ICAR-CIPHET News
सीफेट समाचार

Produce Process Prosper

Vol. XVI No. 4 OCTOBER - DECEMBER 2015

FROM THE DIRECTOR'S DESK

Welcome to the fourth issue of quarterly newsletter of ICAR-CIPHET for the year 2015. It gives me immense pleasure to share with you that the Institute has completed 26 glorious years of its establishment on December 29, 2015.

During this quarter ICAR-CIPHET has continued to advance post-harvest research and has attained another milestone in the area of by-product utilization by designing and commissioning a pilot plant for the production of protein isolates from de-oiled groundnut cakes. It takes thousands of small but focused steps over the years to achieve major changes. I hope that this achievement will prove a revolutionary step towards the commercial production of protein isolates in the country. To address the increasing demand for live fish and problems associated with live fish transportation, a battery operated transportation system for local transport of live fish has also been designed and developed. Nowadays, food adulteration is a serious problem in our country. Concerns about food safety and regulation have ensured the development of various techniques for adulterant detection in food. In this direction, ICAR-CIPHET has developed/ validated NIR and PCR based methods for detection of common adulterants of milk and saffron. To create awareness about post-harvest management of agricultural commodities, a series of extension activities/ programmes including 13 radio talks titled *"Do Duni Chaar"* were broadcasted through AIR, Jalandhar. Besides, during this quarter, various HRD programmes i.e. ICAR sponsored winter school on "Recent Advances in Development of Automatic Systems/Machines for Secondary Agriculture", model training course on "Post-Harvest Management and Processing of Fruits and Vegetables for Sustaining Horticulture Industry", hands on training on process for dried onion flakes and powder were organized. Institute participated and showcased its technologies in various exhibitions i.e. IASOWA exhibition at New Delhi, 5th Global Economic Expo Summit 2015 at WTC, Mumbai and India International Trade Fare-2015 at New Delhi. The Institute also celebrated "Communal Harmony Week (Nov 19-25, 2015)", "Vigilance Awareness Week (Oct 26-31, 2015)" and "Jai Kisan Jai Vigyan Week (Dec 23-29, 2015)" during the quarter. In the last, I congratulate our editorial team for successful publication of 4th issue of quarterly newsletter of ICAR-CIPHET for the year 2015. I wish a very happy new year-2016 to all the readers.

(R. K. Gupta)

IN THIS ISSUE

SECTORAL NEWS

International Year of Pulses-2016

Pulses have captured the attention of the United Nations, so much so that the General Assembly of the UN has voted to declare 2016 as the 'International Year of Pulses'. The Food and Agriculture Organization of the United Nations (FAO) has been nominated to facilitate the implementation of the Year in collaboration with Governments, relevant organizations, non-governmental organizations and other relevant stakeholders. The Year provides a unique opportunity to encourage connections throughout the food chain that would better utilize pulse-based proteins, further global production of pulses, and address the challenges in the varietal development, agronomical practices as well as trade of pulses.

Pulses are main source of protein to vegetarian people of India. It is the second important constituent of Indian diet after cereals. *Tur* (pigeon pea), gram (chickpea), *urad* (black gram), *moong* (green gram), *masoor* (lentils) and peas are the major pulses of India. Per capita net pulse availability has declined from 60 g/day in the 50s to 40 g/day in the 80s and further to 41.9 g/day (2013) as against WHO recommendation of 80 g/day (India's Pulse Scenario, National Food Security Mission). Globally India is the world's largest producer (25%), consumer (27%) as well as importer (14%) of pulses. In 2014-15, India spent $ 2.79 billion for import of 4.5 mTs of pulses. Though India is the largest producer of the pigeon pea (80 % of global production), but due to high demand in the domestic market it is imported. The demand was about 3.5 mTs in 2015 while; domestic production was only 2.0 mTs. The trend is likely to be similar in 2015-16 as domestic production may increase marginally to 2.1 mTs. Preparing to tide over another year of shortage in availability of pulses, particularly of pigeon pea that triggered a crisis; private importers have informed government of their intention to import nearly 5.5 mTs of pulses in 2015-16 as compared to 4.5 mTs in 2014-15. Recently, Union Minister of Finance said that the government is planning to create a buffer stock for pulses.

Main reasons behind the declined production are drought in pulse growing zones affecting *kharif* pulses (mainly *urad* and *moong*) and unseasonal rains affecting *rabi* pulses (*masoor* and gram). More than 80% area under pulses in India doesn't have protective irrigation. Pulses cultivation is very much a gamble on the monsoon. Pulses are also called "orphan crops", as largely cultivated in marginal lands prone to moisture stress. With additional area under pulses, especially 3-4 million hectares of irrigated area can raise the average pulse yield from 750 kg per hectare to over 2 tonnes with the use of high yielding, pest and disease resistant varieties/hybrids. High yielding varieties of shorter duration need to be developed while ensuring the availability of seeds to the farmers. Punjab, Haryana and western Maharashtra farmers need to be induced to grow pulses.

