Campaign on Foot and Mouth (F&M) Disease at Badaga village of Virajpet taluk on April 09, 2013 and addressed the farmers' gathering on severity and death of animals due to the foot and mouth disease. The campaign was conducted under ATMA program during which 26 cattle, 12 buffaloes and 27 goats belonging to 18 farmers were vaccinated.

Demonstrations

The Division of Extension and Training in association with the scientists of other divisions of the Institute organized the following demonstrations of IIHR technologies in farmers' fields for popularizing the varieties and technologies developed by the institute.

Sl. No.	Technologies/ Varieties	Place and date	Nos
1.	Onion drum seeder (tractor drawn) under NICRA project- TDC component	Farmers' field at Hirenallur and Giriyaपुरa villages in Kadur taluk 12.06.2013	05
2.	Onion drum seeder (bullock drawn) under NICRA project-TDC component	Farmers' field at Hirenallur and Giriyaपुरa villages in Kadur taluk on 29.06.2013	04
3.	Onion varieties viz., Arka Kalyan and Arka Niketan	Farmers' field at Hirenellur and Giriyaपुरa villages in Kadur taluk and Koratikere, Tharikere taluk	21
4.	Onion hybrids viz., Arka Lalima and Arka Kirthiman	Farmers' field at Hirenallur and Giriyaपुरa villages in Kadur taluk	04
5.	Arka Rakshak tomato hybrid	Farmers' field in Bengaluru rural and urban, Kolar and Chikkaballapura districts	12
6.	Precision farming practices in tomato, capsicum, watermelon, okra, cucumber, field beans, ridge gourd and chilli crops using new varieties and hybrids of IIHR	NICRA villages of Kadur Mysore and Bengaluru North taluks and farmers' fields at Chamarajanagara, Kolar, Chikkaballapura districts	16
7.	Precision farming practices for vegetable crops under RKVY Seed Production Project	Bengaluru urban and rural, Ramanagara, Mysore, Chikkaballapura and Kolar	65
8.	Tomato hybrids - Arka Rakshak & IIHR-2856 under NICRA Project	Harati in Kolar district	04
9.	Climate resilient technologies in fruit and vegetable crops	Kolar, Chikkamagalur, Mysore, Chikkaballapura, Bengaluru Urban and Rural	28
10.	Coriander variety Arka Isha	Bengaluru urban & rural and Tumkur	4
11.	Cauliflower variety Arka Spoorthy and Arka Vimal	Bengalureu urban and rural	3
12.	Seed Pro in ginger	Kasargod in collaboration with KVK- CPCRI	5
13.	China Aster – variety Kamini, Poornima and Shashank	Tumkur in collaboration with KVK- Hirehalli	3
14.	Production technology of mushroom	Seethkempnanahalli Shivkote Aivarakandapura Kaakolu Shanuboganahali	26 15 30 13 8



Onion sowing using IIHR Onion Drum Seeder by the farmer in Giriyaपुरa village, Kadur taluk

Prolific bearing of IIHR tomato hybrid- Arka Rakshak

Front Line Demonstration (FLD): The KVK, Gonikoppal organised a FLD of high yielding and blast resistant paddy variety Tunga in eight ha at Hebbale village, Kushalnagar Hobali, Somwarpet taluk for *khari* season 2013 in 30 farmers plots.

Surveys/Field Visits

- A joint exploration mission by IIHR scientists Dr. Anuradha Sane and Dr. C.Vasugi, scientists of CISH, Lucknow and CARI, Port Blair was undertaken to middle and north Andaman Islands during April 08-13, 2013 to

collect trait specific types of mango. Twenty seven types of various traits viz., cluster bearing, polyembryonic, fruits with high pulp recovery and some high yielding types were collected from **Rangat, Billiground, Nimudera and Digilipur**. *Mangifera* species such as *Mangifera griffithii* and *Mangifera andamanica* were collected from Mount Harriet and Chidiatapu respectively.

