Produce Process Prosper

CIPHET NEWS

Vol. XV No. 2 APRIL - JUNE 2014

FROM THE DIRECTOR'S DESK

The quarter from April to June showed CIPHET reaching new heights in the area of post-harvest technology and licensing of technologies to the stake holders. CIPHET has developed process protocol for amplification of 3 genes, namely omt-1 gene, nor-1 gene and apa gene to differentiate between aflatoxigenic and non-aflatoxigenic molds. This will help in the identification of responsible mould for aflatoxin production in grains. Compact fruit grader was developed for grading of oblong and round fruits viz. aonla, tomato and peach etc. prior to packing. The grader will help the farmers and entrepreneurs in better marketing of their produce. *Technology for production of protein rich extruded product using de-oiled groundnut cake was developed to meet the ever increasing demand of food availability from non-conventional sources.* Technology has been developed based on packaging to enhance the shelf-life of highly perishable fruits like plums and strawberry. There is a good demand for the CIPHET developed technologies and this is proved by the six technologies that were transferred during this quarter. The 23rd Institute Research Council Meeting was held during June 20-21, 2014 at CIPHET, Ludhiana under the Chairmanship of Dr. R.K. Gupta, Director, CIPHET. Dr. S.M. Ilyas, Project Director, NIRD, Hyderabad was the invited expert for the meeting. *Dr. Gurbachan Singh, Chairman, ASRB visited online examination centre at CIPHET, Ludhiana.* Dr. S. N. Jha, Head, AS & EC Division was bestowed with Fellowship of National Academy of Dairy Science, India. ICAR sponsored 21 days Summer School on "Modern Technologies and Approaches in Storage of Harvested and Processed Plant and Animal Food Products" was organized from June 11 to July 01, 2014. I hope our endeavour to serve the science and society will continue and we will be able to do so in much better ways in coming days.

(R. K. Gupta)

SECTORAL NEWS

IN THIS ISSUE

Agriculture and Allied Activities get a boost in Central Plan Outlay 2014-15

The Department of Agricultural Research and Education (DARE) which is responsible for Agricultural Research and Education in the country through Indian Council of Agricultural Research (ICAR), has been allocated Rs 3715.00 crore in the main budget 2014-15. Out of this, Rs 2575.00 crore has been allocated for Crop Husbandry, Rs 225.00 crore for Soil and Water Conservation and Rs 100.00 crore for Climate Resilient Agriculture Initiative. The outlay for programmes under Crop Husbandry, Animal Husbandry, Dairy Development and Fisheries is Rs 4400.40, 1021.57, 504.47 and 422.56 crores, respectively.

Under Food Storage and Warehousing schemes, the Department of Food and Public Distribution is implementing schemes for the procurement of food grains and its distribution for ensuring food security. Sum of Rs 181.00 crore has been allocated in

2014-15 for the scheme "Construction of Godowns by Food Corporation of India (FCI) and State Governments" for implementation in Jammu & Kashmir, North East and in newly emerging major procurement states. The allocation of funds for development of Food Processing Industries for 2014-15 is Rs 770.00 crore. The schemes for 12 new Mega Food Park projects, 75 Cold Chain projects and 50 Abattoir projects have been approved for implementation during the 12th Plan to attract more investment in this sector. For the new Centrally Sponsored Scheme launched on 1st April 2012, namely, "National Mission on Food Processing", Rs 180.00 crore has been provided for the current year.

INSTITUTE NEWS

RESEARCH HIGHLIGHTS

Process protocol for amplification of 3 genes, namely a) omt-1 gene, b) nor-1 gene, c) apa gene to differentiate between aflatoxigenic and non-aflatoxigenic molds

Aflatoxin contamination of foods and feeds is a serious worldwide food safety problem resulting either from improper storage of commodities or preharvest contamination. Such contamination has resulted in serious food safety and economic implications for the agriculture and food industry. The aflatoxins are synthesized by the filamentous fungi *Aspergillus flavus* and related *Aspergilli* spp. Therefore, development of rapid tools for detection of potential aflatoxin producing fungi is essential.