Further as per report of AICRP on PHET at national level losses during harvest and on-farm post-harvest operations are 4.69-7.23% and 6.36-8.41% respectively among the major pulses (AICRP on PHT, 2015). The storage losses of pulses at farm, godown, wholesale, retail and processing units are 1.2-1.8%, 0.5-2.2%, 0.8-1.3%, 1.1-1.6 and 1.0-1.8%, respectively which are mainly due to insect infestations during storage. Saving the storage losses only may be helpful in making 0.28 mTs available for human consumption, while reducing the import of pulses by 7%. Distribution of seed-storage bins to the farmers and mass awareness campaign for adoption of scientific methods of storage of pulses at the village level can help to reduce losses in pulses caused by stored grain pests. At present, post-harvest processing of pulses is mainly handled by the private sector. Installation of efficient, mini *dal* mills/small processing units in villages will reduce the cost of processing and ensure their ready availability at cheaper rates. India being the largest producer and consumer of pulses in the world should play a leading role and set the way to overcome the crises of pulses and proteins.

INSTITUTE NEWS

RESEARCH HIGHLIGHTS

Pilot plant for protein isolation

Protein isolates contain over 90% protein on a moisture free basis and are the most concentrated form of protein products. Being almost pure protein, these can be made practically free of objectionable odour, flavour, colour, anti-nutritional factors and flatulence. Furthermore, the high protein concentration provides maximum formulation

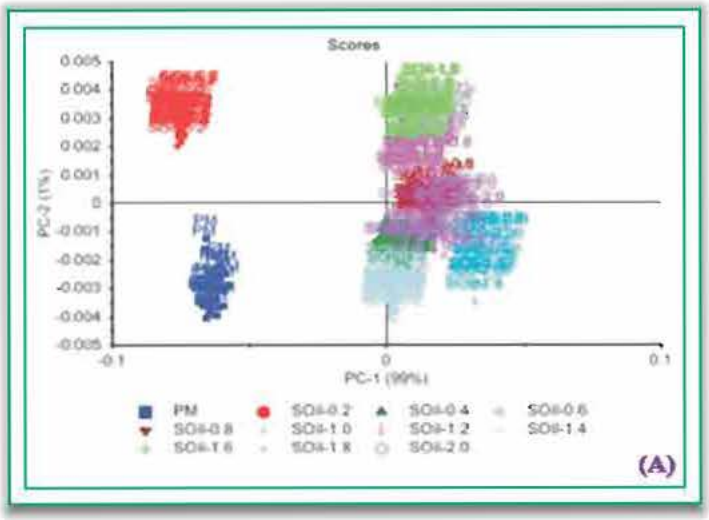
flexibility for incorporation into food products. The protein isolates had several applications such as in meat analogues, texturized vegetable proteins, protein supplements, bakery, infant foods, imitation dairy products etc. The availability of protein can be increased by utilizing the proteins from de-oiled cake. The de-oiled cake left after oil extraction from major oilseeds viz. soybean, groundnut, mustard and sunflower is about 10 mT (soy meal: 4.0 mT, groundnut cake: 3 mT, mustard: 2 mT, sunflower cake:1.0 mT). At present, these cakes are either utilized as animal feed or being exported to other countries like China and Malasia. In 2014-15, India imported 11.02 million kg soy protein isolate worth 38.9 million USD. There is need to shift this pattern by developing suitable processing technologies and indigenous machines/equipment so that these cakes can be utilized in our country as a result we may get protein at cheaper cost to fortify our products.

In India presently no indigenous machinery is available for the commercial production of protein isolate from de-oiled cakes. The ICAR-CIPHET, Ludhiana has designed and commissioned the first (to the best of our knowledge) indigenous pilot plant (Fig 1) for production of protein isolate from groundnut DOCs, having capacity of 40 kg of raw material/day. The pilot plant comprises of the following major components viz. 1) Extraction tank 2) Centrifuge 3) Precipitation tank along with a control panel for automated operation. Isolates produced from this plant has more than 90 % of protein.

Fig 1. Protein Isolate Pilot Plant

Detection and quantification of soybean oil and common table sugar in milk

Increase in world population, rising incomes, government and private-aided schemes have lead to growth in demand of dairy products, which in turn has encouraged certain illegal practices such as adulteration of milk with water, starch, urea, sugar, formalin, detergents and vegetable fats. The role of attenuated total reflectance (ATR) - Fourier Transform Infrared (FTIR) spectroscopy was evaluated in detection and quantification of soybean oil and common table sugar in milk. ATR-FTIR spectroscopy, along with chemometric tools was used to detect and quantify them in milk. Spectral absorption peaks and depressions of pure and adulterated samples revealed significant differences in the wavenumber regions of 1735-1135 cm^{-1} and 1200-900 cm^{-1}, for soybean oil (SO) and common table sugar (CS), respectively (Fig 2). Discrete clusters of the pure and adulterated (SO and CS) samples were obtained in score plot following Principal component analysis (PCA) at 5% level of significance, based on concentration of the adulterants. The classification efficiency for SO and CS adulterated samples were found to be >93% and 100%, respectively, using SIMCA approach. The results indicated that milk sample can be classified as pure and adulterated based on the level of soybean oil and common table sugar using FTIR spectroscopy.