- Dr. G. Karunakaran, CHES, Chettalli visited State Horticulture Farm, Madapur, Kodagu for establishment and consultancy for development of new farm on May 23, 2013.
- A team of subject matter specialists from KVK, Gonikoppal comprising of crop and animal production and management visited Sivapuri Ashrma, Devarapura on May 02, 2013 to ascertain cropping pattern for paddy fallow and wasteland development, Balele block on May 07, 2013 for ascertaining paddy varieties for the *kharif* 2013 and Badagarakeri village on June 03 and June 05, 2013 for ascertaining banana disease affected plots for selection of village and farmers for implementation of OFT/FLDs for the ensuing season 2013-14.
- Dr. P. Sampath Kumar visited Jalna, Maharashtra regarding cultivation of Arka Sahan on June 04-06, 2013.
- Dr. A. Rekha and Dr. Anuradha Sane undertook exploration to Belgaum and surrounding areas to collect jamun germplasm during June 11- 14, 2013.
- Dr. A.S. Sidhu, Dr. A.T. Sadashiva, Dr. Shankar Hebbar, Dr. K.V. Ravishankar, Dr. B. Balakrishna, Dr. S.K. Tikko and Mr. B.L. Kashinath visited the plot of tomato hybrid Arka Rakshak in farmers' fields at Kadatanamale, Doddaballapur taluk on June 18, 2013. Tomato grower Mr. Nagaraju harvested 90 tons from 3 acres and earned Rs. 20 Lakhs.



Dr. A. S. Sidhu, Director, and other staff members witnessing Arka Rakshak tomato crop

- Dr. P. Sampath Kumar visited farmers' orchards under tissue culture grown pomegranate at Sira and Hosadurga area on June 19-22, 2013.
- Dr. T. Sakthivel surveyed Kolli Hills in Tamil Nadu for underutilized fruits and collected *Elaeocarpus serratus* L. and *Clausena dentate* (Willd.) M. Roem on June 24-28, 2013
- Dr. B. Varalakshmi visited the coriander demonstration plot raised in farmers' fields and distributed the seedlings of cauliflower varieties, Arka Vimal and Arka Spoorthi

for demonstration at Seethakempanalli and Kakolu on June 29, 2013.

- Dr. Tripathi, P.C., Dr. Sankar, V., Dr. Reddy, T.M. and Mr. Sanna Manjunath, K.S. visited vegetable varieties block demonstration at Subramanya Estate, Suntikoppa and observed good yield of okra, French bean, yard long bean, pumpkin, amaranth and brinjal and suggested control measures for disease management.

Radio Program

Dr. B. Narayanaswamy participated in a radio interview on 'Mixed cropping system' on 03.05.2013 at AIR, Bengaluru.

TV Program

The following TV programs by resource persons from the Institute were telecasted on Doordarshan, Bengaluru.

1. Discussion on integrated pest management in mango by Dr. B. Narayanaswamy on April 14, 2013.
2. Leafy vegetable varieties released by IIHR, Bengaluru by Dr. B. Varalakshmi on May 07, 2013.
3. Discussion on kharif season and agricultural preparation by Dr. B. Narayanaswamy on June 26, 2013.

Technology Transfer/Interactive Meetings

1. Interaction with Additional Director of Horticulture (Farms & Nursery) and JDH (Vegetable Crops), Dept. of Horticulture, Govt. of Karnataka on 'Demonstration of biological control of pests and diseases and integrated crop management practices in protected cultivation of vegetables and flowers' at Department of Horticulture, Lalbagh, Bengaluru on May 04, 2013.
2. Interaction of Scientists of IIHR, NBAII, Bengaluru and Koppert Bio-control with officers of Dept. of Horticulture, Govt. of Karnataka on RKVY project 'Demonstration of biological control of pests and diseases and integrated crop management practices in protected cultivation of vegetables and flowers' at NBAII, Bengaluru on June 21, 2013.
3. Interaction with Additional Director of Horticulture (Farms & Nurseries) and team of state and district level officers, Dept. of Horticulture, Govt. of Karnataka on 'Development of package and publication on precision farming in vegetable crops'.
4. Dr. R.B. Tiwari transferred osmotic dehydration technologies of pineapple to CPCRI-KVK, Kasargod, Kerala, April 2013.

