



Central Institute of Post Harvest Engineering & Technology Ludhiana

OUR SLOGAN: PRODUCE, PROCESS AND PROSPER

**CIPHET E – Newsletter for June, 2010
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Director's Column



Dear All

Technological changes are making rapid strides in all fields' of science. These directly and indirectly touch our lives. Many new developments in processing and value addition of food products have also taken place. Some of these are extrusion cooking, cryogenic grinding of spices & condiments, microwave heat processing, extraction of bio-active compounds, pulse electric field and high pressure processing, ohmic heat processing, irradiation, nano-technology, ultrasonics, supercritical fluids for extraction, plasma treatment, nutrigenomics etc. A presentation on these emerging technologies was made in front of the empowered committee of NAIP for the National Fund for Basic, Strategic and Frontier Application Research (NFBSRA). Based on the presentation and discussions, four areas, namely, Bio-polymer based smart packaging for food materials, Pulse Electric Field (PEF) treatment for enhancement of Shelf Life of Milk and RTS Beverages, Rapid and Precise Detection Systems (bio sensors) for Adulterants, pesticide residues and Food Borne Pathogens in Foods and Safe irradiation techniques for disinfestations, pasteurization, sterilization and reduction in anti-nutritional factors foods have been short listed for probable funding under NAIP.

Training programmes on 'Design and Manufacturing of Agro-Processing Machinery and Storage Structures' and 'Primary Processing of Medicinal and Aromatic Plants' were conducted. These were attended by twenty four and fourteen participants from Bihar and Uttarakhand respectively.

Dr. P.R. Bhatnagar, PC (APA) participated in brain storming session on "Protected Cultivation in N-W Himalyas' at SKUAST-K, Srinagar. Er. Manpreet Kaur Grewal attended National Seminar on Food Safety Management Systems. The food chain comprises of production, post harvest handling, distribution and consumption on small, medium and large scale. It is essential to ensure the integrity and the safety of food throughout the food chain. Food safety issues have been recognized by ISO and an International Standard ISO 22000: 2005 'Food Safety Management Systems-Requirements for any Organization in the Food Chain' has been prepared. The technologies for producing snack foods, onion, ginger and garlic powder and EC Room were licensed to entrepreneurs.

The technology for rapid production of ethanol from sugarcane juice is highlighted. Juice from insect infested, shriveled, damaged canes was used for ethanol production by using a thermo-tolerant yeast species. High ethanol concentration, high volumetric productivity and thermotolerant characteristics of the microbial strain are desired traits for commercial ethanol production. Thermotolerant characteristics of the fermenting strain are required for commercial production of ethanol because refrigeration is not only an expensive, but also an energy intensive process. In India, where the ambient temperatures during summers in most parts of the county range from 40-45 °C, fermentation process at 35-40 °C resulting in higher ethanol concentration and higher ethanol productivity holds a good potential for scale-up to a pilot and commercial scale level.

The institute also published 'CIPHET Annual Report 2009-2010'.

With best regards

**R.T. Patil
Director**

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Emerging Technologies in Post Harvest Management & Value Addition

Dr. R.T.Patil, Director, CIPHET made a presentation on “Emerging Technologies in Post Harvest Management & Value Addition” in front of Empowered Committee of NAIP for the National Fund for Basic, Strategic and Frontier Application Research in Agriculture (NFBSRA) during June 28 -29, 2010. The meeting was chaired by Dr. Mangla Rai , Ex-DG, ICAR and Dr. S.K. Sen, Former Director, BRI & Head, Advance Laboratory for Plant Genetic Engineering, IIT, Kharagpur; Dr. K. Gopa Kumar, Former DDG (Fishery), ICAR; Dr. B.S. Pathak, Former Director, SPRERI; Dr. S.M. Virmani, Former Principal Scientist, Agro Metrology, ICRISAT, Hyderabad were members. Hon’ble D.G. ICAR, Dr. S. Ayyappan and all DDGs and National Director (NAIP) were present along with Directors of other institutes from other sectors. The presentation included present level of technology adoption and scope for various emerging technologies for processing indigenous products. The house was informed about the following emerging technologies their principle and present status of technology internationally and how and for what products they can be adopted in India to remain competitive internationally in the area of food processing

