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From Director's Desk

Indian agriculture is predominantly small holders' agriculture as more than 82 per cent of the holdings are small and marginal. The average size of the landholding declined from 2.28 ha in 1970-71 to 1.55 ha in 1990-91 and to 1.23 ha in 2005-06 with a concurrent increase in the absolute number of operational holdings from about 70 million to 129 million. Added to this is the growing trend of urbanization. During the period between 2007-08 to 2010-2011 about 4, 06,000 hectares of cultivable land has been lost due to urbanization. It is estimated that by 2050 almost 65% of the population would be living in urban areas. While the chances of horizontal expansion of area in agriculture in the coming years would be too difficult, crop diversification to horticultural crops particularly the vegetable, flower and few fruit and medicinal and aromatic crops and alternate production systems like vertical farming under protected environment under urban and peri-urban areas holds more promise for attaining resilient food system for the growing population. Hence it is essential to ensure greater participation of small and marginal land holdings and convert their inherent weaknesses into opportunities by promoting high value horticulture production systems like greenhouses, net houses, tunnels etc. High quality vegetables and flowers have great potential both in domestic and overseas market. India has the advantage of producing these at relatively low cost if low cost structures suitable to various locations and agro climatic conditions along with production technology suitable to small and marginal farmers are developed and standardized for adoption. The ICAR-Indian Institute of Horticultural Research, Bengaluru initiated work in this direction way back in late nineties under the World Bank aided National Agriculture Technology Project (NATP) and came out with standardization of structures and production technology for vegetable and flower crops. As a result, the technology developed by the Institute was adopted in 60 acres in about 80 units of 1000 to 4000 m² area each and few units with 10,000 m² area. To date, the holistic package of IIHR for cultivation of vegetable crops under cost effective shade-nets and naturally ventilated poly house is adopted by more than 650 farmers covering an area of about 1150 acres across the country in more than 16 states. Initially the crops covered were colored capsicum and tomato. With crop diversification, the technology was standardized for musk melon/cantaloupes, watermelon, English cucumber, French bean (Bush Type) and Haricot bean. In the field of flower crops initially the technology of production of roses, gerbera, carnation, orchids and anthurium under poly house was borrowed by the growers from other countries on turnkey basis. Of late, soil health management and insect-pest and disease management in these crops has taken a different dimension causing economic damage to the crop produce. The flower projects were hard hit in terms of returns on investment as the turn key projects demanded higher expenditure on consultancy and inputs on planting material. To overcome these problems the Institute has taken up new initiatives in Protected Cultivation in network mode with IIHR, Bengaluru as the

Events

ICAR Foundation Day Celebration

The Institute celebrated 86th ICAR Foundation Day on July 16, 2014 by organizing Foundation Day Guest Lecture by Dr. S. V. Hithalamani, formerly Additional Director of Horticulture, Govt. of Karnataka, Bengaluru. Dr. T. Manjunatha Rao, Director, IIHR, Bengaluru presided over the function. An exhibition displaying the activities, achievements and technologies developed by the Institute was organized for the benefit of the visiting public. More than 250 visitors comprising of students, teachers, farmers from Tumakuru, Kolar, Chikkaballapur and Bengaluru Rural districts and all the staff members of IIHR, Bengaluru participated in the celebration. Three innovative farmers viz., Smt. Saroja, tomato grower, Shri K. Sreenivasa Gowda, mango grower from Chintamani and Shri Siddharthan, floriculturist, from Tamil Nadu were felicitated on the occasion.



Dr. T. Manjunatha Rao felicitating one of the innovative farmers

Licensing and Exchange of MoU with entrepreneurs for commercialization of the technologies developed by the Institute was also organized on the occasion. Fifty farmers of NICRA project village were felicitated by giving 'Smart Farmer Certificates'. The Central Horticultural Experiment Stations at Bhubaneswar, Chettalli and Hirehalli and KVKs at Gonikoppal and Hirehalli also celebrated ICAR Foundation Day in a befitting manner by organizing various farmer friendly programs.

Meeting cum Workshop of Tribal Sub Plan

The CHES, Chettalli organized a Meeting cum Workshop of Tribal Sub plan at KVK, Gonikoppal on August 04, 2014. More than 30 tribal beneficiaries from Awargundha, Dodda Reshme and Chika Reshme villages, scientists from CHES, Chettalli and KVK, Gonikoppal and officials from Forest College and Research Institute, Ponnampet participated the program. Progress made under the tribal sub plan was reviewed and action plan for the future was formulated during the meeting-cum-workshop.

National Seminar cum Workshop on Strategies for Improvement, Enhancing Productivity and Utilization of Cucurbits

The Central Horticultural Experiment Station, Bhubaneswar and Society for Promotion of Horticulture, IIHR, Bengaluru organized a National Seminar cum Workshop on Strategies for Improvement, Enhancing Productivity and Utilization of Cucurbits during August 08-10, 2014 at Bhubaneswar. Shri Pradeep Kumar Maharathy, Hon'ble Minister for Agriculture, Fisheries and Animal Husbandry, Government of Odisha inaugurated the Seminar. Dr. Manoranjan Kar, Vice Chancellor, OUAT, Bhubaneswar delivered the Key note address. Shri S. K. Chadha, Director, Directorate of Horticulture, Govt. of Odisha also participated. Three progressive successful farmers, each from Telangana State, Maharashtra and Odisha State were felicitated by the Hon'ble Minister. An exhibition on 'Cucurbits: Progress & Prospectus' was organized on the occasion. More than 200 delegates participated in the deliberations. Dr. N. K. Krishna Kumar, DDG (Hort. Sc.), ICAR, New Delhi chaired the plenary session on August 10, 2014. Dr. T. Janaki Ram, ADG (Hort.), ICAR, New Delhi co-chaired the Session.



Dr. N. K. Krishna Kumar interacting with the delegates during the plenary session

Concluding the Seminar, Dr. N. K. Krishna Kumar said that all the recommendations emerging out of this seminar may be implemented in veracity and review of the same would be taken up in the next follow up seminar after 2-3 years.

Launching of Document Management Portal

Dr. N. K. Krishna Kumar, DDG (Hort. Sci.), ICAR, New Delhi launched the Document Management Portal in the Technical Cell of CHES, Bhubaneswar on August 09, 2014. Dr. T. Janakiram, ADG (Hort. Sc.), ICAR, New Delhi was present on the occasion. Dr. H. S. Singh, Head, CHES, Bhubaneswar appraised them of various research and developmental activities of the Station and the initiatives undertaken for office

automation. Reviewing the progress of the Station, DDG (Hort. Sc.) suggested to develop a master plan of the campus keeping in view the future needs.

DG, ICAR Inaugurates Flower Seed Unit

Dr. S. Ayyappan, Secretary, DARE, Govt. of India and Director General, ICAR, New Delhi inaugurated the Flower Seed Unit at IIHR, Bengaluru, on August 16, 2014. Dr. N. K. Krishna Kumar, Deputy Director General (Hort. Sci.), ICAR, New Delhi and Dr. R. K. Jain, Dean and Joint Director, IARI, New Delhi, Dr. T. Manjunatha Rao, Director, IIHR, Bengaluru and Head, Division of Ornamental Crops, scientists and technical staff members of the Division of Ornamental Crops and other staff members of the Institute were present on the occasion.



Dr. S. Ayyappan inaugurating the flower seed unit

The basic objectives of the Flower Seed Unit are to produce quality seed and planting material of various flower crops viz., rose, gladiolus, tube rose, carnation, China aster, chrysanthemum and crossandra and evolving standards for seed and planting materials of flower crops. The Flower Seed Unit would cater to the needs of flower growers, gardeners, and urban landscapers. The flower seed unit is built under the financial assistance of RKVY project of Govt. of Karnataka at cost of Rs.30.00 lakhs.

Launching of Consortium Research Platform on Borers

The Institute organized launching program of the project on 'Consortium Research Platform (CRP) on Borers', sanctioned in the XII five year plan period on August 18, 2014 at its campus. Dr. N. K. Krishna Kumar, DDG (Hort. Sci.), ICAR, New Delhi was the Chief Guest. Launching the program, Dr. Krishna Kumar called upon all participating institutes to contribute effectively to come out with measurable output in the form of quality publications and technologies. A technical Bulletin entitled "Borer Pests: Status and Challenges" was released on the occasion. A Web Portal on Borers was also launched. o

Technical bulletin 'Borer Pests: Status and Challenges' being released on the occasion



The launching program was attended by about 50 scientists representing 31 centers across the country from ICAR Institutes, State Agricultural Universities and Coffee Board with IIHR, Bengaluru as the Lead center. The centers would address about 50 borers in about 37 crops including fruits, vegetables, flower crops and plantation crops and also has a center to work on pulse borers.

Interactive Meeting on Plant Variety Protection and Participatory Research Appraisal in Ornamental Crops

The Institute organized an Interactive Meeting on Plant Variety Protection and Participatory Research Appraisal in Ornamental Crops at its campus on August 22, 2014 involving all the stake holders of floriculture industry. Legal experts, researchers, floriculture consultants, growers and exporters, members of International Flower Auction, Ltd. Bengaluru (IFAB) and South India Floriculture Association (SIFA) participated in the discussion. Apart from creating awareness about the Protection of Plant Varieties and Farmers' Rights Act and its implications on floriculture industry, many topics like 'royalty issues and legal impact on flower crops for domestic and export market', 'the present ground realities of floriculture industry in India *visa vis* the other leading countries in floriculture industry' *etc.* were presented. Many researchable issues, production challenges faced by the industry, collaboration between research institutes, state agricultural / horticultural universities, development departments and the floriculture industry, planting material, marketing and export *etc.* were discussed. Dr. T. Manjunatha Rao, Head, Division of Ornamental Crops, and Director, IIHR, Bengaluru Chaired and presided over the deliberations.

Communal Harmony Fortnight

In commemoration of Communal Harmony Fortnight observed during August 20 - September 05, 2014, the CHES, Bhubaneswar organized a program on August 26, 2014 at the Station. Re. Bhrama Kumari Geeta, Bhrama Kumari Vishwa Vidyalaya, Bhubaneswar was the Chief Guest and lead speaker on the occasion. Dr. Bani Singh, Deputy Director, National Horticulture Board, Bhubaneswar was the Guest of Honour. Re.

Bharma Kumari Geeta delivered an extensive sermon on the principles of harmony in one's life and cited real life instances and examples to impress upon the audience to practice the principle of 'forgive and forget', the essence of communal harmony. Dr. H S Singh, Head, CHES, Bhubaneswar presided over the function.

Brain Storming Session on Insecticide Resistance Management in Horticultural Crops – Way Forward!

IIHR, Bengaluru and the Association for Advancement of Pest Management in Horticultural Ecosystems, Bengaluru jointly organized a brain storming session on 'Insecticide Resistance Management in Horticultural Crops – Way Forward!' at its campus on August 30, 2014.

A view of the session in progress

Sixty five representatives from private sector and



students participated in the deliberations. Dr. K. R. Kranthi, Director, CICR, Nagpur delivered the key note address on the overview of insecticide resistance in arthropods with special reference to cotton bollworms and *Bt* cotton. Dr. B. V. Patil, formerly the Vice Chancellor, UAS, Raichur emphasized the role of young researchers in educating the farmers. Dr. T. Manjunatha Rao, Director, IIHR, Bengaluru presided over the Session.

Seminar on Status and Scope of Mechanization in Horticulture

The CHES, Bhubaneswar organized a seminar on 'Status and Scope of Mechanization in Horticulture' on September 02, 2014. More than 100 farmers from various villages, faculties and experts from ICAR institutes, OUAT, Bhubaneswar, NHB, NGO functionaries and students participated in the seminar. Prof. Manoranjan Kar, Vice Chancellor, OUAT,

The compendium being released

Bhubaneswar inaugurated the seminar. Dr. S. K.



Chadha, Director, Directorate of Horticulture, Govt. of

Odisha and Dr. Neelum Grewal, Director, DRWA, Bhubaneswar were the Guests of Honour. A compendium on 'Mechanization in Horticulture' was released on the occasion. An exhibition on farm machinery, tools and implements was also organized. A prototype of power tiller mounted fertilizer application device for perennial trees (CHES FERTREE Drill) designed by CHES, Bhubaneswar was inaugurated on the occasion.