Exhibition

The CHES, Bhubaneswar participated in the State Level Fruit Festival, organized by Directorate of Horticulture & Odisha Horticulture Development Society, Odisha, Bhubaneswar at Adivasi Ground, Bhubaneswar on May 19-22, 2013.

Sale of IIHR Technological Products

The technological products of IIHR viz., Banana Special Mango Special, Vegetable Special, Citrus Special, Trichorich-N, *Pseudomonas fluorescens*, *Paecilomyces lilacinus*,

Microbial Consortium, Pongamia Soap, Neem Soap, Sealer cum Healer, Vegetable fruit fly traps and lures, Institute Publications, VCDs and DVDs, Vegetable Seeds Kit & Sample Packets, PHT products, Sapota, Mango and Lime Harvesters etc. were sold through the ATIC sales counter to the visiting farmers and general public and a revenue of Rs. 5,25,115.00 has been generated. Apart from this RS. 2,42,520.00 has been generated by the Mushroom laboratory by way of sale of mushroom spawn, ready to fruit (RTF)bags and trainings.

General Visitors

- A total of 720 farmers, 307 students and 08 others/officers visited the Institute. The visitors were taken round the Institute farm and laboratories and the activities and achievements of the Institute were explained to them by the staff of Division of Extension and training.
- A total of 510 farmers, students, agriculture officers private gardeners etc. from 14 different places of Odisha and other states, sponsored by eight different organizations / agencies / NGO's visited CHES, Bhubaneswar for exposure in horticultural technologies and got benefited.

PUBLICATIONS

Research Papers

- Devi, B. Nightingale, Krishnan, M., Venugopalan, R. and Mahapatra, B. K. (2013). Artificial neural network model for synergy analysis of input markets in ornamental fish trade in Mumbai. *Agril. Eco. Res. Review*, **26**:83-90.
- Eugene Sebastian J. Nidiry and Loksha, A. N. (2013). A rapid spectrophotometric method for the quantitative estimation of octadecyl *p*-coumarates. *J. Appl. Spectroscopy*. **80**: 478-481.
- Mythili Avadhani, M. N., Immanuel Selvaraj C., Rajasekharan, P. E. and Tharachand, C. (2013). The sweetness and bitterness of sweet flag (*Acorus calamus* L.) – a review. *Res. J. Pharm. Biol. Chem. Sci.* Volume 4, Issue 2, (April - June)
- Naresh, P., Madhavi Reddy, K., Shivashankara, K. S. and George Christopher, M. (2013). Genotypic variation for biochemical compounds in capsicum. *Ind. J. Hort.* **70**:43-47.
- Ragupathi H. B., Shakthivel, T. and Ravishankar, H. (2013). Preliminary DRIS ratio norms for diagnosis of nutrient imbalance in Coorg mandarin. *Ind. J. Hort.* **70**: 33-36.
- Ramya, M., Yogeesh, H. S., Bhanuprakash, K. and Veere Gowda, R. (2012). Physiological and biochemical changes during seed development and maturation in onion (*Allium cepa* L.). *Veg. Sci.* **39**: 157-160.
- Ravi, G. S., Venugopalan, R., Padmini, K. and Gowda, D. M. (2013). Nonparametric measures for assessing

yield stability in cucumber. *Int'l. J. Agril. Statl. Sci.* **9**: 65-371.

