



Central Institute of Post Harvest Engineering and Technology, Ludhiana

Our Slogan: Produce, Process and Prosper

CIPHET E – Newsletter for May, 2007
Vol. II No. 5

Director's Column



Dear All,

Punjab is a fast developing economy with agriculture at its base. It enjoys the credit of ushering the green revolution in the country. Agriculture in the state found a favorable environment in the topography, sub-tropical continental climate, fertile soils, and favorable conditions of water supply through water bodies and irrigation. All this provided a favorable foundation for the green revolution. The state's remarkable success in agriculture laid down a base for rapid strides in other sectors of the economy. Today, however, the agricultural sector is facing challenges due to virtually static level of per hectare yield of rice and wheat, depleting water table and deteriorating soil health. There is an urgent need to diversify not only the cropping pattern, but also the economy, towards value addition and other non-farm activities. Fortunately, for the state, large/medium industries are picking up, as also small-scale industry, however it is not the case with agro industries in general and food processing in particular.

The role of agro and food processing industries is very important for increasing the agricultural GDP and also to keep the farming as an attractive profession. Food processing is very important to encourage forward as well as backward linkages in farming. Processing of agriculture produce not only reduces post harvest losses but it also provides value addition in the agricultural produce generating extra income. Punjab produces many important crops including cereals, pulses, oilseeds, cotton, sugarcane and variety of horticultural crops. Though, the cropping pattern has shifted more towards rice-wheat crops replacing other crops particularly after the green revolution in Punjab. This has made Punjab an important wheat and rice producing state in the country but lately the productivity of these crops has become unsustainable due to poor soil health and critically depleting water table in most of the region of the state. Diversification of agriculture in Punjab has become a buzzword in the new century to make farming sustainable and attractive enterprise. Agro-industries have important role to play in providing employment and income generation from agriculture through value addition in crop produce. The technology based EDP programmes started at CIPHET is a **Confidence Building Measure** to attract progressive farmers into agro processing and value addition in production catchments.

The telephone numbers at CIPHET have been changed. The new numbers are given on the last page of this newsletter.

With best regards

R.T. Patil
Director

Events:

Application of plastics in agriculture

One of the most efficient ways of utilizing resources in agriculture as well as proper handling of agricultural produce is through use of plastics. In the present scenario of depleting natural resources and declining productivity it is all the more important. The usefulness of man made plastics needs no justification and it is very difficult to think to live without plastics similar to electricity. Even the 'concept of modernization' is well connected with the use of plastics. Now plastics have become a part of life and every component is deeply associated with plastics. As far as agriculture is concerned, plastic based technologies play an important role in various activities/ operations on the farm. The developed nations are taking enormous benefits from plastic based technologies in the field of moisture conservation, surface covered cultivation and post harvest management of the farm produce. However India is still in the infant stage as far as use of plastics in agriculture is concerned and per capita utilization of plastics in India is only 4.1 kg whereas the world average is about 16 kg. With the strong backing of government policies in current and coming eleventh plan, it is expected to rise up to 8.0 kg by 2010 with the fabulous growth rate of about 18%.

To strengthen the research related to use of plastics in post harvest management and environment control a meeting of all research engineers under All India Coordinated Research Project on Application of Plastics in Agriculture was held at CIPHET Ludhiana on May 4, 2007. The project has 9 centers in the country and 12 participants attended this meeting.

The research engineers were urged to come out with full package of different technologies for reducing post harvest losses of different commodities using plastics. It was emphasized in the meeting that plastic oriented technologies can revolutionize the farm productivity and can result into evergreen revolution. The role of plastic in revolutionizing water conservation and storage methodology, role of drip irrigation, plastic mulching to save every drop of water for sustainability of agriculture, further use of plastic in mulches and soil solarization for water conservation and weed/pest management, surface covered cultivation for higher and quality production, scope of plastics in agricultural structures like animal sheds, aquaculture, also its use in pre-coolers, pack houses, safe storage and transport of fruits & vegetable, fish and meat etc was thoroughly discussed .

The plastics have a fascinating future in handling, storage and packaging of different food items. The use of plastic dunnage in storage can reduce insect-pest infestation to a large extent. Similarly, washable plastic fibre sacks can store the grains as well as other commodities better than gunnysacks. The jute being hygroscopic absorbs the moisture from atmosphere and leads to fungus infestation on the surface, which also penetrates inside. Uses of various plastics in handling like foldable crates, wrapped packages are not only easy to use but also deter deforestation. The key role of plastics in MAP and intelligent plastics is unavoidable and hence project should guide the consumers and processors on its proper use. Simple shrink-wrapping as demonstrated at CIPHET can extend the shelf life twice. This needs to be tested and propagated for all fruits and vegetables and in all regions. The scope of this technology also needs to be tested for fish and meat with required modifications in selection of plastics and design of packages.

