



Central Institute of Post Harvest Engineering and Technology,

Ludhiana

Our Slogan: Produce, Process and Prosper

**CIPHET E – Newsletter for December 2007**

**Vol. 2 No. 12**

#### Director's Column



Dear All,

Last month I got an opportunity to visit Arunachal Pradesh and share with farmers of Basar about the scope of post harvest management for getting remunerative prices for their produce. This state is blessed with diverse agro climatic conditions and potential for growing organically variety of field crops, fruits, vegetables, spices, medicinal and aromatic plants, flowers and orchids etc. Since communication is a big problem in Arunachal Pradesh, the horticulture commodities grown cannot access long distance markets and thus there a great need for intermediate processing to convert low value high volume raw material into low volume high value intermediate products like puree and powders. This state is rich in horticultural crops mainly orange, pineapple, ginger, large-cardamom, turmeric, apple, kiwi, lemon etc. and medicinal and aromatic crops like geranium, Indian valeriana, tegetus, taxus, coptistita, aconitum, lissi, chirayata, patchouli, citronella, lemongrass, vetiver, agar, cubeba, ach, monjista are prominent, cane and bamboos are another two major forest produce in the state. If different promotional schemes for establishing NGOs, VOs, developing cooperatives for taking up post harvest management and value addition in production catchments are implemented effectively it will change the plight of the farmers.

To help achieve post harvest management at micro enterprise level a technique of ISWP-Individual shrink-wrap packaging has been standardized at CIPHET. It is a new technique for post harvest handling of fruits and vegetables, which extends the shelf life by preventing the moisture loss, maintaining firmness and reducing the respiration rate. It also delays the physiological deterioration of fruits some times even better than the low temperature storage. In general 10-20% reduction in transpiration rate is possible by shrink-wrap packaging under ambient condition. Such unit pack provides protection against abrasion and maintains an attractive appearance of the product. It avoids condensation of droplets within the package. One of the biggest advantages of individual shrink-wrap packaging is that it prevents secondary infection, which is important for long-term storage. Individual fruit wrapping also provide the optimum gas and humidity condition for maintaining the quality during transit and storage. The cost of packaging varies with the commodity to be wrapped or films to used for wrapping. In practice, it adds a packaging cost of Rs 0.80-1.25 to one kg of fruit and vegetable depending upon their sample size. This cost can be reduced further if tray wrap packaging of 6-10 units per pack is made. Shrink-wrapping also enhances the effectiveness of fungicide by slowing down its dissipation rate when fungicide treated fruits are shrink-wrapped. Individual shrink-wrapping thus produces a micro atmosphere that can be enriched with a suitable volatile fungicide and may acts as a fumigation chamber to control decay over a prolonged period.

At CIPHET we provide 7 days duration hands on training for the upcoming entrepreneurs who would like to take this up as a micro enterprise.

With this we present to you the 12<sup>th</sup> issue of CIPHET E-newsletter for 2007 and seek your valuable inputs and advise from time to time to serve farming community better.

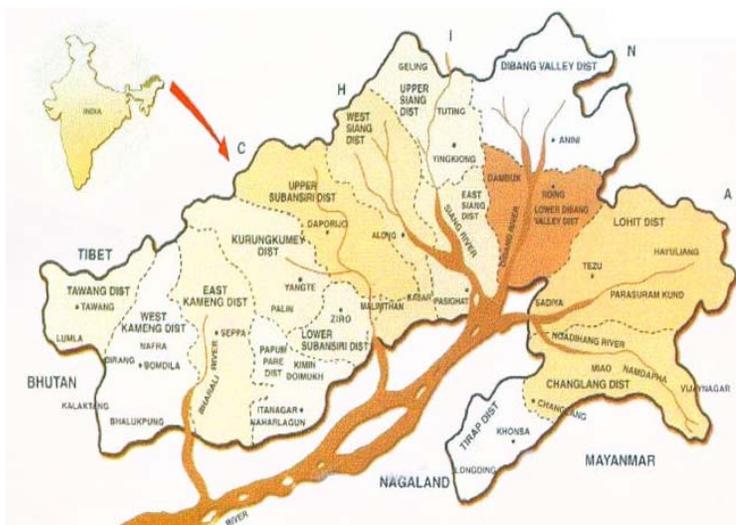
Wish you and your family a very happy 2008.