- Extrusion cooking technology
- Extraction of the bioactive compounds
- Cryogenic grinding of spices and condiments
- Pulse electric field
- High Pressure Processing
- Microwave heat processing
- Ohmic heat processing
- Micronisation
- Irradiation
- Nano-technology (Nano-composites for food packaging, smart packaging and for increased bio availability of nutrients and medicines)
- Ultrasound
- Supercritical fluids for extraction and value added processing
- Plasma treatment
- Nutrigenomics

Out of above emerging technologies, following four topics were recommended for probable funding by NAIP under scheme of National Fund for Basic & Strategic Research:

1. Bio-polymer based smart packaging for food materials
2. Pulse Electric Field (PEF) treatment for enhancement of Shelf Life of Milk and RTS Beverages
3. Rapid and Precise Detection Systems (bio sensors) for Adulterants, pesticide residues and Food Borne Pathogens in Foods
4. Safe irradiation techniques for disinfestations, pasteurization, sterilization and reduction in anti-nutritional factors foods.

Training Programme on “Design and Manufacturing of Agro-Processing Machinery and Storage Structures”

Seven days integrated training programme on “Design and Manufacturing of Agro-Processing Machinery and Storage Structures” for the farmers (would be entrepreneurs) from Bihar state was organized by AICRP on PHT, CIPHET Ludhiana during 13 to 19th June 2010. During inaugural session, Dr. R. T. Patil, Director CIPHET formally welcomed the participants and stressed on the importance of processing in the rural catchment.



Dr. S. K. Nanda also advised to choose one profession: either manufacturing of post harvest equipments or food processing as an entrepreneur. Dr. Deepak Raj Rai, Head TOT briefed the scheduled training programmes of CIPHET. Four sessions were planned to cater to the need of the participants. Firstly design, layout, principle, and operation of post harvest tools and equipments was covered. Second session was on design and construction of storage structures such as evaporated cool room for fruits and vegetables, and metallic bin and silo for food grains storage. Community level / warehouse storage structures (FCI/CWC/ CAP) were also discussed. Third session was on processing technologies for novel food products and their marketing. Finally, a visit of participants was arranged to Department of Processing and Food Engineering, PAU Ludhiana, Markfed Canneries Jalandhar, Nijjer Agro Industry Ltd, Amritsar. Participants also visited Tomato Pilot Plant, Chilli Processing Plants and Mobile Agro Processing Unit at CIPHET, besides hands on experience on some of CIPHET technologies.

Twenty four participants including eight women had participated in this training programme. Drs. Anil Kumar Dixit and Sangeeta Chopra coordinated this training programme successfully.

Brain Storming Session on “Protected Cultivation in N-W Himalayas”

Dr. P. R. Bhatnagar PC (APA) CIPHET, Ludhiana participated in the Brain Storming session on “Protected Cultivation in N-W Himalayas” and reviewed the progress of SKUAST-K, Srinagar centre, during 10-16 June, 2010. The brainstorming session started with introduction by Dr. S Wani, Associate Director Research, SKUAST-K, Srinagar followed by details presented by Prof. A Alam, Vice-chancellor, SKUAST-K, Srinagar, who presented and discussed about the present status of horticultural



development, level of protected cultivation, technical needs of the region, and technologies suitable for the areas, with specific reference to three states i.e.; J&K, HP and Uttarakhand.

National Seminar on Food Safety Management Systems

Er Manpreet Kaur Grewal, Scientist (AS&PE) attended the national seminar on food safety management systems. Bureau of Indian Standards (BIS) organized this seminar at Patna on June 1, 2010 to make industry and other stake holders aware of the salient features of this international standard. Sh. D. K. Chaudhury, DDG East B.I.S, inaugurated the seminar

Food and Agriculture is the largest sector in the national economy. The food chain system comprises of its production, post harvest handling, distribution and consumption. It is a complex, multidisciplinary activity covering varying scales of operations i.e. small, medium and large. Before reaching the consumer, food passes through many hands and is handled and processed in several ways. To retain its quality, it is essential to ensure the integrity and the safety of food throughout the food chain. Any measures taken to ensure the above will also add to its value as a commodity and create better acceptability by the consumer, both domestic and international market.

