



Produce

Process

Prosper

CIPHET NEWS

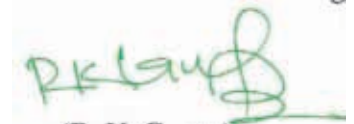
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FROM THE DIRECTOR'S DESK

It is my pleasure to present before you the scientific and academic heights achieved by CIPHET during this quarter. Our scientific team have got success in optimization of process parameters for supercritical fluid extraction of safflower oil. We have developed antioxidant rich pasta by adding optimum levels of groundnut meal and beetroot juice. The highest oil yield of 26.54% was reported at temperature, pressure and incubation time of 70°C, 450 bars and 75 min. respectively. I am very grateful to Mrs. Harsimrat Kaur Badal, the Hon'ble Union Cabinet Minister for Food Processing Industries for paying her visit to CIPHET on 5th July 2014 to get apprised and review the progress achieved by the CIPHET in 'Assessment of Post Harvest Losses of Major Crops and Livestock Produce in India', a project sponsored by the Ministry of Food Processing Industries, India. ICAR sponsored 21 days Summer School on "Food Quality and Safety: Recent Advances in Evaluation Techniques" was organized here during August 05-25, 2014. CIPHET has licensed three technologies namely 'Process of manufacturing mix for ready to constitute makhana kheer', 'Process for making beetroot shreds and powder' and 'Groundnut milk beverage, curd and paneer' to different entrepreneurs from across the country. I am very happy to inform my readers that CIPHET is celebrating its silver jubilee year and on this auspicious occasion, we are organizing Silver Jubilee Seminar on 'Present Status & Future Strategies for Processing and Value Addition of Agricultural Commodities' during December 19-20, 2014.




(R. K. Gupta)

SECTORAL NEWS

Food wastage: a global phenomenon

Per capita food wasted by consumers in Europe and North-America is 95-115 kg/year, while this figure in sub-Saharan Africa and South/South-east Asia is only 6-11 kg/year (Global Food Losses and Food Waste, Extent Causes and Prevention, 2011, FAO of the UN, Rome). Food losses in industrialized countries are as high as in developing countries, but in developing countries more than 40% of the food losses occur at post-harvest and processing levels, while in industrialized countries, more than 40% of the food losses occur at retail and consumer levels. Food waste at consumer level in industrialized countries (222 million ton) is almost as high as the total net food production in sub-Saharan Africa (230 million ton). Here it is interesting to note that India produced 257.13 million tonnes of food grains in 2012-13. (Annual Report 2013-2014, Department of Agriculture and Cooperation, Ministry of Agriculture, Government of India, New Delhi).

Nearly one third of the food produced in the world for human consumption every year (approx. 1.3 billion tonnes) gets lost or wasted. Food losses and waste amounts to about US\$ 680 billion in industrialized countries and US\$ 310 billion in developing countries. Fruits and vegetables, plus roots and tubers have the highest wastage rates of any food. Global quantitative food losses and waste per year are 30% for cereals, 40-

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50% for root crops, fruits and vegetables, 20% for oil seeds, meat and dairy and 30% for fish. Every year, consumers in rich countries waste almost as much food (222 million tonnes) as the entire net food production of sub-Saharan Africa (230 million tonnes). The amount of food lost or wasted every year is equivalent to more than half of the world's annual cereals crop (2.3 billion tonnes in 2009/2010). Per capita waste by consumers is between 95-115 kg a year in Europe and North America, while consumers in sub-Saharan Africa, south and south-eastern Asia, each throw away only 6-11 kg a year. Total per capita food production for human consumption is about 900 kg a year in rich countries, almost twice the 460 kg a year produced in the poorest regions. In developing countries 40% of losses occur at post-harvest and processing levels while in industrialized countries more than 40% of losses happen at retail and consumer levels. The food currently lost or wasted in Latin America could feed 300 million people. The food currently wasted in Europe could feed 200 million people. The food currently lost in Africa could feed 300 million people. Even if just one-fourth of the food currently lost or wasted globally could be saved, it would be enough to feed 870 million hungry people in the world. (SAVE FOOD: Global Initiative on Food Loss and Waste Reduction, <http://www.fao.org/save-food/resources/keyfindings/en/>).