During this meeting the decision were taken to expand and refocus the mandate and it was felt that each cooperating center must be well versed with different applications of plastics in agriculture for effective promotion among the end user. These centers should work as vehicle for technology delivery.

However the issue of proper disposal of plastics is equally important, as it is a great threat to biodiversity and sustainable environment. Hence the innovations related to biodegradable plastics need to be accelerated. The AICRP centers can help the industry to properly study and test the suitability of such plastics to determine their effectiveness as well as techno economic feasibility. There is a need for compiling database and complete technical information on plastics suitable for use in various production and post harvest operations. In view of greater demand in post harvest sector, it was felt that scope of work of scheme should meet this changing need of society.



Contract farming

India is one of the largest producers for high-value food commodities such as milk, fruits, vegetables and poultry but value addition is low. To create an enabling atmosphere, the government amended the Agriculture Produce Market Committee Act to allow direct transaction between buyers and sellers outside regulated markets. A two day workshop on **Contract Farming: Methods and Experience** was organized jointly by ICAR-USDA on 5-6th May, 2007 to discuss various issues related to contract farming and share the experience of India and USA to benefit the Indian farmers. This workshop was organized under US-India-Agricultural Knowledge Initiative (AKI). In the Inaugural Session, the Chief Guest was Mr. Sharad Pawar, Minister of Agriculture, Consumer Affairs & Public Distribution; Guest of Honour was Sh. P.K. Mishra, Secretary, Department of Agriculture and the Chairperson was Dr. Mangala Rai, Secretary, DARE & DG, ICAR.

Several papers and studies conducted by Indian and American (USDA) scientists were presented to highlight the bottlenecks in making contract farming feasible to cater to the corporate food chains and supermarkets that would come up for retail marketing in the coming year. Booming economy, rising incomes, growing urbanization, changing consumer preferences and rising supermarkets are changing the food basket of Indian consumers towards high-value and processed food products. To cope up with that the government is creating an enabling environment for investment in agribusiness and for strengthening backwards and forward linkages through various policy and regulatory means and this workshop was a step in that direction.



CIPHET procures a low cost collet extruder

A low cost collet extruder, 25 kg/h and 10 HP motor for production of ready to eat snacks from cereals, millets and other ingredients has been procured at CIPHET Ludhiana to conduct experiments on developing the ready to eat value added products from various ingredients like rice brokens, millets, coarse grains and fruit pulps similar to the ones developed by long barrel single and twin screw extruders and compare their physical, textural and sensory qualities vis-à-vis their cost of production. The attempts are being made for optimization of process parameters for gluten free health foods from millets and legumes.





Low cost Collet extruder installed at CIPHET

Training of B. Tech Students

During this month 18 students from Chattisgarh Agricultural Engineering College, Risali, Dhanora Road, Dhanora, Durg-491001 and Dr. Ulhas Patil College of Agricultural Engineering, Jalgaon 425003 attended their one-month training. The policy of CIPHET is to involve the students in the actual research work under the guidance of the scientist in his respective on going institute project. The students are exposed to real world problems and ways to solve them. They are also trained to handle sophisticated instrumentation and equipment used in product development and quality evaluation.

Rice Tech 2007

The 7th International Exhibition and Conference on Rice Processing Technology was held at Chandigarh during 25-27 May 2007 to discuss the various issues related to rice processing industry. There was a well-attended exhibition of various rice processing machineries including latest grading, sorting technologies and packaging technologies. The technical discussions were held on May 26, 2007 on wide ranging topics namely Latest Developments in Rice Processing Industry, Rice Procurement Policy & Related Issues, Hi- technology for Rice Industry, Modernisation of Rice mills – Problems & Prospects, Innovations in Rice Processing System, Rice parboiling problems and solutions, Degree of Rice milling (Rice Polishing) System, Biomass gasification for new generation energy for heat & power, Rice Safety & Nutritional Aspects, By-products utilization, Cleaning and grading technology of food grains, Use of Rubber rolls for paddy dehusking etc. The technical conference was attended by Mr. Vijay Kapoor, President, All India Rice Exporters Association, Mr. B.D. Kapoor, Secretary, Punjab Rice millers Association, Mr. Anurag Bhatnagar, Group Manager Buhler India Ltd, Bangalore, Mr. L.P. Bali, Chairman, Bali Group, Mr. Ram Kumar Gupta, Dev Raj Hitech, Ferozpur, Dr. R.T. Patil, Director, Central Institute of Post Harvest Engineering Technology, Ludhiana, Dr. Pilliar, Rice Processing Consultant Tanjavuar, Dr. K.K. Singh, Head (Food Grains & Oilseeds Processing), Central Institute of Post Harvest Engineering Technology, Mr. Mukherjee, Grain Process Kolkata, Mr. Satish Chakkar, Expert in Rice Quality measurement New Delhi, Mr. T.N. Tiwari, Golden Rolls Pvt. Ltd., Mr. Gangan Deep Tuteja, Process Technologies. The deliberations created awareness among the rice millers about

advances in rice processing technologies being developed in the world and encouraged them to follow modern techniques to reduce the losses, improve the quality of rice and optimize the profits in this rural based industry.