- Shivashankara, K. S., Laxman, R. H., Geetha, G. A., Roy, T. K., Srinivasa Rao, N. K. and Patil, V. S. (2013). Volatile aroma and antioxidant quality of Shiraz grapes at different stages of ripening. *Int'l J. Fruit Sci.*, **13**: 389-399.
- Soumya Shetty, Ravishankar, K. V. and Aghora, T. S. (2013). Identification of molecular markers linked to rust resistance in French bean (*Phaseolus vulgaris* L.). *Pl. Archives*, **13**: 353-357.
- Swarupa, V., Ravishankar, K.V. and Rekha, A. (2013). Characterization of tolerance to *Fusarium oxysporum* f. sp. *cubense* infection in banana using suppression subtractive hybridization and gene expression analysis. *Physiol. Molecular Pl. Path.* **83**:1-7.
- Swathi, K. and Tejaswini. (2013). Effect of pollen source on maximizing hybrid seed production: case study in petunia. *Crop Res.* **45**: 244-247.
- Syed Asadulla, Ramandang and Rajasekharan, P. E. (2013). Preliminary phyto-chemicals investigation of *Embelia Ribes*. *Int'l J. Res. Pharmacy and Chemistry Ijrpc*, **3**: 389-91.

Books/Book Chapters

- Bharathi, L. K., Behera, T. K., Sureja, A. K., Joseph, J. K. and Todd C., Wehner. (2013). Snake gourd and pointed gourd: botany and horticulture. *In: Horticultural Reviews*, Volume 41, Janick, Jules (Ed.). ISBN 978-1-118-70737-1-John Wiley & Sons.

Popular Articles

- Narayanaswamy, B., Hegde, M.R. and Saju George. (2013). Sustainable agricultural practices for good environment, *Yojana*, **28**(11): pp 30-33
- Tripathi, P. C. and Karunakaran, G. (2013). Relative susceptibility of sapota cultivars to flat foot diseases under Coorg conditions. *Prog. Hort.* **45**(1):235-238.
- Sudhakar Rao, D.V. (2013). *Easy method of ripening of mangoes*. *Vijayavani*, Kannda Daily Newspaper, April 29, 2013, pp 4.

Proceedings / Abstracts/Souvenir of Conference/Symposium/Seminar

- Bharathi, L. K., Singh, H. S., Shivashankar, S., Ganeshamurthy, A. N., Suresh Kumar, P. (2013). Assay of nutritional composition and antioxidant activity of three dioecious *Momordica* species of South East Asia. *Proc. Natl. Acad. Sci., Ind, Sect. B., Biol. Sci.* DOI 10.1007/S 40011-013-0205-7

Technical Bulletin

- Tripathi, P.C., Prabhakar, B., Veerendra Kumar, K.V., Suresh, S.C. and Devaiah, K. A. (2013). Importance, production and utilization of organic inputs for organic farming.

Extension Folder

- Suresh S. C. (2013). Goat farming.

PAPERS PRESENTED IN SEMINAR / SYMPOSIUM / CONFERENCE ETC.

2nd Meeting of PMC, Hyderabad, April 04-05, 2013.

- Sadashiva, A. T. - Introgression of begomovirus resistance in tomato.

Meeting of O&M Program Committee of NAIP, PIU-NAIP, KAB-II, New Delhi, April 11-12, 2013.

- Sudha Mysore - Proposal on BPD unit at IIHR, Bengaluru.

UHS, ZHREC Meeting, South Zone, Bengaluru, April 18, 2013.

- Hima Bindu, K. - Farm trials on velvet bean.

Entrepreneurs Meet on Plant Health Management, IIHR, Bengaluru, April 18, 2013.

- Sudha Mysore - Role of incubators in plant health management technologies.

31st Group Meeting of All India Coordinated Research Project on Vegetable Crops, CSK HPKV, Palampur, H.P, May 02-05, 2013.

- Mohan, N. - Hybrid trials of solanaceous crops of all centers in the hybrid trial session.
- Doreyappa Gowda, I. N. - Development of lycopene and vitamin C in tomatoes during development.
- Ranganath, H. R. - Report of trials on IPM of vegetable crops.