India have a distinction as world ranking primary producer of many items including fruits, vegetables, milk, fish, livestock and poultry but we process hardly 2-4 percent of that and the quantity which cannot be consumed as fresh goes waste without any value addition. Here it seems to be fashionable to discuss the criticality of food wastage and then giving stock solution like setting up the cold chain and infrastructure.

In developing countries food waste and losses occur mainly at early stages of the food value chain and can be traced back to financial, managerial and technical constraints in harvesting techniques as well as storage and cooling facilities. Strengthening the supply chain through the direct support of farmers and investments in infrastructure, transportation, as well as in an expansion of the food and packaging industry could help to reduce the amount of food loss and waste (SAVE FOOD: Global Initiative on Food Loss and Waste Reduction, <http://www.fao.org/save-food/resources/keyfindings/en/>). We, therefore, need demand linked supply chain infrastructure.

INSTITUTE NEWS

RESEARCH HIGHLIGHTS

Development of RFID based quality tracing system

Today's food chain is becoming global. To ensure the quality and safety of food products in the global supply

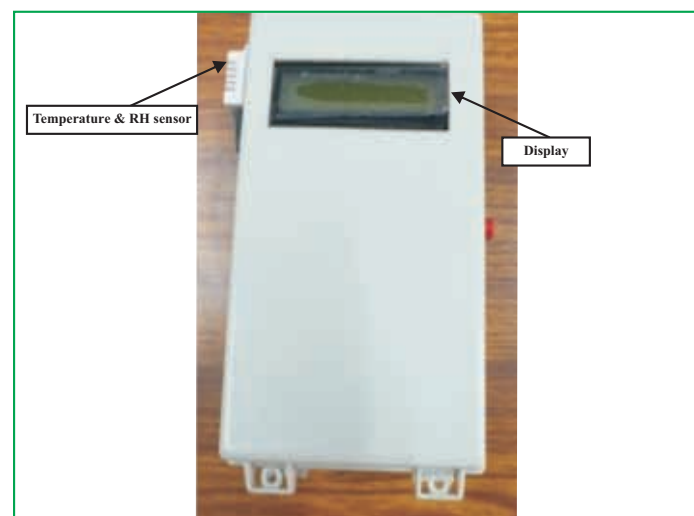


Fig. 1: Small sized RFID tag embedded with sensor

chain, it is necessary to monitor the environmental conditions experienced by the food products throughout supply chain. RFID (Radio Frequency Identification) is an emerging technology that is increasingly utilized in food logistics & in supply chain for effective tracing and tracking of food items. RFID technology uses Radio Frequency signals for automatic identification of objects. RFID system, which can monitor the environmental conditions of perishable during storage has been developed.

The RFID tags shown in fig (1) are used for collection of the deviations in environmental parameters such as temperature that are responsible for significant losses in quality of food products and fresh produce. Developed RFID system is embedded with temperature (range -40 to 80°C), RH sensor (range is 0 to 100 %) and ethylene sensor (range 0 to 2000 ppm). RFID system is able to provide the information of environmental conditions (temp., RH, ethylene) of fruits, vegetables etc. during storage. During the trials conducted for measurement of temperature and RH,

the RFID system has been proved effective tool to measure the fluctuations experienced by the fruits (guava, tomato) stored in cold room. Further, the system is supported by the application software that includes the traceability information that can authenticate the source of food products.