Bio Polishing

There is a scope for commercial production of enzymes required for efficient milling operations of food grains such as oil milling, dal milling and even for rice milling. According to Dr. S. Sreenivasan Director, and Dr. Balasubrananya, Head, Chemical & Bio-chemical Processing, CIRCOT, Mumbai, the enzyme production technology and protocol has been developed by CIRCOT for bio-scouring of Cotton Stalk and similar approach of application of enzymes can be adopted for dal milling and also oil milling as well as oil refining. Director CIPHET, Dr. Patil visited this prestigious laboratory of ICAR to explore the collaboration between CIPHET and CIRCOT. They informed me that they have conducted trials in collaboration with CIAE, Bhopal on laboratories scale and the results were encouraging. However, the study on larger sample size and commercial scale could not be done which now CIPHET wants to conduct along with modern dal milling. To explore the possibility of collaborative work between CIPHET and CIRCOT on low cost production of enzyme cocktail Dr. R. T. Patil, Director visited CIRCOT on May 25, 2007. The CIRCOT has standardized method to produce enzymes in the glass jar of 20 liters capacity, which can be scaled up 100 to 500 liters capacity easily. The enzymes production under the anaerobic was achieved on large scale by using water sealing similar to biogas plant for large-scale production of enzymes consortium. The toxicological studies on consortium of enzymes are needed to be for food uses. The collaboration between CIPHET and CIRCOT in developing the pilot plant production facility for fairly good quality and safe enzyme consortium for dal milling, oil milling and even rice & millet milling looks very promising.

IPR issues in ICAR

The intellectual property rights and proper technology management is now getting due attention in ICAR system. A three days Training cum Workshop on “IP and Technology Management in ICAR System” was held at NAARM, Hyderabad during 28-30 May 2007 in which about 50 participants from 31 ICAR Institutes participated. From CIPHET **Dr. S. N. Jha** attended this workshop. In this workshop Dr. Rita Sharma, Financial Advisor of ICAR emphasized the need for technology generation and an IP protection from the beginning of the project. She said filing of patent should be done as soon as we have some technology and for that if need be an attorney general can be hired. We should fix target for every year for filing patents. Now world is moving with IP regimes we have to be vigilant and give top priority for registration of plant varieties, copy right protection and filing patents of IP generated. Many dignitaries addressed the gathering and made the participants aware about the ICAR Guidelines for IP protection and commercialization of technology. Dr. Mangal Rai, the honorable Secretary DARE and DG, ICAR, chaired the plenary session of the workshop-cum-training on 30.5.2007. The chairman fixed the various milestones for accelerated development of IP documentation and patents. Important amongst them are to send requirement for strengthening the Institute technology Management Unit (ITMU) so that it can be included in EFC of the 11th five year Plan. The DG emphasized to organize a workshop/seminar in respective institutes to sensitize other scientists for this purpose to work towards IP protection on war footing. He also said that all efforts should be made to protect our genetic resources and IP generated in ICAR at all cost.

Another important event on this topic was a graduate course of 4 day duration on “Intellectual Property Management and Technology Transfer” organized by the Society for Technology Management (STEM) at Goa during 19-22 May 2007. The programme was aimed at capacity and skill building of intellectual property and technology transfer professionals in the country. The course was attended by about 60 participants from public sector (such as ICAR, ICMR, CSIR and SAUs) and the private sector represented by industrial, biotechnology, drugs and pharmaceuticals firms. **Dr. S.K. Nanda, Project Coordinator (PHT) and Dr. Matthew Prasad, Head, Transfer of Technology Division, CIPHET** attended this programme. In this workshop invited dignitaries from India (ICMR, CSIR, ICAR, Sathguru Management, ICICI) and abroad (Management of Intellectual property in Health Research aka MIHIR, UK; Public Intellectual property Resource for Agriculture aka PIPRA, USA; South African Medical Research Council aka SAMRC; and Florida State University, USA).made lectures and presentations The topics like Institutional Patent Policy Development, Licensing Strategies for the Technologies and Options and Sourcing as well as Transferring the Technologies with Public Private Partnership Case Studies were covered through the lectures and presentations.

