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IN FOCUS

Ensuring Quality and Safety of Fresh-cut Vegetables

Fresh fruits and vegetables (F&V) are integral part of a healthy diet due to their richness in nutrients, dietary fibre and bioactive molecules. To deliver the intended benefits, the quality maintenance of these perishables is very important. Changes in lifestyles due to urbanization has encouraged the vendors to venture into new areas of agribusiness such as ready- to- use fruits and ready- to- cook vegetables. Ideally, these should be "zero- waste" products retaining the fresh-like qualities with excellent microbiological safety.

Research at ICAR- IIHR has successfully developed technologies for extending shelf life of ready- to- use vegetables such as capsicum, carrot, French beans, radish, cucumber, leafy greens, cabbage, peeled garlic, onion etc. This was achieved through identifying the specific spoilage issues associated with vegetables and minimizing them with suitable pretreatment agents and modified atmosphere packaging. These technologies are suitable for using in the open commercial chillers of supermarkets. Shelf life of the products vary from one to three weeks depending on the commodity; and thus the technologies hold promise for use by retailers, caterers and restaurants. Further, the pretreatments used are substances with generally recommended safe status (GRAS), assuring that packed vegetables are free from class II preservatives. Adoption of these technologies will help the agri-entrepreneurs to have safe and novel protocols for the production of minimally processed vegetables. ICAR-IIHR has also developed varieties like Arka Sarath (French beans), Arka Isha (coriander leaves), Arka Sona (onion) etc. suitable for fresh-cut use.

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Fresh Cut Vegetables

Director's Desk



Post-harvest management and value addition has been a thrust area of research at ICAR-IIHR since the inception of the institute. Past years have witnessed the technology development on low cost ripening chambers, modified atmosphere packaging, fruit beverages, culinary pastes, osmotically dehydrated products, fermented vegetables etc. at the Institute; and subsequent successful transfer of them to potential entrepreneurs. Post-harvest technologies would ensure better income to the farmers, the Institute on

its part has developed varieties having traits desirable for processing viz., attractive pulp colour, higher nutrient status in both fruits and vegetables. Varieties, technologies of agro-techniques for production, integrated IPM and IDM packages complete the value chain for a crop. Apart from the technologies, the packaging plays an important role in the shelf life as well as in the marketability of the product. Technologies on fresh-cut vegetables and storage boxes are a recent add-on to the chain of post-harvest technologies released from ICAR-IIHR. Such technologies on convenience foods deserve a focus in the era of urbanization and changing life styles. Besides ensuring a long shelf life of the products, the ICAR-IIHR fresh cut vegetable technologies offer the products free from class II preservatives and microbiological hazards. Concern on microbiological

contamination has gained attention in the recent times due to polluted irrigation water sources, intensification of animal production as well as complex network of supply chain with poor traceability. Use of safe sanitizers at households and processing plants can solve this issue to a great extent. The Institute has developed methodologies for this purpose, which can give impetus towards attaining goal of safe food for public. The recent establishment of 'Food Safety Referral Laboratory' with a microbiology unit is another stride towards ensuring quality control and public health. The state-of-the-art and close-to-real-time pathogen detection facilities available in the laboratory is expected to be equally valuable for food processors, exporters and the public.



M.R. Dinesh
Director

From Page-1

Traditionally known quality attributes such as sensory and nutritional spoilage of fresh and fresh-cut F&V are often perceptible to the consumers due to their interlinked expression. But, contamination with the enteric pathogens is hidden and cause health hazards. It is of high alarm globally in recent times due to high environmental prevalence of pathogens from intensified animal production, water pollution and poor quality of irrigation water. The issue has particular relevance in our country characterized by high population density and varied agricultural practices. Fruits and vegetables can be contaminated at any point in the farm to fork chain, so that potentially they may harbor a diverse range of human pathogens. However, from reviewing the incidence of food borne illnesses associated with fruits and vegetables, it is seen that the human pathogens of primary concern continue to be Salmonella, Escherichia coli O157:H7, Shigella, Norwalk-like viruses and pathogenic protozoa. Considering the ill effects of microbial hazards on public health and trade, it is imperative for the country to have efficient system of their detection and efficient decontamination strategies. ICAR-IIHR has validated the relative efficacy of novel and safe sanitizers like organic



Fresh Cut Vegetables

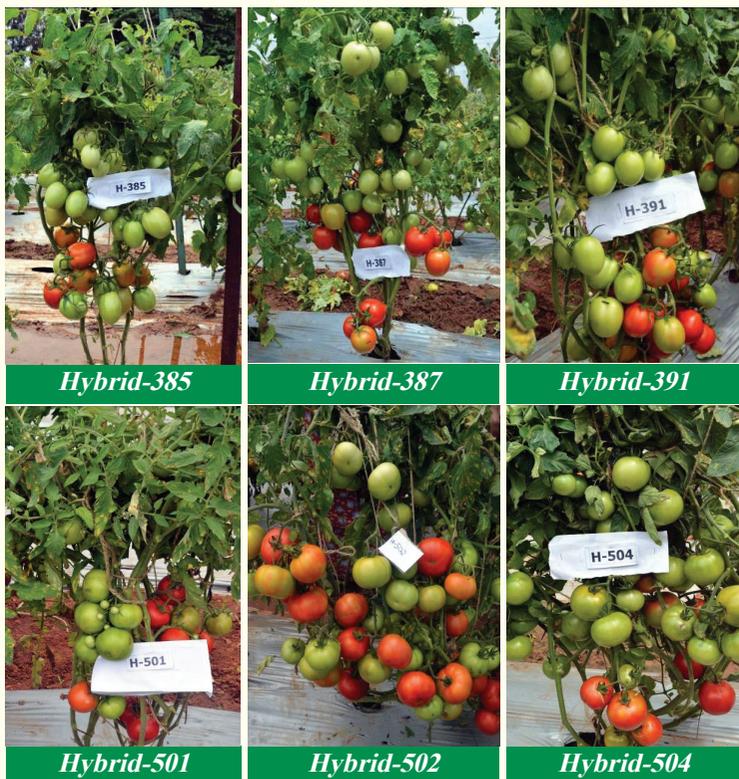
acids and their salts, bacteriocins, neutral electrolysed water etc., for their use in decontaminating popular vegetables of India. The Food Safety Referral Laboratory of ICAR-IIHR, houses a state-of-the-art facility and expertise to detect biological hazards by conventional and close-to-real-time methods. The utilization of microbial testing facilities and above technologies can greatly guarantee the supply of high quality, safe horticultural food products.