In an effort to address issues concerning Food Safety, ISO brought a International Standard ISO 22000:2005 'FOOD SAFETY MANAGEMENT SYSTEMS-REQUIREMENTS FOR ANY ORGANIZATION IN THE FOOD CHAIN' to integrate the principles of HACCP with Quality Management Systems Standards (ISO 9001) in September 2005 which specifies requirement of a food safety management system covering all organizations in the food chain from farm to fork including catering and packaging companies. The standard combines generally recognized key elements to ensure food safety along the food chain including: interactive communication; system management; control of food safety hazards through pre-requisite programmes and HACCP plans; and continual improvement and updating of the management system. ISO 22000:2005 is intended to define the requirements for companies that desire to exceed the regulatory requirements for food safety. It is also for companies seeking to integrate their quality management system, for example ISO 9001:2000, and their food safety management system.

Primary Processing of Medicinal and Aromatic Plants

A seven day's training programme on primary processing of medicinal and aromatic plants was organised at CIPHET, Ludhiana during June 5 – 11, 2010. It was sponsored by Herbal Research and Development Institute, Gopeshwar, Uttarakhand for fourteen participants belonging to high altitude blocks of district Pitorahgarh, Uttarakhand. This training was co-ordinated by Dr Sangeeta Chopra and Dr. D. Dhingra. The group visited CIPHET Ludhiana to improve their skills, solve their problems and learn techniques of primary processing of medicinal and aromatic plants like aloe vera, safed musli etc. They were exposed to the concepts of processing of extraction techniques and their utilization, drying and modified atmosphere packaging for medicinal and aromatic plants like aloe vera, shatawar, mulhati, cymbogan grasses and patharchur. The practicals were conducted and they were given hands on processing and value addition of beetroot and ginger.

Evaporative Cooled Room Technology Transferred to Bihar Based Farmer

Central Institute of Post Harvest Engineering and Technology (CIPHET) today licensed the technology of evaporative cooled (EC) room to a Bihar-based-farmers and farm organizations, which could store more than two tonnes of fruits and vegetable. A memorandum of understanding has been signed in this regard.

Dr R.T Patil, Director CIPHET, said that storage of fruits and vegetables in fields was a big problem for farmers and many times they had to sell them at much lower prices. He said that EC room is simple but effective storage alternative for farmers. Rajeev Kumar a farmer from Bihar, who has got this technology, said that he was presently engaged in aromatic and medicinal plants farming in his village Seikhupura. “I will store vegetables produced from my village in the EC room,” he said, adding that wanted to create more job opportunities including for women in his village. “I want to develop my village as model in Bihar,” added he. Sh. Vijayanand Singh who also signed the MoU for setting up this unit said that he will try to propagate this technology for the benefit of farmers of Bihar and also of neighbouring states so that losses could be reduced and distress sale vegetables in the market could be avoided.



Dr Sangeeta Chopra, Senior Scientist, who has developed this technology, said that EC lowers the temperature 12 to 15 degree Celsius than outside and increases the internal humidity level. “EC room is double walled structure with space of 12 cm between them. This space is filled with fine sand free from clay and organic matter. A drip system is connected from the top of walls to make the sand wet, she said, adding that this was quite useful for providing small to medium storage capacity in the field and cost of operation was quite low. It can be constructed with cost of Rs 50 thousand.

CIPHET Student Takes up Entrepreneurship in Food Processing

Opting to beat trodden path, Kuldeep Kumar has successfully established himself as an industrialist in food processing industry at age of 22 in Chattisgarh after completing his B.Tech degree. He owes his success to experience got from Central Institute of Post Harvest Engineering and Technology in capacity of student and later as lab technician. Today, he got license for production of extruded products from the institute to further expand his business.