Brain storming for soybean growth and sustainability in India

A Brain Storming Session on Soybean Growth and Sustainability in India was organized on 15th May 2007 at NACS Complex New Delhi jointly by ICAR, SOPA, SFPWA. The Chief guest of the function was Dr. P.Das, DDG (Agril. Extn.), ICAR and inaugural session was chaired by Dr. Nawab Ali, DDG (Engg.). In the inaugural session the Dr. Nawab Ali welcomed the delegates and gave presentation on status of the soybean production and processing in India. Other lectures delivered were by Mr. Rajani Kant, ITC & representative of SOPA, Indore; Mr. Girish Matlani, President, SFP&WA, New Delhi. The soy entrepreneurs namely Mr. Bachittar Singh Garcha and Mr. Daksha Gupta, soy entrepreneurs also spoke about their business. The technical session was chaired by Dr. A. Alam and speakers in this session were Dr. SD Kulkarni, Dr. RT Patil, Dr. GS Chauhan.

The major recommendations arrived out of this workshop were as follows;

1. High yielding soybean varieties developed by National Agricultural Research Systems (NARS) consisting of NRCS, SAU’c should be promoted along with sufficient quantity of seeds to increase current 1100kg/ha productivity to 1500kg/ha as per world average. This target to be achieved in the next five years.
2. Support in increasing Soya bean productivity.
 - a. To provide funds for training farmers to upgrade farming technology.
 - b. To increase low seed replacement rate (about 10% presently) by augmenting seed production & making seed Economical.
 - c. To allocate funds for more intensive research to develop new varieties of seed domestically as well as by taking help from other countries like Brazil & Argentina.
3. Introduction of soy foods category in the Govt. Gazette.
 - a. Currently there is no recognition of soy foods in the GOT schedule, which makes these products to be considered as other foods. This attracts high taxes and duties.
4. Bringing standards for soy food products.
 - a. Suitable legislations and/or to propose amendment in existing law affecting the Soy Food Trade and Industry.

5. Working with WCD and various state governments to include soy food products in Feeding programs such as ICDS and Mid-day meal programs.
6. Working with Department of Food Processing Industries, GOT to get.
 - a. Support for setting up soy food businesses.
 - b. Support for EDPs and soy food training.
 - c. Support for upgrading soy food industries such as value added products such as defatted soy flour; soy protein concentrates, isolates etc.
7. Technologies to be developed for complete utilization of soybeans. Technologies to be developed where ever gaps exist
8. Getting Health claim from GOT through Ministry of Health.
9. Efforts to distribute Soy grits/flour/Dal analogue through PDS.
10. Fortification wheat flour (10^o/o) and besan (15%) with defatted soy flour may be recommended.
11. Concerted efforts from all the stakeholders in conducting seminars, exhibitions and other promotional activities.
12. Promotion of soybean utilization by KVK officers at the farmers level.
13. Promotion of benefits of Soya on the lines of Pulse Polio Immunization work by health ministry through print and electronic media.
14. Support Industry Association in promotion campaign to spread health benefits of Soya food.
15. keep taxes on Soya product at par with basic food like wheat, rice, pulses, vegetables, milk, meat, egg.
16. Constitute a task force comprising intra-ministerial and trade representative to implement & monitor process to achieve above goals.
17. Generic campaign support to further popularize soy food consumption through print and electronic media.
18. Linkage between industry and R&D institutes Industry should work with Research institutions in developing and transferring technologies re improvement of quality of Soy bean Food and ingredients to help widen scope of scope in the traditional foods end innovative: supplement, and other livestock feed application.
19. Industry should support R&D for augmentation of production.
20. Tightening quality control norms specially protein content in ICDS/mid day meal schemes supplies
21. PFA standards should be realistic and at par with other food products
22. Industry should make sure that soy food products be made available at competitive prices with quality

Processing of onion, ginger and garlic in to value added products

The annual production of onion, ginger & garlic in India during the year 2005 was 5.5, 0.23 and 0.5 million metric tonnes respectively. These crops are invariably added in most of our traditional cuisines. Apart from their aroma and taste, these crops are also known for their medicinal properties. These crops undergo qualitative and quantitative losses during storage. For want of knowledge about the commercial level processing these crops are sold in the raw form after prolonged storage and hence there are losses. The dehydration is the best option both for their value addition and safe storage. The processing of these crops into value added products through dehydration route such as flakes, slices, powder, pickle, pastes etc. adds convenience and also results in reduction of post harvest losses. To

promote the processing of these crops a one-week entrepreneurship development programme was organized at CIPHET during 17th May 2007 to 23rd May 2007.