With best regards

R.T. Patil,  
Director

## Director, CIPHET visits Arunachal Pradesh

To encourage entrepreneurship in post harvest management and value addition, Dr. Patil, Director, CIPHET attended a seminar cum farmers fare at ICAR Research Complex for North East Regional Station at Basar in Arunachal Pradesh and delivered a key note lecture. The theme of the seminar was - *Entrepreneurship Development, Post Harvest Management and Marketing of Agriculture Produce in Arunachal Pradesh*. Arunachal Pradesh is largest hill state of North East and blessed with diverse agro climatic conditions and potential for growing organically variety of field crops, fruits, vegetables, spices, medicinal and aromatic plants, flowers and orchids etc. Though agriculture is the main occupation, it is technologically for behind then rest of the country. The difficulty to reach to this region has resulted in minimal use of fertilizer and pesticides thereby making the agriculture by default organic. Since communication is a big problem in Arunachal Pradesh, the horticulture commodities grown cannot access long distance markets. To overcome this problem there is a need to develop infrastructure like cold storage, pack house and refrigerator van at strategic locations and provide modern packaging and processing for converting them into preservable and value added products. The low value high volume raw material of North East has tremendous potential to become low volume high value produce after processing. This state is rich in horticultural crops mainly orange, pineapple, ginger, large-cardamom, turmeric, apple, kiwi, lemon etc. and medicinal and aromatic crops like geranium, Indian valeriana, tegetus, taxus, coptistita, aconitum, lissi, chirayata, patchouli, citronella, lemongrass, vetiver, agar, cubeba, ach, monjista are prominent, cane and bamboos are another two major forest produce in the state. The horticulture produce based processing industries which could be taken up on the small-scale are- orange, pineapple, ginger, large-cardamom, turmeric, apple, kiwi, cashew nut, betel nut, cane and bamboo. The farmers had attended this function in large number along with representatives from all concerned departments of state govt. The people are willing and enthusiastic to learn the new processing technologies and accept value addition as a feasible agro based enterprise. The representative from different financial and developmental organizations narrated different promotional scheme for establishing NGOs, VOs, developing cooperatives for taking up post harvest management and value addition in production catchments. The NERAMAC Ltd. has initiated a scheme for collection, transport and marketing of the Arunachal Pradesh product in the main market through NGOs and farmers group. These efforts are commendable as they are getting remunerative price for valuable ginger and other crop produce grown in Arunachal Pradesh.



The lecture by Dr. Patil covered information on various technologies developed and Entrepreneurship Development Programme (EDP) based on them conducted by CIPHET, which can help build confidence and improve skills of upcoming entrepreneurs. This attracted the rural youth attending the Kisan Mela and seminar. The examples of the success stories of agro processing entrepreneur in others parts of the country convinced them about feasibility of becoming an agro processing entrepreneur. The local polytechnic college showed keen interest in exposing their students to the opportunities in agro processing sector. Looking to enthusiasm shown by farmers, the student community, various govt. department, it seemed that developing modern agro processing cluster at Basar will be appropriate and will help in great way in changing the post harvest scenario in Arunachal Pradesh.

### **Future scope of non caloric sweeteners**

Dr. Patil delivered a special lecture on “**Processing Industry in Reference to Sweeteners- A global view**” covering mostly the information on non caloric sweeteners to the participants of the winter school on “Processing, Handling and Storage of Jaggery from Sugarcane” at IISR, Lucknow on 15<sup>th</sup> December 2007. Sugar, honey and Jaggery are commonly used sweetening agents. Jaggery is important for India because it is made for sugar cane juice in the production catchments. It is an important agro based enterprise providing employment in the rural area and effective value addition to farmer’s produce. Jaggery is a fair source of iron and has many health benefits. Due to higher incidences of diabetic patients, related diseases and increase in obesity, the consumption of caloric sweeteners is decreasing year after year. Hence, there is a need to develop non-caloric and non-nutritive sweeteners from other natural sources. The non-caloric sweeteners are either having zero calorie or are fully caloric with sweetness potencies so high that extremely low usage levels have no significant impact on the final caloric content of the product. In India, the literature survey on non-saccharin sweet plants indicate that there are 13 plants species, which are having the sweet principal which is 300 to 2000 times sweeter than sugar. These plant species are –