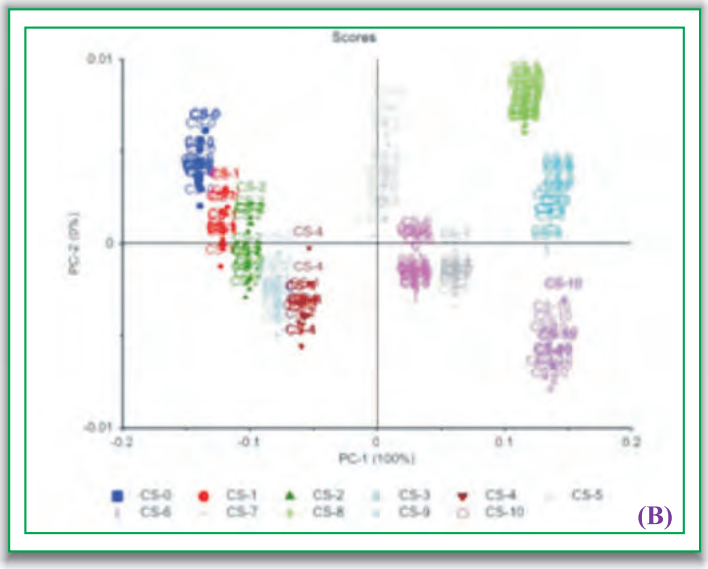


Fig 2. Principal Component scores plot depicting clusters of milk and soyoil (A) and common sugar (B) spiked milk in the wavenumber range of 1250-1450 and 982-1152 cm^{-1}, respectively.

Detection of Safflower adulteration in Saffron

Saffron (*Crocus sativus*) is used as spice and food colorant and, less extensively, as a textile dye or perfume. It is one of the most common spices that is adulterated. Saffron is the highest priced plant substance in the world. Its high price and demand incites fraud, which is achieved mainly by inclusion of other cheaper substances colored with additives and not authorized by health organizations. Safflower is most commonly used biological adulterant of Saffron. A PCR based method for detection of Safflower adulteration in Saffron is optimized and validated.

PCR reactions were conducted on approximately 40 ng of DNA template, in a 25 µL reaction containing 1X Standard Taq reaction buffer, 0.2 mM Deoxynucleotide mix, 10 pmol forward and reverse primer respectively and 0.5 units of Taq DNA polymerase. Magnesium concentration was varied in Taq reaction buffer from 1.5mM-2.5mM and 2 mM concentration was found optimum. Amplification was performed as follows 94 ºC or 7 min, 35 cycles of 94 ºC for 1 min, gradient temperatures for 1:30 min, 72 ºC for 1:30 min, followed by one cycle of 72 ºC for 5 min. The amplification product was resolved on 1.5% agarose gel and visualized under UV light in a gel documentation system. Annealing temperature of 55 ºC gave best results in case of all the three sets of primers. Single amplicon of 414 bp for SAF L-40 (Fig 3), 131 bp for ScCt131 (Fig 4) and 412 bp for SAF L-4 (Fig 5) was observed at an annealing temperature of 55 ºC.

To check the level of detection, PCR was also performed in samples of Saffron adulterated with 1%, 3%, 5%, 7% and 10% of Safflower. PCR reactions were carried out in 25 µL reaction volume and amplification was performed as follows 94 ºC for 7 min, 35 cycles of 94 ºC for 1 min, 55 ºC

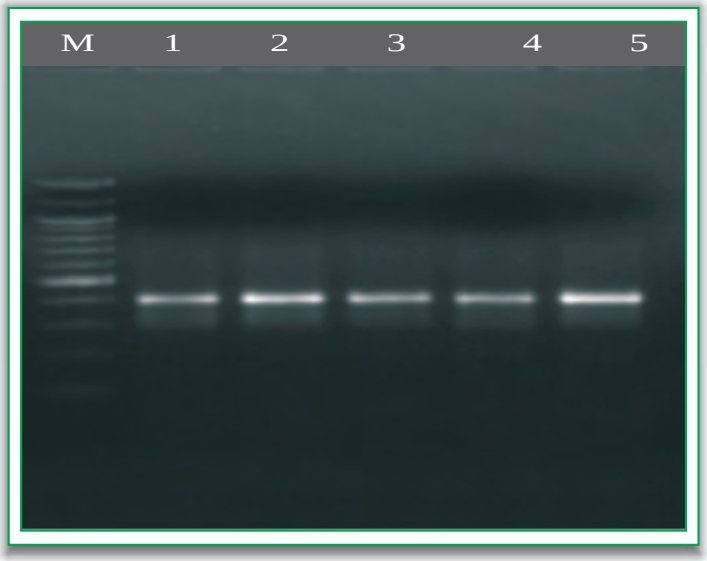


Fig 3. Amplification of safflower with SAFL-40. Lane no. M: 100bp DNA ladder; Lane 1-5 (gradient temperatures): 52ºC, 55ºC, 57ºC, 58ºC and 60ºC.

