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# NRCL newsletter

## *From the Director Desk.....*

Litchi is an important fruit crop of the country with tremendous domestic market and export potential. At present, an area of 84,000 hectares is under cultivation in this crop with a production of 5,94,000 metric tonnes fruits. The productivity of litchi is although better in India in comparison with its native country but still wide gap exists between present productivity level (7-8 tonnes/ha) and realizable potential productivity (14-15 tonnes/ha). Litchi contributes significantly to the growers' economy in Bihar, West Bengal, Assam and Jharkhand states of India that accounts for 78% of the total production in the country. Bihar produces 45% of total litchi and occupies nearly 40% of the area in India. The NRC on litchi has been mandated to address the productivity gap through basic and strategic research in areas of crop improvement and genetic enhancement, development of sustainable production techniques and integrated pest and disease management systems *vis-a-vis* act as nodel centre for information on litchi. The centre has tailored its R &D activities for addressing the litchi related problems and suggests the sustainable approach for improving the productivity and quality to various stakeholders.

**(Vishal Nath)**
**Director**

## *In this issue.....*

# Research Highlights

## Recent developments on R and D of litchi in India

Litchi is an important fruit crop of North India, particularly the Gangetic belt, and has potential in other regions of the country too. Litchi as an enterprise contributes towards livelihood security of millions in India right from the hills of North-Eastern states through the tarai regions of UP and Uttarkhand to the foothills of the Himalayas in Himachal Pradesh, Punjab and J & K. ICAR-NRCL has been actively involved in dissemination and transfer of the latest technologies to stakeholders across India. Recently, with constant efforts of ICAR-NRCL, litchi has been successfully introduced and established in certain pockets of Tamil Nadu, Kerala, Karnataka, and Maharashtra. In South India litchi flowers in September and matures in December, a period when litchi is produced nowhere in the rest of the country. Imports and market trend suggest that the winter crop fetches very good returns for growers owing to huge demand at a time of scarcity. Litchi-orcharding in South India is therefore, gaining wide popularity. The spread and growth of litchi has attained a pan-India phenomenon, recording about 3.8% growth annually over the last decade.

The establishment of ICAR-NRCL in 2001 catalysed research and development efforts in litchi. Through advocacy of good agricultural practices and improved production technologies, the production of litchi in India has increased from 2.36 lakh tonnes (2004-2005) to 5.87 lakh tonnes (2014-15). This represents an almost 150% increase in production over the course of a decade. Another important factor is supply of quality planting material of elite germplasm by the centre. ICAR-NRCL has been instrumental in making quality planting material available to growers all over the country. On an average 45,000 healthy air-layered saplings have been produced annually from the nursery and propagation unit at the centre. Presently, the approximate per capita availability of litchi in India is around 400g annually and therefore a production of 7.70 lakh tonnes of litchi would be required by 2050. The need to increase acreage, production, and productivity of litchi will require concerted R & D efforts and policy support.

Food processing sector represents one of the biggest industries in the world. Litchi offers tremendous scope for growth of litchi-based food processing sector. With the possibility of growing litchi in different pockets across India, the concept of establishing production hubs near consumption zone to reduce carbon and energy footprint becomes feasible. NRCL is involved in research to reduce postharvest losses and development of value-added products of litchi.

Basic and strategic research work has been initiated on various theme areas and recently inflorescence characterization for five cultivars has been completed based on IPGRI litchi descriptor. For development of hybrid variety in litchi, there are 13,000 flowers has been crossed involving four parents (*Shahi, China, Bedana* and *Kasba*). DNA has been isolated from the unique clones, nucleotide sequence was downloaded and polyA-Tail sequences were removed using Trimest program. In the investigation, there was observation that floral shoots of litchi has higher photosynthetic rate and transpiration rate than non floral shoots, during March month. While studying stressed litchi plants and application of polyamines, the proline content was estimated at initial fruit set stage in leaves of litchi plants [Spermine-(Shahi: 28.5 µg/g, China: 31.4 µg/g) and Putrescine (Shahi: 31.8 µg/g, China: 25.7 µg/g) and control (30.4 µg/g). Under floral biology it was found that before panicle emergence, leaf N content ranges from 0.95-1.77%. For preparation of soil health card and its distributions, soil samples from Muzaffarpur, Samastipur and Vaishali districts have been collected, analyzed and 120 soil health cards have been distributed.

Pruning of infected branches during July with two spray of *Propergite* @ 3.0 ml/L found effective for litchi mite management. Although not much serious disease found in litchi but percent infected leaflet due to *Alternatia* leaf blight in nursery plants was observed upto 25-100%, with PDI: 55.92. "Under livelihood and Nutritional improvement of tribal farm women through horticulture" project, Bakwa Chandraul and Persauni in West Champaran district of Bihar is selected as tribal village for horticultural development.