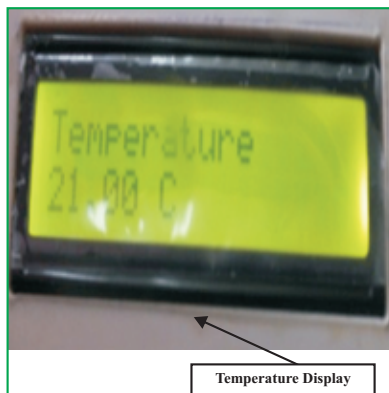


Fig. 2: RFID tag displaying the temperature information

The developed RFID system can be used in warehouses, cold stores, ripening chambers etc. for monitoring the environmental parameters. Further, using the RFID system will bring improvements in inventory management activities in agri-food sector & food industry.

Optimization of food materials for development of antioxidant rich pasta

Optimization of food materials for development of antioxidant rich pasta was carried out with the help of response surface methodology. Different experimental combinations involving variation in groundnut meal from 10-20 g, beetroot juice from 6-18 ml and wheat flour from 80-90g were designed using box-benken design of experiments. The results revealed that pasta samples containing higher levels of groundnut meal and beetroot juice were high in total phenols, antioxidant activity and overall acceptability. Optimization revealed that the samples containing 20g groundnut meal with 83g wheat flour and 18ml beetroot juice indicated 125.89 mg/100g total phenols, 23.953% antioxidant activity, 19.56% protein content, 5.5 min. cooking time, 6.28 rehydration ratio, 1.37% solid loss and 8.71 overall acceptability, thereby giving desirability of 0.905, respectively.

Optimization of process parameters for supercritical fluid extraction of safflower oil

Response surface methodology was used to optimize the conditions for extraction of oil from the safflower seed sample by using supercritical fluid extraction technology. The pressure range 300 to 450 bars, temperature 40 to 80°C and the incubation time from 45 to 75 min. was used in the design. The highest yield of 26.54% was reported at temperature 70°C, pressure 450 bars and incubation time 75

minutes. Extraction time was reported to be 45 min and acid value of extracted oil was 0.73 mg KOH/gm. Acid value of hexane extracted oil was found to be 1.765 mg KOH/gm. Peroxide value and colour value of SCFE extracted oil was also better than hexane extracted oil. Induction time (h) at 180°C of hexane extracted oil was 0.03h while it was 0.02h for SCFE oil.

Design and development of ozone based farm level storage bin for managing insects in stored grain (Coimbatore Centre of AICRP on PHT)

For large volumes of stored grains, studies of ozone application are mostly empirical, so they cannot be generalized and applied to different storage systems. So, the reaction kinetics of ozone gas in terms of saturation time, decay rate and half life of ozone in paddy was evaluated. Experiments were performed in different heights of 5 and 10 cm, at moisture contents 11.6 and 14.3 % and gas flow rates 2 and 4 L min⁻¹ at 31°C. From the analysis of the concentration of ozone gas during and after the fumigation process of paddy, it was found that for paddy whose moisture content was 11.6 and 14.3 % (w.b.) with flow rates of 2 L min⁻¹ at 5 cm height, the ozone saturation time was 19 and 30 min. at the concentration of 688 and 1046 ppm, respectively. The decomposition kinetics obtained was first order model, in which the decomposition rates constant were found to be 0.0795 and 0.1012 minutes. The highest value, with regard to half-life of ozone, was 8.71 min for grains with 11.6% moisture content ozonated at 5 cm height. In the process of ozone decomposition in paddy grains, height and moisture contents were the key factors. Hence, this study would be useful for finding out the total fumigation time for farm level storage bin.