Institute Foundation Day Celebration

The Institute celebrated its 48th Institute Foundation Day on September 05, 2014. Padmashree Dr. Kishan Lal Chadha, formerly Deputy Director General (Hort.), ICAR and President, The Horticultural Society of India, New Delhi was the Chief Guest and delivered the first Dr. G. S. Randhawa Memorial Foundation Day Lecture. Dr. T. Manjunatha Rao, Director, IIHR, Bengaluru presided over the function.

Dr. K. L. Chadha addressing the gathering

Recognizing the contributions made by some of the



retired staff members, the Institute felicitated Dr. R. Palaniappan, Shri J. S. Rao, Shri S. K. Ramakrishna Rao, Shri K. N. Ananthapadmanabhan, Shri C. Krishnappa, Shri Doddathimmaiah, Shri V. R. Kulkarni, Shri N Nagarajaiah, Shri M. Hanumantharayappa, Shri H. Thimmappa, Shri H. N. Rajanna and Shri Chikkamarasiddiah. Two progressive farmers, Shri Babu Reddy and Shri N.C. Patel who have adopted and transferred/popularized the technologies developed by the Institute were also honoured on the occasion. Awards of Excellence instituted for the staff members were presented on the occasion to Dr. Sudhamoy Mandal from scientific category, Dr. B. L. Kashinath, Shri Somasekhar and Shri N. Shivarudraiah from technical category, Shri R. Gopal from administrative category and Shri Channarayappa from supporting category for the year 2014. Winners of various sports events conducted as a part of Foundation Day celebration for the staff members of the Institute were also given prizes on the occasion. A common lunch for the Guests and all the staff members was organized in the afternoon followed

by light entertainment program performed by the staff members.

Brain Storming Session on Nematodes Problems under Protected Cultivation

The IIHR, Bengaluru and the AICRP on Nematodes organized a brain storming session on 'Nematodes problems under protected cultivation' at its campus on September 08, 2014. Dr. R. K. Jain, Project Coordinator, AICRP on Nematodes, Dr. P. Parvata Reddy, formerly Director, IIHR, Bengaluru, Dr. Uma Rao, Head, Division of Nematology, IARI, New Delhi, Dr. Basavaraj, Executive Director, Karnataka State Horticulture Mission, Dr. A. Chakravarty, Head and Dr. M. S. Rao, Principal Scientist, Division of Entomology and Nematology, IIHR, Bengaluru, Dr. Dhal Singh, Deputy Director, NHB, Bengaluru, delegates from Department of Horticulture of Punjab, Karnataka, Maharashtra, Haryana, Delhi, Tamil Nadu and Kerala states, scientists from various ICAR Institutions, SAUs and KVKs participated in the meeting. Dr. R. K. Jain, Dr. P. Parvata Reddy and Dr. Uma Rao addressed the gathering and explained the need for testing the soil before preparation of the beds in the polyhouses and suggested the farmers to use certain safe chemicals, bio-nematicides/ bio-pesticides along with organic materials viz., vermicompost, FYM, neem/pongamia cakes during the bed preparation. More than 145 delegates participated in the deliberations.

Asian Solanaceous Round Table 2014 (ASRT 2014)

The Asia Pacific Seed Association (APSA), Thailand IIHR, Bengaluru and Society for Promotion of Horticulture (SPH), Bengaluru jointly organized a round table meet 'Asian Solanaceous Round Table (ASRT) – 2014' with the theme 'Disease and Insect Pest Resistance in Solanaceous Vegetables: Successes and Challenges' on September 09 - 10, 2014 at Bengaluru. Sadguru Uday Singh, Chairman & *All the Guests on the dias during inaugural session* Managing Director, Namdhari Seeds, Bengaluru



inaugurated the Meet on September 09, 2014 and

addressed the gathering. Dr. G. Kalloo, formerly DDG (Hort.) ICAR, New Delhi gave the opening remarks and Dr. N.K. Krishna Kumar, DDG (Hort. Sci.), ICAR, New Delhi delivered the Keynote address on 'Insect resistance using native genes in tomato and pepper: an entomologist's perspective on successes and challenges'. Dr. T. Manjunatha Rao, Director, IIHR, Bengaluru presided over. The inaugural session was followed by technical sessions which included presentations by 23 internationally renowned speakers followed by presentation of country reports from India, Thailand and Southeast Asia, China, Japan and Korea. A field visit to the vegetable demonstration block of IIHR, Hesaraghatta, Bengaluru was also organized on September 11, 2014 for the benefit of the delegates. More than 250 researchers from seed companies, government organisations and research institutes in the Asia Pacific region involved in research on solanaceous vegetable crops participated in the deliberations.

Launching Program on Micronutrient Management in Horticultural Crops

The Institute organized launching program of a new initiative on 'Micronutrient management in horticultural crops' along with two other new initiative programs on 'Protected horticulture' and 'ORP on sucking pests' sanctioned in the XII five year plan period on September 10, 2014 at its campus. Dr. N.K. Krishna Kumar, DDG (Hort. Sci.), ICAR, New Delhi, Dr. T. Manjunatha Rao, Director, IIHR, Bengaluru, Dr. A. N. Ganeshamurthy, Dr. M.

Dr. A. N. Ganeshamurthy addressing



Prabhakar, Dr. Asokan, the Principal Investigators, Co-Investigators from the participating centers and other scientific staff from the Institute participated in the program. All the participating centers presented their technical programs. A detailed technical program for the entire period of the project was drawn including training for farmers and KVK's. An Extension Folder on Arka microbial consortium for sustainable vegetable production and a website on Micronutrient Management in Horticultural crops developed by the Institute were released/launched on the occasion.

National Workshop / XXII Group Meeting of AICRP on Medicinal, Aromatic Plants and Betelvine

Indian Institute of Horticultural Research, Bengaluru and Directorate of Medicinal and Aromatic Plants Research, Anand organized the National Workshop/XXII Group Meeting of AICRP on Medicinal, Aromatic Plants and Betelvine at IIHR, Bengaluru during September 17-20, 2014. The inaugural program of the Group Meeting was held on September 18, 2014 under the Chairmanship of Dr. Manjunatha Rao, Director, IIHR, Bengaluru. Dr. D. L. Maheshwar, Vice Chancellor, UHS, Bagalkot was the Chief Guest and Padmasree Darshan Sankar, Chairman, I-AIM, Bengaluru, Dr. S. K. Malhotra, ADG(Hort.), ICAR, New Delhi and Dr. S. B. Dandin, formerly the Vice Chancellor, UHS, Bagalkot were the Guests of Honour on the occasion.



Extension folder on Ashwagandha being released

Dr. Jitendra Kumar, Project Coordinator, AICRP on MAP&B and Director, Directorate of Medicinal and Aromatic Plants, Anand presented the progress report of AICRP Project. An extension bulletin on 'Herbs for household', an extension folder on 'Ashwagandha- an ancient medicinal herb' and proceedings of 'National Meet on Betelvine – Farmers Traders and Researchers, Interface' held at IIHR, Bengaluru during February 22-23, 2014 were released during the Group Meeting. An exhibition on Medicinal and Aromatic Plants was also organized on the occasion. Dr. N. K. Krishna Kumar, DDG (Hort. Sci.), ICAR, New Delhi Presided over the Plenary session on September 19, 2014. Progress of work under the project of all the AICRP centers during the last year was reviewed and technical program for the coming year was formulated.

5th Scientific Advisory Committee (SAC) Meeting of KVK, Hirehalli

The Krishi Vigyan Kendra, Hirehalli conducted the 5th SAC meeting under the Chairmanship of Dr. T. Manjunatha Rao, Director, IIHR, Bengaluru on September 30, 2014. Dr. N. Loganandhan, Program Coordinator of KVK presented the progress report for the year 2013-14 and plan of work for the forth coming season. The KVK website - www.iihrkvvk.org - was launched by Dr. Manjunatha Rao. Dr. Raghavendra Bhatta, Director, NIANP, Bengaluru a



Dr. T. Manjunatha Rao addressing

Special Invitee on the occasion, released the updated brochure on KVK, Hirehalli. An exhibition was also organized on the occasion depicting different technological products produced in the KVK for the benefit of the participants.

Hindi Workshop

The CHES, Chettalli organized a Hindi Workshop on July 08, 2014 for the benefit of its staff members. All scientific, administrative and technical staff of CHES, Chettalli and Head, Krishi Vigyan Kendra, Gonikoppal and scientists of Coffee Research Sub Station, Chettalli participated in the workshop. Shri A. K. Jagdeeshan, gave orientation about the use of Hindi and implementation procedures of official language, use of Hindi in computers, Hindi typing and Hindi Software etc. Dr. R. B. Tiwari spoke about Hindi speaking and conversation in a very simple and effective way. Dr. P. C. Tripathi, Head CHES Chettalli highlighted the importance of Hindi in day to day office work.

Hindi Week Celebration

The Institute at Hesaraghatta celebrated Hindi Week during September 15-23 2014. Dr. Aditya Shukla, Lead Scientist, ITL Ltd., Bengaluru, the Chief Guest inaugurated the Hindi Week on September 15, 2014. Dr. A.N. Ganeshamurthy, Director I/c. presided over the function. The Official Language Magazine of the Institute, *Bagwani* - Vol. V was released on the occasion.



Bagwani - Vol. V being released by the Chief Guests

Competitions on Hindi terminology & noting, reading, recitation, singing, Pre-written essay, debate and conversation were conducted for the staff members during the Hindi Week. Valedictory and prize

distribution ceremony was held on September 23, 2014. Dr. (Mrs.) Vijaya Malik, Retd. Sr. Hindi Officer, Central Power Research Institute, Bengaluru was the Chief Guest and Dr. Firoz Khan, Head, Regional Station, Central Inland Fisheries Research Institute, Bengaluru was the Guest of Honour. Dr. A. K. Chakravarthy, Head, Division of Entomology and Nematology and Director, I/c presided over the function. Cash prizes and certificates for the winners of different competitions and also for the winners of Hindi Incentive Scheme were distributed on the occasion. The CHES, Bhubaneswar celebrated Hindi Week during September, 15-22, 2014. Dr. Anand Prakash, Formerly Head, Division of Crop Protection, CRRI, Cuttack and Dr. H.S. Singh, Head, CHES, Bhubaneswar inaugurated Hindi Week on September 15, 2014. Several Hindi competitions viz., poem recitation, debate, dictation and singing were organized during the week for the staff of the Station. The valedictory function was held on September 22, 2014. Dr. P.C. Lenka, formerly Director, DPME, OUAT, Odisha, Dr. G. Naik, formerly Principal Scientist, CHES, Bhubaneswar graced the occasion as Chief Guest and Guest of Honour respectively. Dr. H. S. Singh, Head, CHES, Bhubaneswar presided over the function. Prizes to the winners of various competitions were distributed on the occasion.

The CHES, Chettalli also celebrated Hindi Week during September 15-20, 2014. Dr. P. C. Tripathi, Principal Scientist and Head, CHES, Chettalli inaugurated the Hindi Week on September 15, 2014. Various competitions viz., Hindi dictation, Hindi meanings, copy writing, poem reading and identification and description of objects in Hindi and picture description were organized for the staff. The valedictory function was held on September 20, 2014. Smt. Shanthalaxmi Principal, Degree College, Bettadapura, Kushal Nagar and Shri. N. S. Tiwari, Hindi lecturer, Sainik School Kudige were the invitee guests for the function. Smt. Nageena Bhanu, Hindi teacher, Mookambica High School, Kushalnagar was the judge for various competitions. The Hindi week was concluded on September 20, 2014 with prize distribution to winners of various competitions by the Guests.

Workshop on Hindi Akshar Gyaan

In order to promote use of Hindi in official works, CHES, Bhubaneswar organized a workshop on *Hindi Akshar Gyaan* on September 27, 2014 for the benefit of the staff members. Dr. Deepa Khulbe, Associate Prof. (Plant Pathology), College of Agriculture, OUAT, Bhavanipatna, Odisha was the Chief Guest on the occasion. Dr. Dr. H.S. Singh, Head, CHES, Bhubaneswar presided over the function. Dr. Deepa Khulbe taught Hindi Varnamala to the participants and

provided basics of Hindi language and necessary guidance regarding use of Hindi in a better and simpler way in day to day office work. Books on Hindi *Varnamala* (1&2), essay writing, letter writing and Hindi translation were provided to all the participants for further use in their daily office work in Hindi.

Research

Varieties/Technologies Identified

Marigold Variety Arka Bangara: The variety has petaloid sterile flowers and has the ability to multiply by vegetative propagation. Flowers are of yellow gold colour (RHS 12.A) in Yellow Group. Comes to flowering by 40-45 days and continues to flower for



next 65 -70 days. Flowers are medium in size with 5-6.5 cm in diameter.