Research Highlights

Tomato

In tomato four lines viz; IIHR-2101 (*Solanum habrochaites* LA-1777), IIHR-2953, IIHR-2901, IIHR-1940 (*S. peruvianum*) and wild accessions of *Solanum pennellii*, *S. chilense* and *S. peruvianum* were free from ToLCV under polyhouse.

Of 25 F1 hybrids evaluated, 8 F1 hybrids H-385 (2.1 kg/pl.), H-387 (2.4 kg/pl), H-391 (2.52 kg/pl.), H-501 (2 kg/pt.), H-504 (1.63 kg/pl), H-505 (1.82 kg/pl.) & H-506 (3.6 kg/pl.) were found highly promising for yield, quality and resistance to ToLCV+BW. Hybrids H-385, H-387 and H-391 were bred for fresh market & processing with resistance against ToLCNDV as they possess both Ty1+Ty2. In addition, the fruits in all three hybrids are very firm with resistance to fruit cracking.



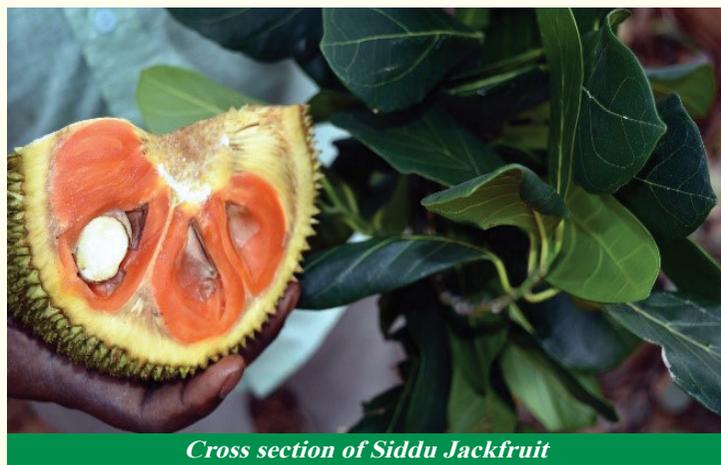
Three new hybrids viz; H-502, H-504 and H-505 were bred in Lakshmi (flat / oblate fruit shape with uniform green shoulder) and Shivam /PKM-1 segment (Flat / oblate fruit shape with green shoulder) respectively. H-502 and H-505 represent Lakshmi segment, whereas H-504 represents PKM-1/ Shivam segment. All the 3 hybrids were found superior to Lakshmi and Shivam in terms of fruit weight (80-90g) and fruit firmness (>6 kgm²). Two Indeterminate F1 hybrids viz; H-501 (uniform green shoulder) and H-506 (green shoulder) were also bred for polyhouse cultivation.

Both hybrids had large (120-140g), oblate and firm fruits suitable for fresh market.



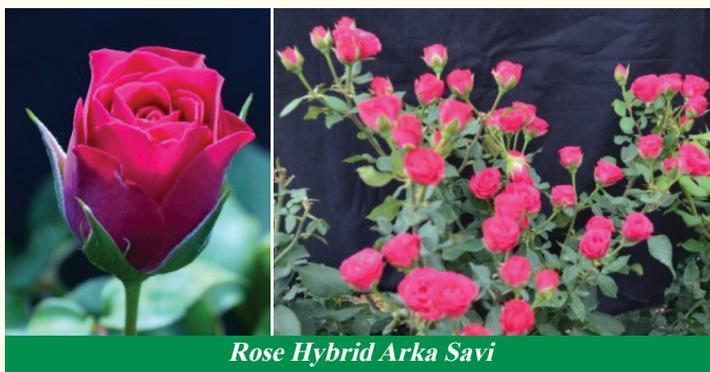
"Siddu" - Novel jackfruit selection with high nutritive value and attractive coppery red flakes

There is no released jackfruit varieties in orange reddish/coppery red flakes in our country which are in huge demand by consumers. In a survey conducted by ICAR- IIHR-CHES, Hirehalli, Karnataka, one superior accession conforming to the criteria of selection was identified from Chelur, Tumkur district. The tree shape is broadly pyramidal, having small sized fruits (2-5 Kg), irregular fruit shape, 450 fruits/ tree. Estimated yield is 1098 kg per tree, each fruit contains 25-30 sweet and firm bulbs of coppery red colour and significantly better than yellow and white flaked ones. Weight per flake is 24.5 g, flake thickness -8.5 mm and highest total soluble solids recorded (31.0 OB) in Siddu jackfruit. This also has highest value of total carotenoids and lycopene as compared to the ones having white colour flakes. Phytochemical composition of coppery red Siddu jackfruit -carotenoids (4.43 mg/100g), lycopene (1.12 mg/100g), total flavonoids (3.74 mg catechin equivalents/100g), total phenols (31.76 mg Gallic acid equivalents/100g), Vitamin-C (6.48 mg/100 g) when compared to yellow and white coloured flakes. Total antioxidant activity 11.00 and 14.93 mg AEAC/100g in FRAP and DPPH assay, respectively which indicate its health promoting potential.



Rose hybrid 'Arka Savi'

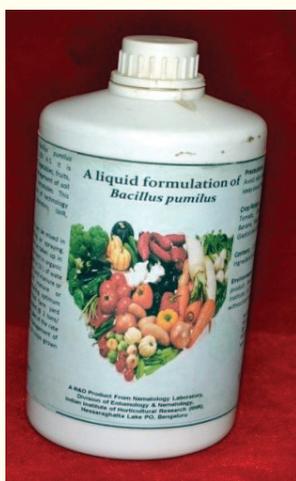
Rose hybrid 'Arka Savi' has been identified for commercial cultivation in open field for loose flower production. 'Arka Savi' is a spray category of rose belonging to floribunda group. It has flowers of Purple Pink flower (RHS colour chart Red purple group 66-A) and flowers are produced in bunches. 'Arka Savi', the rose hybrid is identified for its floriferous nature with high yield. Potential yield of flowers expected is 30 tons/acre/year. In addition to high yield, it has added advantage of long shelf life (5 -6 days).