Brainstorming Workshop on Post Harvest Stability of Farm Produce organized by National Agri-Food Biotechnology Institute (NABI), Mohali, Department of Biotechnology, Govt. of India, May 08, 2013.

- Sudhakar Rao, D.V. - Controlled and modified atmospheres for storage and transportation of tropical fruits.

International Conference on Impact of Technological Tools on Food Security under Global Warming Scenario (ITTFS-2012), Shobhit University, Modipuram, Meerut, May 11-12, 2013.

- Rajiv Kumar - Genetic variability, heritability, correlation and path analysis for quantitative traits in Asiatic *lilium*.

Jack Fruit Mela-2013, Bamboo Village, Tirikkaipette, Wayanad, Kerala, May 17-19, 2013.

- Tiwari, R. B. - Value addition to jack fruit.

XXII AICRP on Biological Control of Crop Pests and Weeds, NBAII, Bengaluru, May 24-25, 2013.

- Ganga Visalakshy, P. N. - Report on biological control of

crop pests and weeds of tropical fruits of all centres of AICRP.

Jack Fruit Mela-2013, Sirsi, May 25-26, 2013.

- Tiwari, R. B. - Value addition to jack fruit.

International Conference on Water Quality and Management for Climate Resilient Agriculture, Jalgaon, May 28-30, 2013.

- Laxman, R. H. - Water use efficiency as a trait for adaptation of banana to climate change.

Action Plan for the Management of Bacterial Blight of Pomegranate, NRCP, Sholapur, May 29, 2013.

- Aswath, C - Biotech intervention in control of pomegranate blight in IIHR.

XII National Seed Seminar on Innovations in Seed Research and Development, Bengaluru, June 08-10, 2013.

- Yogeesh, H. S. - Ultra low moisture drying as a cost effective technique to extend longevity of papaya and onion seeds under ambient conditions.
- Yogeesh, H. S. - Standardization of seed pelleting technology in onion and carrot.
- Padmini, K. and Naik, L. B. - Effect of seasonal variations and pollination methods on seed yield in chilli (*Capsicum annum*).
- Padmini, K. and Naik, L. B. - Effect of temperature during crossing on pollen germination and hybrid seed yield in watermelon (*Citrullus lanatus* Thunb).

Growers Association of India (19) Promoted by the National Horticulture Board, Gurgaon, June 25, 2013.

- Senthil Kumaran, G. - Requirement of plant & machinery for horticulture.

Food Con -2013: Conference on Emerging Technologies in Food Processing Sector, Chennai, June 28, 2013.

- Tiwari, R. B. - Technologies and scope for developing fruit and vegetable based snacks.

1st International and 3rd National Conference on Biotechnology, Bioinformatics and Bioengineering, organized by Society of Applied Biotechnology, Dharma, June 28-29, 2013.

- Aswath, C. - Application of biotechnology in improvement of horticultural crops.
- Chandra Prakash, M. K. and Reena Rosy Thomas. - Transposable element excision footprints found in heat shock protein coding regions of solanaceous crops.

HONOURS/RECOGNITIONS/AWARDS

- CHES, Bhubaneswar received "King of Show" honour from His Excellency, Governor of Odisha, Shri S. C. Zameer for the variety Arka Neelachal Kesri during Fruit competition in the State level Fruit Festival-2013,

organized by Directorate of Horticulture & Odisha Horticulture Development Society, Odisha, Bhubaneswar at Adivasi Ground, Bhubaneswar, May 19-22, 2013 and also received ten other prizes in different categories for mango varieties viz., Kesar, Manjeera and Rajpuri, sapota varieties DSH-1, Kalipatti, Cricket ball, Co-2, and minor fruit varieties Passion fruit, Lasoda, and Rose apple.



