

# CISH NEWS

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## FROM THE DIRECTOR'S DESK



**F**ruit production in general and particularly in the subtropics has become much more challenging in the context of eroding genetic resources, shrinking cultivable land, depleting surface and ground water, escalating labour costs and limited renewable energy resources. Moreover, economic globalization has thrown umpteen opportunities as well as gauntlets for subtropical fruit research. Climate change has impacted the reproductive and vegetative phenophases of mango, guava, aonla, bael, jamun, etc. and understanding the shifts in phenophases of these fruit crops is important for mitigating the impact of weather aberration on the productivity. Emergence of market driven economy warrants paradigm shift in the research approaches on subtropical fruits taking in loop all the stakeholders

including farmers, traders, consumers and entrepreneurs. Besides, biotechnological tools comprising genomics, metabolomics and recombinant DNA technologies offer ample opportunities in understanding the emerging as well as perennial problems confronting fruit production in subtropics.

Recently, two improved guava varieties *viz.*, Dhawal and Lalima developed by ICAR-CISH, Lucknow were released by the Hon'ble Governor of Uttar Pradesh, Shri Ram Naik. The Institute has a unique distinction of maintaining world's largest germplasm collection of mango and guava. The Institute is also making concerted efforts to enrich its germplasm of bael, jamun, karonda, wood apple, jackfruit, khirni, etc. These germplasm are also being characterized using morphological and molecular markers. DUS guidelines have been developed for mango, guava, aonla, bael and jamun. The Institute has developed several production technologies, which led to improved farm productivity apart from increasing the income of the stakeholders.

During the period, over and above mandated activities, the Institute remained vigorously indulged in Swachha Bharat Mission of the Government of India. In course of this Mission, scientists and other officers cleaned the Institute's premises and schools & panchayat bhawans in the nearby villages. The scientists of the Institute were also involved in soil testing endeavour resulting in distribution of soil health card to selected farmers on the occasion of World Soil Day. We are also persuing the Mera Gaon Mera Gaurav programme. In this regard all scientists are contributing towards the integrated development of the selected 40 villages.

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(SHAILENDRA RAJAN)

## RESEARCH HIGHLIGHTS

**Guava varieties released**

Two improved guava varieties *viz.*, Dhawal and Lalima developed by ICAR-CISH, Lucknow were released by Hon'ble Governor of Uttar Pradesh, Shri Ram Naik at the Paryatan Bhawan, Lucknow on June 22, 2015. The predominant features of varieties are as follows :

**Dhawal:** It is a heavy bearer (20% higher than Allahabad Safeda) with round, smooth, medium to large fruits (200-250 g). It is a half-sib selection from Allahabad Safeda. Mature fruits develop as whitish light yellow colour on ripening. Pulp is white, sweet in taste having muskiness, TSS 13.4 °B, acidity 0.42 per cent and vitamin-C more than 250 mg/100 g fruit. Seeds are soft, moderate in number and having 0.93 g/100 seed weight.

**Lalima:** It is a selection from half-sib population from Apple Guava, which has attractive crimson coloured fruits, higher proportion of coloured fruit and good yield with higher shelf-life (fruit weight 190 g and TSS 13.7 °B).



Dhawal and Lalima varieties of guava

**Identification of genes and regulatory pathways in mango**

Transcriptome analysis of mango leaf allowed assembly of more than 50,000 contigs, prediction of CDS and functional annotation of predicted CDS identified several genes involved in meristem and floral development *viz.* *Constans*, *SOC*, *SPL5*, 9, 10 *AP1*, *AGL 8*, 15, 80, *SVP*, *AG*, *AP2* and *PI*. Their expression profiling will reveal key genes for marker development. Similarly, identification of multiple contigs sequences (Chalcone synthase-3, Chalcone isomerase-6, Flavonoid-3'-monooxygenase-2, Flavonol Synthase-3) from

phenylpropanoid biosynthetic pathway was done using transcriptome data, which will help in marker development/trait improvement for fruit peel colour.

**Conserved domain identification in MADS BOX and SOC1 genes for flowering related transcription factors****On site DUS testing of mango**

For the first time, Institute demonstrated a model DUS testing for on-site inspection and certification. A total number of 37 farmers' mango varieties of Malihabad are being tested by the Institute and the information will be utilized towards the development of a model for on-site DUS testing procedure for mango.