Six participants belonging to Punjab, Haryana and Rajasthan attended the programme. The faculty drawn from CIPHET conducted the theory and practicals. The following topics were covered during the programme:

- Chemistry of onion, ginger & garlic
- Varieties and processing characteristics of onion, ginger & garlic
- Dehydration of onion, ginger & garlic-methods & machines
- Operation and maintenance of processing equipment
- Quality standards of dehydrated onion, ginger & garlic
- Methods of pickling
- Extraction of essential oils of ginger and garlic
- Preparation of project profiles
- F.P.O (Fruit Product Order)- Terms & conditions for licensing
- Project planning, launching and management

The participants were given hands on training on preparation of processed products, such as onion flakes, ginger powder, garlic powder, ginger pickle, extraction of essential oils etc. and operation and maintenance of the machines.



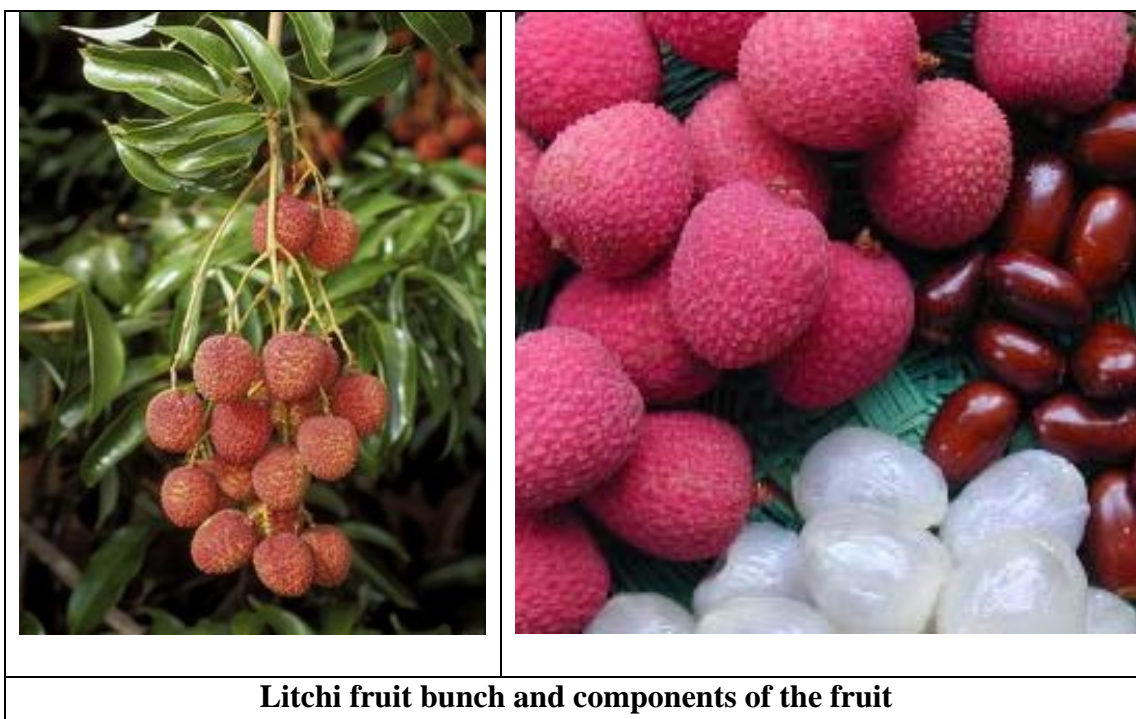
Post Harvest Engineering and Technology interventions in Litchi cultivation

On invitation of National Research Centre for Litchi, Mr. VK Garg, Technical Officer and Dr. RK Gupta, Head, Horti Crops Processing Division at CIPHET Abohar visited NRC Litchi at Sherpur, to study the ways of harvesting and processing of litchi fruits.. The farmers normally go far harvesting early in the morning due to shelf life problem of litchis. Farmers remove about 20 inches stalks to harvest litchi from the tree manually using fingers. Stalks so removed are collected in gunny bag and after filling of the bag, it is lowered down with the help of a rope where women sit around for grading and harvesting litchi. The removal of 20 inches stalk is necessary for best flowering in the next season as it solves the purpose of both harvesting and pruning. Though manual labor is not at all a problem in lichi

growing area, farmers want a easy and safe mechanism of harvesting to help labour to do the job more effectively. About 70 wooden boxes having 1000 fruit each are packed in a day by about 25 persons through the operations of harvesting, sorting, grading, packaging etc. During the process of harvesting 3 percent loss was observed due to falling from the top and bursting.