While studying growth kinetics on processed products of litchi, the growth rate of KIV and PC was faster at 20-25 $^{0}$C whereas EC and KIVSc have a faster growth rate at ambient condition. The optimized blended RTS (ready to serve) product as 50:20:30: Litchi: Longan: Guava, 65:35:Litchi: Longan, and 60: 40: Litchi: Guava when stored up to 8 months at ambient condition had sensory quality score: 7.78.

# NRCL Technology/ Success Story

## High Pulp containing litchi germplasm identified as VNSDASU-1

Litchi adored with refreshing, juicy fragrant aril and packed with nutrition, the luscious fruit of litchi has 60-70 percent edible portion in commercially grown litchi cultivars with big size seed. Therefore, a promising clone VNSDASU-1 has been identified in collaboration with GBPUAT, Pantnagar. The Clone has more than 83 percent pulp with approximately 30 g fruit weight. The yield potential of the identified clone (about 60 year tree) is 2.0-2.5 q/plant per year.

**Fruit of VNSDASU-1**

This genotype is regular in bearing and develops crimson red colour fruits. The plant is comparatively free from any pest and diseases. In view of all the positive characters, this clone has been regenerated for detailed characterization and multi location testing. The comparative advantage of new clone has been given in following tables along with photographs:-

| Cultivar/Clone | Fruit wt. range (g) | Seed wt. range (g) | Peel wt. range (g) | Pulp wt. range (g) | TSS range (0 Brix) |
|---|---|---|---|---|---|
| Shahi | 10.08-22.00 | 0.33-03.83 | 1.30-3.33 | 12.63-19.40 | 14.60-18.20 |
| China | 16.84.24.14 | 1.48-4.46 | 3.04-5.48 | 07.88-13.69 | 13.20-18.90 |
| Bedana | 12.08-22.30 | 0.78-2.50 | 2.65-4.25 | 8.47-16.74 | 17.7-20.00 |
| VNSDASU-1 | 26.05-35.30 | 0.69-1.79 | 2.85-4.16 | 22.14-30.75 | 17.4-19.50 |

## Managing litchi wilt

The isolate of *Trichoderma viride,* NRCL-T 01 isolated from rhizosophere of litchi at ICAR-National Research Centre on Litchi, Muzaffarpur has been found panacea for managing wilt caused by *Fusarium solani.* The isolate was evaluated initially under *in-vitro* condition along with four other isolates of *Trichoderma* spp. The inhibition of colony growth in dual culture was 61.5% and the antagonist completely overgrew the pathogen in six days. Later it was tested under glasshouse conditions in potted trees with artificial inoculation of pathogen and the biocontrol agent, where it was found significantly superior to other isolates in overcoming the pathogen. A talc based formulation was then developed with minimum count in final product $2x10^6$ cfu/g. Quality parameters and viability of the product under storage conditions was studied. On pilot basis it was applied in orchard trees at NRCL farm to the apparently sick trees that were on the verge of wilting. The talc based formulation was applied after mixing with vermicompost. The sick trees became healthy after 20 days of application restoring normal development of feeder roots in affected trees. The population level of *Trichoderma* in rhizosphere of inoculated trees assayed after 20 days were in the range of $1.2\text{-}9.0 \times 10^4$ cfu/g. NRCL has developed the technology to mass produce this efficient isolate for field application. The viable count in formulation can be best maintained at 4 °C without contaminants and moisture build up in the pack. The isolate NRCL T 01 is novel in terms of unique growth habit, tolerance to a wide temperature regime (15-40 °C ), pH (4.0-9.0) and salinity (can grow up to a salt concentration of 1.5M NaCl), and also for production of volatile and non-volatile compounds inhibitory to pathogens. Besides controlling soil borne pathogens, it is also having a good plant growth promotion activity and help air-layers to establish in field.

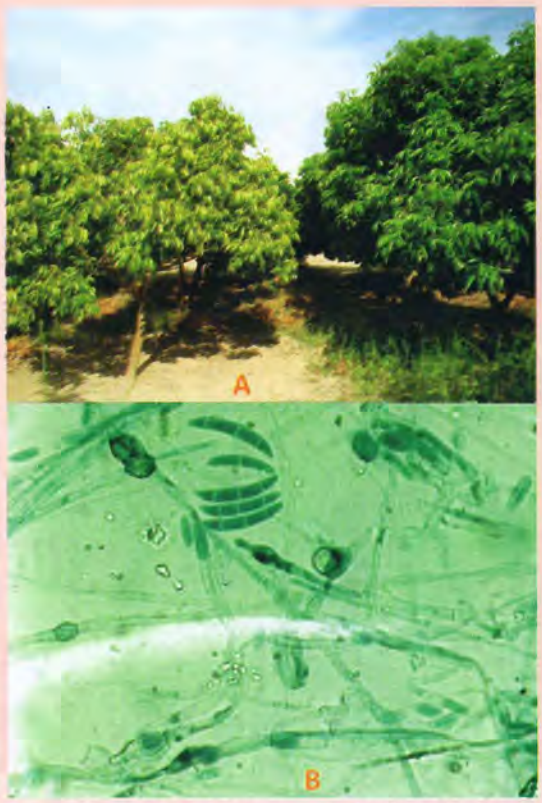


**Fig. A. Tree with early symptoms of wilting (Left) and healthy tree (Right), B. Conidia and microsclerotia of *Fusarium solani***