Dr. H S Singh, Head receiving prize for "King of the Show" from His Excellency Hon'ble Governor of Odisha, Shri S. C. Zameer

- Dr. Aswath, C. received the 'Excellence in Biotechnology Award' instituted by Society of Applied Biotechnology, Dharwad.



Dr. Aswath receiving the Excellence in Biotechnology Award

- Dr. Rajiv Kumar received HTHS Gold Medal Award for the year 2012 instituted by Hi-Tech Horticultural Society for outstanding contribution and recognition in the field of horticulture, during International Conference on Impact of Technological Tools on Food Security under Global Warming Scenario (ITTFS-2012) Shobhit University, Modipuram, Meerut, May 11-12, 2013 and also acted as one of the Judges among four Member Committee for evaluation of poster papers presented during International Conference.
- Dr. Sudha Mysore was invited as a panellist in the XIII ISST National Seed Seminar- in the session on 'Innovations through partnerships', UAS, GKVK, Bengaluru, and June 09, 2013.
- The research paper by Nagachiatanya, M.V., Aswath, C., Lakshmana Reddy, D.C., Dinesh, M.R., Vasugi, C.

entitled 'Assessment of genetic diversity in Guava using SSR markers' was awarded Best Oral Paper Presentation award in the International Conference on Biotechnology, Bioinformatics and Bioengineering by Society of Applied Biotechnology, Dharwad, June 28-29, 2013.

- Dr. Deepa Samant was nominated as a member of the expert team for nursery verification and visited different plant nurseries of West Bengal, Andhra Pradesh and Odisha, June 2013.
- Dr. Aswath, C. was elected as 'Fellow-2012' for the outstanding contribution in the field of horticulture biotechnology by Society of Applied Biotechnology, Dharwad.
- Dr. Sridhar, V. has been elected as Secretary, Association for Advancement of Pest Management in Horticultural Ecosystems.
- Dr. Ranganath, H. R. has been nominated as Treasurer, Association for Advancement of Pest Management in Horticultural Ecosystems.
- Dr. Reddy, P. V. R. has been nominated as Chief Editor for the journal, Pest Management in Horticultural Ecosystem.
- Dr. Singh, H. S., Dr. Srinivas, P. and Dr. Deepa Samant acted as Judges of exhibits in State Level Fruit Festival 2013 conducted by Office of the Director of Horticulture, Odisha, May 19-22, 2013.
- Dr. Singh, H. S. acted as Chief Guest in the training programme for primary stakeholders under IWMP on 'Horticulture for Sustainable livelihood', CIFA, Bhubaneswar, June 06, 2013.

PERSONALIA

New Entrant

1. Dr. Sankar, V. Sr. Scientist (Hort.) joined CHES, Chettalli on his transfer from Directorate of Onion and Garlic Research, Rajguru Nagar, Pune w.e.f. 01.05.2013

Promotion

Technical Staff

1. Mr. Thippesway, T-6, IIHR, Bengaluru has been promoted to the next higher grade to T(7-8) w.e.f. 03.11.2011
2. Mr. Varadaraju, V., T-(7-8), IIHR, Bengaluru has been promoted to the next higher grade T-9 (Lib) w.e.f. 03.02.2012.
3. Mr. Prabhakara, B., SMS (Horticulture), (T-6) KVK, Gonikoppal has been promoted to the next higher grade to T7-8 w.e.f. 3.4.2012.
4. Mr. Bopaiah, B. B., (T-5) KVK, Gonikoppal has been promoted to the next higher grade to T6
5. Ms. Padmavathy, M.K., (T-5) KVK, Gonikoppal has been promoted to the next higher grade to T6
6. Mr. Velmurugan, K., (T-2) (Jeep driver), KVK, Gonikoppal has been promoted to the next higher grade to T3

Administrative Staff

- Ms. Sangeetha, UDC IIHR, Bengaluru has been promoted to the post of Assistant w.e.f. 04.04.2013.