New Table Grape Variety for Mild Humid Tropics:

A multiple disease resistant grape variety *Fr um o s a Alba* (Katta Kurghan x Sevyne Villard), having short vegetative cycle suitable for production of two crops per year has been identified by CHES, Hirehalli. The vines are precocious and tolerant to anthracnose and to some extent powdery mildew. Clusters 1-2 per shoot on spur/short cane, long peduncle, medium size, 200-300g, conical to cylindrical in shape, berries milky white, spherical to obovate, medium bold, 18-20 mm



dia., crisp pulp with mild muscat flavor, TSS 16° Brix and fruit acidity 0.70 % (during July harvest) and suitable for both table and wine making. Berry skin is rain tolerant and thus can be grown where ever the traditional Bangalore Blue variety is grown. This variety is suitable for organic farming also in mild humid tropical climates.

Arka Saka Nivaraka - An Environmentally Safe Technology for Prevention of Spongy Tissue in Alphonso Mango

The IIHR, Bengaluru, for the first time in the world has developed an environmentally safe formulation, Arka Saka Nivaraka for prevention of spongy tissue in mango fruits. Arka Saka Nivaraka, a liquid formulation needs to be applied twice at pre-harvest stage between 40 to 60 per cent maturity, either by dipping the fruits (while on the tree) in solution or by spray on the fruits, @ 100 to 125ml/ litre. Dipping ensures 100 per cent prevention of spongy tissue, while, spray results in 95 to 98 per cent success as a few fruits may escape contact with the formulation. Dipping uses up lesser quantity of the formulation and is economical, while, spray consumes more volume of the formulation and is, thereby, slightly more expensive. Pre-harvest dip treatment of fruits twice between 40-60 per cent maturity stage @100 - 125ml/litre costs around 0.50 paisa/fruit, including labour charges. Fruit-dippers of various capacities have also been developed by IIHR for ease of dipping fruits while on the tree, and these dippers reach a height of upto 20-25'. The formulation also helps to improve



No spongy tissue found in fruits treated with Arka Saka Nivaraka two weeks after

fruit quality like higher fruit weight (10-20%), better appearance, uniform development of colour both externally and internally, better fruit firmness, improved pulp texture, aroma and extended shelf-life of fruits (up to 3 weeks under ambient conditions).

Prototype of Fertilizer Application Device for Perennial Trees

Application of fertilizers in perennial fruit crops is labour intensive and costly. Considering the

importance of nutrient management through efficient and cost effective application of fertilizers, a prototype of power tiller mounted device (CHES FERTREE Drill) has been designed by the CHES, Bhubaneswar.



The implement has three units: storage unit, transmission unit and delivery unit. Hopper has a funnel shaped two chambered fertilizer box of 65x50x40 cm dimension having the fertilizer carrying capacity of 20 kg. The separate chambers are meant for granular fertilizer and powder form of fertilizer in the fertilizer box. Agitator (non-screw type) has been attached at the base of the box to ensure continuous flow of fertilizer. The agitator gets power through a pulley attached with the crank of the power tiller. To control of flow of fertilizer, two valves (one in each chamber) have been provided at the base of hopper which can be manually controlled. The transmission unit has two PVC delivery pipe (5 mm dia.) which receives fertilizer from box and transmit to the delivery unit. The delivery unit has a funnel shaped collection box (20x20x20 cm) without valve wherein delivery pipe (4 cm dia.) is attached. The delivery pipe is attached with tyne and furrow opener. The delivery GI pipe (4 cm dia.) places fertilizer (@ 4-10 kg/minute) just behind the furrow opener. The depth of the furrow can be adjusted with the help of two adjustable wheels attached with the both ends cultivator bar.

Human Resource Development

DG, ICAR Inaugurates Post Graduate School

Dr. S. Ayyappan, Hon'ble Secretary, DARE, Govt. of India and Director General, ICAR, New Delhi inaugurated the Post Graduate School of Horticultural Sciences and laid the Foundation Stone for the 'Arkavathi Student Hostel' at IIHR, Bengaluru on August 16, 2014. Dr. N. K. Krishna Kumar, Deputy Director General (Hort. Sci.), ICAR, New Delhi and Dr. R. K. Jain, Dean and Joint Director, IARI, New

Delhi were also present as Special Guests on the occasion. Addressing the gathering on the occasion Dr. S. Ayyappan called upon the students to make best use of the expertise and facilities available at the Institute to excel in their research studies.



Dr. S. Ayyappan laying the foundation stone
 “Vision 2050” document of the Institute was also released on the occasion. The Post Graduate School of Horticultural Sciences presently would be offering Ph. D program in the disciplines of Fruit Science, Vegetable Science, Floriculture & Landscape Architecture and Post-Harvest Technology. During the current academic year (2014-15), 16 students (three in Fruit Science, six in Vegetable Science and seven in Floriculture & Landscape Architecture) have been admitted to pursue Ph. D degree program.

Summer School on Advances in Molecular Diagnostics of Emerging Plant Diseases for Biosecurity

The Institute conducted ICAR sponsored Summer School on 'Advances in Molecular Diagnostics of Emerging Plant Diseases for Biosecurity' in the Division of Plant Pathology during August 01-21, 2014. The main theme of the Summer School was to give hands on training on molecular diagnostic methods to detect and identify emerging plant pathogens. Dr. T. Manjunatha Rao, Director, IIHR, Bengaluru inaugurated the Summer School on August 01, 2014. During the 21 days training Dr. N. K. Krishna Kumar, DDG (Hort. Sci.), ICAR, New Delhi and



Dr. R. K. Jain, Joint Director (Edn.) & Dean, IARI, New Delhi also addressed the participants. Besides the

faculty from IIHR, Bengaluru many resource persons came from different ICAR institutes to give talks on various aspects of diagnostics. Twenty five trainees from 14 states participated in the program.

Post Graduate Research and Education

IIHR Scientists as Chairman / Co-chairman / External Examiners

- Dr. Rajasekharan, P. E. acted as Chairman for the Open Defense and Viva-Voce of G. Jayakrishan, Ph. D. student, School of Biosciences, MG University, Kottayam, Kerala for the thesis entitled 'Autoecological studies on the river mangrove *Aegiceras corniculatum* (L.) Blanco on July 18, 2014.
- Dr. Sreenivasa Murthy, D. acted as External Examiner for conducting the Viva-Voce Comprehensive Examination of two PG students of ICAR-NDRI, SRS, Bengaluru on September 27, 2014.
- Dr. Rajasekharan, P. E. acted as Chairman for the Open Defense and Viva-Voce of Benoy Jose, Ph. D. student, School of Life Sciences, MG University, Kottayam, Kerala for the thesis entitled "Induction of genetic variation through *in vitro* methods in *Plumbago rosea* L. on September 29, 2014.

Award of degree

- Ms. Chalumuru Girija Kumari (ID No. UHS12PGM269), College of Horticulture, UHS Campus, Bengaluru, completed her Master's Degree in Horticulture in Floriculture and Landscape Architecture for the thesis entitled 'Standardization of planting density, propagule size and post-harvest practices for higher flower productivity and quality of tuberose (*Polianthes tuberosa* L.) cv. Prajwal' on July 25, 2014 under the guidance of Dr. Sujatha A. Nair.

Deputation Abroad

- Dr. Prakash Patil was deputed to Malaysia to participate in the 8th Session of International Tropical Fruits Network (TFNet) Board of Trustees Meeting and International Symposium on Tropical Fruits as the Bureau Officer on behalf of DARE / ICAR for the TF- Net (International Tropical Fruits Network) in the member countries of South Asia from August 12 -14, 2014 at Putrajaya, Malaysia.
- Dr. Y.T.N. Reddy and Dr. L. K. Bharathi were deputed to Australia to participate in the International Horticultural Congress, 2014 at Brisbane, Australia during August 17-22, 2014.

Training of IIHR Staff

- Dr. Suresh, S.C. was deputed for a training program on Extension Management for Livestock Development at NDRI, Karnal, July 02-05, 2014.
- Dr. Veerendrakumar, K.V. was deputed for a training program on IPM in important crops at NBAII, Bengaluru, July 23-25, 2014.
- Dr. Anuradha Sane was deputed for a Short Term Workshop in Molecular Phylogenetics-2014 organized by Indian Institute of Science, Bengaluru, August 01-05, 2014.
- Mr. Hanumanthegowda was deputed for training program on 'Innovative approaches and advances for diagnosis and detection of plant diseases in relation to their management' at Govind Ballabh Pant University of Agriculture & Technology, Pantnagar, September 02 - 2014.
- Dr. Sridhar, V. was deputed for 'International training on pest risk analysis' at NIPHM, Hyderabad, September 01-05, 2014.

Training Imparted

- Mr. Chandra Prakash, M. K. and Mrs. Reena Rosy Thomas conducted 5 days training program on 'Relational database development and management', organized on RDBMS at IIHR, Bengaluru on August 04–08, 2014.

Participation in Seminar / Symposium / Conferences / Meetings etc.

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

- ❖ Dr. Tripathi, P. C. and Dr. Reju, M. Kurian - IRC Meeting of DCR, Puttur, July 05, 2014.
- ❖ Dr. Gajanana, T. M. - Meeting for Expanding Insurance Coverage to Horticultural Crops, Krishi Bhavan, New Delhi, July 07, 2014.
- ❖ Dr. Manjunath Rao, T. - EFC Meeting of IARI, New Delhi, July 09, 2014.
- ❖ Dr. Murthy, B. N. S. - 35th IMC of NRC for Grapes, Pune, July 09, 2014.
- ❖ Dr. Manjunath Rao, T. - Academic Council Meeting, IARI, New Delhi, July 10, 2014.
- ❖ Dr. Manjunath Rao, T. - EFC Meeting of IIHR, Bengaluru, ICAR, New Delhi, July 13-15, 2014.
- ❖ Dr. Saju George, Mr. Prabhakar, B. and Dr. S.C. Suresh - TSP Review Meeting, CHES, Chettalli, July 14, 2014.
- ❖ Dr. Narayana, C.K. - National Seminar on Biodiversity Conservation- Present Status & Way Forward organized by National Academy of Biological Sciences in collaboration with K. S. Rangasamy College of Science & Technology, Tiruchengode, July 19-20, 2014.
- ❖ Dr. Sulladmath, V. V. - Fifth Meeting of Research Council of University of Horticultural Sciences, Bagalkot, July 23, 2014.
- ❖ Dr. Manjunath Rao, T. - 86th ICAR Foundation Day ceremony and also Vice Chancellors & Directors' Conference, ICAR, New Delhi, July 29-30, 2014.
- ❖ Dr. Singh, H. S. - Special support group meeting at office of the Director of Horticulture, Bhubaneswar, August 05, 2014.
- ❖ Dr. Narayana, C. K. - KAPPEC meeting to scrutinize the technical bids for construction of cold storages in Kudachi, August 07, 2014.
- ❖ Dr. Saju George, - Workshop on minor fruit crops, KVK, Pathanamthitta, Kerala, August 07-08, 2014.
- ❖ Drs. Singh, H. S., Mandal, S., Srinivas, P., Sangeetha, G., Bharathi, L. K., Deepa Samant, Pitchaimuthu, M. and Varalakshmi, B. - National Seminar cum Workshop on Strategies for Improvement, Enhancing Productivity and Utilization of Cucurbits, CHES, Bhubaneswar, August 08-10, 2014.
- ❖ Dr. Hima Bindu, K. - Interaction meeting of High Value Chemicals Platform, IISR, Calicut, August 12, 2014.
- ❖ Dr. Murthy, B. N. S. - NAAS - IFFRI Brainstorming meeting on developing PME indicators and mechanisms in NARS, NAAS, New Delhi, August 12, 2014.
- ❖ Dr. Singh, H. S. - Launching of Consortium Research Platform (CRP) on Borers at IIHR, Bengaluru, August 18-19, 2014.
- ❖ Dr. Doreyappa Gowda, I. N. - FKCCI first meeting of Food Processing Committee at FKCCI, Bengaluru, August 19, 2014.
- ❖ Dr. Manjunath Rao, T. - 394th Academic Council of IARI, New Delhi, August 21, 2014.
- ❖ Drs. Manjunath Rao, T., Meenakshi Srinivas, Tejaswini, Nair, Sujatha A., Dhananjaya, M.V., Rajiv Kumar, Mrs. Usha Bharathi, Rajasekharan, P. E., Anuradha Sane, Narayana, C. K., Doreyappa Gowda, I. N. and Balakrishna, B. - Interactive meeting on ornamental crops: plant variety protection and participatory research appraisal, IIHR, Bengaluru, August 22, 2014.