Rose Hybrid Arka Savi

Liquid formulations of *Bacillus pumilus* -1% A.S.: A promising technology for managing nematodes in horticultural crops

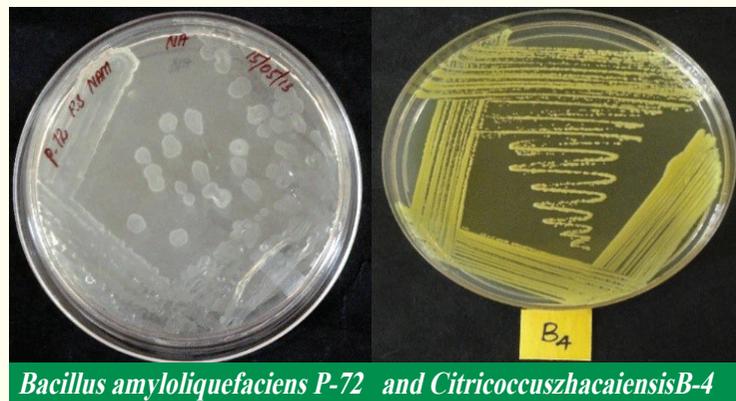
Bacillus pumilus (IIHR BP-2, NAIMCC-B-01213) is a promising bacterial biocontrol agent that effectively controls nematodes in horticultural crops. This bioagent resulted in 89.73% reduction in egg hatching of root knot nematode, *Meloidogyne incognita* and 88.5% mortality of its infective juveniles (J2). The protocol for mass production of *B. pumilus* has been standardized. The liquid formulations have a longer shelf life of 12 – 15 months. Seed treatment at 20 ml kg⁻¹ and soil application of 5 tons of FYM enriched with 5 lit of *B. pumilus* 1% A.S.ha⁻¹ recorded 14.76 to 16.32 % yield increase in carrot.



Alleviation of deficit irrigation stress in tomato through microbial inoculation

4 Based on intensive screening of their plant growth promotion traits under osmotic stress conditions, the aerobic end spore forming bacterial strain *Bacillus*

amyloliquefaciens strain P-72 and the Actinobacterial strain *Citricoccuszhacaiensis* strain B-4 have been found to alleviate the deficit irrigation stress effects in tomato under pot culture conditions. *Bacillus amyloliquefaciens* P-72 solubilizes tricalcium phosphate and zinc phosphate under osmotic ally stressed conditions besides producing IAA and GA3 under PEG induced stress, apart from releasing ammoniacal nitrogen. *Citricoccuszhacaiensis* strain B-4, solubilizes tricalcium phosphate and zinc phosphate under osmotic ally stressed conditions besides producing IAA and GA3 under PEG induced stress. Under pot culture conditions, the soil inoculation of both these isolates at planting, significantly improved the growth of tomato plants (cv. Arka Saurabh and F1 hybrid Arka Rakshak), that were subjected to deficit irrigation levels of 50 and 75 %. The inoculated plants recorded significantly higher plant growth parameters viz., root /shoot lengths, plant biomass, number of fruits and marketable fruit yield /plant compared to the un-inoculated plants. Efforts are on to develop these bacterial strains into a drought stress alleviating bacterial inoculant for tomato crop.



Bacillus amyloliquefaciens P-72 and *Citricoccuszhacaiensis* B-4

Conservation of wild edible mushroom

A wild edible mushroom collected from Tripura was identified as *Lentinus tuber-regium* based on molecular data. It was conserved and domesticated on paddy straw based substrate.



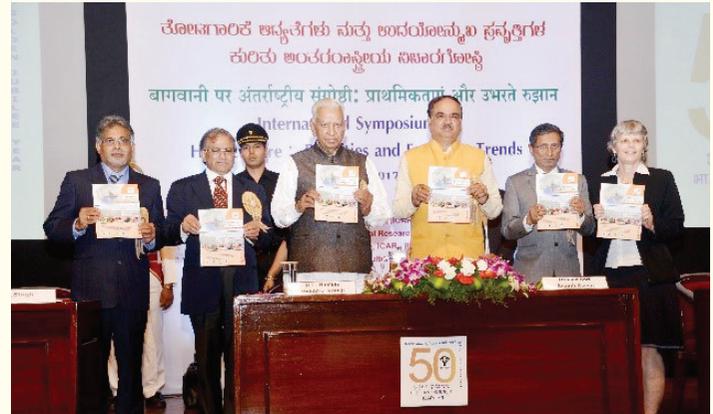
Wild culinary medicinal mushroom (*Lentinus tuber-regium*) from Tripura.

News and Events

International Symposium on Horticulture: Priorities & Emerging Trends

An International Symposium on 'Horticulture: Priorities & Emerging Trends', jointly organized by ICAR – Indian Institute of Horticulture Research, Bengaluru, Society for Promotion of Horticulture (SPH) and International Society for Horticultural Sciences (ISHS), Belgium was held at JN Tata Auditorium, National Science Symposium Complex, IISc, Bengaluru during 4th - 8th September, 2017 to commemorate the Golden jubilee year of inception of the Institute. His Excellency Shri Vajubhai Rudabhai Valaji, Hon'ble Governor of Karnataka State of India inaugurated the Symposium on 4th September, 2017. Shri Ananth Kumar, Hon'ble Union Minister for Chemicals & Fertilizers and Parliamentary Affairs, Govt. of India graced the occasion as the Chief Guest. Dr. M. R. Dinesh, Director, ICAR-IIHR extended warm welcome to the dignitaries, delegates and the participants. Dr. A. K. Singh, Deputy Director General (Horticultural Sciences), ICAR, New Delhi, highlighted the growth of horticulture in the country and mentioned that horticultural production has touched 300 million tonnes from an area of 25 million ha during 2016-17. Shri. Ananth Kumar appreciated the contribution of the Institute in supporting the horticulturists through development and dissemination of farmer-friendly technologies. His Excellency Shri. Vajubhai Rudabhai Vala mentioned that agriculture supports the livelihood of 65 per cent of the country's population. He called upon the scientists to help the farmers in doubling their income.