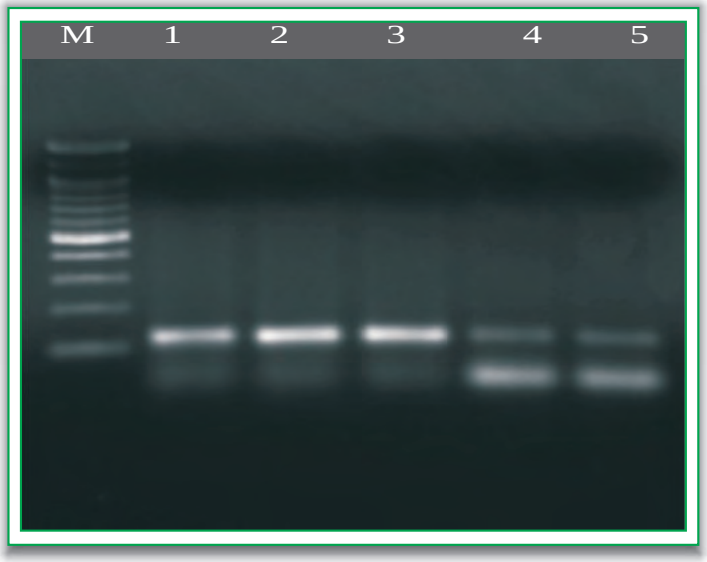


Fig 4. Amplification of safflower with ScCt131. Lane no. M: 100bp DNA ladder; Lane 1-5 (gradient temperatures): 52ºC, 55ºC, 57ºC, 58ºC and 60ºC

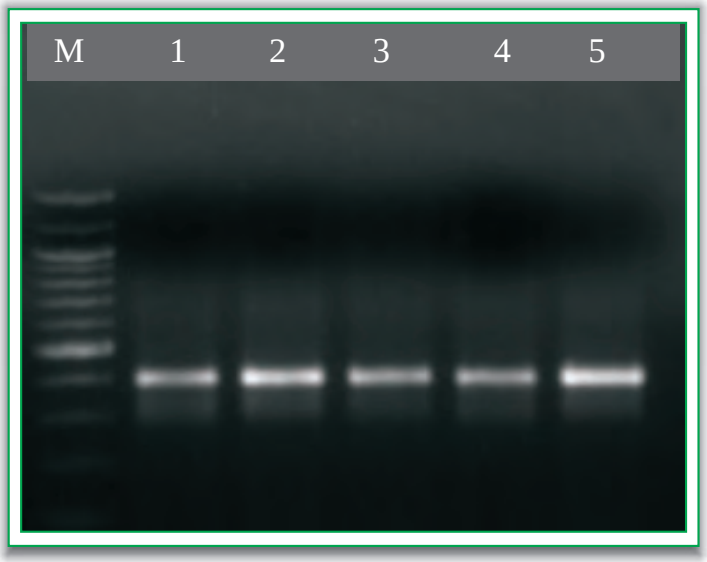


Fig 5. Amplification of safflower with SAFL-4. Lane no. M: 100bp DNA ladder; Lane 1-5 (gradient temperatures): 52°C, 55°C, 57°C, 58°C and 60°C.

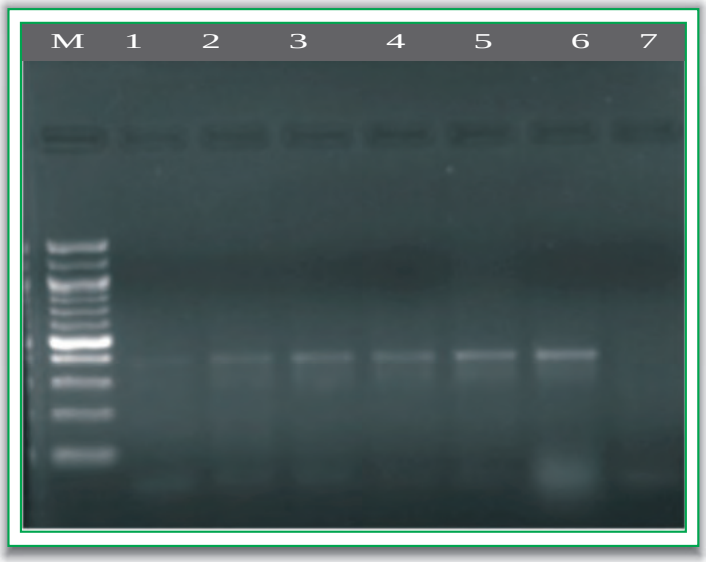


Fig 6. Amplification of Safflower with SAFL-40 in Saffron: Safflower mixture. Lane no. M: 100bp DNA ladder; Lane 1-7: 1% Safflower in Saffron, 3% Safflower in Saffron, 5% Safflower in Saffron, 7% Safflower in Saffron, 10% Safflower in Saffron, Pure Safflower and Pure Saffron

for 1:30 min, 72 °C for 1:30 min, followed by one cycle of 72 °C for 5 min. Safflower concentration of as low as 1% could be detected by using primer set SAFL-40 which resulted in single amplification product of expected size 414 bp (Fig 6).