- ❖ Dr. Doreyappa Gowda, I. N.-Curtain raiser program of Agro-vision South 2015 organized by KASIA and MM Activ Sci-Tech Comm, Bengaluru, August 22, 2014.
- ❖ Dr. Rami Reddy, P. V. - Brainstorming meet on biosecurity issues related to insect and quarantine, NBAII, Bengaluru, August 26, 2014.
- ❖ Drs. Suryanarayana, M.A., Hima Bindu, K., Sukanya, D. H., Vasantha Kumar, T.- Interaction meeting on collaborative research work with of Centre of Sustainable Development, Hyderabad, IIHR, Bengaluru, August 30, 2014.
- ❖ Dr. Dinesh, M. R. and Gajanana, T.M. - Workshop on 'Writesop' organized by ICAR-Bioversity International Project on 'Conservation and sustainable use of cultivated and wild tropical fruit diversity: promoting sustainable livelihoods, food security and ecosystem services', Madikeri, August 31-September 06, 2014.
- ❖ Dr. Narayana, C. K - PMC meeting for monitoring and implementation of cold chain project for fruits and vegetables, Dept. of Horticulture, Lalbagh, Bengaluru, September 01, 2014.
- ❖ Dr. Singh, H. S. - World Coconut Day celebration, Coconut Development Board, Pitapalli, Khurda, September 02, 2014.
- ❖ Dr. Sreenivasa Murthy, D. - Presentation of project on 'Marketing of onion in India - causes and consequences of price volatility, Directorate of Onion and Garlic Research, Pune, Maharashtra, September 02, 2014.
- ❖ Drs. Tripathi, P. C., Senthil Kumar, R. and Sankar, V. – First group meeting of AICRP on Citrus, NRC for Citrus, Nagpur, Maharashtra, September 02-03, 2014.
- ❖ Dr. Sulladmath, V. V. - 205th Monthly Seminar of KVK- Jalna, September 05, 2014.
- ❖ Dr. Balakrishna, B. - Third US-INDIA-AFRICA Triangular International Training Programme on New Dimensions in Agricultural Extension Management for Extension Practitioners from Kenya and Malawi as a resource person, MANAGE, Hyderabad September 06, 2014.
- ❖ Drs. Tripathi, P.C., Senthil Kumar, R. and Sankar, V., and Reddy, T.M. - Regional consultative forum meeting of Coffee Board, Central Coffee Board Research Substation, Chettalli, September 06, 2014.
- ❖ Drs. Veere Gowda, R., Sadashiva, A. T., Prabhakar, M., Madhavi Reddy, K., Ahora, T. S., Mohan, N., Pitchaimuthu, M., B. Varalakshmi, Hebbar, S. S., Nair, A. K., Sreenivas Rao, E., Singh, H. S., Srinivas, P., Ponnamm Naresh and Gaddagimath, P. B. - Asian Solanaceous Round Table 2014 organized by APSA in collaboration with ICAR, IIHR and SPH, Bengaluru, The Hotel Lalit Ashok, Bengaluru, September 09-10, 2014.
- ❖ Dr. Venugopalan, R. - Project proposal development workshop for the CPI and CCPI of the project entitled 'Modeling climatic variability on horticultural crop productivity: a statistical approach' funded by ICAR-NFBSFARA, NAARM, Hyderabad, September 09-11, 2014.
- ❖ Dr. Narayana, C. K. - National workshop on solar dryer technology organized by Bayer (India) Ltd, Chennai in collaboration with Silpakorn University, Thailand, Asian Society for Social Improvement and Sustainable Transformation (ASSIST), Philippines and National Productivity Council, New Delhi, Trichy, Tamil Nadu, September 12, 2014.
- ❖ Dr. Veere Gowda, R. - Meeting of indexing of onion and garlic varieties for release, organized by Directorate of Onion and Garlic Research (DOGR), Pune and NHRDF, Nashik and Horticulture Division, ICAR, DOGR, Rajagurunagar, September 12, 2014.
- ❖ Mr. Prabhakar, B. - Mechanization in horticultural crops organized by SKDRDP (NGO), Madikeri, September 18, 2014.
- ❖ Dr. Sreenivasa Murthy, D. - GARUDA - NKN Partners Meet 2014, NIAS, IISc. Campus, Bengaluru, September 19-20, 2014.
- ❖ Dr. Manjunath Rao, T. - Foundation Day Celebration of University of Agricultural & Horticultural Sciences, Shivamogga, September 21, 2014.
- ❖ Dr. Dinesh, M. R. - Meeting for monitoring and reviewing the progress of foreign aided projects at office of DDG (Hort. Sci.), ICAR, New Delhi, September 23, 2014.
- ❖ Dr. Rami Reddy, P. V. - International symposium on conservation and management of pollinators, New Delhi, September 24-26, 2014.
- ❖ Dr. Reddy, Y.T.N. - Meeting on 'Good Management Practices' and 'Cost of Cultivation' in mango convened by Karnataka Mango Development and Marketing Corporation Ltd., Bengaluru, September 29, 2014.
- ❖ Dr. Vasantha Kumar, T. and Dr. Suryanarayana, M. A. - Scientific Advisory Committee (SAC) meeting of KVK, Hirehalli, September 30, 2014.
- ❖ Dr. Singh, H. S. - Hindi Pakhwadaas Chief Guest,

ICAR-Directorate of Research on Women in Agriculture, Bhubaneswar, September 30, 2014.

Special/Guest Lectures Delivered

The scientists of the Institute delivered special lectures / guest lectures on various topics as detailed below.

- Dr. Narayanaswamy, B. - IIHR farmer friendly technologies and integrated farming systems at "Fish Farmers Day", Extension Information Centre, KVASPU, Hesaraghatta, July 10, 2014.
- Dr. Sudhakar Rao, D.V. - Post harvest management aspects of vegetables, at the training program organized by Metro Cash & Carry India for the farmers of Malur, July 22, 2014.
- Dr. Ganeshan, S. - Value added products for venture creation in horticulture at Technology Entrepreneurship Development Program at

Vellore Institute of Technology Business Incubator, Vellore, July 22, 2014.

- Dr. Sudha Mysore - World Bank sponsored NAIP on Business Planning and Development in Horticulture – an Overview' at Technology Entrepreneurship Development Program, Vellore Institute of Technology Business Incubator, Vellore, July 22, 2014.
- Dr. Sudhakar Rao, D.V. - Post harvest management of pomegranate for export at the 5th training program on pomegranate organized at Hosadurga, Karnataka by Karnataka Agribusiness Development Corporation, July 30, 2014.
- Dr. Ganeshan S. - Incubation, establishing of start-ups and business opportunities in the domain of horticulture at the Academic Industry Interaction Meeting organized by Lady Doak College,

Training

Transfer of Technology

At IIHR, Hesaraghatta

The Division of Extension and Training in association with other divisions of the Institute organized the following on campus training programs.

Sl. No	Title of the training	Dates	No. of participants
1	Importance of vegetable and fruit crops for the farmers of Jalgaon dist. Maharashtra.	02-06.09. 2014	20
2	Entrepreneurship development through mushroom spawn production and mushroom cultivation.	18-26.09. 2014	23
3	On farm training on enrichment of FYM / vermicomposting with bio-pesticides (<i>Trichoderma viride</i> , <i>Pseudomonas fluorescens</i> and <i>Paecilomyces lilacinus</i>), methods of application through seed, substrate treatment and drip system.	26.09.2014	50

IIHR, Scientists as Resource Persons

- Dr. Manjunath, B. L. participated as a resource person in the 'State level technical workshop on papaya production technology organized by Association for Promoting of Organic Farming at Alumini Convention Centre, UAS, Bengaluru, August 06, 2014.
- Dr. Murthy, B. N. S. participated as a resource person in the 5th Farmers Training Program on 'Pomegranate' jointly organized by Karnataka Agri Business Development Corporation, Bengaluru and Department of Horticulture, Hosadurga, July 30, 2014.
- Dr. Shivaramu, K. participated as a resource person in the training program on 'Bee keeping – rearing' organized by KVK, Gonikoppal, July 04, 2014

organized in collaboration with HARPAL for more than 30 tribal farmers from Kashipur, Rayagada, Odisha.

2. Three days training program on 'Nursery production and management of fruit and vegetable crops' in association with Paradeep Phosphate Limited, Bhubaneswar, September 04-06, 2014. Twenty one farmers belonging to four villages from NAIP project area of Keonjhar district participated.

Photographs

At CHES, Bhubaneswar

CHES, Bhubaneswar organized the following trainings

1. 'Canopy management and INM in mango under Tribal Sub-Plan' on Sept. 01, 2014,

At KVK, Gonikoppal

Upgrading the knowledge of different stakeholder viz. farmers, farm women, rural youths and extension functionaries in agriculture and its allied fields is one of the mandate of the KVK. During the period, twenty two training programs were conducted in different disciplines benefitting 786 farmers including 512 farm women.

Discipline	No. of trainings	No. of participants		Total
		Male	Female	
Horticulture	07	146	151	297
Home science	05	00	140	140
Livestock	03	47	54	101
Plant protection	07	81	167	248
Total	22	274	512	786

KVK Staff as Resource Persons

Mr. B Prabhakar, M. and Mr. Veerendrakumar, K.V. were deputed as resource persons for a three day training program organized by District Agricultural Training Centre, Kudige, Kodagu on September 03, 2014 and Hobali level Bhoochethana seed treatment campaign organized by Department of Agriculture on July 07, 2014.

At KVK, Hirehalli

The KVK, Hirehalli conducted the following training programs during the quarter,

On Campus Trainings

Sl. No	Title	Dates	No. of participants
1	Nutritional gardening.	31.07.14	12
2	Use of AMC & foliar micronutrients in horticulture crops.	14.08.14	10
3	Fodder cultivation for extension officers of KMF, Tumkuru.	21.08.14	33
4	IPDM in paddy and leaf, soil analysis for ATMA staff.	22.08.14	25
5	Organic farming and vermicomposting for Savayavabhagya Yojane staff.	23.08.14	30

Off Campus Trainings

Sl. No	Title	Place	Date	No. of participants
1.	Improved production technology for red gram,	Bukkapattanna, Sira	17.7.14	35
2.	Pest and disease management in pomegranate,	Mangalawada, Pavagada	22.7.14	31
3.	Production of ragi ML-365.	Pavagada	22.7.14	27
4.	Enhancement of soil fertility by biofertil-izers & use of Arka Microbial Consortium.	Kodigenahalli, Madhugiri	25.7.14	25
5.	Commercial floriculture.	Kodigenahalli, Madhugiri	26.7.14	27
6.	Sampling method for leaf analysis and use of polythene mulch in tomato.	Nagarjunahalli, Tumkuru	28.7.14	23
7.	Cultivation of fodder crops.	Hosahalli, Madhugiri	06.08.14	48
8.	Soil, leaf & water testing and their management.	Rangapura, Sira	17.9.14	26
9.	Production technology for dry land horticulture.	Bootayyanagudi, Sira	18.9.14	58

Sl. No	Title	Place	Sponsoring Agency	Date	No.of participants
Sponsored Training					
	Coconut production practices	Jinnenahalli, Shravanabelgola	SKRDP	26.08.14	134
Vocational Training					
	Honeybee keeping	KVK, Gonikoppal		14-16.07.14	16

Field Days / Campaigns / Awareness Programs Tomato Field Day

A Field Day on tomato hybrid Arka Rakshak was organized by IIHR, Bengaluru in collaboration with Department of Horticulture, GOK in the tomato field of Shri Babu at Hennagara village, Anekal, Bengaluru Urban district on July 02, 2014. Shri



Ramalinga Reddy, Minister of Transport and In-charge Minister, Bangalore Urban district, Govt. of Karnataka inaugurated the Field day. Justice Nagamohan Das presided over the function. The tomato grower Mr. Babu, who had raised the tomato hybrid on his five acre of land shared his experience about the advantages of cultivating Arka Rakshak. Arka Rakshak is high yielding with triple disease resistance with excellent fruit quality attributes like fruit firmness and good keeping and transport quality. More than 250 farmers participated in the field day.