Fig. 3 shows the saturation time of ozone gas in paddy at 11.6 and 14.3% (wb) moisture content tested at a height of 5 cm, with the flow rates of 2 and 4 L min⁻¹ at 31°C. Saturation time was defined as the time required for achieving a

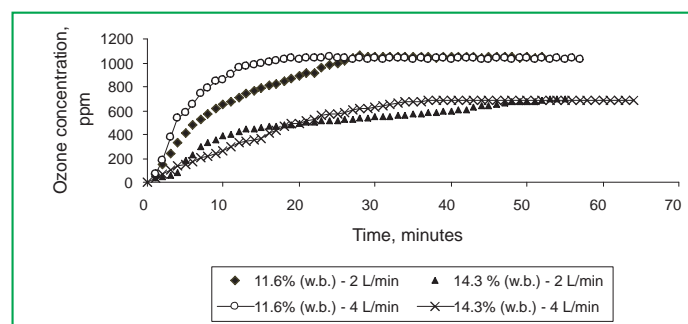


Fig. 3: Residual concentration of ozone as a function of time

constant residual concentration of ozone. The residual concentration of ozone gas achieved a constant value past 29, 53, 18 and 38 min. at the concentration of 1046, 694, 1034 and 688 ppm, respectively, for all the arrangements of gas flow rate with 11.6 and 14.3 % (w.b.) moisture content at 5 cm height. The residual concentration of ozone gas as a function of time were fitted by a logarithmic function with correlation coefficient of (R^2) >0.80 for all the combinations.

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CONSULTANCY/LICENSING OF TECHNOLOGY

Process of manufacturing mix for ready to constitute *makhana kheer*' (Patent application no.-746/DEL/2008) was licensed to M/s A1 Foods India Pvt. Ltd., 6-2-8/3, Shivrampally, Katedhan Village, Rajendranagar Mandal, RR District-500 052, Telangana on 02.07.2014.

Training and licensing of the technology namely 'Process for making beetroot shreds and powder' was conducted by Dr. Mridula D. to an entrepreneur namely Ms Shelly Gandhi, A-11, Nizamuddin East, New Delhi during 25-26 July 2014'.

Technology transfer cum training programmes on 'Groundnut milk beverage, curd and paneer' was organized during July 30-31, 2014" by Dr D. N. Yadav for 3 entrepreneurs from Bhatinda.

Nine (9) pieces of banana comb cutter were sold to the delegates from Kenya and Malawi on Sep 10, 2014

PROGRAMMES ORGANIZED

An Entrepreneurship Development Programme (EDP) was organized by CIPHET, Ludhiana for farmers, entrepreneurs and Self Help Groups on 'Nutritive Functional Flour and Health Foods' from July 15-21, 2014, sponsored by ATMA, Palampur (HP). The programme was coordinated by Dr. Mridula D., Sr. Scientist and Ms. Monika Sharma, Scientist of FG&OP Division. On this occasion, Director CIPHET, Dr. RK Gupta emphasized on the importance of health foods. The EDP was designed to give participants a complete exposure to the basic concepts of value addition, processing and packaging, quality control, safety issues and regulatory standards of health foods.



On the occasion of ICAR foundation day on 16th July, a Technology Awareness Meet was organised with the farmers and students. 50 farmers from in and around Ludhiana and 40 students from Kundan Vidya Mandir, Civil Lines, Ludhiana participated in this programme. They were apprised about the latest development in post harvest sector by CIPHET.

A training was organised for 9 M.Tech. students from CAET, Junagarh during 1st July-26th July, 2014 at CIPHET Ludhiana.

One month implant training was imparted to 13 students (12 B.Tech and 1 B.Sc) during 1st July-31st July 2014.

ICAR sponsored 21 days Summer School on "Food Quality and Safety: Recent Advances in Evaluation Techniques" was organized from August 05-25, 2014 at CIPHET, Ludhiana. Dr. Pranita Jaiswal and Dr Rahul Kumar Anurag, were the Course Director and Co-Course Director respectively. 24 participants in the rank of Assistant /Associate professor from different SAUs



across the country eg. J&K, Punjab, Delhi, Maharashtra, Tripura, Andhra Pradesh, Chattisgarh and Uttar Pradesh attended the summer school. Summer school was blend of lectures, practicals, hands on experience, discussion, Skype lectures etc. Visits were also made to Punjab Biotechnology Incubator, Mohali, PHPTC PAU, GADVASU, Ludhiana, Verka milk processing plant and Field Fresh Pvt. Ltd., Lodowal. Dr B.S. Bisht, Director, Birla Institute of Applied Sciences, Bhimtal and Former VC, GBPUA&T Pantnagar distributed the Certificate to the trainees. Dr. R. K. Gupta encouraged participants for collaborative work in future.