## Management of litchi fruit borer using IGRs and Organic Products

Field trials was conducted to evaluate the different Insect Growth Regulators and different bio-enhancers and it was found that minimum fruit infestation (5.77%) was recorded with first spray of neem oil (3ml/L) before flower opening,

second and third spray of diflubenzuron (25 WP) (0.06%) at clove stage fruit size and after 21 days of second spray against high (45.8%) fruit damage in control followed by lufenuron.

Among various organic products/ bio-enhancers, *Panchgavya* 3% (30ml/L) found to be the most effective for healthy and quality litchi production. Four sprays at 10 days interval after fruit attaining clove size kept the infestation below threshold level. Moreover, pruning of infested twigs in June followed by manuring of litchi trees with 4 kg of castor and 1 kg of neem cake in first week of July and need based spraying of bio-enhancer formulations have been recommended for keeping the litchi pests at minimum level.


**Fig. 2: A: Damaged fruit, B: Pupae on leaves, C: Pupation plastic crates, D: Adult**

# Important Events

## Centre is accreditated with ISO 9001:2008 Certificate

Through auditing and certification procedures and on the basis of facilities available on **'Basic and Applied Research on Productivity, Quality and Utility of Litchi**, the firm TUV India Private Limited, Mumbai has given ISO 9001:2008 certificate to the centre.

## Foundation Day celebrated on 6th June, 2015

The centre celebrated 15th '*Foundation Day cum Litchi Day*' on 6th June, 2015. On this auspicious occasion, Shri. Parasnath, IPS (Inspector General, Police, Muzaffarpur Range) was Chief Guest and Dr. Gopaljee Trivedi, Former Vice Chancellor, RAU, Pusa, Samastipur was guest of honour. He exhorted farmers and stake holders to be digitised and use ICT in litchi production, marketing and export. Dr. Vishal Nath was the Member Secretary of the functions.


**Dignitaries and stakeholder of Litchi present during 15th Foundation Day**

## 9th Research Advisory Committee Meeting

The Ninth meeting of the Research Advisory Committee (RAC) of the Centre was held on 15th September, 2015 under the Chairmanship of Dr. S. D. Shikhamany, Former Vice Chancellor, YSR Horticultural University, West Godawari, AP in the Conference hall. Chairman, RAC appreciated the on-going research and development activities and the achievements of the Institute. The meeting was attended by other members including Dr. Manjit Singh, Director, DMP, Solan, HP; Dr. S.K. Mitra, Former Dean, BCKVV, Kalyani; Dr. D.S. Khurdiya, Former Head, Division of PHT, IARI, New Delhi; Dr. Jitendra Kumar, Director, DMAPR, Anand, Gujarat; Dr. V.V. Ramamurthy, PS, IIHR, Bengalore and Dr. Vishal Nath, Director. The other Ex-Officio member were, Sh. Ranjan Sahu, Sh. Mukesh Sharma as farmer representative. The members visited the experimental farm,


*Progress of 9th RAC*

various laboratories and other research infrastructure facilities and appreciated the work being carried out by the centre in recent years. They emphasized on basic and strategic research including Identification of markers, development of mapping population and work on marker-assisted selection (MAS and expedition of collection of germplasms from Assam and Tripura for litchi, West Bengal and South India for longan). They also called upon researcher to establish factors contributing to fruit bud formation namely carbohydrates, light, endogenous GAs/CKs ratio, soil moisture stress etc. As per their advice, bio-ecology of fruit borer should be studied.

## हिन्दी चेतना मास

राष्ट्रीय लीची अनुसंधान केन्द्र पर नराकास, मुजफ्फरपुर के सहयोग से आयोजित हिन्दी काव्य–व्यंग प्रतियोगिता एवं पुरस्कार वितरण समारोह सम्पन्न हुआ। इस अवसर पर 17 संस्थाओं के प्रतिनिधियों ने काव्य का पाठ किया जिसमें राम निवास कुमार, दूरदर्शन केन्द्र, मुजफ्फरपुर को प्रथम पुरस्कार, डॉ. शेषधर पाण्डेय, प्रधान वैज्ञानिक, लीची अनुसंधान केन्द्र को द्वितीय, श्री सौरभ कुमार, सेन्ट्रल बैंक को तृतीय पुरस्कार मिला एवं सान्तवना पुरस्कार श्री अरविंद कुमार वरूण, भारत बैगन एवं डॉ. संगीता कुमारी, जीवन बीमा निगम को दिया गया।