For detection of aflatoxigenic fungi, process protocol for amplification of 3 genes namely; *a) omt-1 gene, b) nor-1 gene, c) apa gene* was standardized. For this, DNA was isolated from aflatoxin producing and non producing *Aspergillus* spp. following the method of Moller *et al.*, 1992. The isolated genomic DNA was quantified using Nanodrop. The primers for sterigmatocystin O-methyltransferase (omt-1) genes were used based on the published sequences for *A. flavus* and *A. parasiticus*. The primers for norsolorinic acid reductase (nor-1) and apa genes were designed based on the published sequences of encoding for the mentioned genes in *A. flavus* and *A. parasiticus*. The PCR mix used for amplification of all the above genes included 1x Standard Taq Reaction Buffer, 200µM dNTPs Mix, 0.2 µM Upstream Primer, 0.2 µM Downstream Primer, 0.75 units of Taq DNA Polymerase/25µl PCR reaction, 100-125ng of DNA Template and the volume was brought to 25µl with Nuclease free water. PCR was carried out as follows:

a) *For omt-1 gene:* 1 step at 94°C for 10 min and 35 cycles of the three steps; 1 min 94°C, 90 sec at 62°C, one final 5 min step at 72°C then hold at 4° C.

b) *For nor-1 gene:* 1 step at 94°C for 10 min and 35 cycles of the three steps;1 min 94°C, 90 sec for 60°C for *nor-1*, one final 5 min step at 72°C then hold at 4° C.

c) *For apa gene:* 1 step at 94°C for 10 min and 35 cycles of the three steps; 1 min 94°C, 2 min at 57°C for *apa*, one final 5 min step at 72°C and then hold at 4° C.

PCR products were separated by electrophoresis on a 1% agarose gel and visualized under UV light in a gel documentation system. A single amplification product of expected length viz. 1024 bp for *omt* gene, 400bp for *nor*

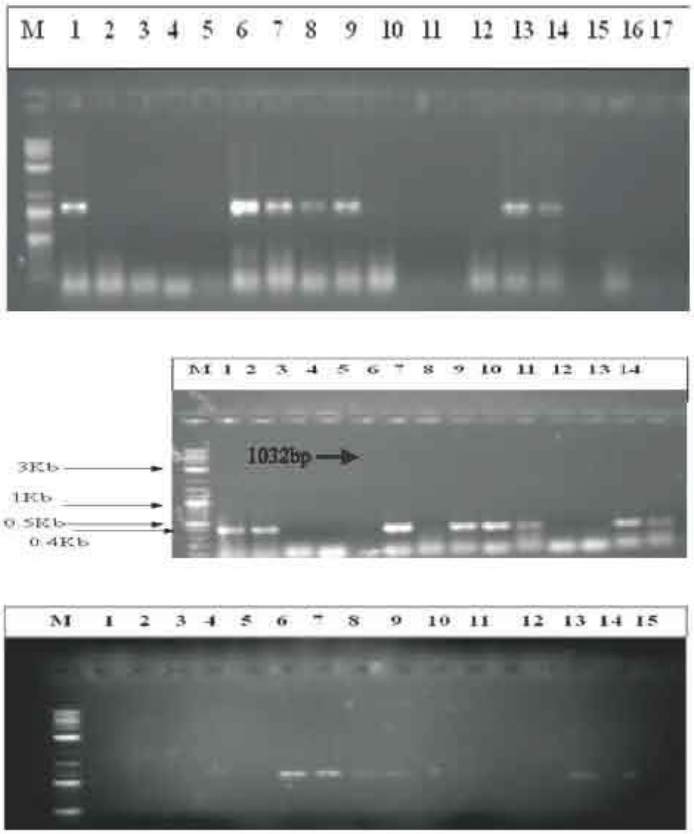


Fig. 1: Amplification of a) *omt* gene, b) *nor* gene and c) *apa* gene in various target samples

gene and 1032 bp for *apa* gene was observed which could specifically differentiate aflatoxin producing *i.e. A. parasiticus* and *A. flavus fungi from non producing A. oryzae, A. fumigatus, A. niger* fungi.