Superannuation

Scientific Staff

1. Dr. Sukhada Mohandas, IIHR, Bengaluru, retired on superannuation from council's service w.e.f 30.06.2013 (AN)

Technical Staff

1. Mr. Lingaiah, J., IIHR, Bengaluru, retired on superannuation from council's service w.e.f 30.04.2013.
2. Mr. Kushalappa, P. A., IIHR, Bengaluru, retired on superannuation from council's service w.e.f 30.04.2013.
3. Mr. Revanna, H. C., IIHR, Bengaluru, retired on superannuation from council's service w.e.f 31.05.2013.
4. Mr. Sudarshan, B., IIHR, Bengaluru, retired on superannuation from council's service w.e.f 30.06.2013.

Administrative Staff

1. Smt.Vani Bheemaiah, AAO, IIHR, Bengaluru, retired on superannuation from council's service w.e.f 30.06.2013.
2. Mr. Linganna, IIHR, Bengaluru, retired on superannuation from council's service w.e.f 30.06.2013.

Voluntary Retirement

1. Mr. Menon Sampath Kumar, T-4 (Driver), IIHR, Bengaluru retired voluntarily w.e.f 08.04.2013(FN)

Transfer

Technical Staff

- Mr. D. Praveen, LDC has been transferred from CHES, Chettalli to IIHR, Bengaluru w.e.f. 10.05.2013.

Obituary

The staffs of IIHR, Bengaluru mourns the sad demise of Mr. Narayanappa, P. SSS, KVK, Hirehalli, who passed away on May 10, 2013.

VISITORS

IIHR, Hesaraghatta, Bengaluru

- Dr. Ramakrishnappa, P. Additional Director (Farms & Nursery), Dept. Of Horticulture, GOK, Bengaluru (19-6-2013)
- Dr. Srivastava, R. B. Director, DIHAR, LEH (16.04.2013)
- Dr. Takker, P. N. INSA, Senior Scientist & Chairman CAC, NAIP, Dr. A. K. Shukla, PC, Micro & Secondary Nutrients & Pollutant Elements, Dr. (Mrs.) Chitralekha Chatterjee, Professor (retired) of Botany, University of Lucknow (29.06.2013).

CHES, Bhubaneswar

- Dr. Malhotra, S. K. ADG(Hort.), ICAR, New Delhi (17.05.2013)
- Mr. Sanjeeb Panda, IPS, IG Personnel, Odisha, Dr. Santhosh Bala, Additional Commissioner of Police, Bhubaneswar (02.03.2013).

CHES, Chettalli

- Dr. Medhi, R. P. Director, NRC Orchids, Patyong, Sikkim (11-04-2013)
- Dr. Anandraj, M. Director, IISR, Calicut (19.06.2013)

KVK, Gonikoppal

- Dr. Sidhu, A. S. Director, IIHR, Bengaluru (17.05.2013)
- Dr. Alexander, Taluk Panchayat Chief Executive Officer
- Dr. Aiyappa, K. P. Deputy Director, Department of AH& VS
- Dr. Chinnappa, K. P. President, Kodagu Kennel Club, Pollibetta
- Mr. Ramakrishna, K. Joint Director of Agriculture

KVK, Hirehalli

- Dr. K.D. Kokate, DDG (Agril.Extn.), ICAR, New Delhi, Dr. S. Prabhu Kumar, Zonal Project Director, TOT, Bengaluru (24.05.2013)
- Dr. George V. Thomas Director, CPCRI, Kasargod (15.06.2013)

For further details please contact:

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Published by : Director, IIHR, Hesaraghatta Lake Post, Bengaluru-560 089
E-mail : director@iihr.ernet.in
Phone : 080-28466420-423
Website : www.iihr.ernet.in
Production and Editing : Publication Committee, 2013-14
Printed at : Precision Fototype Services, Bengaluru-560 008, ☎: 9845044311, precision_new@yahoo.co.in