Following technological interventions are needed in litchi post harvest management

1. Improved Harvesting ladder (8 ft to 40 ft) with manual automatic lifting device equipped with plastic wire netting around.
2. Litchi secator cum pruner
3. Litchi grader (mechanical)
4. Litchi peeler (mechanical)
5. Litchi Destoner (manual)- Destoning can be done without peeling as peeling can be done at a later stage required for processing for Rasgolla (sweet)



Litchi fruit bunch and components of the fruit

CIPHET participation in National Seminar on “Role of Post-Harvest and Value Addition in Employment and Income Generation”

Dr. OD Wanjari, Head AS&EC attended the above national seminar at Raipur. It was jointly organized by Indira Gandhi Agriculture University, Raipur and Magnum Foundation, Nagpur on 26th May 2007 at Raipur. This seminar was an effort in the direction to make 2nd green revolution successful by bringing together all sectors. In the seminar around 10 papers on the following topics were presented. The subjects covered in the seminar were as follows:

1. Effective coordination of agricultural institutes and functionaries under the control of various authorities for the success of second green revolution.

2. Activate medias to take-up the responsibility to educate the masses in relation to role of Agriculture and small farmers in present economy.
3. Involvement of research institutions with the farmers to tender direct benefits of research.
4. Participation of non-traditional credit institutions in agriculture development.
5. Development of partnership between consumers and farmers directly.
6. Formulations of eco-friendly and soil conservative chemicals and fertilizers to offer continuous strength to soil.
7. Invention of new equipments and development in traditional local instruments to meet the requirement of local farmers.
8. Low cost micro irrigation arrangements with the participation of the farmers.
9. Development of local seeds with the strength to face draught or excessive rains.
10. Development of harmless pesticides to protect environment.
11. Development of value addition industries as the part of farming with employment of local resources and labour.

Joining: New Head of Division at CIPHET



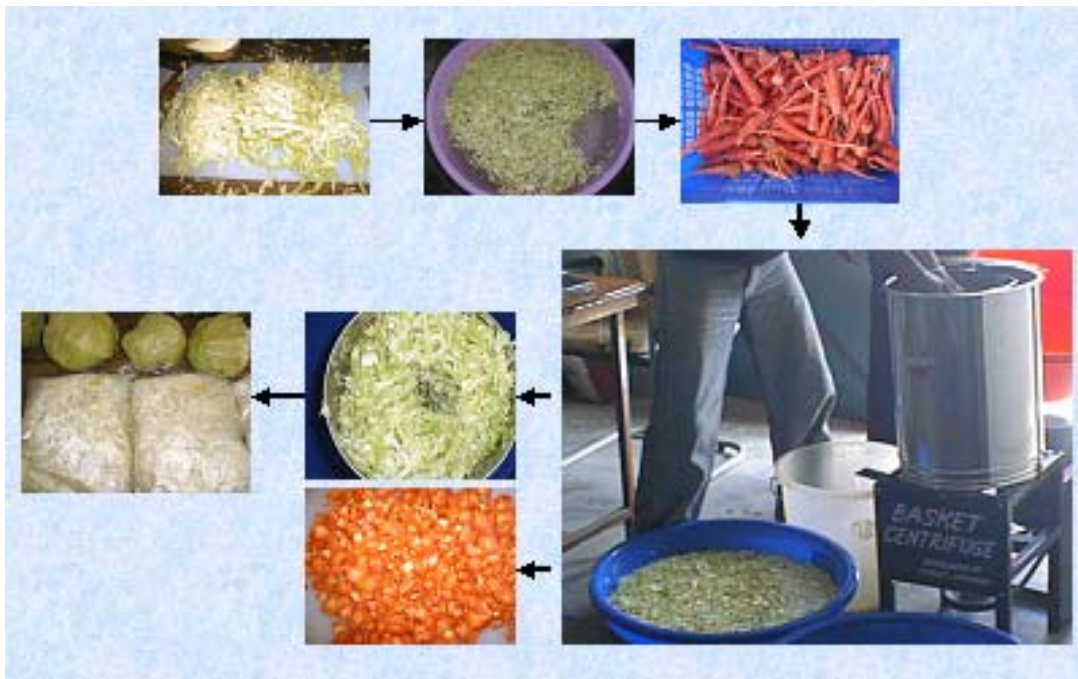
Dr. Matthew Prasad, doctorate in post harvest engineering from I. I. T. Kharagpur has joined as **Head of Transfer of Technology Division** on 10/05/2007. A Jawaharlal Nehru Award winner for his PhD, Dr. Prasad has long experience in working on modified atmosphere packaging of fresh fruits with perm selective polymeric films. He also has vast industrial experience as he has worked with tea, rice processing machinery, tractors and rice milling industries. Dr. Prasad had worked in varied capacities ranging from Dean of Biotechnology to Director of Extension in different organizations. His selection as head of **Transfer of Technology Division of CIPHET** will surely benefit in effective dissemination of post harvest management and value addition technologies in Punjab as well as in India.