1. *Perilla frutescens* (L.) Britton (Labiatae), commonly known in various regional languages as: bhanjira (Hindi); ban tulsi (Bengali); jhutela (Kumaun)
2. *Stevia rebaudiana* (Bertoni) Bertoni (Compositae).
3. *Glycyrrhiza glabra* L. (Leguminosae) commonly known as licorice, liquorice; madhuka (Sanskrit), mulhatti (Hindi).
4. *Abrus precatorius* L. (Leguminosae) commonly known as Indian liquorice, jequirity gunja (Sanskrit and Marathi), ghungchi and rati (Hindi), kunni (Malayalam), kunch (Bengali).
5. The plant species *Achras sapota* L. (Sapotaceae).
6. *Hydrangea macrophylla* (Thunb.), Seringe (Saxifraceae) commonly known as amacha. *H. macrophylla*.
7. *Smilax glycyphylla* Sm. (Liliaceae) known as barichob-chini (Hindi), kukardara (Kumaun), harina-shuk-china (Bengali). *Smilax glycyphylla* Sm.
8. *Symplococos paniculata* Miq. (Simplocaceae) commonly known as sweetleaf, sapphire berry, lodhra (Sanskrit), ludh (Hindi).
9. *Citrus aurantium* L. (Rutaceae) commonly known as seville orange, khatta (Hindi), karna (Malayalam).
10. *Citrus paradisi* Macf. (Rutaceae) commonly known as grape fruit.
11. *Citrus sinensis* L. (Rutaceae) commonly known as betavian, sweet orange, musambi (Hindi), narangi (Bengali), kamala (Gujarati), nembia (Marathi).

12. Citrus limon L. (Rutaceae) commonly known as lemon, baranibu and jambira (Hindi), idalimbu (Marathi), pariya and yelumichai (Tamil).
13. Cynara scolymus L. (Compositae) commonly known as globe or burr artichoke, hathichak and hathichoke (Hindi), hathichoke and hathichoke (Bengali).

The discussion provided motivation to the participant to look into the scope of non-calorie sweeteners and to do further research on these plant species for commercial product development.

## **Indian Convention of Food Scientists and Technologists at IIT Kharagpur**

Dr. RT Patil Director CIPHET and Dr. D R Rai attended this convention. Dr. Patil delivered a plenary lecture on “Role of Post harvest Engineering & Technology in meeting the Food and Nutritional Security of the Nation” on Jan 1, 2008. The ICFOST-2007 on “Health Foods” was organized by The Association of Food Scientists & Technologists (India) [AFST(I)] at IIT, Kharagpur during 31<sup>st</sup> December, 2007 to 2<sup>nd</sup> January, 2008. Dr. Patil also chaired a technical session on “*Processed Food and dietary supplements*”. In his lecture he emphasized the importance of engineering and technology interventions to reduce the crop losses and add value to them at production catchments through establishing macro enterprises. The importance of proper harvesting, safe handling and packaging was emphasized for effective post harvest management and the technologies developed in this area by CIPHET were elaborated. Similarly, the tools and equipments developed at CIPHET for this purpose was discussed. The novel value added products developed at CIPHET were also covered in this lecture. Various training programmes and Entrepreneurship Development schemes started at CIPHET from last 1½ year were highlighted. The presentation was very much appreciated and developed lot of interest among the participants to visit CIPHET and learn new agro processing technologies to meet the growing demand of processed foods in the country.