आगंतुकों का हिन्दी चेतना मास में सहभागिता

इस कार्यक्रम के मुख्य अतिथि श्री नवीन कुमार, प्रभारी निदेशक, दूरदर्शन केन्द्र, मुजफ्फरपुर एवं अध्यक्षता डॉ. विशाल नाथ, निदेशक, राष्ट्रीय लीची अनुसंधान केन्द्र ने किया। इस कार्यक्रम में बोलते हुए मुख्य अतिथि एवं अध्यक्ष महोदय ने हिन्दी के व्यापक प्रचार–प्रसार एवं उपयोग पर बल दिया। नराकास, मुजफ्फरपुर के सदस्य सचिव श्री निरंजन वर्णवाल, गोपाल जी किशोर सहित केन्द्र के सभी वैज्ञानिक एवं कर्मचारी उपस्थित थे। कार्यक्रम का संचालन डॉ. सुशील कुमार पूर्वे एवं धन्यवाद ज्ञापन डॉ. शेषधर पाण्डेय ने किया।

## Round Table Conference on Litchi Borers

ICAR- NRC Litchi, Muzaffarpur, the nodal institute for litchi research in the country have jointly organized a one day *'Round Table Conference on Litchi borers'* with Consortia Research Plateform (CRP) on Borer on December 4th, 2015. The meeting was attended by scientists, including entomologists and horticulturists from NRC Litchi -


**Round Table Conference on Borers; visit of dignitaries to litchi orchard**

Muzaffarpur, IIHR - Bengaluru; CHES - Bhubaneswar and State Agricultural Universities who are part of AICRP on Fruits. Dr. A. Krishnamoorthy, former PS, IIHR and Ex-PI, CRP on Borers was the external expert. Dr. Vishal Nath, Director, NRC Litchi chaired the sessions. At the outset, delegates were welcomed by Dr. S.D. Pandey, Chairman, PME, and the session was started with opening remark of Dr. P. V. Rami Reddy, Principal Scientist and PI-CRP on Borers, ICAR-IIHR, Bengaluru introducing the topic and presenting an outline of CRP on Borers and the essence of the Round Table Conference.

## Celebration of 'World Soil Day'

The ICAR-National Research Centre on Litchi, Muzaffarpur celebrated '*World Soil Day*' on 5th December 2015. The function was presided by Dr. Gopal Ji Trivedi, the former Vice-Chancellor of RAU, Samastipur. The honourable Member of Parliament from Muzaffarpur, Shri Ajay Nishad, was the Chief Guest of the function. Shri Suresh Sharma, Member of Legislative Assembly (MLA) from Muzaffarpur (city) was Special Guest on this occasion.

**Dignitaries present on Dais on World Soil Day; presence of stakeholder of litchi**

Shri Ranjan Sahu, Member, IMC, and Farmer's representative was another dignitary in the function. About 100 farmers and staffs of ICAR-National Research Centre on Litchi attended the programme. At the outset, the Director, welcomed the guests and highlighted the importance of soil and appraised the gathering that 2015 has been declared as '*International Year of Soil*' and 5th December is being celebrated as "*World Soil Day*". Dr. Trivedi in his presidential speech highlighted the importance of soil sampling and management for quality and assured litchi production. He also emphasized the need for close monitoring of plantations.

The chief guest, Shri Ajay Nishad (MP) appreciated the initiative of ICAR-NRCL in implementing Government of India scheme to provide soil health card to farmers on this occasion and suggested to strengthen the setup for reaching to more farmers. Shri Suresh Sharma emphasized to undertake research on effective insect pests management of litchi for assured income. Earlier speaking to farmers in the function, Dr. Vinod Kumar, Senior Scientist highlighted the importance and use of microbes in soil health management while late Dr. Rajesh Kumar, Principal Scientist, shared information on various aspects of production management of litchi. At the end of function, soil health cards were distributed to the farmers of Muzaffarpur and Vaishali districts.

## NRCL started collaborative Research Project with ICAR-National Research Centre on Grapes, Pune, Maharashtra

NRC on Litchi, Muzaffarpur has started a collaborative research project with ICAR-National Research Centre on Grapes, Pune on 'Mining of compound with hypoglycaemic activity in litchi (*Litchi chinensis*) fruits. There will be estimation of compound having potential hypoglycaemic activity in litchi ecotypes at different stages of litchi fruit development.

The MCPG level in the edible portion of litchi pulp as reported by Mukul Das *et al.*, 2015, IITR, Lucknow, is very-very low and needs to be reconfirmed for which the ICAR-NRCL and ICAR-NRC on Grapes, Pune are working in collaboration to delineate the level of probable hypoglycin/MCPG in different germplasms of litchi and fruits of different stages during development and ripening. The work has been approved by the respective IRCs and a team of scientists from NRCL and NRCG have started work. The standards of MCPG are being procured from M/s Akos consulting solutions, Germany by NRCL and work will be intensified during this fruiting season.