65th Independence day was celebrated at CIPHET Ludhiana and Abohar with enthusiasm and great patriotism on 15.08.2014. All CIPHET staff, contractual workers and families of the



staff took part in the celebration. On this occasion, Dr. R K Gupta, Director CIPHET hosted the National Flag. In his address, Dr Gupta highlighted the progress of the institute and requested all to work with dedication and sincerity to enable the institute to reach new heights and to help the farming community and food processors to get remunerative returns of their produce.

As a part of Silver Jubilee lecture series, the lecture on the topic “Contemporary science, society and post harvest technology” was delivered by Dr. B.S. Bisht, Former Vice-Chancellor, GBPUA&T Pantnagar, Former ADG, ICAR New Delhi and Director, Birla Institute of Applied Sciences, Bhimtal at the CIPHET, Ludhiana on August 25, 2014. The faculties from Department of Food Science & Technology and Department of Processing & Food Engineering, PAU, Ludhiana were present during the lecture. Besides, the participants of ongoing summer school at ICAR-CIPHET, Ludhiana also attended the lecture.

CIPHET imparted implant training to 12 B.Tech students from UAS Bangalore during Aug. 2014.

CIPHET is imparting implant training to 2 B.Tech students from OUAT, Bhubaneswar from Aug. – Nov. 2014.

Dr. Abdel Gawad Saad, Visiting Scientist from Egypt, Cairo, completed the Post Doctoral Fellowship under the guidance of Dr. S.N. Jha, Head AS&EC Division at CIPHET.



Dr. Saad was recipient of Non-aligned and other Developing Countries Science & Technology Fellowship under DST Scheme of Research Training Fellowship for Developing Country Scientists (RTF-DCS) in the area of Post Harvest Engineering from April to August 2014.

30 delegates from Kenya and Malawi along with two officials of MANAGE visited ICAR-CIPHET, Ludhiana on Sep. 10, 2014 as part of their international training programme entitled 'New Dimensions in Agricultural Extension Management' under US-India-Africa triangular International Training Programme coordinated by MANAGE, Hyderabad. On this occasion, Director CIPHET, Dr R.K. Gupta showcased CIPHET technologies in the area of post harvest technology. Besides, two lectures on 'Impact assessment of CIPHET technologies' and 'Occupational health hazards in agro processing and control measures' were also delivered by Dr A.K. Dixit, Sr. Scientist and Dr Indu Rawat, Scientist respectively.

A capacity building training-cum-exposure visit on 'Post harvest technology of major crops and livestock produce of Odisha state' sponsored by



Govt. of Odisha was organized by Dr S K Nanda, I/C Head TOT and Dr Indu Rawat, Scientist, TOT division for 19 Agricultural Officers during Sep. 15-19, 2014.