Performance evaluation of compact fruit grader for oblong and round fruit

Compact fruit grader was developed for grading of oblong & round fruits with four grading boards prior to packing in boxes. The grading efficiency of the machine was found to be 90% when the machine was operated at a speed of 16 rpm. The machine has the grading capacity of 300 kg/h at this speed. Four different grades of <25 mm, 25-30mm, 30-35mm and >35mm diameter can be obtained through this grader at a time. The machine is suited for both oblong and round fruits and is operated by 1hp electric motor.

Salient features of the compact grader for oblong fruit (Ber):

Speed (rpm)	Capacity (kg/h)	Efficiency (%)
16	303	89.72
24	375	73.56
32	460	65.06

Fig. 2: Compact Fruit Grader

<25mm 25-30mm 30-35mm >35mm

Fig. 3: Ber fruits graded through Compact Fruit Grader

Coloured plastic mulch for repulsion of insect-pest in capsicum

Use of blue and black coloured plastic mulch was found most suitable for repulsion of insect/pests from the capsicum field. The yellow colour plastic mulch attracted insect/pests. Highest aphid attack (550-620 aphid/plant) was found in yellow plastic mulched plots followed by unmulched control plots (350-400). Least number of aphids were found in green (30-50), blue (30-50) and black plastic (70-85) mulched plots. In terms of plant growth, more number of branches and leaves with no weed growth was found in green, blue and black plastic mulched plots. While, in yellow and red coloured mulched plots, more weed density was observed. Capsicum yield (kg/plant) in different mulched plots in ascending order was found to be in silver black (3.8 kg/plant) and green (3.4 kg/plant) plastic mulched plots followed by black (3.2 kg/plant), blue (2.9 kg/plant) and red (2.8 kg/plant). Thus silver black (with silver inner lining), green, blue and ordinary black plastics can be recommended for mulching in capsicum field for repulsion of insects/ pests without using any chemicals.

Fig. 4 a. Silver black mulched capsicum plot
b. Capsicum plot with no mulching (Control)

Active packaging of plum fruits

Active modification of gaseous mixture inside the packaging material can extend the shelf life of fruits significantly and can be used as an alternative for the frozen storage and shelf life extension. It can also aid during transportation and handling of fruits from the producer to the consumers in the supply chain.

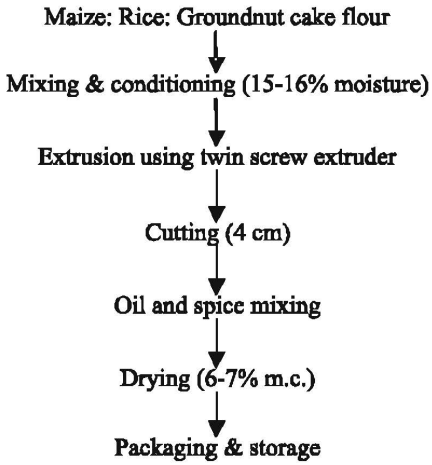
Fig. 5: Plum fruits in active packaging

Experiments on active packaging of plums carried out in Food Packaging and Transportation Laboratory at CIPHET have shown that high level of TSS, anthocyanin content, sugars etc. can be maintained in high barrier films. Metal aluminium laminates were used in this study for maintaining bioactive compounds and sensory quality for high value fruits. Active modification or desired gas mixture combinations were used for flushing into the packaging material. Moisture absorbing pads made up of cellulose and carbon dioxide scavenging material were used in the study to increase the shelf life of plums upto 25 days. By minimizing the rate of respiration through the gaseous modification and packaging materials, the shelf life of high value fruits like plums and strawberry in retail outlets can be extended successfully. Presently, the shelf life of these fruits in cold storage is 8-11 days at 10° C and 85-95% RH.

Technology for production of protein rich extruded product using de-oiled groundnut cake

Extruded products were produced from blend of maize-rice-groundnut cake flour (50:40:10) at a barrel temperature of 130°C and screw speed of 350 rpm. They did not differ significantly with extruded produced from maize-rice blend (60:40) and contained two times higher protein (8.2%). The process flow chart is as follows:

Fig. 6: Extruded products using groundnut cake



Testing of potato peeler machine

Testing of the machine was carried out. It can peel 6 to 8 kg potatoes in 5 to 10 min. The machine is made of mild steel with two drums rotating in opposite direction. The outer drum is made of stainless steel and inner drum is made of abrasive carborundum roller which peels the potatoes.