## Model Training on GAPs in litchi

The centre conducted Model Training Course (MTC) sponsored by Directorate of Extension, Ministry of Ag. and Farmers Welfare on "*Good Agricultural Practices in Litchi*" at ICAR-NRC on Litchi Muzaffarpur, during 23-30th November, 2015. The training was aimed to provide recent technological knowledge and advance informations for improving productivity and quality of litchi in the country. During the Model Training, the aspects like varietal selection, orchard establishment and management, orchard floor management and crop diversification possibilities to enhance farm income, farming system and organic litchi production, IPM and IPNM for litchi, rejuvenation protocol for senile orchards, pre harvest management protocols to improve harvest life and realizing better price, etc. were covered by various eminent experts.


**Participants receiving certificate of training programme; visit of participants in PHM Laboratory**

## Mera Gaon Mera Gaurav

A '*Kisan Gaushthi*' in the presence of *Pradhan* and *Panchayat* members was held in village Kankati (Kothia Hariram), Mehsi, East Champaran on 28.12.2015 in which large number of farmers from the adopted village participated and discussed their current farming practices and the problems they are facing in increasing the productivity. The farmers were provided the contact numbers of the team members to make available them the required information whenever needed. Farmers were made aware of their important role in meeting the challenges of food production and support of the Govt. of India and ICAR, Department of Agriculture to boost the production and making farming an economic pursuit. Importance of improved varieties of crops, control of weeds, diseases and pests was also elaborated and queries raised by farmers were solved there itself. Another village of Muzaffarpur district was selected as Binda, of Mushahari Block and Katarmala village of Goraul Block , Vaishali is also taken for future programme.

***Mera Gaoan Mera Gaurav*** **programme at Binda, Mushahari, Muzaffarpur**

## Participation in 'Kisan Mela'

1) The centre actively participated in *Horti-Sangam*, at Motihari, Bihar on 10-12th April, 2015 and had separate session on scientist-farmer interaction meet on litchi with display of technology on Litchi.
2) The centre participated *Inter State Horti-fair "Sangam"* under the objective of transfer of technology, exchanging good Horticulture practices and marketing of Horticultural produce by way of direct participation of the producers, scientist and buyers, on 27-28th June 2015 at Barahi, Hazaribagh, Jharkhand
3) Centre participated in 'Foundation laying function of IARI, Jharkhand' at Barhi, Hazaribagh, Jharkhand on 28th June, 2015 which was laid by Hon'ble Prime minister of India.

4) Scientists of the centre attended '*ICAR Foundation Day, Award Ceremony and National Conference of KVK's* on 25th July, 2015 at Sri Krishna Memorial Hall, Patna.

5) Scientist of the centre displayed technology on litchi and mango during '*Inaugural Function of ICAR-NRC on Integrated Farming, Motihar*i' on 20th August, 2015 at Piprakothi, Motihari, Bihar.

6) Centre took part in Jai Kisan- Jai Vigyan Programme on 25th December, 2015 at Town Hall, Motihari organized by ICAR-RCER, Patna

## 13th IRC Meeting

The 13th Institute Research Council (IRC) meetings of NRCL were held from 2nd – 3rd December, 2015 under the Chairmanship of Dr. Vishal Nath, in the section mode, individual scientist of each theme areas made a brief presentation of his/her contributions with respect to the research and extension activities during the year 2015-16 across disciplines.


**Scientists taking part in 13th IRC meeting**

## 10th IMC Meeting


**10th LMC meeting in progress**

The 10th Institute Management Committee Meeting was held in the chairmanship of Dr. Vishal Nath, Director on 30th December, 2015 at 11:00 AM in the Committee Room of ICAR-NRC on Litchi, Muzaffarpur, other members were Dr. A. K. Mishra, Head, CISH, Lucknow; Dr. V. K. Gupta, Pr. Scientist, ICAR-RCER-Research Centre for Makhana, Darbhanga and Dr. I. S. Solanki, Principal Scientist & Head, ICAR-IARI, Regional Station, Pusa, (Bihar). Sh. Mukesh Kumar Sharma, Sh. Ranjan Kumar Sahu were the farmers representative. The Members expressed their happiness on research activities, development of facilities and infrastructures in the farm as well as Laboratory and Office to undertake the advanced research in the field of Litchi. Members were also eager to know about the methods used by the Center to disseminate information related to research and development to the farmers and other stakeholders. Some concern was also raised about the litchi borer. The members expressed their satisfaction over the pace of research and development at the centre.