Technology of the month

Minimal Processing of vegetables.

Minimal processing technologies along with proper packaging and low temperature storage provide convenience, fresh like quality and sufficient shelf life to foods to allow their distribution. Also, the consumer can always have the advantage of tasting the difficult to peel, cut, but highly nutritious fruits and vegetables. With rapid urbanization and increase in the workingwomen force, there is an increasing trend and interest among the people to consume minimally processed fruits and vegetables available on limited scale in the retail shopping malls of the country. The complete set of operations during the production of minimally processed products include cleaning, washing, trimming, coring, slicing, shredding, rinsing to remove cellular fluids, drying by centrifugation, packaging and so on. The minimally processed products are highly perishable and activities that increase safety and extend their shelf life are extremely important. Hence modified atmosphere packaging (MAP) along with low temperature storage is required which uses the natural process of respiration of vegetables in conjunction with the restricted gas exchange through a barrier (film package) to control in-pack O_2 and CO_2 to extend shelf-life in a perforated or non-perforated packaging films.

At Central Institute of Post Harvest Engineering and Technology, Ludhiana a package of technology for minimal processing and modified atmosphere packaging of different vegetables such as cabbage, spinach, carrot and spinach has been developed. The activity involves the use of very little hardware such as wash tubs, cutting table, sharp edge cutting knives, basket centrifuge (10 kg centrifugation capacity developed at CIPHET, Ludhiana and cost Rs. 15000/-) and can be easily adopted by the farmers for value addition to the different vegetables.



Project Profile of the month

PROJECT REPORT ON PRODUCTION OF VERMICOMPOST

Introduction

Cultivation of high yielding crops and use of inorganic fertilizers has spoiled the health of soils in Punjab. Deficiency of nitrogen, phosphorus, zinc, potassium, iron, sulphur, manganese, copper etc. has been observed in the soils. The amount of organic matter in the soil has come down to 0.02% - 0.25%. However organic matter to the tune of 0.45% (min) is required in the soil for healthy activity of microorganisms. The health of soils can be improved by using manures and compost. Vermi-compost is a very good source of organic matter and mineral elements and can prove helpful in improving the health of soils and thus production of agricultural crops. The main objectives of using vermi-compost are protection of soil health, recycling of dung and waste, reduce dependence on inorganic fertilizers, improve the quality of crops, fruits/vegetables and increase the income of the farmers. The specie *Eisenia foetida* of the worms is suitable for producing vermicompost. The worms of these species are 3 inch long and red in colour. These worms do not go deep into the soil and eat mostly organic matter instead of soil. These worms can daily eat organic matter equal to their body weight. The compost becomes ready in 45-60 days.

Method of producing vermicompost

Land, shed, water, organic matter (agricultural residue, kitchen waste, dung etc.) and worms are required to produce vermicompost. Pits under shady trees can be used to produce vermicompost. Sheds can be constructed to produce vermicompost on large scale. The shed is to be made 12 feet wide the length can be chosen on the basis of capacity. The longer dimension of the shed should be oriented in the east west direction to avoid direct sun in the morning and evening hours. The height of the sidewalls should be 6 feet high. The flooring in the shed is to be made of bricks (with flat surface on top). Shed should be protected from entry of rainwater. Three feet wide pits are to be made inside the shed for the composting of organic waste.

Financial Analysis

Fixed Capital

S. No.	Item	Cost
1	Shed 42 ft x 26 feet along with flooring	Rs. 40,000/-
2	Filling of soil (6 inches) and supply of 3-4" thick straw	Rs. 15,000/-
3	15 kg worms raw material (dung, organic waste) arrangement of covering watering and small tools)	Rs. 5,000/-
Total		Rs. 60,000/-

Working Capital (monthly)

Labour 1 no.	:	Rs. 2,500/-
Raw Material 30 quintal @ Rs 10/ quintal	:	Rs. 300/-
Watering Charges	:	Rs. 50/-
Straw and Consumables	:	Rs. 50/-

Working capital for 2 months Rs. 5,800/-

Total Capital investment: Rs. 65,800/-

Annual Cost

Working Capital	:	Rs. 34,800/-
Interest on TCI	:	Rs. 7,238/-
Depreciation (building) (5% of shed)	:	Rs. 2,000/-
Total	:	Rs. 44,038-00