**Biochemical profiling for identifying nutritionally rich cultivar of mango**

Initiatives were taken to identify the mango cultivars rich in bioactive compounds to provide information regarding inheritance pattern of major nutraceuticals. The improvement of fruit nutritional quality can be achieved with the selection of new fruit genotype with increased content of the bioactive compounds. Forty mango varieties and 60 hybrids were analyzed for biochemical compounds. Among all the varieties and hybrids, the total phenolic content ranged from 22.0-230 mg/100g GAE; the total flavonoids from 4-37 mg/100g; the total antioxidants from 0.2-1.40 µmol Trolox/ 100g and the total carotenoids from



1.30 - 11.00 mg/100g. Alphonso recorded the highest phenolic content of 234.72 mg/100g, whereas, Amrapali recorded highest flavonoids as well as total carotenoids content of 37.07 and 10.37 mg/100 g, respectively. The total antioxidant activity was highest in cultivar Langra (1.51  $\mu$ molTrolox/100g). A significant variability was observed in different nutritional compounds among the important cultivars of mango as well as high heritability was observed for the traits that have been studied. It will help in selection of genotypes for hybridization programme to develop nutritionally rich cultivars in mango.

### Fern - A potential intercrop for mango

Fern (*Nephrolepis tuberosa*) has proved highly remunerative intercrop for mango orchards. It is a shade loving plant. Leaves have got good market demand in all parts of the country, as it is used for various decorative purposes and leaf base of bouquets. The plant is easily propagated by root suckers. Plants spaced at 45 x 45 cms are planted on bunds in the tree basins leaving 1.5 to 2 m distance from the tree trunk. Fern as intercrop has the potential to produce an average number of 9-12 lakh leaves per ha depending upon the care of plants. The return obtainable from the fern has been found encouraging.



Fern as intercrop in mango orchard

### Mango shoot gall psylla incidence increasing in Uttar Pradesh

Mango shoot gall psylla (*Apsylla cistellata*) incidence was observed in five districts of Uttar Pradesh viz., Faizabad, Sitapur, Barabanki, Lucknow and Saharanpur. The incidence of this pest was not observed in nearby Lucknow till 2013, however, its incidence got noticed in Bhikhampur (Bakshi-ka-talab) in very severe form during the

year 2014. Shoot gall psylla incidence spread to Barabanki and Sitapur districts during the last week of November, 2015. For management of this pest farmers are advised to spray quinalphos @ 1.5 ml/litre of water or dimethoate @ 2 ml/litre of water during the second week of August. In endemic areas farmers are advised to spray profenophos @ 2 ml/litre of water during the first week of March to kill shoot gall psylla eggs.

### Management of shoulder browning in mango

The fruit skin turns dark brown to black after rain which affects its marketability. Encouraging results have been obtained by bagging the fruits or spraying of difenoconazole 25 EC @ 1.5 ml/litre water or tree oil formulation @ 1.0 per cent on fruits before onset of monsoon for controlling shoulder browning disease of mango.

### Healthy probiotic drinks for improved digestion

Institute developed probiotic drinks from fruits like banana, aonla, mango, bael, guava, jamun and mulberry and vegetables like carrot, cabbage, broccoli, capsicum and cucumber. These probiotic drinks have pleasant flavour and taste and good amounts of vitamins and antioxidants. The beverage possesses therapeutic value owing to the presence of health-friendly *Lactobacillus*. It can be stored up to 28 days at low temperature (4°C) without any deterioration in sensory qualities.



Probiotic beverages prepared from fruits and vegetables

### Mango pulp - a rich source of nutraceuticals

Mango pulp has been found rich in nutraceuticals such as mangiferin and lupeol, which are anti-ageing and anti-carcinogenic. Dashehari contained as high as 33.0  $\mu$ g/g and Neelam accounted for 28.0  $\mu$ g/g of mangiferin. Out of 14 varieties analyzed, maximum lupeol was recorded in Malgoa (4.30 mg/100g) followed by Langra (3.63 mg/100g).