Fig. 7: Potato peeler

Performance evaluation of buckwheat grader

The mild steel screens of 3.5 mm diameter were fabricated according to the requirement of the machines adopted for buckwheat grading namely, pedal cum power operated (Central Institute of Agricultural Engineering, Bhopal) air screen grain cleaner cum grader and indented cylinder separator (AGROSAW, Ambala) (Fig 8 & 9). Experiments were conducted to determine the efficiency of the flat and circular screens in separating the buckwheat seed and kernel. The screen in air screen grain cleaner cum grader has horizontal oscillating motion and slightly vertical motion. These two motions in combination moved the kernel down the screen and at the same time slightly tossed the material above the screen so that the mixture of seed and kernel is properly stirred. The buckwheat kernels dropped through the screen opening by gravity and collected at one end. The seeds passed over the sloppy screen and were

collected at the other end. The grading efficiency for this machine was 53.43% when operated by electric motor (1470 rpm) and 83.82% during manual operation (60 rpm). In the indented cylinder separator, the horizontal rotating cylinder was made using 3.5mm screen. The mixture of seed and kernel was fed at one end of the cylinder. Due to gravity and centrifugal force, the kernels dropped into a trough placed below the cylinder and the seeds flew through the inclined cylinder and collected at the seed outlet. The efficiency in separating the seeds and kernels using this cylinder was determined as 78.50% (at 60 rpm). The flat screen (3.5mm round openings) with horizontal oscillation may perform well at low operating speed for efficient separation of buckwheat seeds from the kernels.

Fig. 8: Pedal cum power operated air screen grain cleaner cum grader

Fig. 9: Indented cylinder separator

PAPERS PUBLISHED/ PRESENTED

- Barman P, Muzaddadi AU, Goswami UC and Mandal SC (2014). A modified method for preparation of *sukati mas* (a traditional fish powder of north-east India) from *muwa* (*Amblypharyngodon mola*). Fishery Technology, 51: 117-124.
- Bhushan B, Kumar S and Pal A (2014). Evaluation of post-germinative lipid peroxidation and enzymatic antioxidant potential in lead absorbing oat (*Avenasativa*) seedlings. Journal of Environmental Biology. (Accepted).
- Bhushan B, Singh J and Pal A (2014). *Prasanskaran evam poshak tatva.* Raksha Khadya Vigyan Patrika, 22 (18): 81-88.
- Bhushan B, Singh J and Sharma PC (2014). *Phalo evam sabzio ke parikatan upraant prabandhan evam prasanskaran ka poshak tatvo par parbhav evam nirakaran.* Krishi Prasanskaran Darpan, 15: 41-44.
- Bordoloi R, Muzaddadi AU and Ganguly S (2014). Sanitary condition of Battala fish market at Agartala, Tripura and its public health significance. International Journal of Current Microbiology and Applied Sciences, 3(3):176-181.
- Grewal MK, Jaiswal P and Jha SN (2014). Detection of poultry meat specific bacteria using FTIR spectroscopy and chemometrics. Journal of Food Science and Technology, doi10.1007/s13197-014-1457-9.
- Jaiswal P, Jha SN, Borah A, Gautam A, Grewal MK and Jindal G (2014). Detection and quantification of soymilk in cow–buffalo milk using Attenuated Total Reflectance Fourier Transform Infrared spectroscopy (ATR–FTIR). Food Chemistry, (In Press) http://dx.doi.org/10.1016/j.foodchem.2014.07.010.
- Jaiswal P, Jha SN, Kaur PP, Bharawaj R, Singh AK and Wadhwan V (2014). Prediction of textural attributes using color values of banana (*Musa sapientum*) during ripening. Journal of Food Science and Technology, 51(6):1179–1184.
- Jha SN, Narsaiah K, Jaiswal P, Bharadwaj R, Gupta M, Kumar R and Sharma R (2014). Non-destructive prediction of maturity of mango using near infrared spectroscopy. Journal of Food Engineering, 124C: 152-157, *doi*: 10.1016/j.jfoodeng.2013.10.012.
- Kadam DM, Wang C, Wang S, Grewell D, Lamsal B and Yu C (2014). Microstructure and antimicrobial functionality of nano-enhanced protein-based biopolymers. Transactions of the ASABE, 57(4): 1-10 doi 10.13031/trans.57.10379.
- Karki I, Sharma P and Rastogi SK (2012). Assessment of work environmental and physiological cost of nurses working in shift pattern in hospitals of Uttarakhand. International Journal of Basic and Applied Agricultural Research, 12 (1):135-139.
- Kumar S, Yadav P, Jain V and Malhotra SP (2014). Isozymes of antioxidative enzymes during ripening and storage of ber (*Ziziphusmauritiana*Lamk.). J. Food Sci. Technol, 51(2): 329-334.
- Muzaddadi AU (2014). Indigenous traditional knowledge associated with fermented fish products of North East India. In: Ancestral knowledge in agri-allied science, Saha R K, Nath D & Saha H (ed), [ISBN 978-93-83305-21-6] NIPA, New Delhi-53, India, pp 115-128.
- Saad AG, Jaiswal P and Jha SN (2014). Non-destructive quality evaluation of vegetables. Paper presented in National Conference on "Safety and quality assurance in fresh vegetables" at IIVR Varanasi during July 12-13, 2014.