## Empanelment of Academic Counsellor for PGDPM/COF Programme sponsored by IGNOU, New Delhi

IGNOU, Regional Centre, Darbhanga has set up IGNOU Programme Study Centre, at NRCL, Muzaffarpur in which they will provide Self Instructional Material to learners and learners study and prepare themselves for examination. The course was started as "Certificate Course on Organic Farming" in which appointed counsellor have been empanelled. All the nominated scientists have been empanelled for this purpose.

**Orientataion programme on Certificate course on Organic Farming**

## Events in Brief

- ❖ आत्मा, मधुबनी द्वारा प्रायोजित लीची एवं आम के बाग में 'उत्तम कृषि क्रियाँएं' विषय पर पाँच दिवसीय, (19–23 जनवरी, 2015) प्रशिक्षण दिया गया।

1. आत्मा, भागलपुर द्वारा प्रायोजित लीची एवं आम के बाग में 'उत्तम कृषि क्रियाँएं' विषय पर पाँच दिवसीय, (05–10 फरवरी, 2015) प्रशिक्षण दिया गया।

- ❖ NRCL participated in Regional Agriculture Fair, 2015 as Co-organizer at CPRS, Patna during 19-21st February, 2015.
- ❖ Centre organized Summer Training programme for UG Students on 'Post-harvest handling of Litchi fruits' from 15-21 June, 2015.
- ❖ NRCL participated in Udyan Sangoshthi- 2015 on 20-21 August, 2015 at Pipra Kothi, East Champaran, Bihar.
- ❖ The centre organized 'Induction Meeting of all Students and Academic Councillors of IGNOU Centre (46023P) on 'Certificate Course on organic farming' on 6th October, 2015.

## Invited Lecture

- ❖ Dr. Vishal Nath, delivered lead lecture on "*New Varieties and Advances in production technology in litchi*" at Patna during "Farmers Day" organized by TAFE, Chennai on 13th February, 2015.
- ❖ Dr. Vishal Nath, delivered key note address on 'Litchi production and utilization: an option for livelihood and rural development' during "*National Conference on Dynamics of smart horticulture for livelihood and rural development*" (28-31 May, 2015) at MGCGV, Chitrakoot, MP.
- ❖ Dr. Sanjay Kumar Singh, Scientist SS (Fruit Sciences) delivered a lecture on "Role of Growth Regulators in physiology of fruit cracking and its Management" in Workshop on '*Fruit Cracking and Soil Health Management in Pomegranate*' held on 03rd October, 2015 at ICAR-National Research Centre on Pomegranate, Solapur, Maharashtra in collaboration with Society for Advancement of Research on Pomegranate (SARP).
- ❖ Dr. Sanjay Kumar Singh, Scientist SS (Fruit Sciences) delivered a lecture on "*Plant Growth Regulators and chemicals for flowering and quality litchi production*' in 'Model Training Courses on Good Agricultural Practices in litchi' held from 23rd - 30th November, 2015 at ICAR-National Research Centre on Litchi, Muzaffarpur, Bihar, sponsored by Ministry of Agriculture and Farmer's Welfare, Govt. Of India.

## HRD

Dr. Vishal Nath, participated in *XII Agricultural Science Congress Sustainable Livelihood Security for Smallholder Farmers* held on 3rd - 6th February, 2015 at ICAR-National Dairy Research Institute, Karnal, Haryana

Dr. Vishal Nath, Director took part in projects worker meet of All India Co-ordinated Research Project-Fruits held at Udaipur during 26th February- 1st March, 2015.

Dr. Vishal Nath, Director took part in 2nd National Seminar on 'Hi-tech Horticulture: Challenges and Opportunities" held at BBA University, at Lucknow during 26-27 February 2015.

Dr. Kuldeep Srivastav, Sr. Scientist, Ag. Entomology *attended National Conference on Dynamics of Smart Horticulture for Livelihood and Rural Development at* MGCGV, Chitrakoot UP *(28th to 31st, May, 2015) organised by CHAI, New Delhi.*

Dr. Kuldeep Srivastav delivered a lecture on 'Management of litchi fruit borer using insect growth regulators (IGRs)' in 11th *National Symposium on Dynamics of Crop Protection: Challanges in Agri-horticultural Ecosystem Facing Climate Change* held on 23-25 April, 2015 at MPUAT, Udaipur, Rajasthan, India.

Dr.Vishal Nath Director attended '*Brain Storming Session and Exhibition on Avocado*' at CHES (IIHR), Chettali, Karnataka.

## Award and Recognitions

- ❖ Dr. Gorakh Singh, Dr. Vishal Nath and Dr. S.D. Pandey have been jointly awarded with "इंदिरा गाँधी मौलिक पुस्तक लेखन पुरस्कार" on their book 'लीची' by Hon'ble President of India on 14.9.2015 at Vigyan Bhawan New Delhi.