Live Fish Carrier System

ICAR-CIPHET, Ludhiana has developed a Battery Operated Self-Contained Aerating System (BOSCAS) for short distance transportation of live fish (Fig 7). The system has been developed under the funding by National Fisheries Development Board (NFDB), Hyderabad. It is useful for carrying live fish from farmers' pond to the auction centers and further to the retail market with least mortality. BOSCAS is operated by rechargeable 4 Lead Acid batteries of 12 Volt 100A each, equipped with self-aerating system with a total carrying capacity of 500 kg (fish 200 kg + water 200 kg). In a single charge it can run about 60-80 km. BOSCAS has two major components, Self-Aerating Containers (SAC) and Battery Operated Vehicle (BOV). SAC are stackable and easy to unload with approximate capacity of 10-20 kg fish/container. It is equipped with aerators, filters and metabolite absorbent to maintain ideal water quality for fish during transportation.

Fig 7. Live Fish Carrier System

PAPERS PUBLISHED/ PRESENTED

- Dr RK Gupta, Director, ICAR-CIPHET delivered an expert lecture in the Food Conference-2015 on Innovative Technologies in Food Product and Processing Technologies at SLIET, Longowal on October 10, 2015.
- Anurag RK, Manjunatha M, Jha SN and Leena Kumari (2015). Storage quality of shelled green peas under modified atmosphere packaging at different storage conditions. Journal of Food Science and Technology, Springer, DOI: 10.1007/s13197-015-2066-y.
- Kumar S, Kumar R, Nambi VE and Gupta RK (2015). Effect of pectin methyl esterase and Ca^{2+} ions on the quality of fresh-cut strawberry. Annals of Agri-Bio Research, 20(2): 194-201.
- Kumar S, Bhushan B, Krishnani KK and Brahmane MP (2015) Metagenomics: Retrospect and Prospects in High Throughput Age. Biotechnology Research International, DOI : 10.1155/2015/121735.
- Dr Sunil Kumar presented a research paper entitled "Removal of bitterness in kinnow juice using various approaches" in International symposium on "Biodiversity, Agriculture, Environment and Forestry" held at Fortune Resort Sullivan Court, Ooty, Tamilnadu during December 11-12, 2015.
- Dr Pranita Jaiswal presented a research paper entitled "Detection of Aflatoxin M1 in milk using Spectroscopy and Multivariate Analyses" in "11th International Food Data Conference" on Food Composition and Public Health Nutrition" during November 3-5, 2015 at National Institute of Nutrition, Hyderabad, Telangana State.
- Dr Sandeep Mann delivered invited lecture on "Latest innovations in bulk and bag storage of Food Grains" at Kissan Bhavan, Chandigrah in the officer's training programme organised by National Institute of Agricultural Marketing (NIAM), Jaipur on December 10-12, 2015.

BOOKS/ POPULAR ARTICLES/ BULLETINS

- Vishwakarma RK, Kumar Y, Kumari L (2015). "Recent Advances in development of Automatic system/machines for secondary agriculture". Technical compendium of 21 days ICAR winter school held at ICAR-CIPHET, Ludhiana during November 18-December 08, 2015, pp. 307.
- Muzaddadi AU (2015). Uttar-pub bharotor xobhamay mach-xonkot, xombhaboniyota aru xongrokhon (in Assamese) translation "The ornamental fish of Northeast India- threat, potential and conservation" in online magazine Xahitya.org, ISSN 2321-5097, December 2015.
- Kundu M, Bansal S, Dixit AK and Mann S (2015). Save Environment: Stop Burning Agricultural Residues and Utilize Biomass for Electric Energy. Popular Kheti 3(4): 203-208.
- Sharma PC, Kumar R and Sharma R (2015). "Post-Harvest Management and Value Addition of Fruits and Vegetables for Sustaining Horticulture Industry." Technical Compendium on Model Training Course held at ICAR- CIPHET, Abohar during November 17-24, 2015, pp. 183.
- Nath P, Kale SJ, Jalgaonkar KR and Mahawar MK (2015). Microgreens: Tiny but Mighty. Processed Food Industry 19(1): 21-29.

CONSULTANCY/ LICENSING OF TECHNOLOGY

- Technology for dried onion flakes and powder was transferred to Mr TVL Narasimha Rao, from Hyderabad, Telengana and Mr Yashodeep Sadashiv Shinde, Nasik, Maharashtra on December 16, 2015.