## EVENTS

## Mango diversity exhibition and stakeholders' interaction

Institute organized Mango diversity exhibition and stakeholders interaction on safe production and ripening of mango at Paryatan Bhawan, Lucknow on June 21-22, 2015. On the concluding day, Hon'ble Governor of UP, Shri Ram Naik presided over the function as the Chief Guest. Speaking on the occasion, he underlined the need to promote cultivation of export demand based cultivars of mango. Hon'ble Governor also visited the mango diversity show. He gave away the awards to farmers for their great efforts to conserve more than 300 types of different mango varieties. On this occasion, Dr. N.K. Krishna Kumar, DDG (Hort. Science), ICAR deliberated on the issues concerning safe and quality production of mango for boosting exports.

Earlier on June 21, 2015, Hon'ble Minister for Horticulture and Food Processing, Government of UP, Shri Paras Nath Yadav inaugurated the mango diversity exhibition. Citizens in large number participated in the mango diversity show and appreciated varietal diversity and different products of mango.



**Hon'ble Governor, Shri Ram Naik and other dignitaries in the mango exhibition**



**Dignitaries on the dais**

## ICAR Technology showcasing and industry interface

The ITMU unit of the Institute organized ICAR technology showcasing and industry interface on March 26, 2015 with a view to transfer the technologies developed at ICAR-CISH, Lucknow to industries and to develop agri-entrepreneur of the region. An MoU was signed between ICAR-CISH, Lucknow and Centre of Technology and



**Industry delegate illustrating his viewpoint**

Entrepreneur Development (CTED), Jagdishpur, Uttar Pradesh regarding two technologies viz., Aonla fibre biscuits and Aonla tea for Rs. One lakh as well as 5 per cent royalty on gross sale of the products.

## Awareness programme

An awareness programme on importance of farmers' varieties was organized at Madhavganj, Hardoi on June 19, 2015. Dr. (Smt.) Anju Bala, Hon'ble MP graced the occasion as the Chief Guest. Four hundred plants of 40 different mango varieties conserved by the Malihabad farmers were



**Hon'ble MP distributing farmers' varieties to growers**



distributed among the students and growers. Presiding over the function, Dr. S. Rajan, Director talked about the importance of popularizing and propagating local varieties and their impact on nutritional status and income generation of rural populace.

### Registration of farmers' varieties

Institute facilitated identification of 37 farmers' varieties from Malihabad, Uttar Pradesh registered under PPV&FRA, New Delhi. Out of 37 varieties, 21 were applied by community from Malihabad and 16 by individual farmers. These varieties were identified by the ICAR-CISH, Lucknow in 2013. The On-Site DUS testing of these varieties was initiated in the year 2014 which continued even in 2015.

### ISO 9001 certification

Institute was accredited with ISO 9001:2008 Certificate.



### Swachha bharat mission

The Swachha Bharat Mission of the Government of India is being vigorously pursued by the Institute. The officers of the Institute not merely cleaned the Institute's premises periodically but they also took up cleanliness drive in the adjacent schools, panchayat bhawans and railway platforms. The officers of the Institute also created awareness on health & hygiene among school children of the vicinity. Cleanliness drive even continued in schools of the adjacent areas.



Institute's staff engaged in cleanliness drive

### Tribal sub plan

Tribal farmers of some districts of Rajasthan and Madhya Pradesh were trained under the Tribal Sub-Plan. With the financial support available

under Tribal Sub-Plan of Government of India, efforts were made by ICAR-CISH, Lucknow in collaboration with KVKs under MPUAT, Udaipur, RVSKVV, Gwalior and JNKVV, Jabalpur for enhancing area expansion and productivity of mango, guava and other subtropical fruits. Endeavours were also made to strengthen the KVK nurseries besides the creation of mother blocks for mass multiplication of quality planting material at KVKs in large quantities to meet the demands of TSP areas.

**Rajasthan:** More than six thousand grafted plants of different improved varieties of mango, guava, bael and jamun were planted in the tribal belt of Banswara and Dungarpur districts of Rajasthan covering an area of 17.4 ha in mango, 10 ha in guava, 3 ha in bael and 1 ha in jamun. Seedlings of improved fruit varieties like Dashehari, Langra, Amrapali, Mallika, Ambika and Arunika in mango; Sardar, Allahabad Safeda, Lalit and Shweta in guava, CISH B-1 and CISH B-2 in bael and J-37 in jamun were planted in various orchards (31.4 ha) benefiting more than 100 farmers. A Training-cum-Kisan Gosthi on harvesting, post harvest handling, ripening and marketing of mangoes was organised for 163 farmers from Banswara and Dungarpur on June 8, 2015.