- Dr. Kuldeep Srivastava, Sr. Scientist (Agricultural Entomology) has been awarded Fellow of Society of Plant Protection Sciences, New Delhi during April 2015.
- Dr. R.K. Patel, Sr. Scientist (Horticulture) has received "Bioved Young Scientist Associate Award-2015" by Bioved Research Scociety, Bioved Research Institute of Agriculture and Technology, Allahabad, U.P.
- राष्ट्रीय लीची अनुसंधान केन्द्र, को नराकास मुजफ्फरपुर द्वारा हिन्दी में कार्य करने के लिए वर्ष 2015 में तृतीय पुरस्कार मिला।
- कुशीनगर में आयोजित राष्ट्रीय किसान मेला सह प्रदर्शनी में केन्द्र को संस्थान वर्ग में वर्ष 2015 के लिए द्वितीय पुरस्कार मिला।

## MOUs

1) The centre in preceding year had MoU (Memorandum of Understanding) with Rajendra Agricultural University, Pusa, Bihar, 848 125 for cooperation in PG teaching and research and MOU was signed on 25th June 2015 in Conference Room of University Apiary and Honey bee Research Centre, RAU, Pusa, Bihar.
2) MoU for cooperation in PG teaching and research was signed with JNKVV, Jabalpur, MP during December, 2015.

# Publications

## Research Articles


- Jadon K.S., Thirumalaisamy P.P., Kumar V., Koradia V.G. and Padavi R.D. (2015). Management of soil borne diseases of groundnut through seed dressing fungicides. *Crop Protection*, 78: 198-203.
- Kumar A., Pandey, S.D., Patel R.K., Singh S.K., Srivastava K. and Nath V. (2015). Induction of flowering by use of chemicals and cincturing in 'Shahi' litchi. *The Ecoscan Special Issue* VII: 493-496.
- Marboh E.S., Singh A.K., Dubey A.K. and Prakash, J. (2015). Analysis of genetic variability among citrus (*Citrus* spp) genotypes using morphological traits. *Indian Journal of Agricultural Sciences* 85(2): 203–11
- Pandey S. D., Kumar A., Patel R.K., Rai R.R. and Nath V. (2015). Influence of planting densities on plant growth, yield and quality of litchi cv. Shahi. *The Ecoscan* Special Issue VII: 397-401
- Pandey, Swapnil, Singh, J., Singh, Sanjay Kumar and Mourya, I. B. (2015). Influence of growing environment on growth, yield and chemical composition of strawberry (*Fragaria* × *ananassa*) fruits under open vs naturally ventilated polyhouse conditions. *Indian Journal of Agricultural Sciences*, 85(12):1540-45
- Patel R.K., Maiti C.S., Deka B.C., Deshmukh N.A., Verma V.K. and Nath A. (2015). Physical and biochemical changes in guava (*Psidium guajava*) during various stages of fruit growth and development. *International Journal of Agriculture, Environment and Biotechnology* 8: 63-70
- Sharma S., Sharma R.R. and Verma M.K. (2015). Postharvest treatment with nitric oxide influences the physiological and quality attributes of 'Santa Rosa' plums during cold storage. *Indian Journal of Horticulture* 72(4): 535-540.
- Singh, Sanjay Kumar, Singh, Awtar, Nath, Vishal, Parthasarathy, V. A., Sthapit B., Rajan, S. and Vinoth, S. (2015). Genetic Diversity in Seedling Populations of Mango. *Indian J. Plant Genet. Resour.* 28(1): 123-131.
- Singh, Sanjay Kumar, Singh, Awtar, Nath Vishal, Parthasarathy, V. A., Sthapit B. and Vinoth, S. (2015). Pummelo in Homestead Garden: Conservation through Family Farming. *Indian J. Plant Genet. Resour.* 28(1): 132-138.
- Singh, Sanjay Kumar, Singh, I. P., Singh, Awtar, Parthasarathy, V. A. and Vinoth, S. (2015). Pummelo [*Citrus grandis* (L.) Osbeck] Diversity in India. *Indian J. Plant Genet. Resour.* 28(1): 44-49.
- Srivastava K., Patel R.K., Pandey S.D. Kumar A., and Nath V. (2015). Integrated management of lepidopteran defoliators in litchi under subtropics of Bihar. *The Ecoscan Special Issue* VII: 477-481.


## Popular Articles


- Kumar, Rajesh (2015). Rejuvenation technology in litchi is economical too. *Indian Horticulture*, 60(1):32-34.
- Singh, S.S., Mishra, D.S., Sachan, S. and Vishal Nath (2015). लीची उत्पादन की उत्तम तकनीके, फल फूल, 36 (2): 3-8.