PROGRAMMES ORGANIZED

- **Winter School:** Winter school on Recent Advances in Development of Automatic Systems/Machines for Secondary Agriculture (November 18 – December 08, 2015) was organized at ICAR-CIPHET by Dr RK

Vishwakrama (Course director), and Dr Yogesh Kumar, Mrs Leena Kumari (course Co-directors). Honourable DDG (Edu.) Dr NS Rathore was the chief guest for inaugural session. Twenty participants from different institution across the India attended the winter school. The winter school provided a platform for researchers to share scientific knowledge and discuss advancements in the area of secondary agriculture (modelling of processing operation, utilization of by products, hybrid hydroponic, industrial waste management etc.). Valedictory session was chaired by Dr RK Sinha, Director, CSIR-CSIO, Chandigarh. Dr RK Gupta, Director, ICAR-CIPHET, appreciated the efforts for smooth organization of winter school and encouraged participants for conducting research in collaboration.

- **हिंदी कार्यशाला :** सीफेट, लुधियाना में 30 दिसम्बर 2015 को हिंदी कार्यशाला का आयोजन किया गया। इस कार्यशाला में श्रीमती किरण साहनी, सहायक निदेशक राज भाषा एवं सदस्य सचिव रा.का.स., लुधियाना ने राजभाषा कार्यान्वयन में ई-टूल्स एवं नोटिंग/ ड्राफ्टिंग/ टिप्पणियां विषयों पर अपनी प्रस्तुति देकर संस्थान के सभी अधिकारियों एवं कर्मचारियों को लाभान्वित किया।

- **Communal Harmony Week-2015:** ICAR-CIPHET observed Communal Harmony Campaign and the Fund Raising Week meant to spread the message of Communal Harmony and National Integration to the people of the country during November 19-25, 2015.

- ICAR-CIPHET organized a special lecture on "Introduction and Importance of Soil Health Card" on December 2, 2015 to sensitize the CIPHET staff as well as farmers. The lecture was delivered by Dr Kuldip

Singh, Sr. Soil Analyst, Department of Soil Science, Punjab Agriculture University, Ludhiana. Further, the ICAR-CIPHET scientists have participated and assisted KVK, Samarala in distributing the soil health cards to farmers and igniting them about the importance and uses of soil health card. The function was organized at *Pawat* village of Ludhiana District.

- **Vigilance Awareness Week 2015:** Vigilance Awareness Week was celebrated during October 26-31, 2015. The week started with the pledge taking ceremony which was observed at both the campuses i.e. Ludhiana and Abohar. During the week, different events i.e. workshop, poster and slogan competition etc. were organized. Mr Kamal Deep, Asstt. Commissioner of Income Tax, Ludhiana discussed various perspectives of Vigilance in the workshop. The week concluded on October 31, 2015 with presentation of awards and an appeal by the Director, ICAR-CIPHET, Ludhiana to the institute's employees to be honest and vigilant.
- **Model Training Course:** Eight days Model Training Course on "Post-Harvest Management and Processing of Fruit and Vegetables for Sustaining Horticulture Industry" was organized by HCP Division, Abohar campus during November 17-24, 2015. The training was sponsored by Department of Agriculture, Cooperation and Farmers Welfare, Ministry of Agriculture and Farmers Welfare, Government of India. 17 officers from horticulture/agriculture/extension departments of six different states participated in this course. The training comprised of series of lectures and hands on training on post-harvest management and processing of fruit and vegetables.

Jai Kisan Jai Vigyan week: On the occasion of the birth anniversary of two former Prime Ministers (Shri Atal Bihari Bajpayee and Late Shri Chaudhary Charan Singh) of India, ICAR-CIPHET organized "JAI KISSAN JAI VIGYAN" week from December 23 – 29, 2015 at its both campuses. During this week, various farmer awareness programmes like scientist-farmers

interaction, showcasing of technical know-how, post-harvest tools, machinery and products, group discussions on post-harvest management etc. were carried out. Dr Ranjeet Singh and his team elaborated the importance of science in agriculture specially post-harvest management and value addition of agricultural produce to the school children of Government Senior Secondary School, *Ayalli Kalan*, Distt. Ludhiana. At Abohar campus, farmers from *Jhalawar* district of Rajasthan visited the campus. On December 26, 2015, a '*Kissan Goshthi*' was organized in collaboration with Department of Agriculture, Punjab at village *Bhangala*, Distt. *Fazilka*. About 100 farmers attended the meet. Detailed interaction about processing and management of horticultural crop was held and facilities like kinnow waxing unit, APC, canning line were demonstrated. Progressive entrepreneur Mr Jain (Nishan Foods, Abohar) also shared his experiences related to processing and value addition of various fruits in his processing unit. An upcoming entrepreneur Ms Sarabjeet Kaur, Gill Food Products, Jalandhar (Punjab), trained by ICAR-CIPHET was honoured by the Dr SR Verma, Former-Dean, College of Agricultural Engineering, PAU, Ludhiana in concluding day ceremony, on December 29, 2015 at ICAR-CIPHET, Ludhiana. During his remark, Dr SK Nanda, I/c Director, ICAR-CIPHET told that agriculture cannot progress as whole without the significant involvement of agro-based entrepreneurs. We need to focus on skill development among the youth of the country through training and demonstration as well as outreach programme in the area of post-harvest and value addition. Dr DN Yadav convenor of the programme also told that to fulfill the dream of "Make in India" mission, the ICAR-CIPHET will organize more agri-business incubation and entrepreneurship development programmes in future.