Presently, he is producing pickles, dehydrated vegetables and snacks under registered brand name JFS foods in Chattisgarh. Sharing his experience, Kuldeep Kumar said that during his B.Tech (Agricultural Engineering) he got associated with CIPHET to complete his project. “I learned lot from this institute and wanted to remain associated with somehow. Luckily, I got an opportunity to join CIPHET as lab technician for six months in year 2009. Besides, learning technical know-how I got managerial skill for establishing my own business in the institute,” he said, adding that on leaving CIPHET immediately set up food processing plant at his village. Coming from farmer family, Kuldeep said that his family was reluctant to take loan for establishing industry. “But, seeing my conviction they agreed to support him,” he said, adding that besides initial

difficulties in marketing to generate sale for his products. “Food processing industry is almost untapped in Chattisgarh, I never had quality issue due to sound technical background. B.Tech degree has helped me to save costs on employing technicians,” he added. Transferring technology to Kuldeep, CIPHET Director Dr R.T Patil said that farmers could easily increase their income by entering into food processing industry. “Most of farmers wanted to purchase more land from their additional income. But, that is not helping them as return from land is very low as compared to exorbitant costs they pay to buy the land. On other hand, they should invest this money in food processing where value addition is very high and they are more knowledgeable about raw produce quality,” he added. Head of Transfer of Technology Division Dr Deepak Raj Rai said that they run number of training programmes and people should take maximum benefit of them. Senior Scientist S. Balasubramiam said that Kuldeep had set up example for other students to become job creators instead of looking for jobs.

CIPHET Transfers Soybean Processing Technology to a Local Youth

Instead of searching for jobs youth should set up their own ventures and create jobs for others. Food processing industry provides immense scope for value addition. Central Institute of Post Harvest Engineering and Technology (CIPHET) Director Dr R.T Patil made these remarks while licensing technology of soybean processing to a local youth, who decided to enter into food processing business.

Saying that profitability is very high in food processing as compared to other industries, Dr R.T Patil said that in no case quality standard be compromised. “Anyone who is setting up industry should give top priority to quality and packaging. Otherwise, customer will not buy the product for second time,” he said, adding that besides this entrepreneur must have patience and urge to improve his product to succeed in his venture. Encouraging youths to get training at CIPHET, he said that they would also allow institute trained entrepreneurs to use brand name of CIPHET and allow use of the pilot plants for production on nominal rent basis. “This will help them to market their products,” he added.



Sham Sunder, who got technology for soybean processing from CIPHET, said that he recently completed his graduation. “I was in dilemma what to do in life. Few months back, I saw exhibition of technologies at CIPHET and got inspired to start my own venture in soybean processing. In the beginning, I will start selling soybean milk,” he added.

Institute Technology Management Unit

Following technologies were licensed to entrepreneurs during June 2010

Sr. No.	Name of the technology	Contracting party	Date of commercial-ization
1.	Licensing and training on Extrusion Technology for snack foods.	Mr. Kuldeep Kumar m/s Jyotirmay Foods, Vill: Khapparwada post: Dangnia, Gumderdehi, Durg. C.G.	4.06.2010

2.	Licensing of technology of Evaporative Cooled Room	Mr Vijyanand Singh,VNS Networks, N.C.Lot, Kankerbagh Patna 800020	19.06.2010
3.	Licensing of technology of Evaporative Cooled Room	Mr. Rajiv Kumar, Vill PO – Chewara Dist. Sheikhpura, Bihar- 811304	19.06.2010
4.	Technology for making Onion, Ginger and Garlic Powder.	Mr. Gurpreet Singh, 7947 St. No 3, Ranjit Nagar, Back Side ATI , Ludhiana	27.06.2010

Advisory consultancy members registered during June 2010

1. Mr. Varinder Singh, Village Palia Khurd, PO Fatehpur, Tehsil Nabha, Distt. Patiala – Punjab.

Promotions

1. Dr. Mukund Narayan has been promoted from T-4 to the post of T-5 (Technical Officer) w.e.f. 09-08-2009.
2. Sh.Pradeep Kumar has been promoted from T-1 to the post of T-2 (Field/Farm Technician) w.e.f. 23-09-2009.

Technology of the Month

Rapid Process for Ethanol Production from Sugarcane Juice

Sugarcane is normally used for sugar production in India. Sugarcane juice is a preferred drink in India, especially in summers. However, disease and insect infested canes or shriveled and rotten canes have to be separated from the healthy canes for processing. Thus, the juice from such unwanted canes could be used for ethanol production, which could be used as bio-fuel to supplement the energy needs of the country. At CIPHET, we have attempted to develop a rapid process for ethanol production from sugarcane juice.