Dr, Patil was also a member of panel for discussion on “Food Processing, Education and Development-Indian Perspective and Priorities” which was chaired by Prof. M. Chakroborty, Dy. Director, IIT, Kharagpur and moderated by Prof. P P Chakorbaorty, Dean, and co-ordinator Sponsored Research and Industrial Consultancy Centre of IIT, Kharagpur. Other panelist were Prof. S.R. Bhowmik, Former Director, CFTRI, Mysore; Dr. Bhimu Patil, Director, VFIC, Texas A&M University, USA; Dr. A.S. Bawa, Director, DFRL, Mysore and Er. Lalit Meshri of Tech-Know Consultants, Mumbai. The important issues, which emerged from this discussion were to develop human resources at ITI and Polytechnic level to meet the operational requirement of food processing industry. Proper and effective dissemination of knowledge of food processing technology developed at various R&D institutions in the country. Generate awareness among the population about the health benefits of various food sources to fight the modern day ailments. Effective coordination between the various R&D institutions working on food processing in the country and formation of consortium of various laboratories to meet the need of growing food industry to assure proper food quality and safety. It was also suggested that the food industry might recruit young graduates in their 3<sup>rd</sup> year of degree programme, so that they can take elective courses and the project suitable to recruiting agency.

Dr. Deepak Raj Rai, Sr. scientist presented a paper entitled “Effect of modified atmosphere packaging on physicochemical attributes of diced carrots” by Rai, D.R., Brar SS, Paul S, Wanjari OD” during the poster session. The poster highlighted the effect of modified atmosphere packaging

on the physical and chemical constituents of diced carrots wherein they can be stored for a longer period under packaged conditions in perforated film packages. In the study presented, carrots were peeled and diced to appropriate size and were kept under different modified atmospheres generated in perforated or non-perforated polypropylene (PP) film packages under low temperature storage (5°C). The control samples were kept under the ambient environment to assess the effect of modified atmospheres on the physico-chemical attributes such as weight loss, lycopene,  $\beta$ - carotene and in-pack water accumulation severity for diced carrots. Results showed that the different packaging treatments resulted in creation of a battery of modified atmospheres ranging from 0.57-15.2 % O<sub>2</sub> and 4.9-23% CO<sub>2</sub> which were having different effects on the selected physico-chemical constituents. While the weight loss was found to be more in case of control samples under ambient (18-22° C) environment, the in-pack water accumulation severity did not vary significantly among all the packaging treatments indicating the high water vapour production tendency of fresh-cut carrots. The lycopene content decreased slightly under all the packaging treatments, but was maintained under perforated 8 holes (0.3 mm diameter each) treatment. On the other hand, the  $\beta$ - carotene content increased slightly under all the packaging treatments, excluding 8 holes treatment that indicated that PP film with 8 macro-holes can be used to store diced carrots for four days at 5°C.

## **Humane Electrical Stunner**

Dr. S. K. Nanda, Project Coordinatr, AICRP (PHT) at CIPHET Ludhiana visited a centre at Tamilnadu Veterinary and Animal Sciences University, Chennai, The center has developed a low cost electrical stunner for small food animals with humane consideration. The team led by Dr. V. Venkataramanujam (now retired) and his associates Dr. K. Dushyanthan, Dr. M. Siddarth, Dr. S. Ezhilvelan and Dr. R. Narendra Babu were involved in the development of this instrument. The instrument has been tested with pigs using different voltages and 75V was found to be optimum for effective stunning. This instrument could be used for stunning other small animals like sheep and goats. This can be used under normal existing conditions using the regular electricity supply in the rural slaughterhouses. At Rs. 10,000/- cost, this stunner is about 90% cheaper than the imported ones.



## संसदीय राजभाषा समिति द्वारा सीफेट में हिन्दी में किए जा रहे कार्यों का निरीक्षण दिनांक 29.12.2007

निर्धारित कार्यक्रम अनुसार दिनांक 29.12.2007 को संसदीय राजभाषा समिति ने सीफेट में हिन्दी में किए जा रहे कार्यों का निरीक्षण किया। संसदीय समिति से प्राप्त प्रश्नावली को उपलब्ध रिकॉर्ड अनुसार आकड़े भरकर संसदीय समिति को प्रस्तुत किया। निरीक्षण के पश्चात संसदीय समिति ने संस्थान में राजभाषा पर किए जा रहे कार्यों की सराहना की परन्तु कहा कि सीफेट द्वारा हिन्दी में किए जा रहे कार्य की प्रतिशतता निर्धारित लक्ष्य से कम है, जिसके लिए समिति ने अपनी एक रिपोर्ट भेजी है जिसमें हिन्दी में किए जा रहे कार्यों को बढ़ावा देने के लिए लिखा है।