26th Foundation day of ICAR-CIPHET

ICAR-Central Institute of Post-Harvest Engineering and Technology (ICAR-CIPHET), Ludhiana celebrated its 26th foundation day on December 29, 2015. Dr SK Nanda, In-Charge Director welcomed all the dignitaries, farmers and entrepreneurs on the day. Dr SR Verma, Ex-Dean, COAE, PAU, Ludhiana was the Chief Guest and Dr Ashwani Kumar, Former Director, ICAR-IIWM, Bhubaneswar (Odisha), and Prof (Dr) Jai Singh, Ex-OSD, ICAR-CIPHET, Ludhiana graced the occasion as Guest of Honour. On this auspicious occasion, the Chief Guest Dr SR Verma emphasised to develop the strong linkages with all the stakeholders at National as well as International level. Dr Ashwini Kumar emphasised in his speech about the need for

multi-disciplinary approach in research activities and also addressed about the need for skill development among youth. During his talk, Prof Jai Singh highlighted about minimizing waste and its utilization, setting up of mini pilot-plant, adoption and creation of process villages, reinforcing the ICAR-CIPHET as a brand by establishing a sale center exclusively for ICAR-CIPHET developed food products etc. All the dignitaries asked the ICAR-CIPHET scientists to address the post-harvest related issues in a holistic manner towards the loss reduction and value addition for making the agricultural, a more attractive and profitable sector. Director, ICAR-CIPHET has shared the institute progress and significant R&D developments during the year 2015 such as *ber* destoner, date palm decorer, extrusion processing, detection of aflatoxin in milk using FTIR and many more.

TRAININGS

- Hands on training on dried onion flakes and powder technology was imparted by Dr Dattatreya M Kadam,

Principal Scientist (APE) to 5 enterprisers from Hydrabad, Telengana and Nasik, Maharastra between December 14-16, 2015.

- A 50 days training was organized for 10 B Tech (Agril Engg) students of Agricultural Engineering College & Research Institute, TNAU, Kumulur, Trichy, Tamil Nadu during September 1- October 20, 2015.
- One month training programme was organized for one MF Sc. student from ICAR-Central Institute of Fisheries Education, Versova, Mumbai during December 1-31, 2015.

PROGRAMMES PARTICIPATED

- Dr RK Gupta, Director, ICAR-CIPHET attended Sub Committee Meeting (Farm Implements & Food Processing Machinery/Equipments) at Agril. Engg. Division, ICAR, KAB-II, New Delhi on October 19, 2015.
- Dr RK Gupta, Director, ICAR-CIPHET attended FCI Meeting on October 20, 2015 at FCI, HQ, New Delhi.
- Dr RK Gupta, Director, ICAR-CIPHET attended Research Advisory Committee meeting at Agril. Engg. Division, ICAR, New Delhi on October 21, 2015.
- Dr RK Gupta, Director, ICAR-CIPHET attended the 5th Global Economic Summit 2015 on "Enabling Food for All" from November 19-21, 2015 at WTC Mumbai and presented invited paper.
- Dr RK Gupta, Director, ICAR-CIPHET attended 2nd meeting of IGSWG on November 21, 2015 at New Delhi.
- Dr Rahul Kumar Anurag, Scientist, AS&EC division, Mrs Surya Tushir, Scientist, FG&OP division and Dr Arvind Kumar Jaiswal, Scientist, TOT division attended 6 days training programme on "Laboratory Quality System Management and Internal Audit as per ISI/IES 17025-2005" held at National Institute of Plant Health Management, Department of Agriculture & Cooperation, Rajendra Nagar, Hyderabad during December 28, 2015 to January 02, 2016.
- Dr Sandeep Mann, Principal Scientist, Dr Arvind Kumar Jaiswal, Scientist and Er Akhoon Asrar Bashir, Scientist, attended International Exhibition & Conference on Agri-Machinery & Equipment- EIMA Agrimach India 2015 at IARI, Pusa, New Delhi on December 03, 2015.