CONSULTANCY/LICENSING OF TECHNOLOGY

- Agreement for licensing of 'Pearl millet based composite extrudates and pasta' was signed with Mr. Ashok Kumar, S/o Mr. Gian Chand, VPO Ghurka, Teh.-Phillaur, Distt.-Jalandhar (Punjab)-144632 on 01.05.2014.
- Agreement for licensing of 'Groundnut flavoured beverage, curd and paneer' was signed with Mrs. Sarbjit Kaur W/o Mr. Sukhjinder Singh, No. 60, Satnam Colony, Alipur Road, Mithapur, near Bhatti Cold Store, Jalandhar (Punjab)-144 006 on 29.05.2014.
- Agreement for licensing of technology of 'Process of manufacturing mix for ready to constitute makhana kheer' (Patent application no. - 746/DEL/2008) was signed with M/s Ultra Bio Naturals 41, DIC (Baddi), Himachal Pradesh through its proprietor, Mr. Pawan Kamra on 06.06.2014.
- Agreement for licensing of technology of 'Minimal processing of vegetables' was signed with M/s Southern India Spices & Essences, Kanjirampara, P.O. Thiruvananthapuram (Kerala)-695 030 through its Chief Executive, Mr. M. Harikrishnan on 19.06.2014.
- Agreement for licensing of technology of 'Knowhow for construction of CIPHET evaporatively cooled storage structure (5-7 tonne capacity)' was signed with M/s Southern India Spices & Essences, Kanjirampara, P.O. Thiruvananthapuram (Kerala) - 695 030 through its Chief Executive, Mr. M. Harikrishnan on 19.06.2014.
- Agreement for licensing of technology of 'A Process of separating a compound containing Allylisothiocynate from mustard seed (Patent No. - 250118)' was commercialised to M/s Parshuram Bio Agrotech Pvt Ltd, 4th floor, Novelty Plaza, Bhai Bala Chowk Ludhiana on 26.06.2014.

PROGRAMMES ORGANIZED

- Dr Gurbachan Singh, Hon'ble Chairman, ASRB visited online examination centre at CIPHET, Ludhiana. The online exam for NET was conducted at CIPHET, Ludhiana from March 26 to April 04, 2014 successfully for different disciplines. The Chairman appreciated the efforts of Dr. R. K. Gupta, Director, CIPHET and his team for successful management of online examination.

- Transfer of Technology Division conducted an Officers Training on 'Post-Harvest Management' during April 07-11, 2014 for 24 officers sponsored by MACP, VANAMATI, Nagpur. It was coordinated by Dr. S. K. Nanda, I/C Head (TOT division) and co-coordinated by Dr. Indu Rawat, Scientist, TOT division.