**Madhya Pradesh:** Sensitization programmes for 350 farmers of different districts, viz, Sidhi, Shahdol, Dindori, Umariya, Mandla, Seoni and Betul were organized by the Institute. More than 4000 grafted plants of different improved varieties of mango, guava, aonla, bael and jamun were distributed to farmers through KVKs. Farmers were trained in planting and after care of fruit plants. As a result, mother blocks were established at KVKs for multiplication of genuine planting materials. Institute's technologies, publications and products were also displayed on this occasion.



Farmers' gosthi underway under the TSP at Banswara

## TRANSFER OF TECHNOLOGY

### Three aonla products' technologies transferred

Institute transferred three technologies viz. aonla fiber enriched biscuit, aonla tea and *amla prash* to CTED, Jagdishpur, Uttar Pradesh. A dietary fiber, vitamin C and antioxidant rich biscuit has been developed by adding aonla pomace as one of the ingredients. The dietary fiber content of the finished product is about five times higher *vis-a-vis* normal biscuits while the vitamin C and antioxidant concentrations are 15.6 mg/100g and 0.25 g per cent, respectively. The shelf life of the biscuits is more than six months.

The aonla tea has multiple health benefits. It is rich in vitamin C and antioxidant value. It is consumed with hot water and sugar without milk. The traditional recipe of *Chyavanprash* incorporates deshi ghee and sugar along with other ingredients. Its process also includes lots of heating for kwath preparation which reduces the nutritional value of the product. However, *Amlaprash* does not include sugar and deshi ghee and requires minimal heating. The product is shelf stable for more than a year without the use of any preservative.

## HUMAN RESOURCE DEVELOPMENT

### Training organized

- Institute organized a training programme on Modern plant protection techniques for control of insect pests in mango for horticulture officers of Himachal Pradesh during January 16-19, 2015. A total number of 11 officials from Directorate of Horticulture, Government of Himachal Pradesh participated in the training.
- A five-day training on "Production, Protection & Postharvest Management of Subtropical fruits" sponsored by ATMA, Madhepura, Bihar was organised at the Institute from January 19-23, 2015. The training was attended by 12 farmers from Madhepura.
- A two-day training programme for enumerators under the aegis of UNEP/GEF project for conducting ex-post survey in adopted villages at Kakori and Malihabad, U.P. was organised on 29 and 30 January, 2015 at ICAR-CISH, Lucknow and village Mohammadnagar Talukedari, respectively. Dr. T.M. Gajanana, P.S., ICAR-IIHR, Bengaluru, Dr. S. Rajan, Director, ICAR-CISH,

Lucknow & PI, UNEP/GEF Project, Dr. Barsati Lal, Senior Scientist along with site officers of the project and representatives from DHAN Foundation participated in the programme. More than 100 farmers participated in the training programme conducted at Mohammadnagar Talukedari village on January 30, 2015.

- A five-day training on Production, Protection & Postharvest Management of Subtropical fruits sponsored by ATMA, Samastipur, Bihar was organised at the Institute from February 24-28, 2015. In this training, 22 farmers from Samastipur participated.
- Institute organized a meeting to discuss ON SITE DUS testing for the Malihabad Mango Farmers' varieties submitted to PPV&FRA, New Delhi on April 18, 2015.
- A two-day exposure visit-cum-training sponsored by Agri-Clinic & Agri Business Training Institute, Kathauta Crossing, Vinamra Khand-1, Gomti Nagar, Lucknow was conducted during May 25-26, 2015, wherein 18 trainees participated.
- One-day training on Harvesting, Postharvest Management & Marketing of Mango for Enhanced Quality Production and Profitability was organized by CISH in collaboration with MPUAT, Udaipur (Rajasthan) for 163 farmers of Banswara & Dungarpur districts of Rajasthan under TSP at KVK, Banswara, Rajasthan on June 08, 2015.