Field Day on / mportance of Arka Microbial Consortium in Capsicum

The Institute organized a field day on 'Importance of Arka Microbial Consortium in Capsicum' in the field of Mr. Yashwanth of Konnagattha village, Doddaballapura taluk, Bengaluru Rural district on September 23, 2014. About 56 vegetable farmers from in and around the village participated in the event. Dr. A.N. Ganeshamurthy, Head, Division of Soil Science and Agricultural Chemistry addressed the gathering and informed about various microbial and micronutrient formulations developed by IIHR,



Bengaluru and appealed to the farmers to take advantage of the novel technologies like Arka Microbial Consortium, Arka Fermented Cocopeat. Dr. G. Selvakumar, Senior Scientist spoke on the importance of Arka Fermented Cocopeat for vegetable seedling production and Dr. P. Panneerselvam, Scientist spoke on the significance of the Arka Microbial Consortium and its utility in boosting vegetable yields and soil health. Mr. Yashwanth, who has been using the product for the past two years shared his experiences with the Arka Microbial Consortium and its importance in capsicum crop production.

Vegetable Field Day

The Institute organized Field Day on Improved Vegetable Varieties / F₁ Hybrids developed and Production Technologies standardized by the Institute in the vegetable demonstration block at its campus on September 16, 2014. High-yielding triple disease resistant tomato hybrids; Arka Rakshak and Arka Samrat, high-yielding disease resistant chilli hybrids; Arka Khyati, Arka Meghana & Arka Harita, bacterial wilt resistant brinjal hybrid, Arka Anand, onion varieties; Arka Vishwas, Arka Sona, Arka Swadista & Arka Ujjwal, onion hybrids; Arka Lalima & Arka Kirthiman and synthetic variety Arka Bheem, French bean varieties; Arka Komal, Arka Suvidha, Arka Anoop & Arka Sharath, dolichos varieties; Arka Amogh, Arka Sambhram & Arka Soumya, pea varieties; Arka Sampoorana, Arka Priya & Arka Pramod, multi-cut Amaranthus varieties; Arka Suguna & Arka Arunima, palak variety, Arka Anupama, coriander variety, Arka Isha, pumpkin varieties; Arka

Suryamukhi & Arka Chandan, bush squash variety, Patty Pan, ridge gourd variety, Arka Sujat and bottle gourd variety, Arka Bahar had been grown in the demonstration plots according to the recommended precision farming techniques including mulching, drip irrigation, fertigation *etc.* A field visit of the farmers was arranged to witness the crops grown in the demonstration block. Brochures on vegetable varieties released from IIHR and recommended cultivation practices were distributed to farmers. Seeds of these



varieties were also made available for sale. More than 200 farmers from Bengaluru, Mysore, Chikballapur, Doddaballapur and Tumkur districts of the Karnataka and Cuddapah district of Andhra Pradesh took part in the Field Day.

Field day cum Scientist- Farmer Interface Program on Arka Microbial Consortium

The KVK, Gonikoppal in association with Division of Soil Science, IIHR, Bengaluru organized a Field Day cum Scientists - Farmers Interface Program on Arka Microbial Consortium on September 19, 2014. More than 100 progressive planters, farmers, extension



functionaries from different taluks of Kodagu participated in the program. Dr. A. N. Ganeshmurthy, Principal Scientist and Head, Division of Soil Science and Agricultural Chemistry, IIHR, Bengaluru inaugurated the field day and informed about various technologies developed by the Institute particularly the crop specific micro-nutrient formulations for vegetables, mango, citrus, grapes and gave a brief overview of Arka Microbial Consortium technology as

a single and economic microorganism based product and emphasized the importance of nutrients in plant health management. Dr. P. Paneer Selvam, Scientist, IIHR, Bengaluru explained in detail the role of Arka Microbial Consortium in producing healthy plants material which can guard against diseases and how to use this product. Dr. G. Selva Kumar, Senior Scientist, IIHR, Bengaluru spoke on the importance of Arka Coco-pith in the production of quality planting materials in vegetable/fruit crops and black pepper. Dr. Saju George, Program Coordinator, KVK, Gonikoppal requested the growers to acquaint with the latest technologies in consultation with the Subject Matter Specialists of KVK in enhancing the production and productivity in black pepper. Mr. Aiyyappa, from Arvathoklu village of Virajpet taluk of Kodagu district who is using Arka Microbial Consortium in black pepper since last one year shared his experiences of recovery of pepper vines by use of Arka Microbial Consortium with the guidance and monitoring from scientists of IIHR, Bengaluru and KVK, Gonikoppal. A field visit was arranged to the garden of Mr. Aiyyappa, where a demonstration was conducted on how to mix Arak Microbial Consortia and method of application to vines.

Field Day on Ridge Gourd

A field day on 'Management of ridge gourd through improved IIHR technologies' was organized in the ridge gourd field of Shri Antony, Silubepura village, Bengaluru Rural on August 22, 2014. About 48 vegetable growing farmers from in and around the village participated in the event. Dr. A. N. Ganeshamurthy, Head, Division of Soil Science and Agril. Chemistry addressed the gathering and spoke about newly released technologies from IIHR and informed



the farmers to take advantage of the newly released low cost technology like Arka Microbial Consortium & Boric acid technologies and eight other technologies developed by the Institute and also informed that the Institute is producing sufficient quantity of seed material for meeting the requirement of local farmers. Dr. G.C. Satisha, Principal Scientist spoke about importance of micro nutrient especially of Boric Acid in cucurbitaceous vegetable crops.

Dr. P. Panneerselvam, Scientist spoke about the significance and use of Arka Microbial Consortium for improved yield and soil enrichment. Smt. & Shri Anotony, progressive farmers addressing the gathered farmer said that ridge gourd has given better yield because of application of Boric acid, Arka Microbial Consortium and integrated management of fly.

Success Stories

Arka Rakshak- Triple Disease Resistant Tomato Hybrid

Mr. Chandrappa, a progressive tomato grower from Devasthanada Hosahalli Village, Chikkaballapura district, Karnataka had discontinued tomato cultivation permanently due to heavy incidence of bacterial wilt and other problems. After visiting the demonstration plot of tomato F1 hybrid, Arka Rakshak at IIHR, Bengaluru and further discussion with the team of scientists he was convinced to take-up cultivation of tomato hybrid, Arka Rakshak during summer of 2012 and since then has not turned back. (5



crops so far). The present summer crop in one acre (3500 plants) has yielded 31 t /ac so far from 12 pickings (110 days after transplanting) and the farmer is expecting to harvest further 30 t/ac from the healthy and pest free field. Mr. Chandrappa has cleverly planned his planting keeping in view the high summer price and so far has earned a gross income of Rs. 9.75 lakhs. Arka Rakshak is the first triple disease resistant *viz.* bacterial wilt, tomato leaf curl virus and early blight developed by IIHR, Bengaluru which apart from being disease resistant, is a high yielder, firm fruits, uniform in weight (90 g) and shape (oblong) and develops attractive deep red colour on ripening. Because of its excellent firmness and longer shelf life (15-20 days) the fruits are ideal for long distance transport and preferred in the market. Mr. Chandrappa has also adopted advanced scientific method of cultivation *viz.*, precision farming practices like drip irrigation, fertigation, foliar nutrition, use of black polythene mulch, application of vegetable special developed by IIHR, Bengaluru as foliar spray *etc.* Dr. S. Ayyappan, Secretary, DARE, Government of India and Director General, ICAR along with Dr. N.K. Krishna Kumar, DDG (Hort. Sci.), ICAR, New Delhi visited Arka Rakshak field of Mr. Chandrappa on August 16, 2014 accompanied by Dr. T. Manjunatha Rao, Director, Dr. A. T. Sadashiva, Principal scientist who has developed this hybrid, Dr. M. Prabhakar,

Principal Scientist and Head, and Dr. Shankar Hebbar, Principal Scientist, Division of Vegetable Crops, IIHR, Bengaluru. Dr. A. T. Sadashiva informed that more than 35 kg of F₁ seeds of Arka Rakshak was distributed to 22 states in the country so far. The Institute is also receiving requests from Africa, Pakistan and Vietnam countries for the supply of seeds. Dr. M. Prabhakar, and Dr. Shankar Hebbar informed that yield potential and uniform size and firmness of fruits were accomplished because of adoption of precision farming practices standardized by the Institute. Dr. Ayyappan congratulated the entire team of scientists involved in the development of Arka Rakshak and appreciated Mr. Chandrappa and his family members for the scientific way of raising the tomato crop.

Poly Mulching in Tomato Cultivation – A Successful Venture by a Farm Woman

Tomato farmers are facing problems due to the climate change which leads to outbreak of pest and diseases, drought situation, bore wells going dry, labour scarcity *etc.* In last 3-4 years major diseases like late blight and leaf curl have emerged as devastating problems for tomato crop. Subsequently cost of cultivation has also gone up and labour shortage has become a major threat for farming community. To mitigate these problems KVK Hirehalli, Tumkur, took up a Front Line



Demonstration (FLD) of the technology - Poly mulching with drip irrigation in tomato crop during the year 2013-14. The FLD was taken up in the field of progressive farm woman, Smt. Saroja of Deverayanapatna village of Tumkur taluk. Smt. Saroja is having two acres of land and minimum experience in the field of agriculture and horticulture. Earlier, she used to grow only ragi and paddy crops during the monsoon. She was unable to cultivate profit oriented crops due to the lack of technical knowhow and labour scarcity. She visited KVK, Hirehalli and discussed with scientists about cultivation of tomato. She was advised on *summer tomato* production technology with Hybrid Arka Samrat during 2013-14. Keeping these suggestions in view, Smt. Saroja decided to go for summer tomato cultivation in her field with technological interventions from KVK, Hirehalli. She planned for one acre of tomato hybrid Arka Samrat and transplanted the seedlings on raised beds with ploy mulch film laid with drip irrigation. She followed the

package of practices with fertigation and plant protection recommendations as per the guidance given by the KVK staff. The practice of mulching helped in moisture conservation, weed suppression and maintenance of soil structure. Mulches also improved the use efficiency of applied fertilizer and use of reflective mulches minimized the incidences of pests and viral diseases. She started harvesting tomato after 65 days of planting and got 32.50 tons of tomato per acre and sold them @ Rs.10 per kg. This resulted in a total income of Rs. 3.25 lakhs per acre. The total cost of cultivation for tomato was Rs.60, 000 per acre. Thus, she earned a net profit of Rs. 2.65 lakh per acre (BC ratio 5.41).

Animal Health Campaign

The KVK, Gonikoppal conducted five animal health campaigns in collaboration with the Department of AH & VS at Teralu, Badagarakeri, Harihara, Parakatageri, Birunani during the month of September 2014. More than 350 cows, buffaloes, pigs and goats were vaccinated against foot and mouth disease.

Interaction Meetings

The Division of Extension and Training organized the following interaction/interface meetings.

- Two Group Interactions Meetings for farm women at Bommanahalli and Singanahalli of Tumkuru district for the benefit of 32 farm women under the DST project - 'Livelihood security of farm women through appropriate horticultural interventions' on August 28, 2014.
- Interaction meeting with officers of NABARD, Dept. of Horticulture, Govt. of Karnataka and National Horticulture Board, Bengaluru on promotion of protected cultivation of vegetable crops in cluster mode in Haveri and Gadag, districts of Karnataka on July 22, 2014.
- Interface meeting with input companies, exporters, bankers and marketers of high value vegetables and flowers for promotion of protected cultivation, bio-control management of pests and diseases under protected environment at BIEC, Bengaluru on August 30, 2014.
- One farmers' group meeting on need assessment for demonstration of drumstick under DST project entitled 'Ensuring livelihood security of farmwomen through appropriate horticultural technologies interventions' at Chikkaballapura district on September 16, 2014.
- Interface meeting with Druv Technology Solutions, Bengaluru and Rijk Zwaan Seeds India Pvt. Ltd., Bengaluru on development of portals on protected cultivation of vegetable crops on September 20, 2014.

Field Demonstrations

The following field demonstrations were organized at various places in the farmers' field.

- Use of integrated technologies (like improved rose

onion variety Arka Bindu, quality seed with seed treatment, seedling protection with fungicide application, spaced seed sowing by direct seeding with seed drum seeder and weed management including weedicides *etc.*) for production of rose onion for export at Dibburahalli, Chikkaballapur district on July 31, 2014.