The symposium was attended by more than 500 delegates including 26 foreign delegates from 11 different countries. The symposium comprised of 8 key note addresses, 7 technical sessions and 4 workshops spread over 4 days from 5th to 8th September, 2017. About 51 invited talks, 174 oral papers and 400 posters were presented during the symposium under seven thematic sessions. There were two exclusive sessions for students where more than 40 students presented oral papers. More than 400 posters were presented as e- posters. The symposium concluded with an open session of feedback from various stakeholders followed by recommendations and awards ceremony.



International Symposium on Horticulture: Priorities & Emerging Trends

Consultative Meeting with ATARI Directors on Dissemination of ICAR-IIHR Technologies

ICAR-Indian Institute of Horticultural Research Organized a "Consultative Meeting with ATARI Directors on Dissemination of ICAR-IIHR Technologies" on July 7, 2017. This is a unique programme initiated by ICAR-IIHR with the purpose of augmenting dissemination of ICAR-IIHR technologies through Krishi Vigyan Kendra's (KVKs) of eleven Agricultural Technology Application Research Institute (ATARI) Zones of the country. The ATARIs are actively engaged in the transfer of technology to the stakeholders, mainly the farmers.

Hon'ble Deputy Director General (Agricultural Extension), Dr AK Singh, and Directors of ATARIs representing ten zones of the country participated as delegates. Dr AK Singh in his introductory remarks appreciated the efforts of ICAR-IIHR to develop many farmer-friendly technologies. MR Dinesh in his introductory remarks mentioned that ICAR-IIHR is very keen to partner with eleven ATARI zones of the country, so that the benefits of horticultural technologies that are viable and having potential to double the income of farmers, will reach the horticulturists through KVKs. During the deliberations, the DDG (AE) and ATARI

Directors expressed their interests towards technologies that are suitable for their respective zones and areas of interests for collaboration such as technology assessment, technology demonstration, capacity building and seed production programmes. Potential areas for further collaboration were arrived-at based on the interests of the ATARI Directors and modalities for way forward were worked out. It was decided that the programmes of ICAR such as ARYA, Farmers First, Farmers Producers Organizations (FPOs) etc., may be utilized for application of ICAR-IIHR technologies by the KVKs, so that the income of horticulturists can be doubled. Nodal Scientists from the Division of Social Sciences and Training were identified for follow-up action towards technology dissemination of ICAR-IIHR technologies identified by the ATARIs.



Consultative Meeting with ATARI Directors

Seminar on Avocado in association with CHES, Chettalli

A one day Seminar on Avocado was conducted on 12th July 2017 at KVK, Gonikoppal, Kodagu in association with CHES, Chettalli. Seventy farmers from Puthari Farmers Producer Company Ltd., Gonikoppal and Dept. of Agriculture, ATMA, Wyanad, Kerala participated in the seminar. During the seminar an exhibition on avocados was also arranged. The programme was inaugurated by Dr. I.N. Doreyappa Gowda, Principal Scientist & Head, CHES, Chettalli who spoke about the

post harvest processing technologies at CHES and IIHR available for licensing and commercialization. Scientists from CHES, Chettalli- Dr. Senthil Kumar and Dr. V. Shankar explained about the production technology of Avocado. Dr. Saju George, Head, KVK spoke about the health benefits of Avocado and why it is now being referred to as a Super food. Mr. Prabhakar, SMS (Horticulture) coordinated the programme. At the end a farmer -scientist interaction session was arranged.

XXVI group meeting of AICRP on Floriculture

The 26th group meeting of AICRP on Floriculture was jointly organised by ICAR-IIHR and DFR, Pune at ICAR-IIHR, Bengaluru during August 3 to 5, 2017. Dr. K.V. Prasad, Director, ICAR-DFR, Pune welcome the delegates of 26 centres and presented Project Coordinator's Report followed by remarks from the guest of Honour, Dr. D.R. Singh, Director, ICAR-NRC Orchids, Pakyong. Release of publications, unveiling of DFR logo, release of rose variety & flower seed box was carried out by the chief guest and dignitaries. Later, Dr. T. Janakiram, ADG (HS-II), ICAR, New Delhi addressed the gathering and the presidential address was delivered by Dr. M.R. Dinesh, Director, ICAR-IIHR, Bengaluru. At the end of the inaugural session, Dr. T.M. Rao, Head, Division of Floriculture and Medicinal Crops, ICAR-IIHR, Bengaluru proposed vote of thanks. There were nine technical sessions during three days of deliberations. There was a session on interaction with the industry.



AICRP- Release of Arka Savi

Ethiopian Delegates Visit ICAR-IIHR

A team of Five Ethiopian Delegates from Tigray Biotechnology Institute (TBI) representing Government of Ethiopia visited ICAR-IIHR on 3rd August 2017 along with the Business manager, Agrinnovate India Ltd, New Delhi, exploring possible avenues for collaboration and technology back stopping. The Institute Technology Management Unit (ITMU), ICAR-IIHR, Bangalore coordinated the programme. Selected technologies of

ICAR-IIHR, that hold potential for commercial licensing and transfer through Ag In were presented by the respective Divisional Heads/innovators.

The team headed by Mr. Teklewoni Assefa, were impressed with the technologies especially, the F1 hybrid disease resistant types of vegetables like tomato, onion and chillies, usefulness of para pheromone trap technology for control of mango fruit flies, use of micronutrient foliar formulations for crop productivity enhancement, use of enriched Cocopeat technology for nursery management; usefulness of bio pesticides and production of value added products through processing technologies. The team also visited the biotechnology laboratory, Soil science and agricultural chemistry, PHT and vegetable field demonstration plots as well.