- Dr D. N. Yadav, Sr. Scientist, FG&OP Division imparted a training on soymilk, curd and paneer to one entrepreneur from Jalandhar during April 14-16, 2014.
- Dr D.N. Yadav, Sr. Scientist, FG&OP Division facilitated 3 days hands on training for Mr. Harbir Singh, farmer from Amritsar on preparation of Soya bean based flavoured beverage (Soymilk) and Tofu (paneer) from April 15-17, 2014 at CIPHET, Ludhiana.
- BPD exhibited CIPHET developed technologies at CME of Obstetrics and Gynaecological Society of Ludhiana at Hotel Park Plaza on April 19, 2014. BPD was approached by Dr. Neelu Sodhi, President of the society to showcase the technologies especially Instant dalia, functional flour, chicken nuggets etc.
- Transfer of Technology Division conducted 3 days training programme on "Post-Harvest Management of Fish" for 12 B.F.Sc. students from College of Fisheries, GADVASU, Ludhiana during May 14-16, 2014.
- Four months training was imparted to three B.Tech (Agril. Engg.) students of College of Agriculture Engineering and Technology, Anand Agricultural University, Godhra (Gujarat) on quality evaluation of debittered kinnow juice and shrink wrap packaging of cabbage w.e.f. 05-02-2014 to 31-05-2014.

- ICAR sponsored 21 days Summer School on "Modern Technologies and Approaches in Storage of Harvested and Processed Plant and Animal Food Products" was organized at the Central Institute of Post-Harvest Engineering and Technology, Ludhiana from June 11 to July 01, 2014 successfully. Twenty four participants across the country participated in the training programme. Summer school was blend of lectures, practicals, hands on experience, discussion, Skype lectures, participants presentation, visit to Adani and FCI storage facilities, Moga, Visit to N P Fresh Foods, Hambran, Visit to Field Fresh Pvt Ltd., Lodowal, Visit to GADVASU's College of Fisheries and College of Dairy Science and Technology, PHPTC and PAU's Food Science and Technology Division. During valedictory function, Dr. R K Gupta, Director CIPHET Ludhiana, distributed the certificates to participants and urged them to utilize the knowledge learned in the school in their professional career.

- A training on 'Shrink wrap packaging of fruits and vegetables' was imparted to M/s Southern India Spices & Essences, Kanjirampara, Kerala by Dr. Rahul Kumar, Scienist, AS & EC division on July 16-19, 2014.
- The 23rd Institute Research Council Meeting was held during June 20-21, 2014 at CIPHET, Ludhiana under the Chairmanship of Dr. R.K. Gupta, Director, CIPHET. Dr. S.M. Ilyas, Project Director, NIRD, Hyderabad was the invited expert for the meeting. Dr. R.K. Vishwakarma, Sr. Scientist & Member Secretary, IRC coordinated the IRC meeting. He presented the Action Taken Report on suggestions/recommendations of the last IRC held during October 28-29, 2013. After thorough deliberations and some modifications, ATR was accepted. Salient achievements of each division were thereafter presented by the respective Head of Divisions, which was followed by presentations of 11 RPP-I, 19 RPP-II and 4 RPP-III.

- As a part of Silver Jubilee lecture series, the lectures on the topics "Possible Paradigm Shifts in Post-Harvest Engineering & Technology R&D" and "Modern Food Processing Technologies - A Survival Kit for Indian Agriculture" were delivered by Dr. S.M. Ilyas, Project Director, Distance Education, National Institute of Rural Development, Hyderabad and Dr. R.T. Patil, Former Director, CIPHET, Ludhiana, Chairman & ED, Benevole for PHT, Bhopal on 20.06.2104 & 27.06.2014 respectively, at CIPHET, Ludhiana. The faculty from Department of Food Science & Tech., Department of Processing & Food Engineering, PHPTC, PAU Ludhiana were also present during the lecture.
- सीफेट, लुधियाना में 30 जून 2014 को हिंदी कार्यशाला का आयोजन किया गया। इस कार्यशाला में डॉ अनिल कुमार गुप्त, प्रशासनिक अधिकारी (राजभाषा), न्यू इंडिया इंश्योरेंस कंपनी लिमिटेड, लुधियाना ने राजभाषा नीति नियम एवं अधिनियम और सरकारी कार्यालयों में हिंदी में पत्राचार विषयों पर मुख्य प्रस्तुति देकर संस्थान के सभी अधिकारियों एवं कर्मचारियों को लाभान्वित किया।
- Three B.Tech. (Agril. Engg) students from Junagadh Agri. University, Junagadh, Gujarat were imparted one month training w.e.f. June 01 - June 30, 2014.