- Srivastava, K., Pandey, S.D., Patel, R.K., and Nath, V. (2015). Litchi fruit borer infestation minimized through organic products. *ICAR News*. 21 (3): 21-22.
- Vishal Nath, Kumar, A., Pandey, S.D. and Tripathi, P.C. (2015). Litchi in winter: A reality. *ICAR News* - 21(1): 4.
- विशाल नाथ, एस.के. पूर्वे, राजेश कुमार, एस.डी. पाण्डेय, अमरेन्द्र कुमार एवं विनोद कुमार (2015), लीची विकास हेतु नई तकनीकें, पूर्वी भारत का क्षेत्रीय किसान मेला, (19–21 फरवरी, 2015), केन्द्रीय आलू अनुसंधान केन्द्र, पटना।

## Books/Book Chapter

- Vishal Nath and Purbey, S.K. (2015). Post-Harvest Management of Litchi for Domestic and International Market *In :* Post-harvest management in Horticultural Crops. Vol. 2 Fruit Crops (Eds. KL Chadha and R.K. Pal). Astral International Pvt. Ltd., New Delhi: 441-460.

## Publications in Conference/Workshops/Seminars Proceeding

- Singh, S. K., Kumar, A., Purbey, S.K. and Sharma, S. (2015) Improving Flowering and Fruit quality in Litchi by applying PGRs and chemical regulators. *In* : Awareness Programme on off-season Litchi cultivation in South India-2015 (December 10, 2015) organized by CHES, ICAR-IIHR, *Chettali*, Kodagu, Karnataka. pp 52-58.
- Nath, V. and Sharma, S. (2015). Advances in litchi production for enhanced productivity and quality. *In* : 3rd Uttar Pradesh Agricultural Science Congress strategic governance and Technological advancement for sustainable agriculture. pp-473-479

## Visit of Dignitaries

- Dr. Arbind Kumar, DDG (Education) visited the centre on 15th January, 2015.
- Dr. R.B. Deshmukh, Former VC MPKV, Rahuri, MS visited this centre on 19th June 2015.
- Dr. K.K. Jindal and Dr. Umesh Srivastava, Former ADG (Hort.) visited this centre on 17th June, 2015
- Dr. G S Dubey, Ex-Vice Chancellor, Birsa Agricultural University, Kanke, Ranchi visited the centre on 27th November, 2015.
- Dr. A. Krishnamoorthy, Former Principal Scientist and Platform Coordinator- CRP on Borers, IIHR, Bangalore visited the centre on 4th December, 2015
- Shri. Ratneshwari Prasad Singh, Member, Governing Body, ICAR, New Delhi visited the NRCL farm and laboratory on 11th December, 2015.



**Dr. Vishal Nath and Dr. S.D.Pandey receiving *Indira Gandhi Maulik Pustak Lekhan Puruskar***

# Staff News

## Recruitment

- Dr. Gopal Kumar, Scientist (Ag. Physics) has been recruited by ASRB, New Delhi as Senior Scientist (Soil Science) and joined on 30th September, 2015.
- Sh. Jai Prakash Verma recruited for the post of Technical-3 (Field/Farm Technician) and joined on 15th July, 2015
- Sh. Ramashish Kumar recruited for the post of Technical-3 (Field/Farm Technician) and joined on 29th July, 2015.

## Joining

- Dr. Alok Kumar Gupta, Scientist (Fruit Sciences), joined ICAR-NRC on Litchi, Muzaffarpur on January 15th, 2015 on transfer from ICAR-CITH, Srinagar, J&K.
- Dr. Swati Sharma, Scientist (Fruit Sciences) joined ICAR-NRC on Litchi, Muzaffarpur on March 2nd, 2015 on transfer from ICAR-CISH, Lucknow, UP.

## Transfer

- Dr. Pawan Singh Gurjar, Scientist (Fruit Sciences) has been transferred to ICAR-CISH, Lucknow and relieved from the centre on 13th March, 2015.
- Dr. Neetu Singh Kushwah, Scientist, (Agricultural Biotechnology) has been transferred from centre on 26th December, 2015 to join at ICAR-Indian Institute of Pulse Research, Kanpur, U.P.
- Dr. Shyamjee Misra, T-3 (Field/Farm Technician) has been transferred to ICAR-CSSRI Regional Centre, Lucknow and relieved from the centre on 22nd July, 2015.
- Smt. Pallavi, T-2 (Lab Technician) has been transferred to ICAR-IISR, Lucknow and relieved from the centre on 17th October, 2015.

# Upcoming Events

- Training Programme on "Capacity Development Programme on cold treated Litchi export to USA" is scheduled on 19th-21st May, 2016.
- BARC Outreach Programme at ICAR-NRC Litchi Muzaffarpur scheduled on 25th - 26th May, 2016 on manual demonstration of litchi preservation technology.
- ICAR sponsored Summer School (21 days) on 'Canopy Architecture Management in Fruit Trees for Conservation and Utilization of Natural Resources in changing climate condition' during 11-31 July, 2016.
- Short Course (10 days) on '*Bioassay, production protocol and quality control for Trichoderma based bio-pesticides*' during 5th-14th September, 2016.

Panoramic view of ICAR-NRCL

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