The Ethiopian team sought technical collaboration with ICAR-IIHR, through AgIn, New Delhi for capacity building programmes through hands on training and technical support to Ethiopia for commercial technology transfer with special reference to (i) Mango propagation, (ii) Organic farming production technologies, (iii) precision farming in vegetable crops through use of yield enhancing practices, and (iv) use of Neem soap and Pongamia soap etc.,



Visit of Ethiopian Delegates

Scientist – Farmers Interface programme on Spine gourd held at KVK, Gonikoppal

An interface cum training programme on spine gourd was held at KVK, Gonikoppal on 11th August 2017. Dr.L.K. Bharthi, Senior Scientist, Division of Vegetable crops, IIHR, Bengaluru gave a first hand information and knowledge of production technology of spine gourd hybrid Arka Neelchal Shanthi. Forty farmers participated in the event.

Consultative Workshop for “Promotion of Horticulture technologies in Karnataka”

ICAR-IIHR Organized a Consultative Workshop on

16.8.2017 with officials of Department of Horticulture, Government of Karnataka and Vice-Chancellors of SAUs in Karnataka for “Promotion of Horticulture technologies in Karnataka”.

At the outset, Dr C. K. Narayana, Chairman, PME Cell, ICAR-IIHR extended a warm welcome to the delegates. Dr MR Dinesh, Director, ICAR-IIHR, in his introductory remarks highlighted the viable technologies of ICAR-IIHR, their impact under real farm situations, and the opportunities for replication of such impact by the extension mechanism of the Department of Horticulture. Shri. Maheshwara Rao and Shri PC Ray briefly expressed the technological needs in horticulture in Karnataka and the modalities through which, ICAR-IIHR and Department of Horticulture may have pragmatic partnership for technology transfer.

The delegates appreciated the purpose of the workshop and desired that such deliberations are to be organized regularly, so that horticulturists of Karnataka will be supported with viable technologies, keeping in view the vision of Shri. Narendra Modi, Hon’ble Prime Minister of India in doubling the income of farmers by 2022.



Consultative Workshop

Parthenium Awareness Week

Parthenium awareness week was observed on 17th August, 2017 at KVK, Hirehalli. All the staff of the KVK Hirehalli involved in removing parthenium in around the campus physically and also by spraying Bio-Weedicide.

International Honeybee day

Training and awareness programme on honey bee was conducted on the occasion of International Honey Bee day on 19th August 2017 at ICAR - Krishi Vigyan Kendra, Hirehalli. and ICAR-KVK Gonikoppal.

KVK Hirehalli

Mr. Nagandra T.C and his staff from Swadheshi

Samooaha of Tumakuru gave hands-on training on bee keeping, honey harvesting and other aspects of rearing honey bees. He emphasized about the role of Honey bees in seed setting in agriculture, horticulture, forest species, etc. and also informed bee keeping can increase farmer's income without affecting the ecology. Dr. N. Loganandhan, Head and Sr. Scientist of ICAR - Krishi Vigyan Kendra, Hirehalli, highlighted the importance of honey bees on food security and maintenance of environmental diversity through pollination process. The programme was attended by more than 70 farmers of Tumakuru District.



International Honeybee day

KVK, Gonikoppal

About one hundred farmers and planters along with officials attended the programme. which was inaugurated by Dr. C.G. Kushalappa, Dean, College of forestry. In his inaugural address he spoke about the importance of honey bee in coffee and how honey bees can increase production to the extent on 30 % in Robusta coffee. The programme was attended by officials from NABARD, Department of Horticulture, Agriculture and College of forestry, Ponnampet. The technical sessions were handled by Dr. Kenchareddy, Professor and expert in Honey bees from the forestry college.

New India Manthan: Sankalp Se Sidhi Programme

The Programme was conducted at ICAR-KVK, Gonikoppal on 30th August, 2017. The programme was inaugurated by Hon. Shri Pratap Simha, MP (Mysore Kodagu Lok Sabha constituency) by lighting the lamp. Honorable Prime Minister's video message on various Government schemes for strengthening farmers was shown to the audience. More than 400 farmers from different parts of the district participated in the event who took a pledge on seven points for doubling the farmers income along with the MP. Officials from the Department of Agriculture, Horticulture, Animal

Husbandry and Veterinary services, NABARD, Scientists from Central Horticultural Experiment station- Chettali, Indian Institute of spices Research, Appangala, Coffee Board Chettali, Spices Board, College of Forestry, participated in the event. A publication on government schemes for farmers was released on the occasion by the Hon. MP. At the end a farmers scientist interaction was organised in which the farmers queries on paddy, pepper, coffee were addressed by the scientists.

This programme was also organised in association with Department of Agriculture, Government of Karnataka, Tumakuru by ICAR-IIHR-Krishi Vigyan Kendra, Hirehalli, Tumakuru. on 30th August, 2017 at Zilla Panchayat Auditorium, Tumakuru. The programme was inaugurated by Shri SP Muddahanume Gowda ji, Honourable Member of Parliament, Tumakuru and attended by Shri. B.Suresh Gowda ji, MLA, Tumakuru Rural, Smt. Roopa Devi D., Joint Director (Agriculture), Tumakuru, Shri. Shantharam K.G., IAS, CEO Zilla Panchayat, Tumakuru, Smt. Sharada N., Vice President, Zilla Panchayat, Tumakuru. Smt. Latha Ravikumar M., President Zilla Panchayat presided over the function. Dignitaries from ICAR, Dr. M.R.Dinesh, Director, Dr. C.K.Narayana, Chairman, PME Cell, ICAR – IIHR, Bengaluru and Dr.G.Karunakaran, In-charge-Head, CHES, Hirehalli, were present as experts.

Honourable Member of Parliament, in his speech, stressed about the coordination of Agricultural Department, Banks and farmers along with marketing support as the key factor to improve the livelihood of farming community. Director,



New India Manthan Programme

ICAR-IIHR, highlighted the importance of technological support that the institute would extend in doubling the farmers' income. About 250 farmers participated and took pledge on Sankalp Se Siddhi for doubling the farmers' income by 2022 by following the seven strategic points. Shri B.Suresh Gowda ji, MLA, Tumakuru Rural, administered the pledge. Welcome address was given by Dr. Loganandhan, N., Senior Scientist and Head, ICAR-KVK, Hirehalli and vote of thanks was by Dr. Ramesh N., Project Director (ATMA), Tumakuru District.