- Dr RK Gupta, Director, ICAR-CIPHET and Dr Sandeep Mann, Principal Scientist attended workshop for Developing a Road Map for Technological Support, Extension and Demonstration Services to the Farmers in Trans-Gangetic Plains Region (Agro-Climatic Zone-VI) at ICAR-Central Soil Salinity Research Institute (CSSRI) on October 5, 2015.
- Dr Sandeep Mann, Principal Scientist, Dr Arvind Kumar Jaiswal, Scientist and Er Akhoon Asrar Bashir, Scientist, attended one day Zonal Workshop Cum Training Programme on Cluster Front Line Demonstrations of Pulses & Oilseeds 2015-16 of Agro-Climatic Zone No. I (Western Himalayan Region) on December 02, 2015 & delivered invited lecture on "Prospects and opportunities in pulse processing".
- Dr Dattatreya M Kadam, Principal Scientist (APE) attended Training on "Advances in Applications of Nanotechnology" at ICAR-CIRCOT, Mumbai from October 05-09, 2015.
- Dr Dattatreya M Kadam, Principal Scientist (APE) attended Interaction Meet cum Workshop on National Agriculture Innovation Fund (NAIF) for project entitled "Agri. Business Incubation (ABI) at ICAR-CIPHET, Ludhiana" on December 23, 2015 at NASC Complex, New Delhi.
- Dr SK Nanda, I/c PC (PET), and Dr Mukund Narayan, Technical Officer visited PAU, Ludhiana to review the research progress on October 28, 2015.
- Dr SK Nanda, I/c PC (PET), Er Navnoth Indore, Scientist and Dr Mukund Narayan, Technical Officer visited Abohar campus to review the research progress on December 09, 2015.
- Dr Sunil Kumar Sr. Scientist acted as chairman in one of the session at International symposium on "Biodiversity, Agriculture, Environment and Forestry" held at Fortune Resort Sullivan Court, Ooty, Tamilnadu during December 11-12, 2015.
- Dr Mukund Narayan, Technical officer (AICRP on PET) attended the training in "Competence Enhancement Training Program for Technical Officer" at NAARM, Hyderabad during December 14-23, 2015.

EXHIBITIONS

Showcased and demonstrated ICAR-CIPHET developed technologies to following visitors during the period:

- Students from Sri Guru Granth Sahib World University, Fatehpur Sahib on October 31, 2015 and November 02, 2015.
- Students from Dept. of Land and Water Resources and Conservation Engineering (LWRCE), Kelappaji College of Agricultural Engineering and Technology, Tavanur, Kerala Agril. University on November 02, 2015.
- Students from University of Agricultural Sciences, College of Agril. Engg., Raichur on November 04, 2015.
- 17 Extension Officers from PAU during exposure visit on November 05, 2015.
- 16 farmers and 1 Officer from Vidsha ATMA on December 9, 2015.
- Students from Punjab Agricultural University, Ludhiana on December 18, 2015.
- Showcased and demonstrated different ICAR-CIPHET developed technologies in IASOWA (Delhi Chapter) exhibition held at Pandara Park, New Delhi during October 31 – November 01, 2015.
- Showcased and demonstrated different ICAR-CIPHET developed technologies in 5th Global Economic Summit Expo Summit 2015 held at Expo Centre, WTC Mumbai, Cuffe Parade, Mumbai during November 19 – 21, 2015.
- Showcased and demonstrated fisheries related technologies developed at ICAR-CIPHET in India International Trade Fare-2015 (IITF-2015) NASC Complex Todapur at Pragati Maidan, New Delhi.

VISITS

- Dr Narendra Singh Rathore, Deputy Director General (Education), ICAR, New Delhi visited ICAR-CIPHET

Ludhiana on November 25, 2015. He interacted with scientists and also visited divisional laboratories and facilities of the institute.

- Dr RK Sinha, Director, CSIR-Central Scientific Instruments Organisation (CSIR-CSIO), Chandigarh visited ICAR-CIPHET, Ludhiana on December 08, 2015.

LINKAGES DEVELOPED

- Linkage developed between All India Radio, Jalandhar and ICAR-CIPHET in which a series of programmes on Post-Harvest Technology under the title "*Do Duni Chaar*" was started by ICAR-CIPHET, Ludhiana. The programme contains 13 talks on different topics related to post-harvest management and value addition of agricultural commodities. The talk will be broadcasted on every sunday w.e.f. December 6, 2015 in *Dehati* programme at 7:00 pm from All India Radio, Jalandhar.

AWARDS

- Dr Pranita Jaiswal received Outstanding Scientist Award (Science / Microbiology) - 2015 by VIFRA (Venus International Foundation Research Award).

TRANSFERS

- Er Monika Kundu, Scientist has been transferred from ICAR-CIPHET, Ludhiana to IARI, New Delhi on November 13, 2015.
- Dr Monika Sharma, Scientist has been transferred from ICAR-CIPHET, Ludhiana to ICAR-southern regional station, Adugodi-Bangaluru on November 30, 2015.
- Dr Aleksha Kudos, Scientist has been transferred from ICAR-CIPHET, Ludhiana to ICAR-Central Institute of Agricultural Engineering, Research Station, Coimbatore on December 10, 2015.

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