### Training attended

- Dr. Israr Ahmad and Ms. Antara Das underwent short course on Recent advances in molecular markers and population genomics held at ICAR-NBFGR, Lucknow during March 10-19, 2015.
- Ms. Swosti Suvadarshini Das attended a one month orientation training at ICAR-IISWC, Dehradun from April 10 to May 8, 2015.
- Ms. Antara Das attended ICAR-sponsored Summer School on RNA-interference as a tool for plant functional genomics and crop improvement held at NRCPB, Pusa, New Delhi during May 6-26, 2015.
- Ms. J. Lenka underwent foundation training of three months from January 01 to March 31, 2015 at ICAR-NAARM, Hyderabad and orientation training from April 10 to May 11, 2015 at ICAR-CISH, Lucknow and professional attachment training from May 12 to August 12, 2015 at ICAR-IIHR, Bengaluru.



- Dr. S. Rajan attended the Interactive Meeting of Vice-Chancellors of Agricultural Universities and ICAR Directors at NASC Complex, New Delhi during May 13-17, 2015.

### Meetings/Workshops/Symposia/Conferences, etc.

- Ms. Antara Das, Ms. Veena G.L. and Shri Muralidhara, B.M. attended the National Meet on Distant hybridization for horticultural crop improvement at ICAR-IIHR, Bengaluru during January 22-23, 2015.
- Dr. A. K. Bhattacharjee participated in the National Symposium on Agrochemicals for food and environment safety held at ICAR-IARI, New Delhi during January 28-30, 2015.
- Dr. P. K. Shukla participated in the National Symposium of ISMPP, Udaipur on challenges and management approaches for the crop diseases of National Importance - Status and prospects held at AC&RI, TNAU, Madurai from February 12-14, 2015.
- Dr. Maneesh Mishra participated in the 2<sup>nd</sup> National Seminar on Hi-Tech Horticulture: challenges and opportunities held at BBAU, Lucknow during February 26-27, 2015.
- Dr. Bharati Killadi participated in the International Conference on Medicinal plants-resource for affordable new generation healthcare at CSIR-CIMAP, Lucknow from March 18-22, 2015.
- Dr. S. Rajan attended the Horti Sangam-2015 at Gandhi Maidan, Motihari, Bihar organized by National Horticulture Board during April 9-10, 2015.
- Ms. Veena, G.L. and Shri Muralidhara, B.M. participated in the AGRI SEARCH 2050 held at NASC Complex, New Delhi on May 18, 2015.

### PFDC

- A two-day training programme on drip irrigation, plastic mulching and importance of protected cultivation in horticultural crops for farmers was organized at two districts, viz., Unnao (May 22-23, 2015) and Bahraich (June 25-26, 2015) by Precision Farming Development Centre (PFDC), ICAR-Central Institute for Subtropical Horticulture, Lucknow. During the training programme farmers, district horticulture officers and associated staff of horticulture department participated.

### Farmers exposure visit-cum-training

- A farmers' exposure visit-cum-training on subtropical fruits sponsored by Department of Agriculture, Bhind (Madhya Pradesh) was

attended by 36 farmers at this Institute on March 28-29, 2015.

- Six hundred eighty four visitors including 89 students and 50 bankers visited the Institute during the period.

## MISCELLANEOUS

### Exhibitions

- Institute participated in the National Farmers Fair & Vegetables Showcasing organised by ICAR-IIVR, Varanasi during January 30-31, 2015.
- Institute participated in the 12th Agricultural Science Congress & India Expo organised by ICAR-NDRI, during February 03-07, 2015.
- Institute participated in the Purvanchal Regional Agricultural Fair & Farmers Gosthi & Exhibition at ICAR-CPRS, Patna during February 19-21, 2015.
- Institute participated in the State Flower & Vegetable Show at Raj Bhawan, Lucknow during February 21-22, 2015.
- Institute participated in the State Flower & Vegetable Show' at Saifai, Etawah from February 28 to March 01, 2015 organized by Directorate of Horticulture & Food Processing, Lucknow.
- Institute participated in the Pusa Krishi Vigyan Mela at ICAR-IARI, New Delhi during March 10-12, 2015.
- Institute participated in the Agrotech-2015 during March 12-14, 2015 organised by Media Group, New Delhi at ICAR-IISR Campus, Raebareli Road, Telibagh, Lucknow.
- National Kisan Gosthi & Exhibition Horti Sangam-2015 organised by NHB, New Delhi at Gandhi Maidan, Motihari, Bihar during April 10-12, 2015.
- Training Programme and Kisan Gosthi in collaboration with MPUAT, Udaipur was organised for the farmers of Banswara & Dungarpur, Rajasthan under TSP at KVK, Banswara on June 8, 2015.
- More than 400 mango varieties of ICAR-CISH, Lucknow were displayed during the Mango Festival-cum-Stakeholders Interaction on safe ripening of mango at the Paryatan Bhawan, Gomti Nagar, Lucknow during June 21-22, 2015.
- Horti Sangam-2015 & Rashtriya Kisan Gosthi at Barhi, Hazaribagh, Jharkhand organised by NHB, Gurgaon during June 27-28, 2015.