Revenue

360 quintals vermicompost @ 250/- quintal	:	Rs. 90,000/-
1 quintal worms @ 40,000/ quintal	:	Rs. 40,000/-
Total	:	Rs. 1,30,000-00

Annual Profit = Rs. 1,30,000 - Rs. 44, 038 = Rs. 85, 962-00

Profit on sales = 66.12%

Return on capital investment: 130.6%



CENTRAL INSTITUTE OF POST HARVEST ENGINEERING & TECHNOLOGY, (CIPHET)
(A Unit of Indian Council of Agricultural Research)
LUDHIANA / ABOHAR (Punjab)

ENTREPRENEURSHIP DEVELOPMENT PROGRAMME (EDP)
on
POST HARVEST ENGINEERING & TECHNOLOGY

Central Institute of Post Harvest Engineering & Technology (CIPHET) Ludhiana / Abohar organizes intensive hands - on training programmes of generally one week duration for students, rural youth, farm women, rural artisans, technicians, entrepreneurs, extension workers / scientists as well as teachers of educational institutions / universities / KVKs, NGOs, food processing industries and other organizations. The training programmes are designed to equip the trainees with required skills in the trade with a focused emphasis on the entrepreneurship development. Details of the training programmes are given below.

Duration : One week
Fee : Rs. 2000/- per candidate (Lodging and Boarding charges extra)

EDP ANNUAL CALENDER

Sl. No	Subject Area	Tentative Dates
1	Construction, Operation and Management of Covered Cultivation Structures for High Value Crops	Jan. 2 - 8
2	Modern Dehydration Technology for Dairy Analogs and its Residue and Okara	Feb.7 - 13
3	Tomato Puree Manufacturing and Bottling Technology	March 5 - 11
4	Processing of Ber for Manufacturing of Value Added Products	April 5 - 11
5	Ginger, Garlic & Onion Powder Making Technology	May 15 - 21
6	Processing of Sunflower Seeds and its By-Products Utilization	June 11 - 17
7	Preservation of fruits and vegetables through dehydration for making value added products	July 4 - 10
8	Modern Dhal Milling Technology	July 11 - 17
9	Modified Atmosphere Packaging (MAP) of Fresh and Minimally Processed Vegetables	July 24 - 30
10	Fabrication, Operation and Maintenance of Mobile Ice Boxes / Cool Chambers for Fruits, Vegetables and Marine Products	Aug. 8 - 14
11	Processing of Mustard for Food and Industrial Uses	Aug.12 - 18
12	Manufacturing of Chili Powder and Paste	Aug. 17 - 23
13	Processing of Pomegranate and By-Product Utilization	Sept. 1 - 7
14	Modern Mechanical Oil Expression and Refining Technology	Sept. 17 - 23
15	Processing of Kinnow for Juice and By-Products Utilization	Oct. 8 - 14
16	Modern Stone Wheat Milling Technology	Oct.23 - 29
17	Processing of Aonla for Manufacturing of Value Added Products	Nov. 13 - 19
18	Evaporative Cooled Structure for Cultivation and Storage of Off-Season Crops	Nov. 22 - 28
19	Processing of Guava for Manufacturing of Value Added Products	Dec. 10 - 16
20	Grading and Shrink Packaging of Fruits and Vegetables for Urban Market	Dec.12 - 18

- Tailored made training programme can also be organized on request

For More Details Contact

Director or Head, Transfer of Technology Division

Central Institute of Post Harvest Engineering & Technology, Ludhiana / Abohar (Punjab)

Phone (Ludhiana):0161-2308669, Fax-161-2308670 E-mail: ciphet@sify.com.

Phone (Abohar): 01634-224024 Fax:01634-225313 E-mail: abciphet@jla.vsnl.net.in

The New Telephone numbers of this Institute are as under

Sr. No.	Official	Old Number	New Number
1.	Director's Office	2808669 2808674 2808670 (Fax) 2808196 (R)	2308669 2305674 2308670 2307196
2.	EPBAX	2809170 2809171 2808828	2304170 2303171 2308828
3.	PC (PHT)	2808672 (O) 2808826 (R)	2308672 (O) 2308826 (R)
4.	PC (APA)	2808673 (O)	2308673 (O)

© CIPHET reserves all rights to information contained in this publication, which cannot be copied or reprinted by any means without express permission.

For further details contact:

Dr. R.T. Patil, Director, or
Dr. R.K. Goyal, Information Manager
Central Institute of Post Harvest Engineering and Technology, Ludhiana -141004 (Pb.)
Phone: 91-161-2308669 (O); 91-1612307196 (R)
Fax: 91-161-2308670
Email: ciphet@sify.com
Web Page: <http://www.icar.org.in/ciphet.html>