Custodian of Novel Jackfruit

A farmer Mr. S.S. PARAMESHA, from Chelur, Tumkur district, Karnataka was awarded as "Custodian of Novel Jackfruit Types with High Nutritive Value and Attractive Coppery Red", on September 4, 2017 during inaugural of the "International Symposium on Horticulture: Priorities & Emerging Trends" on September 4, 2017 at J. N. Tata Auditorium, Indian Institute of Science, Bengaluru and "SIDDU" Jackfruit –farmer's variety was released by Excellency Shri Vajubhai Rudabhai Valaji, Hon'ble Governor of Karnataka. Further, IIHR entered understanding with farmer for production of planting material of "Siddu" jackfruit.



Awarded Custodian Jackfruit elite types



MOU between Director IIHR and Farmer

Field day on Horticultural Crops

Field day on all Horticultural crops was organized on 14-9-2017 at ICAR-IIHR, Bengaluru. The programme was organized in collaboration with Department of Horticulture (DoH), Government of Karnataka; Krishi Vigyan Kendras, Non-Governmental Organizations (NGOs) and the Farmers Producers Organizations (FPOs). More than 350 farmers, extension officials, students, executives of NGOs and FPOs and scientists etc., representing more than 27 districts of Karnataka, Telangana, Kerala, Rajasthan, Tamil Nadu, Maharashtra, Arunachal Pradesh and Uttar Pradesh participated in the field day. Dr AT Sadashiva, Head, Division of Vegetable Crops explained the participants about the importance of the field day and the technologies demonstrated. Dr S. Shankar Hebbar, Principal Scientist, Division of Vegetable Crops moderated the interaction programme. Mr. Sunil, a tomato grower who successfully adopted Arka Rakshak at Gokak shared his experience with the participants.



Farmers at vegetable demo



Arka Rakshak grower Mr. Sunil

Hindi Fortnight Celebration at ICAR-IIHR

ICAR- IIHR, Bengaluru celebrated Hindi Fortnight during 14th September to 03rd October 2017. Dr. Ashok Bhatia, Advisor, DRDO was the Chief Guest

and Dr. A.K. Chakravarthy, Director I/C., ICAR-IIHR, Bengaluru presided over the inaugural function. A special talk on “Food Scenario of India” was also organized on this occasion by the Chief Guest. During the Fortnight different competitions like Hindi Terminology and Noting, Pre-written Hindi Essay, Hindi Recitation, Hindi Song, Hindi Extempore, Antakshari, Hindi Conservation were conducted. The concluding function was organized on 03rd October 2017, under the chairmanship of Dr. M.R. Dinesh, Director, ICAR-IIHR, Bengaluru, in which Dr. Mangal Prasad, Former Dy. Director (OL), Kudremukh, Bengaluru was the Chief Guest. The prizes, cash awards and certificates for the winners of different competitions were given by the Chief Guest and other dignitaries.

of the valedictory function on 21st September, 2017 when prizes were distributed.



Hindi Week at CHES, Chettalli

Celebration of Sarwatra Swatchhta Diwas

The Sarwatra Swatchhta was celebrated from 26.09.2017 to 27.09.2017 at the premises of ICAR-KVK, Hirehalli. We started with taking oath regarding Swachhta seva on 18th September, 2017. All the staff members of KVK and CHES, Hirehalli - both permanent and temporary were actively involved in cleaning the office campus of KVK and CHES, Hirehalli till date as part of the programme.



Address by the Chief Guest

Hindi Week Organized at Central Horticultural Experiment Station (CHES), ICAR-IIHR

Central Horticultural Experiment Station, ICAR-IIHR, Chettalli, Coorg celebrated “Hindi Week (Sapthaah)” from 16-21st September, 2017. Mr. Arjun Singh, Principal, Kendriya Vidyalaya, Madikeri, inaugurated the Hindi Saptah programme. Dr. I.N. Doreyappa Gowda, Principal Scientist and Head i/c, CHES, Chettalli welcomed the guests and addressed the staff about importance and necessity of Hindi language in our daily life. Dr.V.Sankar, Principal Scientist (Hort), CHES, Chettalli introduced the guest and briefed the events to be carried out during Hindi Week. Several competitions viz., Dictation in Hindi, Reciting hindi poem, Hindi meanings, Copy writing and Hindi Aksharmala writing were conducted. Shri Subramanya, Programme Executive, All India Radio, Madikeri and Dr. Shridhar Ramkanth Hegde, Associate Professor and Head of Department (Hindi), Field Marshall Cariappa College, Madikeri, graced the function as chief guests



Sarwatra Swatchhta Diwas Celebration

Transfer of Technology

On campus training:

Title	Date	No. of Participants
ICAR-IIHR, Bengaluru		
Capacity building training program for rural women	July 25-26 Aug 29-30 Sept 26-27	40
Entrepreneurial training on mushroom spawn production and mushroom cultivation	Sept 14-22	33
ICAR- KVK, Gonikoppal		
Capacity building programme for Village Watershed Committee (VWC) of Virajpet taluk on sustainable black pepper and coffee production technologies	Aug 02	50
Training on Bakery items for women entrepreneurs	Aug 20	10
Fruit processing technologies for SHG members	Aug 22	25
Case studies/SWTO analysis of different FPOs for Puthari Farmers Producer company, Gonikoppal Board of Directors	Aug 29	15
Orchard management techniques in Coffee and Black pepper for Tibetan farmers of Kushalnagar	Sep 14	38
ICAR-KVK, Hirehalli		
Flower crop production practices	Aug 02	20
Ragi value addition	Sep 15	25
Improved production practices and post harvest management in Mango	Sep 21	40
Training on Mushroom Cultivation	Sep 26	50

Off campus training

Title of the training	Date	No. of participants
ICAR-KVK, Hirehalli		
Training programme on Improved technologies in horticultural crops in collaboration with DATC Chikkanahalli	Aug 08	33