## Peer Recognitions

Dr. P. K. Shukla acted as a Co-chairman in scientific session of National Symposium of ISMPP Udaipur on Challenges and management approaches for the crop diseases of National Importance-Status and prospects held at AC&RI, TNAU, Madurai during Feb. 12 -14, 2015.

Dr. S. Rajan was invited as the guest speaker at Uttar Pradesh Biodiversity Board, Lucknow on the occasion of National Conference on Biodiversity for Sustainable Development on May 22, 2015.

Er. Anil Kumar Verma delivered a lead lecture at Mango Mahotsava, Kolkata on 13 June, 2015.

Dr. A.K. Misra was conferred with the Fellow of Uttar Pradesh Academy of Agricultural Science, Lucknow for Plant Protection Sciences on June 16, 2015 at SHIATS, Allahabad.



## Visitors

Ju Hee Rhee, Senior Scientist, Regional Office for Asia the Pacific and Oceania, Bioversity International, Darul Ehsan, Malaysia visited the Institute on May 1, 2015.

Hon'ble Agriculture Minister, Govt. of UP, Shri Rajiv Kumar Singh visited the Institute on May 18, 2015.

Shri Kaushal Kishore, Hon'ble MP visited the Institute on June 12, 2015.

Dr. N.K. Krishna Kumar, D.D.G. (Hort. Sci.), ICAR, New Delhi visited the Institute on June 22, 2015.

Dr. S. B. Dandin, Ex. V. C., UHS, GKVK, Bangalore visited the Institute on June 25, 2015.

## PERSONALIA

### Scientific

#### New entrants

Dr. Dinesh Kumar, Principal Scientist (Fruit Science) joined the Institute on April 8, 2015.

Ms. Jotirmayee Lenka, Scientist (Fruit Science) joined the Institute on April 10, 2015.

Dr. (Smt.) Sharmila Roy, Principal Scientist (Agricultural Entomology) joined the Institute on May 2, 2015.

### Technical

#### Promotions

Shri S.K. Arun, Senior Technical Officer granted merit promotion to post of Asstt. Chief Technical Officer wef July 01, 2008 vide letter No. 1-10(2)/Estt./1092-96.

Dr. Raghubir Singh, Asstt. Chief Technical Officer granted merit promotion to the post of Chief Technical Officer wef April 01, 2014 vide letter No. 1-10(2)/Estt./dt 28-3-15.

Shri Sanjay Kumar, Asstt. Chief Technical Officer granted merit promotion to the post of Chief Technical Officer wef January 01, 2014 vide letter No. 1-10(2)/Estt./dt 28-3-15.

Shri Abhay Dixit, Asstt. Chief Technical Officer granted merit promotion to the post of Chief Technical Officer wef July 01, 2014 vide letter No. 1-10(2)/Estt./dt 28-3-15.

### Administrative

#### Promotion/Upgradation

Shri S.S. Arora, Ex AAO granted IIIrd MACP wef September 01, 2008

Shri Gyani Prasad Mishra, Pvt Secretary granted IIIrd MACP wef December 18, 2014.

### Transfer

Mrs. Pushpa Chethan Kumar, Scientist (Food & Nutrition) was transferred to ICAR-IIHR, Bengaluru and relieved from this Institute on May 23, 2015.

*Published by S. Rajan, Director*

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