संस्थान में दिनांक 15 से 29 सितम्बर, 2014 तक हिन्दी पखवाड़ा मनाया गया। समारोह का उद्घाटन मुख्य अतिथि आदरणीय निदेशक महोदय, डा. आर. के. गुप्ता के कर कमलों द्वारा किया गया। समारोह के अन्तर्गत विभिन्न संयोजकों के सहयोग से विभिन्न प्रतियोगिताएँ आयोजित की गईं। दिनांक 30.09.2014 को हिन्दी पखवाड़ा का समापन समारोह आयोजित किया गया। इसमें मुख्य अतिथि ई. एच. एस. जोगी, (उप-मुख्य अभियंता), पंजाब स्टेट पावर कॉर्पोरेशन लिमिटेड लुधियाना द्वारा विजेताओं को पुरस्कार वितरित किए गए। हिन्दी पखवाड़ा के अन्तर्गत आयोजित सभी प्रतियोगिताओं में संस्थान के सभी अधिकारियों एवं कर्मचारियों ने बढ़-चढ़कर हिस्सा लिया व समारोह को सुचारु रूप से सम्पन्न कराने में अपनी भागीदारी दी। इस कार्यक्रम व समारोह में ग्यारह प्रतियोगिताएँ जैसे हिन्दी कम्प्यूटर टंकण प्रतियोगिता, हिन्दी अनुवाद प्रतियोगिता, प्रार्थना पत्र प्रतियोगिता, हिन्दी नोटिंग एवं ड्राफ्टिंग प्रतियोगिता, निबन्ध प्रतियोगिता, कविता प्रतियोगिता, एक दिवसीय (हस्तलिखित) पोस्टर पत्र प्रतियोगिता, तत्काल भाषण प्रतियोगिता, विज्ञान संबंधित संगोष्ठी



प्रतियोगिता, प्रश्नोत्तरी प्रतियोगिता, लघु संगीत प्रतियोगिता आयोजित की गई।

सीफेट, लुधियाना में 23 सितम्बर 2014 को हिंदी कार्यशाला का आयोजन किया गया। इस कार्यशाला में श्री भवेश खान्ना, पबंधाक (राजभाषा), भारतीय



स्टेट बैंक, प्रशासनिक कार्यालय, लुधियाना ने 'राजभाषा हिंदी' और 'अंग्रेजी से हिंदी में अनुवाद' विषयों पर मुख्य प्रस्तुति देकर संस्थान के सभी अधिकारियों एवं कर्मचारियों को लाभान्वित किया।

PROGRAMMES ATTENDED

Dr. Swati Sethi, Scientist, FG&OP division, underwent three months Professional Attachment Training during May-July 2014 at Defence Food Research Laboratory, Mysore and completed a research project on "Influence of green mango pulp and high pressure processing on physico-chemical properties of mayonnaise".

Er. Dhritiman Saha, Scientist, FG&OP division, underwent three months Professional Attachment Training during May-July 2014 at Department of Food & Agricultural Process Engineering, Agricultural Engineering College & Research Institute (AEC&RI) TNAU, Coimbatore and completed a research project on "Rapid detection of formalin in milk by Fourier Transform near Infrared Spectroscopy".

Er. Chandan Solanki, Scientist, FG&OP division, underwent three months Professional Attachment Training during May-July 2014 at Department of Food & Agricultural Process Engineering, Agricultural Engineering College & Research Institute, TNAU, Coimbatore and completed a research project on "Evaluation of engineering properties of minor millets & performance study of single chamber centrifugal dehuller".

Dr. P. R. Bhatnagar, PC (APA) attended the 12th Plan EFC meeting for consideration of Plans schemes of DARE/ICAR at KAB, New Delhi during 13-14 July 2014.

Dr. A U Muzaddadi, Sr. Scientist, TOT division attended a Refresher course on 'Agricultural Research Management' for directly recruited Senior/Principal Scientists at NAARM, Hyderabad during July 14-26 2014.

Dr. Sunil Kumar, Sr. Scientist, HCP Division attended Refresher course on "Agricultural Research

Management" during July 14-26, 2014 at NAARM, Hyderabad.

Dr. P C Sharma, Head HCP Division attended MDP on Leadership development at NAARM Hyderabad w.e.f. July 15- July 26, 2014.

Dr. P C Sharma, Head HCP Division participated in DST sponsored ASEAN INDIA stakeholders meeting at CFTRI Mysore w.e.f. Aug. 05-06, 2014.

CIPHET showcased its technologies in Innovation Exhibition at National Institute of Technology, Hamirpur, Himanchal Pradesh during August 12-13, 2014.