Integrated Pest and Disease Management in ground nut and betelvine at Lingadahalli village of Pavagada taluk	Aug 18	43
Training programme on pomegranate and lime cultivation, soil health management in Pomegranate for Pavagada farmers at DATC Sira.	Sep 07	30
Climate Resilient Technologies in collaboration with DHAN foundation at Koratagere	Sep 13	100
ICAR- KVK, Gonikoppal		
Scientific Goat farming for SHG members in collaboration with SKDRDP at Athur	Sep 01	27
Scientific Pig for SHG members in Collaboration with SKDRP at Athur	Sep 22	22
Scientific Fodder cultivation practices for improved income at T- Shettigeri	Sep 26	32
Training programme for Veterinary doctors on Diagnosis of Gynaecological problems in Livestock in association with Dept of AH and VS. at Madikeri	Sep 27	66
Training programme on Importance and management of rabies in veterinary field for Veterinary officials at Madikkeri	Sep 28	40

Field Demonstrations

On Farm Trials:

Description of the trial	Location	No. of Trials
ICAR-IIHR, Bengaluru		
Released varieties of flower crops and medicinal crops	ICAR-IIHR, Bengaluru	01
Field demonstration of ICAR-IIHR bred vegetable varieties / hybrids & Improved cultivation practices	ICAR-IIHR, Bengaluru	01

Frontline demonstrations

ICAR-KVK, Gonikoppal

Sl. No.	Name of the demonstration	No. of Demonstrations
1	Demonstration of high yielding and blast resistant Paddy var. KPR-1	10
2	Integrated crop management in black pepper	10

3	Management of foot rot disease in black pepper	10
4	Demonstration of Fodder Bank with COFS-29, Hedge Lucerne and DHN-6 for higher milk yield	10
5	ICM in Coorg mandarin	10

Field Days

Field day on Tomato F1 hybrid Arka Rakshak was organized in collaboration with UHS, Bagalkot and Department of Horticulture on 2nd Sept. 2017 at Sanganakeri village of Gokak Taluk in Belagavi District. About 150 farmers participated in the programme. Tomato grower, Mr. Sunil Jaganur could harvest 50 tons from his 1 acre land and realized a net profit of Rs. 8 lakhs in 4 months. Dr. D.L. Maheshwar, VC-UHS, Bagalkot inaugurated the field day and addressed the gathering. Dr. Shankar Hebbar spoke about salient features of Arka Rakshak and how to achieve maximum yield by adopting precision farming in tomato.

ICAR- Krishi Vigyan Kendra, Hirehalli participated at field day on "Improved Varieties and Technologies" on 14th Sept. 2017 at ICAR-IIHR, Hessaraghatta, Bengaluru to showcase the productivity potentials and profitability of IIHR technologies viz. vegetable, fruit and ornamental crop varieties/hybrids, plant protection and soil health management technologies. Demonstration and interaction with horticulturists was conducted. The programme was organized in collaboration with Department of Horticulture (DoH), Government of Karnataka; Krishi Vigyan Kendras, Non-Governmental Organizations (NGOs) and the Farmers Producers Organizations (FPOs). More than 350 farmers, extension officials, students, executives of NGOs and FPOs and scientists etc., representing more than 27 districts of Karnataka, Telangana, Kerala, Rajasthan, Tamil Nadu, Maharashtra, Arunachal Pradesh and Uttar Pradesh participated.



Arka Rakshak at Gokak, Dr. D.L. Maheshwar, VC-UHS, Bagalkot inaugurated the field day

Field Visit:

Dr. G. Karunakaran, Sr. Scientist, CHES, Hirehalli visited Dragon fruit plot at Hiriyuru Chitradurga Dist. on 26th August 2017.

Technologies assessed:

Arka Rakshak at Gowdikere, Hanagudu Hobli, Hunsur Taluk, Mysore District

Tomato F1 hybrid Arka Rakshak was adopted in 5 acres by Mr. Manjunath, of Gowdikere village, Hanagudu Hobli, Hunsur Taluk, Mysore District of Karnataka during July 2017. The crop was in peak fruiting and farmer could realize a net profit of Rs. 25 lakhs from his 5 acre plot.

Arka Rakshak at Thalagawara village, Chintamani Taluk, Chikkaballapura District

Tomato F1 hybrid Arka Rakshak was planted (3700 plants) on 13th April, 2017 on 3/4 acre plot by Mr. S.R. Nagaraj, an Executive Engineer, BESCO, at Thalagawara village, Chintamani Taluk, Chikkaballapura District of Karnataka. Mr. Nagaraj could harvest 25.5 tons from 3000 m² (85 t/ha) and realize a net profit of Rs. 8 lakhs. His cost of cultivation was Rs. 1.54 lakhs.





Arka Rakshak at Hunsur Taluk



Arka Rakshak at Thalagawara village

Sale of ICAR-IIHR products through ATIC

The ATIC realized a revenue of RS. 6, 54, 295 through the sale of Mushrooms and Rs. 12, 67, 630 through the sale of products and publications during the quarter.

Commercialisation of Technology:

A total of 13 technologies were licensed to 13 companies during the period July-September 2017 and generated a revenue of Rs 21,81,374/-

Name of the Company/ Name	Technology
Agrigenics, Ahmedabad	“Arka Agni & Arka Bangara-2 varieties”
Prashanth G S, Karnataka	“Papaya and Guava Fruit Bar technologies”
Scientek Services, Karnataka	“Manufacturing of Mushroom Machinery”
M/s Waycool fruits and products pvt Ltd, Chennai	Arka High Humidity Box
KVK Hirehalli, Karnataka	Arka Microbial Consortium (Liquid)
M/s Bapna Seeds, Madhya Pradesh	Arka Rakshak
Mr. Praveen Prachande, Chhattisgarh	Arka Bangara-2
M/s RR Seeds Agri Tech Pvt Ltd, Karnataka	Pre-Released F1 Hybrid H-504 (IIHR-2907 X IIHR-2892) and their parental lines
Sri Basaveshwara Agro Kendra , Shimogga, Karnataka	Arka Agni and Arka Bangara -2
M/s Lakshmidivi Industries, Bangalore, Karnataka	Drawings of High Humidity Storage boxes for leafy Vegetables
M/s Agriland Biotech Lmt., Gujarat	Mass production of Verticillium chlamydosporium
M/s Agriland Biotech Lmt., Gujarat	Mass production of Trichoderma harzianum
M/s Ganesh Bio-Control Systems, Gujarat	Mass production of Pseudomonas fluorescens