PROGRAMMES ATTENDED

- A stall showcasing CIPHET technologies was put up at Agri Business Idol Camp and Incubation Workshop organised by NAIP at IARI on May 09, 2014. Dr. D. Rama Rao, ND NAIP, Dr. S. Saxena I/C CEO Agrinnovate, Dr. S. Maurya, ADG IP&TM, ICAR, Dr. P S Pandey NC-1 NAIP, Dr. H.S. Gupta, Director IARI, Dr. Neeru Bhooshan, PI, ZTMBPD, IARI, guests from industries, other dignitaries, students, entrepreneurs were present. Dr. D M Kadam, Senior Scientist and PI, BPD attended this workshop.

- CIPHET participated in an Agri-Innovation Conclave Organized by NAIP at NASC Complex, N Delhi on May 18-19, 2014. Conclave started with welcome address by Dr. S. Ayyappan, Secretary DARE and DG ICAR. Other dignitaries like Former NDs of NAIP, Dr. Bangali Baboo and Dr. P. L. Gautam, Dr. D. Rama Rao, ND NAIP, Dr. Kiran Sharma, CEO, ABI, ICRISAT, Dr. P.S. Pandey, NC-1 NAIP, Mr. Karuppanchetty, ICRISAT were also present.
- Dr. D.M. Kadam, Senior Scientist and PI BPD attended Expert Advisory Committee (EAC) meeting and presented Project proposal entitled "Business Planning and Development of Food/ Agro Processing, Value Addition and Post-Harvest Engineering and Technology Enterprise" under i-STED of DST at PSG-STEP, PSG College of Technology, Coimbatore on June 09, 2014.
- Dr. S.N. Jha attended National Conference on "Safety and quality assurance in fresh vegetables" at IIVR Varanasi during July 12-13, 2014.

AWARDS/HONOURS

- Dr. S. N. Jha, Head AS & EC Division was bestowed with Fellowship of National Academy of Dairy Science, India.

JOINING/TRANSFER

- Dr. Jitendra Kumar, Sr. Scientist was transferred from CIPHET, Abohar to NCIPM, New Delhi on 02.05.2014.
- Dr. Ranjeet Singh, Sr. Scientist (APE) joined CIPHET, Ludhiana on 09.05.2014.
- Dr. (Smt.) Swati Sethi, Scientist (Food Technology) joined CIPHET, Ludhiana on 01.04.2014.
- Sh. Yadav Rahul Subhash, Scientist (Food Technology) joined CIPHET, Ludhiana on 09.04.2014.
- Sh. Kale Sakharam Jagan, Scientist (Agri. Str. & Env. Mang.) joined CIPHET, Abohar on 09.04.2014.
- Ms. Prerna Nath, Scientist (Agri. Structures & Env. Mang.) joined CIPHET, Abohar on 09.04.2014.
- Ms. Jalgaonkar Kirti Ramesh, Scientist (Agri. Process Eng.) joined CIPHET, Abohar on 09.04.2014.
- Sh. Chandan Solanki, Scientist (Agri. Process Eng.) joined CIPHET, Ludhiana on 09.04.2014.
- Sh. Manoj Kumar Mahawar, Scientist (Agri. Process Eng.) joined CIPHET, Abohar on 09.04.2014.
- Sh. Dhritiman Saha, Scientist (Agri. Process Eng.) joined CIPHET, Ludhiana on 09.04.2014.

REVENUE GENERATION

- CIPHET generated revenue of Rs. 8,64,621 during April to June 2014 from licensing of CIPHET technologies, sale of farm produce and sale of processed products etc.

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Printed and designed by : Printing Service Co., 3801/1, Pritam Nagar, Model Town, Ludhiana. Ph. : 9888021624