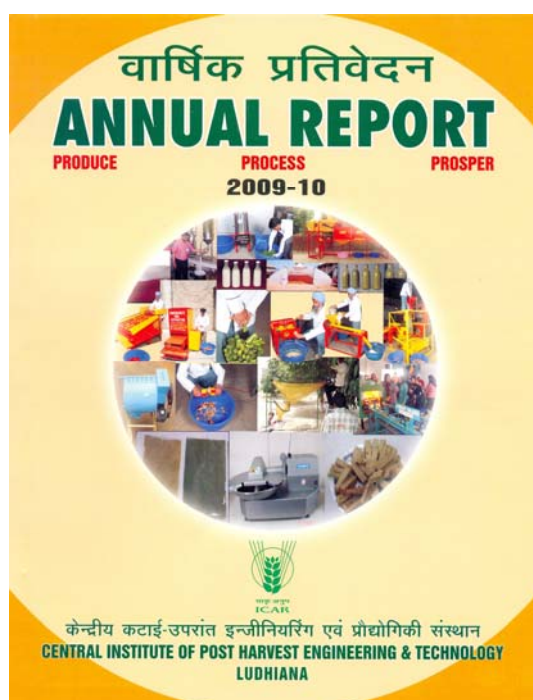


2.5 litre Minifors (Infors HT, Switzerland) fermenter used for ethanol production from sugarcane juice

The process has been formulated using a thermotolerant yeast species, which was developed using selection and adaptation methods. The yeast cells were grown on different sugars and the best carbon source, which resulted in high ethanol yield was selected for further experiments. The cells were adapted to the cultural and fermentation conditions through repeated cell recycling. The entire fermentation process could be completed in 12 h yielding an ethanol concentration ranging from 50 to 82 g/l. The isolated microbial strain is able to tolerate high substrate and high product concentrations and is also able to ferment juice in the temperature ranging from 30 °C to 45 °C. The process was repeated over five batches through recycling of yeast cells at 35 °C and an ethanol concentration ranging from 75-82 g/l was obtained in 12 h fermentation. Usually, ethanol production process from sugarcane juice and molasses is carried out at 25-30 °C and the fermentation takes 18-24 h to complete, especially when a concentration above 70 g/l is desired. Fermentation efficiency varied from 80 to 95 %, depending upon the fermentation conditions.

High ethanol concentration, high volumetric productivity and thermotolerant characteristics of the microbial strain are desired traits for commercial ethanol production. Thermotolerant characteristics of the fermenting strain are required for commercial production of ethanol because refrigeration is not only an expensive, but also an energy intensive process. In India, where the ambient temperatures during summers in most parts of the country range from 40-45 °C, fermentation process at 35-40 °C resulting in higher ethanol concentration and higher ethanol productivity holds a good potential for scale-up to a pilot and commercial scale level. High ethanol productivity means that more batches could be completed in a short time, which is likely to offset the production costs. We are now evaluating the potential of this microbial strain in ethanol production from fruit residues as well as lignocellulosic biomass. The experiment is also in progress to investigate if this particular yeast strain is able to ferment the pentose sugars such as xylose and arabinose in addition to disaccharides and hexose sugars such as, sucrose, glucose, fructose, and galactose. The conversion of pentose sugars to ethanol is one of the major limitations in cellulose-to-ethanol conversion process, as such sugars are abundantly present in the hemicellulosic fraction of the lignocellulosic biomass. Hemicellulose alone accounts for 20-35% of the total biomass in lignocellulosics, such as rice straw, bagasse, cotton stalk and wheat straw. We are also attempting to evaluate the ethanol production process from fruit residues through simultaneous saccharification and fermentation (SSF), which is considered an economically viable process from starchy as well as cellulosic substrates. As enzymes and the fermenting microbial strains have to be accommodated together in the same vessel at the same time during SSF, an efficient thermotolerant microbial strain is the need of an hour.

Publication of the Month



CIPHET ANNUAL REPORT 2009-2010

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