M/s Ganesh Bio-Control Systems, Gujarat	Mass production of Trichoderma viride
M/s PARLE Bio Care LLP, Uttar P Pradesh	Mass production of Verticillium chlamydosporium
NRDC, Bangalore, Karnataka	IIHR share of Revenue from sale after technologies

Human Resource Development

Dr B. Varalakshmi attended the training program on “FMS/MIS –HRMS Self Service” as Member Secretary, VTIC on 26.7.2017 at ICAR-IIHR, Bengaluru

Dr. T.R. Rupa, Principal Scientist attended the training program on Experimental Designs and Statistical Data Analysis at ICAR-IASRI, New Delhi, from 11th to 20th September, 2017

Dr. Suresh SMS (Livestock) attended a training programme on “Nutritional management for infertility problems in dairy cows” at NIANP, Bengaluru on 5th August 2017

Honours and Recognition

Dr. A.T. Sadashiva served as Co-Chairman, Session II: Genetic Improvement - Conventional breeding at the International Symposium on Horticulture: Priorities & Emerging Trends. 4-8, September 2017. J.N. Tata Auditorium National Science Seminar Complex Indian Institute of Science, Bengaluru-560012

Dr Rajasekharan,P.E Principal Scientist as the chairman reviewed the both ongoing and new projects of Selective Augmentation of Research and Development of Kerala State Council for Science, Technology and Environment at Shastra Bhavan, Pattom.

Dr. P.C. Tripathi, Principal Scientist & Head, Div. of Plant Genetic Resources acted as Expert for the Brain Storming Session for finalization of Production and Post harvest trials of AINPO&G, at DOGR, Rajgurunagar, Pune on July 21, 2017.

Dr. P.C. Tripathi, Principal Scientist & Head, Div. of Plant Genetic Resources, Dr. C. Aswath, Principal Scientist, Div. of Ornamental Crops, and Dr. T.S. Aghora, Principal Scientist, Div. of Vegetable Crops acted as Conveners of International Symposium on Horticulture: Priorities and emerging Trends, ICAR-IIHR, Bangalore, Sept 5-8, 2017

Distinguished Visitors

ICAR-IIHR:

Mr. S.K.Singh, IAS, Financial Advisor DARE

Shri. Chhabilendra Roul, Addl. Secretary, DARE & Secretary, ICAR, Ministry of Agriculture, New Delhi.

Mr. C. Ramesh Rao, DGM, NSFDC, New Delhi

CHES Hirehalli:

Dr. N Kumar, Former Dean (Horti), TNAU, Coimbatore

Dr. D. L. Maheswar, Vice Chancellor, University of Horticultural Science, Bagalkot

Dr. B. N. S. Murthy, Horticulture Commissioner, GOI, New Delhi.

Dr. P Rethinam, Former Chairman, CBD, Former Executive officer, APCC, Jakarata

CHES Chettalli:

Shri. Chhabilendra Raul, Addl. Secretary, DARE & Secretary, ICAR, Ministry of Agriculture, New Delhi.

Dr. K. Nirmal Babu, Director, Indian Institute of Spices Research, Calicut.

Dr. S. J. K. Annamalai, Head, ICAR-Central Institute of Agricultural Engineering, Regional Centre Coimbatore

Dr. K. S. Varaprasad, Former Director, IIOSR, ICAR-IIHR, Hyderabad, Telangana.

Newsletter

ICAR-KVK, Gonikoppal

Shri. Chhabilendra Raul, Additional Secretary, DARE & Secretary, ICAR

Dr. Nirmal Babu, Director, ICAR- IISR, Calicut

Dr. Chandre Gowda, Principal Scientist, ATARI, Bengaluru

Dr. S. Aiyappan, Former Director General, ICAR and Secretary DARE

Dr. P.G. Chengappa, Former Vice Chancellor, UAS, Bengaluru

Mr. M. C. Nanaiah, District Development Manager, NABARD, Kodagu District

Personalia

NEW ENTRANT

- Shri S.K.C. Bose, Chief Finance & Accounts Officer has been transferred from CPCRI, Kasaragod to IIHR, Bengaluru and reported on forenoon of 02.08.2017.
- Ms. Aachal Palewar, (DR-ASRB) has reported for duty to the post of Assistant on the AN of 05.08.2017.
- Shri R Ashok Kumar, S/o Late Shri. H Ravi was offered the post of Skilled Support staff at IIHR, Bengaluru on compassionate grounds and reported for duty on the FN of 01.08.2017.
- Ms. Pooja Kumari, (DR-ASRB) has reported for the duty to the post of Assistant on the FN of 01.09.2017.

PROMOTION

- Smt. S. Bhagyalakshmi, UDC has been promoted to the post of Assistant and reported on 11.07.2017 (FN).

- Smt. N.S. Nirmala, Personal Assistant has been promoted to the post of Private Secretary and reported on 11.07.2017.

- Shri K. Chandrashekaraiyah, Technical Officer (DRA-Photography) has been promoted to next higher grade of Senior Technical Officer (DRA-Photography) w.e.f. 31.12.2014.

TRANSFER

- Dr. Partha Chowdary, Principal Scientist has been transferred from DWR, Jabalpur to IIHR, Bengaluru and reported at IIHR on 01.07.2017 (FN).
- Dr. Raja Shekar, Senior Scientist has been transferred from CPRI, Shimla to IIHR, Bengaluru and reported at IIHR on 07.07.2017 (FN).

SUPERANNUATION

- Shri Puttamdashetty, Technical Officer (Field/Farm) retired from Council's service on superannuation on 31.07.2017 (AN).
- Shri N Shivarudraiah, Sr. Technical Assistant (Lab.) retired from Council's service on superannuation on 31.08.2017 (AN).

MISCELLANEOUS

- Consequent of cancellation of transfer order, Dr. B. Mahesha, Scientist joined back to IIHR on 04.07.2017.
- Shri C. Lokesh, Senior Technical Officer (Field/Farm), IIHR, Bengaluru expired on 25.08.2017.
- Shri T. Muniraju, Senior Technician, IIHR, Bengaluru expired on 21.09.2017.

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