CIPHET attended 'Research and Extension Specialists Workshop for Rabi Crops' organized by Directorate of Extension Education, Punjab Agricultural



University, Ludhiana, Punjab during August 12-13, 2014 held at Pal Auditorium, PAU Ludhiana.

CIPHET developed technologies were displayed in the *Kisan Mela* held during September 12-13, 2014 at PAU, Ludhiana.

CIPHET developed technologies were displayed in the *Kisan Mela* organised on September 16, 2014 at Punjab Agricultural University Regional Station, Patiala, Punjab.



CIPHET Abohar attended an exhibition in *Kisan Mela* held at Regional Research Station of PAU at Bhatinda on Sep. 27, 2014. During this exhibition about 2000 farmers/ entrepreneurs visited the CIPHET stall and appreciated the developed technologies and products.

AWARDS/HONOURS

Dr. Ranjeet Singh, Sr. Scientist, TOT Division was awarded 'Certificate of Excellence' award during the 2nd Science and Technology Awards-2014 by EET CRS research wing for excellence in professional education and Industry in an award ceremony held at Bangalore.

He received the award for his contributions in Active Packaging technologies by using oxygen and ethylene scavengers for maintaining and extending shelf life of horticultural produce. The technology has promising and wider scope for extending shelf life with quality, safety and improved convenience during cold chain distribution and management of horticultural produce. He was also a recipient of 'Bharat Jyoti Award-2011' by

IIFS New Delhi for his outstanding contribution in agricultural post harvest engineering and technology research and extension.

TRANSFER

Sh Neeraj Kumar Tahiliani, F&AO was transferred from CIPHET, Ludhiana to Indian Institute of Soil Science, Bhopal on 21.07.2014.

Hon'ble Union Cabinet Minister for Food Processing Industries Visits CIPHET

Mrs. Harsimrat Kaur Badal, the Hon'ble Union Cabinet Minister for Food Processing Industries, visited the CIPHET on 5th July 2014 to get apprised and review the progress achieved by the CIPHET in 'Assessment of Post Harvest Losses of Major Crops and Livestock Produce in India', a project sponsored by the Ministry of Food Processing Industries, India. CIPHET had already conducted the benchmark survey under the leadership of Dr S K Nanda, Former Project Coordinator of AICRP-PHT on quantitative post harvest losses in India and brought out its results during the last Plan. Dr R K Gupta, Director, CIPHET explained the progress in this repeat study on the post harvest losses. Expressing her concern over the substantial post harvest losses in the country, the Hon'ble Minister advised CIPHET to collaborate with PAU, GADVASU and Punjab State Government in popularizing the loss reduction technologies developed by CIPHET, which may be emulated in other states. Dr Gupta also briefed the Hon'ble minister about the significant achievements of CIPHET in recent years including litchi peeling machine, custard apple pulper, ground nut milk technology, etc, which were highly appreciated by the Minister.

The minister also visited the laboratories and the Agro Processing Centre of the institute and witnessed the pilot plant demonstration of milk production from ground nut, manufacturing of extruded products and cryogenic grinding system. She also interacted with the entrepreneurs trained by the Institute. The products displayed by the entrepreneurs were soybean milk and tofu, groundnut milk, amla candy, fruits and vegetable based pickles, rose water, multi grain flour, etc. She applauded the efforts of the entrepreneurs and also the CIPHET who gave them training and helped in establishing their ventures. She also instructed the concerned officials to provide appropriate platform to the entrepreneurs for marketing and popularizing their products.



Editorial
Board



Dr. R.K. Gupta



Dr. S.K. Nanda



Dr. Mridula D.



Dr. Tanbir Ahmad



Dr. Indu Rawat

Published by : Dr. R.K. Gupta, Director, ICAR-Central Institute of Post-Harvest Engineering and Technology, PO: PAU Campus, Ludhiana 141 004 (Punjab)
Ph: 0161-2308669, Fax: 0161-2308670, www.ciphnet.in, E-mail: ciphnetludhiana1989@gmail.com

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