- Use of micronutrient formulation, Arka Banana Special and bunch bagging technique of IHR, Bengaluru for enhancing growth, yield and quality in banana (Grand Naine) in two villages of Somwarpet taluk of Kodagu district.
- Use of micro nutrient formulation, Pepper Special of IISR, Calicut for enhancing growth, yield and quality in black pepper in three villages of Kodagu district.
- Twenty demonstrations of high yielding fodder var. Co- 3 in increasing the green fodder yield and milk yield in cows at KVK, Gonikoppal.
- Five on-farm trials to find out effective treatment for management of quick wilt in black pepper. The treatments include Bordeaux mixture spray, soil application of Arka Microbial Consortia with Actino-bacterial Consortia, Potassium Phosphanate spray and Trichoderma application at Balyamandoor, Hudikeri and Kumutur village of Virajpet taluk of Kodagu district.
- Paired row system of planting of banana for enhancement of productivity and quality in banana var. Grand Naine in five farmers' field in Kodagu.
- Use of Arka Microbial Consortium in onion, papaya and capsicum under polyhouse in 26 farmers' fields in Bengaluru Urban, Bengaluru Rural, Ramanagara, Mysuru, Chamaraja Nagar districts.
- Bio-control of pests and disease under protected cultivation of vegetable crops in six farmers' fields in Bengaluru Urban and Bengaluru Rural districts under RKVY project.

Survey/Field visits

- Drs. Anuradha Sane and Rekha, A. undertook exploration in Srisailem forest area (Andhra Pradesh and Karnataka border region) for survey and collection of jamun germplasm during July 01-05, 2014.
- Dr.Narayana, C. K. visited the fields in Pannapatti and Omalur in Salem district and flower markets in Erode and Salem to survey post-harvest loss assessment in chrysanthemum flowers on July 21-22, 2014.
- Dr. Sankar, V. and Smt. Swathy, P. B surveyed 24

tribal families at Avaregunda Village of Virajpet taluk under TSP program on July 21, 2014.

- Drs. Tripathi, P. C. and Reddy T.M. surveyed Sandalkad estate at Kodagu on for offering technical guidance for the demonstration plots of Coorg orange grafted plants on July, 23, 2014.
- Dr. Veere Gowda. R. visited onion F₁ hybrid plots at Hirenellur and Kadur, Chikkamagalur dist. for guiding farmers on *Kharif* onion cultivation on August 26, 2014.
- Dr. Murthy, B.N.S. surveyed Parvati Valley in Kullu district of Himachal Pradesh along with team of scientists from NBPGR, Phagli and IARI, Regional Station, Shimla for collection of pomegranate breeding material during August 27 - September 01, 2014.
- Dr. Sakthivel, T. visited Varanasi for survey, exploration and collection of Karonda germplasm during August 28-31, 2014.
- Dr. Veere Gowda. R. visited Arka Bindu rose onion seed production plots at Dibburahalli, Chikballapur district on September 06, 2014.
- Dr. Rajiv Kumar visited farmers' fields at Agrahara village for interaction and identification of farmers for demonstration of IIHR released varieties of China aster and demonstrated horticultural practices like nursery raising, planting method and pinching in improving the productivity on September 07 and 24, 2014.
- Dr. Veere Gowda. R, visited onion F₁ hybrids Arka Lalima and Arka Kirthiman seed bulb production

plots and demonstration plot of F₁ hybrids Arka Lalima and Arka Kirthiman at Doddatumkur, Doddaballapur taluk to guide the farmers on production of quality seed bulbs on September 12, 2014.

- Dr. Narayana C.K. visited the field at Sannasipatti, Trichy district, Tamil Nadu to witness the successful use of solar dryers for drying of fruits and vegetables on September 12, 2014.
- Dr. Sulladmath, V.V. visited Somanahalli, Kaval and Madapur horticulture farms for suggesting necessary modifications in the detailed project reports with respect to development of horticulture technology demonstration centers prepared by Govt. of Karnataka on September 19-20, 2014.
- Ms. Anushma, P. L. participated in the exploration program to North East Region arranged by NRC for Banana for exploration of wild species and wild relatives of Musa in and around Arunachal Pradesh during September 19-30, 2014.
- The Program Coordinator and Subject Matter Specialists of KVK, Gonikoppal along with Department of Horticulture officials visited the banana gardens at Galibeedu village and neighboring villages of Madikeri taluk to assess the damage caused by the sudden pest outbreak on banana crops causing serious damage and to offer management strategies.
- Seven field visits were taken by the staff of KVK, Gonikoppal to offer suggestions on field based problems in pepper and banana crop in different villages of the Kodagu district during the quarter.

T.V Programs

The following television programs on various aspects of horticulture were given by the scientists of the Institute.

Sl. No	Topic	Channel	Date	Resource person
1	Horticultural cropping systems and hints to farmers.	Chandana, Bengaluru	11.07.2014	Narayanaswamy, B.
2	Tomato hybrid Arka Rakshak.	India TV	17.07.2014	Report
3	Tomato hybrid Arka Rakshak	NDTV	25-7-2014	Report
4	Plant protection in coffee and other crops in plantations.	Chandana, Bengaluru	29.07.2014	Narayanaswamy, B.
5	ATIC in the service of farming community.	Chandana, Bengaluru	14.08.2014	Narayanaswamy, B.
6	IIHR Extension activities and importance of exhibitions.	Chandana, Bengaluru	16.08.2014	Narayanaswamy, B.
7	Anti-oxidant rich amaranth varieties, ArkaSamraksha and Arka Varna released by IIHR, Bengaluru.	Chandana, Bengaluru	18.08.2014	Varalakshmi, B.
8	Field day on vegetable varieties developed by IIHR, Bengaluru.	Chandana, Bengaluru	25.08.2014	Report
9	Raitha mithra on preparation for <i>rabi</i> crops.	Chandana, Bengaluru	26.08.2014	Narayanaswamy, B.
10	IIHR okra varieties.	Chandana, Bengaluru	15.09.2014	Pitchaimuthu
11	Recent advances in quick wilt disease management in black pepper (recorded).	Chandana, Bengaluru	20.09.2014	Veerendrakumar, K. V.
12	Scientific goatary farming(recorded).	Chandana, Bengaluru	20.09.2014	Suresh, S.C.
13	Diseases of piggery (recorded).	Chandana, Bengaluru	21.09.2014	Suresh, S.C.
14	Scientific banana cultivation(recorded).	Chandana, Bengaluru	21.09.2014	Prabhakara, B.
15	Soil and water conservation – NICRA,D.Nagenahalli, Koratagere, Tumkuru.	Chandana, Bengaluru	05.09.2014	Naik,L.B., Ramesh P. R., Jagadish, K.N.& Prasanth J. M.

Radio talks

The following radio talks were given by the staff of IIHR, Bengaluru.

Sl. No	Topic	Date	Resource person
1	Role of KVK in addressing climate change in agriculture and horticulture.	17.07.2014	Jagadish, K. N.,Ramesh, P. R.,Prasanth, J. M.,Gowda, B.H,& Somashekara
2	Organic farming.	21.08.2014	Narayanaswamy, B.

Fairs / Exhibitions

The Institute and its regional stations organized/participated in the following exhibitions.

Sl. No.	Event	Place and date
1	Exhibition of IIHR technologies on the occasion of 86th ICAR Foundation Day celebration.	IIHR, Hesaraghatta, Bengaluru July 16, 2014.
2	10th International Agriculture and Horti. Expo 2014.	Pragathi Maidan, New Delhi July 25-27, 2014.
3	Exhibition of IIHR technologies on the occasion of inauguration of P.G. School in Horticultural Sciences.	IIHR, Hesaraghatta, Bengaluru August 16, 2014.
4	Hasiru Santhe, organized by the BBMP and Ministry of Agriculture, Govt. of Karnataka.	Vidyaranyapura, Bengaluru August 24, 2014.

Commercialization of technologies

- ❖ A total of 18 technologies developed by IIHR, Bengaluru were commercialized through licensing to 26 private firms and KVKs generating a total revenue of Rs. 43, 68,657/- during the period.

Revenue Generated by Mushroom Laboratory

- ❖ An amount of Rs. 6, 81,432/- was generated by the mushroom laboratory through sale of Mushroom spawn (Rs. 5, 71,002/-), RTF bags (Rs. 6930/-) and training (Rs. 1, 03,500/-).

Sale of Technological Products through ATIC

- ❖ 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 kits & Sample packets, PHT products, sapota, mango and lime harvesters etc. were sold through the ATIC, IIHR, Bengaluru to the visiting farmers and general public and generated a revenue of Rs. 23, 34,154/- during the period.

General Visitors

- ❖ 1069 farmers, 1310 students and 24 others/officers visited the Institute at Hesaraghatta, Bengaluru. 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.
- ❖ 218 farmers from Odisha, Andhra Pradesh, Tamil Nadu, 72 students from OUAT, Bhubaneswar, 23 unemployed youth, sponsored by 9 different organizations / agencies / NGO's, visited CHES,

Bhubaneswar for exposure in horticultural technologies and got benefitted.

- ❖ 1507 farmers and other visitors from Karnataka, Kerala, and Tamil Nadu visited CHES, Chettalli for exposure in horticultural technologies, planting material and consultancy services.

Publications

Research Papers

- Ambresh, Veere Gowda R., Varun Amingada S. and Ansar, H. (2014). Studies on seed set abilities of male sterile and male fertile lines of tropical onion (*Allium cepa* L.). *Green Farming*, 5(1):152-154.
- Bhatt, R. M., Rashmi, Nageswara Rao, A.D.D.V.S., Laxman, R. H. and Singh, T. H. (2013). Seed germination and seedling growth in *Solanum* species to water stress under in vitro conditions. *Journal of Horticultural Sciences*, 8(2): 262-267.
- Kavitha, P., Shivashankara, K. S., Rao, V. K., Sadashiva, A. T., Ravishankar, K. V. and Sathish, G. J. (2013). Genotypic variability for antioxidant and quality parameters among tomato cultivars, hybrids, cherry tomatoes and wild species. *J. Sci. Food and Agri.*, 94:993-999.
- Lavanya Devi, K., Anuradha Sane, Shivanna, M. B. and Ganeshan, S. (2014). Optimization of DNA isolation and PCR protocol for ISSR analysis of species of *Spilanthes* - a medicinal herb - from peninsular India. *Int'l J. Sci. Res.*, 3(9):1088-1091.
- Lokeshwari, D., Hayat, M., Krishna Kumar, N. K., Manjunatha, H. and Venugopalan, R. (2014). First occurrence of the aphid parasitoid, *Aphelinus Basilicus* (Hymenoptera: Aphelinidae), on *Aphis gossypii* (Hemiptera: Aphididae) color forms in India. *Florida Entomologist*, 97(2):809-813.
- Mahesh Badiger, Pitchaimuthu, M., Parvati, B. and Sachin, U. (2014). Heterosis studies on conventional and genic male sterility based hybrids

- in okra [*Abelmoschus esculentus* (L.) Monech]. *Green Farming*, 5(4):524-528.
- Mahesh Badiger, Pitchaimuthu, M., Parvati, B. and Sachin, U. (2014). Combining ability of male sterile in okra [*Abelmoschus esculentus* (L.) Monech]. *Green Farming*, 5(5):746-748.
 - Mohapatra, S. (2014). Residue dynamics of chlorpyrifos and cypermethrin in/on pomegranate (*Punica granatum* L.) fruits and soil. *Int'l J. Environ. Analytical Chemistry*, <http://dx.doi.org/10.1080/03067319.2014.954564>.
 - Muralidhara, B. M., Reddy, Y. T. N., Venugopalan, R., Akshitha, H. J. and Shivprasad, M. K. (2014). Effect of VA Mycorrhiza on seedling growth and vigour of mango. *BIOINFOLET*, 11-2(b):536-538.
 - Muttappanavar R. D., Sadashiva, A. T., Vijendrakumar, R. C., Roopa, B. N. and Vasantha, P. T. (2014). Combining ability analysis of growth, yield and quality traits in cherry tomato (*Solanum lycopersicum* var. Cerasiforme). *Molecular Pl. Breeding*, 5(4):18-23.
 - Muttappanavar, R. D., Sadashiva, A. T., Vijendrakumar, R. C., Vasantha, P. T. and Geeta, S. V. (2014). Assessment of quality and biochemical traits of parents and F₁ hybrids of cherry tomato (*Solanum lycopersicum* var. Cerasiforme). *Green Farming*, 5(3):408-410.
 - Ranjitha, K. and Sudhakar Rao, D. V. (2014). Modified atmosphere packaging of green gram (*Vigna radiata* L.) sprouts for extending shelf life and acceptance in Indian market. *Asian J. Dairy & Food Res.*, 33(2):91-97.
 - Reena Rosy Thomas, Chandra Prakash, M. K., Krishna Reddy, M., Sukhada Mohandas and Riaz Mahmood (2013). Microsatellite identification in Solanaceous crops with Nucleocidine Diphosphate Kinase (NDK) specific to abiotic stress tolerance through *in silico* analysis. *J. Hortl. Sci.*, 8(2):195-198.
 - Rymbaia, H., Laxman, R. H., Dinesh, M. R., John Sunoj, V. S., Ravishankar, K. V. and Jha, A. K. (2014). Diversity in leaf morphology and physiological characteristics among mango (*Mangifera indica*) cultivars popular in different agro-climatic regions of India. *Scientia Hort.*, 176:189-193.
 - Sharma, K. K., Mukherjee, Singh, B., Sahoo, S. K., Parihar, N. S., Sharma B. N., Kale, V. D., Nakat, R. V., Walunj, A. R., Mohapatra, S., Ahuja, A. K., Sharma, D., Singh, G., Noniwal, R. and Devi, S. (2014). Residual behavior and risk assessment of flubendiamide on tomato at different agro-climatic conditions in India. *Environment Monitoring and Assessment*, 186(11):7673-7682
 - Singh, H. S. (2013). Damage and distribution of red banded mango caterpillar (RBM), *Deanolis albizonalis* (Hampson) (Lepidoptera: Pyralidae). An emerging pest in eastern India. *Int'l J. Innovative Hort.*, 2(2):137-141.
 - Singh, H. S. and Kundan Kishore (2014). Status and strategies for red banded mango caterpillar, *Deanolis albizonalis* (Hampson) (Lep: Pyralidae). An emerging pest in eastern India. *J. Applied Zoological Res.* 25(1):11-20.
 - Singh, H. S. (2014). Management of fresh leaf-cutting weevil, *Deporaus marginatus* (Pascoe) in mango. *Insect Environment, (a supplement of Current Biotica)* 20(1):19-21.
 - Singh, H. S. (2014). Record of *Cryptophlebia ombrodelta* (Lower) (Tortricidae: Lepitoptera) on Bael (*Aegle marmelos*) and tamarind (*Tamarindus indica*) in eastern India. *Insect Environment (a supplement of Current Biotica)*, 20(1):24-25.
 - Sudha Mysore, Ramasundaram, P. and Hegde, M. R. (2014). Assessing the economic impact of technology adoption in horticulture: concepts and case study of dogridge root stock adoption in grape **cultivation in India**. *Int'l J. Agril. Innovations and Res.*, 3(1):2319-1473.
 - Sudhakar Rao, D. V. and Shivasankar, K. S. (2014). Individual shrink wrapping extends the storage life and maintains the antioxidants of mango (cvs. Alphonso and Banganapalli) stored at 8°C. *J. Food Sci. Technol.*, DOI 10.1007/s13197-014-1468-6.
 - Thomas Pious, Sadashiva Avverahally, Upreti Reshmi and Mujawar Mohammed (2014). Direct delivery of inoculum to shoot tissue interferes with genotypic resistance to *Ralstonia solanacearum* in tomato seedlings. *J. Phytopathology*, doi: 10.1111/jph.12281.
 - Thomas, P. and Upreti, R. (2014) Influence of seedling age on the susceptibility of tomato plants to *Ralstonia solanacearum* during protrait screening and at transplanting. *Amer. J. Plant Sci.*, 5:1755-1762.
 - Thomas, P. and Upreti, R. (2014) Testing of bacterial endophytes from non-host sources as potential antagonistic agents against tomato wilt pathogen *Ralstonia solanacearum*. *Adv. Microbiol.*, 4:656-666.
 - Vandana, V. V., Suseela Bhai, R. and Shamina Azeez (2014). Biochemical defense responses of black pepper (*Piper nigrum* L.) to *Phytophthora capsici*. *Physiological and Molecular Plant Patho.*, 88:18-27.

Popular Articles

- Bhuvaneswari, S. and Narayana, C. K. (2014). *Sadak dwara chicku ke parivahan ki vidhi. Bagwani*,(5):21-22.
- Bhuvaneswari, S. and Narayana, C. K. (2014). Corrugated fiber board (CFB) boxes- an ideal package for long distance transportation of tropical fruits. *Vatika, Spring-2014(I)*:35-37.
- Chakravarthy, A. K. (2014). New horizons in insectscience: towards sustainable pest management. *Springerspublications*, pp.500.
- Dhananjaya, M.V. and Rajiv Kumar. (2014). *Heliconia: Ek wishisht phool. Bagwani*,5:83-86.
- Narayanaswamy, B. (2014) Tomato disease resistant hybrids. Sujatha Sanchike, (Kannada monthly), 20(10):32-35.
- Narayanaswamy, B. (2014) IIHR extension activities – a mega Field Day. Sujatha sanchike (Kannada monthly), 20 (10):42
- Rajiv Kumar and Manjunatha Rao,T. (2014). *China aster. Bagwani*,5:77-79.
- Rajiv Kumar. (2014). Wild bat flower is beautiful. *Indian Horticulture*,59(3):36-37.
- Sudhakar Rao, D. V. (2014). *Aam ka sashyotthar - Prabhandhan. Bagwani*, (5):32-27,
- Sujatha A. Nair. (2014). *Sajawati Patte. Bagwani*, 5:80-82.
- Tiwari, R. B. and Sarojini Jalali (2014). *Awana-leke mulya vardhit Utpaad. Bagawani*,(5):41-42.
- Tripathi, P. C., Sankar, V. and Prasanth Kumar, G. M. (2014). Minor citrus fruits of Coorg. *Coffee Land News*,September 17&25, pp-33-36.
- Veerendra Kumar, K. V., Saju George and Prabhakar, B. (2014). Pest and disease management in Coorgmandarin. *Krishi Mitra*, Kannada monthly, 7:33-36.

Books/Chapters in Books

- Sudha Mysore, Krishna Kumar, N. K., Ganeshan, S., Krishnamoorthy, A. and Sidhu, A. S. (2012). Enabling public private partnership through technology licensing in horticultural crops, *In: Technology Transfer and Commercialization, Experiences of India and USA*, (Eds.)Karim Maredia, Sudha Mysore, Suresh Kumar and Callista Ransom,Michigan State University Press, East Lansing, pp:50-62.

Extension Folders

- Sadashiv, A.T., Prabhakar, M., Hebbar, S. S., Narayanaswamy, B., Kashinath, B. L. and Nagegowda, N. S. (2014) Arka Rakshak and Arka Samrat–Thriroganirodhaka adhika iluvary tomato.

Extension handout, IIHR, Bengaluru.

- Sukanya, D. H. and Suryanarayana, M. A. (2014). Ashwagandha- an ancient medicinal herb. Extension folder, September 2014, IIHR, Bengaluru.
- Suryanarayana, M. A., Hima Bindu, K., Sukanya, D. H., Vasantha Kumar, T. and Lalitha, B. R. (2014). - Herbs for household, Extension bulletin, September 2014,IIHR, Bengaluru.

Proceedings/Abstracts/Souvenirs

- Jagadishan, A. K and Tiwari, R. B. (2014). *Bagwani vishay men hindi me takniki prakashan ki Chunoutiyan. In: Abstracts, Rastriya Hindi Vigyan Samellan-2014, Bhopal, August 01-02, 2014*, pp.2.
- Hima Bindu, K., Vasantha Kumar, T. and Suryanarayana, M. A. (2014). Proceedings, National Meet on Betel vine-Farmers Traders and Researchers, Interface, February 22-23, 2014, IIHR, Bengaluru, India, September 2014.

Annual Technical Review and Planning Meeting and 10th NPSC Meeting of UNEP-GEF Project, IIHR, Bengaluru, July 10-12, 2014.

- Gajanana, T. M. - Baseline report- Chittoor. National Conference on Pre - Post Harvest Losses and Value Addition in Vegetables, IIVR, Varanasi, July 12-13, 2014.
- Tiwari, R. B. and Sarojini Jalali - Retention of vitamin C during blanching and freezing of vegetables.
- Narayana, C. K. – Post-harvest losses in vegetables.
- Doreyappa Gowda, I. N. - Innovative processing techniques in vegetables.
- Sudhakar Rao, D. V., Anuradha Srivastava, and Ranjitha, K. - Active and smart packaging in vegetables.

National Seminar-cum-Workshop on Strategies for Improvement, Enhancing Productivity and Utilization of Cucurbits, CHES, Bhubaneswar, August 07-11, 2014.

- Singh, H. S. - Single line trellis-an alternative strategy for pest management in small cucurbit.
- Srinivas, P. (2014). Predominant viruses of minor cucurbits in Odisha.
- Bharathi, L. K. (2014). Wide hybridization studies in the genus *Momordica*.
- Bharathi, L. K. (2014). Potential of minor cucurbits for enhanced income for livelihood support for small and marginal farmers of Odisha.

- Narayana, C. K. and Rao, D. V. S. (2014). Post-harvest management and value addition in cucurbits.
- Rajasekharan, P. E.-*Ex situ* conservation strategies for cucurbits the session on genetic resources in cucurbits: diversity, conservation and utilization.
- Varalakshmi, B., Pitchaimuthu, M. and Lakshman Reddy, D.C. -Present status and future breeding strategies for improved cultivation of bottle gourd.
- Pitchaimuthu, M., Varalakshmi, B., Kanupriya and Ansar Vani - Present status and future breeding strategies for improved cultivation of cucumber and native melons in India.
- Umamaheshwarappa, P., Krishnappa, K. and Pitchaimuthu, M. - Effect of varying levels on nitrogen, phosphorus and potassium on growth and yield of bottle gourd under southern dry region of Karnataka.
- Umamaheshwarappa, P., Krishnappa, K. and Pitchaimuthu, M. - Uptake of nitrogen, phosphorus and potassium by plant and leaf chlorophyll content of bottle gourd cv. Arka Bahar under southern dry region of Karnataka.
- Umamaheshwarappa, P., Krishnappa, K. and Pitchaimuthu, M. - Effect of varying levels on nitrogen, phosphorus and potassium on flowering, fruit set and sex ratio of bottle gourd under southern dry region of Karnataka.
- Umamaheshwarappa, P., Krishnappa, K. and Pitchaimuthu, M. - Effect of varying levels on nitrogen, phosphorus and potassium on flowering, fruit set and sex ratio of cucumber (*Cucumis sativus* .L) under southern dry region of Karnataka.
- Umamaheshwarappa, P., Krishnappa, K. and Pitchaimuthu, M. - Growth and yield of cucumber (*Cucumis sativus* .L) as influenced by varying levels of nitrogen, phosphorus and potassium under southern dry region of Karnataka.

International Symposium on Tropical Fruits Organized by International Tropical Fruits Network (TFNet), Putrajaya, Malaysia, August 14, 2014.

- Prakash Patil - Recent advances in tropical fruit research in India.

XII Group Meeting of AICRP on Medicinal, Aromatic Plants and Betelvine, IIHR, September 17, 2014.

- Hima Bindu, K. - Status of plant genetic resources of medicinal plants.

29th International Horticultural Congress (IHC) and Mango Workshop, Brisbane, Australia, August 17-22, 2014.

- Dinesh, M. R. - Evaluation and *Ex-situ* conservation of indigenous (*Naati*) mango varieties.
- Bharathi, L. K. - Synthesis and preliminary characterization of a new synthetic *Momordica* species with potential as a new vegetable crop.

Asian Solanaceous Round Table-2014 on Disease and Insect Pest Resistance in Solanaceous Vegetables: Success and Challenges, Bengaluru, September 09-10, 2014.

- Sadashiva, A. T. - Breeding tomato for resistance to early blight in combination with bacterial wilt and tomato leaf curl virus.

International Symposium on Conservation and Management of Pollinators, New Delhi, September 24-26, 2014.

- Reddy, P. V. R., Varun Rajan, V., Vasugi, C. and Verghese, A. - Pollinator profile of mango in India.

Honours/Recognitions/Awards

- ❖ Dr. Kamala Jayanthi, P. D. has been awarded Panjabrao Deshmukh Outstanding Woman Scientist Award for the year 2013 from Indian Council of Agricultural Research.
- ❖ Dr. Sadashiva, A. T. has been conferred with Dr. Kirti Singh Life Time Achievement Award in Vegetable Science by the Indian Society Vegetable Science (ISVS), Varanasi.
- ❖ Dr. Sudhamoy Mandal has been awarded IIHR Best Scientist Award for the year 2014 on the occasion of IIHR Foundation Day.
- ❖ Dr. Soudamini Mohapatra, has been qualified to be a member in the panel of National Accreditation Board for Testing and Calibration Laboratories (NABL), Department of Science & Technology, Government of India, as an Assessor for Chemical Testing Laboratories.
- ❖ Dr. Narayana, C. K., was elected as Fellow of National Academy of Biological Sciences, Chennai and was conferred the Fellowship during the National Seminar on Biodiversity Conservation-Present Status & Way Forward organized by National Academy of Biological Sciences in collaboration with K.S. Rangasamy College of Science & Technology, Tiruchengode, July 20, 2014.
- ❖ Dr. Narayanaswamy, B. was conferred with the

award 'Farmer Friendly Scientist' by UAS, Bengaluru under DBT project on 'Rural bio-resource complex' on September 02, 2014.

- ❖ Dr. Singh, H. S. have been nominated as member of the State Level Monitoring Committee for implementation of C.D.B. schemes for the year 2014-2015.
- ❖ Dr. Ganeshan, S. acted as Chairman for the session on 'Genetic resources in cucurbits: diversity, conservation and utilization at the National Seminar-cum-Workshop on Strategies for Improvement, Enhancing Productivity and Utilization of Cucurbits at CHES, Bhubaneswar, August 08, 2014.
- ❖ Dr. Narayana, C. K. acted as Chairman for the Technical Session on 'Participatory research appraisal in ornamental crops at the National Interactive Meeting on Plant Variety Protection and Participatory Research Appraisal in Ornamental Crops at IIHR, Bengaluru, August 22, 2014.
- ❖ Dr. Singh, H. S. acted as Co-Chairman for the Technical Session of 'Consortium Research Platform on Borers at IIHR, Bengaluru, August 18-19, 2014.
- ❖ Dr. Ganeshan, S. acted as Co-Chairman for the Session on PGR at the XXII Group Meeting of AICRP Medicinal, Aromatic Plants & Betelvine, IIHR, Bengaluru, September 17-20, 2014.
- ❖ Dr. Rajasekharan, P. E. acted as Rapporteur for the Technical session on 'Genetic resources in cucurbits: diversity, conservation and utilization at the National Seminar- cum-Workshop on Strategies for Improvement, Enhancing Productivity and Utilization of Cucurbits at CHES, Bhubaneswar and was also nominated as a judge for the poster session and students presentation, August 08, 2014.
- ❖ Dr. Rajasekharan, P. E. acted as Rapporteur in the Technical Session 1: Perspectives and challenges of plant variety protection at the National Interactive Meeting on Plant Variety Protection and Participatory Research Appraisal in Ornamental Crops at IIHR, Bengaluru, August 22, 2014.
- ❖ Dr. Anuradha Sane acted as Rapporteur in PGR session in XXII group meeting of AICRP Medicinal, Aromatic plants & Betelvine, IIHR, Bengaluru, September 17-20, 2014.

Personalia

New entrant Scientific staff

After successful completion of three months Professional Attachment Training at various ICAR institutes, the following scientists have reported for duty at IIHR, Bengaluru and its Regional Stations on August 13, 2014 as mentioned below:

- Mr. Nazeeb Naduthodi, Scientist (Fruit Science), CHES, Chettalli.
- Ms. Linta Vincent, Scientist (Fruit Science), IIHR, Bengaluru.
- Ms. Ponnamm Naresh, Scientist (Veg. Science), CHES, Bhubaneswar.
- Ms. Sonavane, S. Scientist (Pl. Patho.), CHES, Chettalli.
- Ms. Anushma. P. L. Scientist (Fruit Science), IIHR, Bengaluru.
- Mr. Awachare Chandrakant Madhav, Scientist (Fruit Science), CHES, Hirehalli.

Professional Attachment Training

- Ms. Anuradha Srivastava, newly recruited ARS scientist from ICAR Research Complex for Eastern Region underwent three months Professional Attachment Training under Dr. Sudhakar Rao, D.V., in the Division of Post-Harvest Technology during May 12- August 12, 2014.
- Ms. Priti S. Sonavane was deputed for a three months Professional Institutional Attachment Training at Division of Plant Pathology, Indian Agricultural Research Institute, New Delhi, May 20-August 20, 2014.

Selection

- Dr. Chowdappa, P. Principal Scientist, Div. of Plant Pathology has been selected as Director, CPCRI, Kasaragod by ASRB, New Delhi and was relieved on September 05, 2014.
- Dr. Dinesh, M.R. has been selected as Head, Division of Fruit Crops, IIHR, Bengaluru by ASRB, New Delhi and took over charge w.e.f 28.08.2014.
- Dr. Prakash Patil has been selected as Project Coordinator, AICRP on Fruits by ASRB, New Delhi and took over charge w.e.f 28.08.2014.

Promotion

Administrative Staff

- Mr. Mohan, C.M. CHES, Chettalli has been promoted to Asst. Administrative Officer w.e.f. 29.09.2014.

Transfer

Scientific Staff

- Dr. Karibasappa, G. S. PS & In-charge Head,

CHES, Hirehalli has been transferred from CHES, Hirehalli retired from Council Service on attaining the age of 60 years w.e.f. 30.09.2014(FN).

- Mr. Sambasdashivaiah, Technical Assistant, IIHR, Bengaluru retired from Council Service on attaining the age of 60 years w.e.f. 30.07.2014 (FN).
- Mr. Puttalakshmaiah, Skilled Support Staff, IIHR, Bengaluru retired from Council service on attaining the age of 60 years w.e.f. 30.07.2014 (FN).
- Mr. Afsar Pasha, Skilled Support Staff, IIHR, Bengaluru retired from Council service on attaining the age of 60 years w.e.f. 31.08.2014 (FN).

Voluntary Retirement

- Mr. Nageshwara Rao, ADDVA. Sr. Tech Officer, IIHR, Bengaluru retired voluntarily from Council Service w.e.f. 02.09.2014.

Miscellaneous

- Dr. Karunakaran, G. took over charge as In-charge Head, CHES, Hirehalli w.e.f. 29.09.2014.
- Dr. Veere Gowda, R., Division of Vegetable Crops took over as Acting Head, Division of Vegetable Crops w.e.f. 30.9.2014 (FN).

Visitors

IIHR, Hesaraghatta, Bengaluru

- Dr. S. V. Hithalamani, formerly Additional Director of Horticulture, Govt. of Karnataka, Bengaluru (16.07.2014).
- Dr. S. Balaji, General Manager Technical, EID Parry, Chennai (22.07.2014).
- Mr. A.K. Jha, ICAR – RAC & RMC member from Bihar (04.08.2014). * * *
- Dr. S. Ayyappan, Secretary, DARE, Govt. of India and DG, ICAR, New Delhi (16.08.2014).
- Dr. N. K. Krishna Kumar, DDG (Hort. Sci.), ICAR, New Delhi (16.08.2014).
- Dr. R. K. Jain, Dean and Joint Director, IARI, New Delhi, (16.08.2014).
- Prof. Ramakrishna, Centre for Intellectual Property Research and Advocacy, National Law School of India University, Bengaluru (22.08.2014).
- Mr. Pranav Kumar Mysore, Senior Associate, K&S Partners; a company of Intellectually Property Attorneys, Bengaluru (22.08.2014).
- Mr. Anne Ramesh, SIFA President and Director of IFAB, Bengaluru (22.08.2014)

- Mr. Venkat Rao, MD, Iris Biotech, Bengaluru (22.08.2014).
- Mr. V.H. Prasad, Director Blooms & Greens Pvt. Ltd, Bengaluru (22.08.2014).
- Mr. Sridhar Chowdhary, MD, Vinayaka Agritech Ltd., Bengaluru (22.08.2014).
- Mr. Robert de Bos, Director, Bangalore Plants First, Bengaluru (22.08.2014)
- Dr. Tilak Subbaiah, Floriculture Consultant, Bengaluru (22.08.2014).
- Dr. K. R. Kranthi, Director, CICR, Nagpur (30.08.2014).
- Dr. B. V. Patil, formerly the Vice Chancellor, UAS, Raichur (30.08.2014).
- Dr. Irani Mukerjee, IARI, New Delhi (30.08.2014).
- Dr. N. Srinivasa, GKVK, Bengaluru, (30.08.2014).
- Dr. K. S. Mohan, Monsanto, Bengaluru, (30.08.2014).
- Dr. G.M.V. Prasada Rao, ANGRAU, Guntur, (30.08.2014).
- Padmashree Dr. Kishan Lal Chadha, formerly DDG (Hort.), ICAR, New Delhi (05.09.2014).
- Dr. R. K. Jain, Project Coordinator, AICRP on Nematodes (08.09.2014).
- Dr. P. Parvata Reddy, formerly Director, IIHR, Bengaluru (08.09.2014).
- Dr. Uma Rao, Head, Division of Nematology, IARI, New Delhi (08.09.2014).
- Dr. Basavaraj, Executive Director, Karnataka State Horticulture Mission (08.09.2014).
- Dr. Niger Godley, Global Product Development Manager (Insecticides), Bayer Crop Science, Germany (10.09.2014).
- Dr. Aditya Shukla, Lead Scientist, ITL Ltd., Bengaluru (15.09.2014).
- Mrs. Sudha Murthy, Chairperson, Infosys Foundation (17.09.2014).
- Dr. Jitendra Kumar, Director, DMAPR, Anand, Gujarat, (17.09.2014).
- Padmasree Darshan Shankar, Chairman I-AIM, Bengaluru (18.09.2014).
- Dr. S. K. Malhotra, Horticulture Commissioner, GOI and ADG (Hort-I) ICAR, New Delhi, (18.09.2014).
- Dr. D. L. Maheshwar, VC, UHS, Bagalkot, (18.09.2014).
- Dr. J. Venkatesh, Director (R), UHS, Bagalkot, (18.09.2014).

- Dr. S. B. Dandin, formerly VC, UHS, Bagalkot (18.09.2014).
- Dr. U. V. Singh, APCCF and CEO, KAMPA, Bengaluru (18.09.2014).
- Dr. T. U. Haqqi, Asst. Adviser, NMPB, New Delhi, (18.09.2014).
- Dr. N. K. Krishna Kumar, DDG (Hort. Sci.), ICAR, New Delhi (19.09.2014).
- Mr. Bhaktha Ramegowda, Special Deputy Commissioner (Revenue), Tumakuru (20.9.2014).
- Dr. Warwick Easdown Regional Director, AVRDC, Taiwan, Dr. Doug Pachico, Plant Breeder and Dr. Jun Acedo, Postharvest Specialist AVRDC, Taiwan (22.09.2014).
- Dr. (Mrs.) Vijaya Malik, Retd. Sr. Hindi Officer, Central Power Research Institute, Bengaluru (23.09.2014).

CHES, Chettalli

- Dr. M. Anandaraj, Director, IISR, Calicut, Kerala (30.08.2014).
- Dr. Javed Akhar, Chairman, Coffee Board, Bengaluru (06.09.2014).
- Dr. Ranvir Singh, Principal Scientist, ICAR, New Delhi (08.09.2014).

CHES, Bhubaneswar

- Dr. E. Aravezhi, Deputy Director, Coconut Development Board, Bhubaneswar (16.07.2014)
- Dr. N. K. Krishna Kumar, DDG (Hort. Sci.), ICAR, New Delhi (09.08.2014).
- Dr. T. Janakiram, ADG (Hort. Sc.), ICAR, New Delhi (09.08.2014).
- Dr. S. Kumar, formerly Head, HARP, Ranchi (11.08.2014).
- Re. Bhama Kumari Geeta, Bhama Kumari Vishwa Vidyalaya, Bhubaneswar (26.08.2014).
- Dr. Bani Singh, Deputy Director, National Horticulture Board, Bhubaneswar (26.08.2014).
- Prof. Manoranjan Kar, Vice Chancellor, OUAT, Bhubaneswar (02.09.2014).
- Dr. S. K. Chadha, Director, Directorate of Horticulture, Govt. of Odisha (02.09.2014).
- Dr. Neelum Grewal, Director, DRWA, Bhubaneswar (02.09.2014).
- Sri. P. Routray General Manager (marketing services) and Sri. Sudhanshu Patra, Sr. Manager, PPL (04.09.2014)
- Dr. Sikhamany, S. D., formerly Director, IIHR (25.09.2014).

KVK, Gonikoppal

- Dr. Sreenath Dixith, Project Director, ZPD, Zone VIII, Bengaluru (21.07.2014).

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For further details contact:

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