## संस्थान का स्थापना दिवस 29.12.2007

विगत वर्षों की भांति इस वर्ष भी संस्थान का 18वां स्थापना दिवस इस संस्थान के सभा कक्ष में सम्पन्न हुआ। इस समारोह के मुख्य अतिथि डॉ. पीतम चन्द्रा, सहायक महानिदेशक (अभियांत्रिकी) थे। इस समारोह में श्री हरीश चन्द्र जोशी, निदेशक, (राजभाषा) भारतीय कृषि अनुसंधान परिषद, नई दिल्ली भी उपस्थित थे, जो संसदीय राजभाषा समिति के सीफेट द्वारा हिन्दी में किए गए कार्यों के निरीक्षण के संदर्भ में लुधियाना आए थे। अपने भाषण में इस संस्थान के निदेशक महोदय ने कहा कि अब हमारा संस्थान 18 वर्ष का हो गया है और 19वां वर्ष लग गया है। उन्होंने यह भी कहा कि अब पूरे भारत की निगाहें इस संस्थान पर टिकी हैं। इसके अतिरिक्त अलग-अलग वक्ताओं ने अपने विचार पेश किए। समारोह के बीच इस संस्थान के चार श्रेष्ठ कर्मचारी-2007 को मीमेटो के साथ रु 1000.00 नकद पुरस्कार देकर सम्मानित किया गया जिनका ब्यौरा इस प्रकार है :-

- |  |                    |
|--|--------------------|
| 1. डॉ. आर. के. गोयल, प्रधान वैज्ञानिक  | - वैज्ञानिक श्रेणी |
| 2. श्री कुंवर सिंह, प्रवर श्रेणी लिपिक | - प्रशासनिक श्रेणी |
| 3. श्री महीपाल सिंह, टी-6              | - तकनीकी श्रेणी    |
| 4. श्री सरूप सिंह, एस.एस.जी.-I         | - सहायक श्रेणी     |

इसके अतिरिक्त उन अधिकारियों एवं कर्मचारियों को मीमेटो देकर सम्मानित किया गया जिन्होंने दिनांक 29.12.2007 तक 10 वर्ष को सेवा काल पूर्ण कर लिया था, जिनकी संख्या लगभग 21 थी। स्थापना समारोह का समापन बहुत ही अच्छे ढंग से पूर्ण हुआ।



**Chief guest Dr. P. Chandra ADG (PE) and Dr. Joshi, Director, Hindi, ICAR, New Delhi on the occasion of CIPHET Foundation day**



**CIPHET Staff during foundation day celebrations**



**CIPHE T Staff during foundation day celebrations**



**An employee receiving memento on completion of 10 years of service at CIPHE T**

### **Hindi training at NAARM, Hyderabad**

श्री जे.एस.पाल, सहा.प्रशा.अधि. एवं श्री अवतार सिंह, प्रवर श्रेणी लिपिक ने नार्म हैदराबाद में आयोजित तीन दिवसीय कार्यशाला में भाग लिया गया था। इस कार्यशाला में राजभाषा अधिकारियों की कार्यान्वयन में भूमिका, अनुवाद की समस्याओं और कृषि संबंधी पारिभाषिक शब्दावली आदि पर एक विस्तृत चर्चा हुई। यह कार्यशाला अधिकारियों के लिए बहुत ही लाभदायक थी जिसमें अधिकारियों के लिए प्रतिदिन आने वाली समस्याओं पर विस्तार से चर्चा हुई। कार्यशाला के अंतिम दिन नार्म, हैदराबाद के निदेशक, डॉ. एस.एम. इल्यास ने सभी प्रतिभागियों को प्रमाण पत्र वितरित किए।

इसके अतिरिक्त दिनांक 04.12.2007 से 06.12.2007 तक शंकड़ अनुभाग से श्री अश्वनी कुमार, अवर श्रेणी लिपिक ने नए पेंरोल से संबंधित प्रशिक्षण/सॉफ्टवेयर की जानकारी हेतु प्रशिक्षण लिया। अब श्री अश्वनी कुमार इसी के आधार पर अधिकारियों एवं कर्मचारियों का वेतन तैयार करते हैं।

# Project profile for Bee Breeding as micro enterprise

## Introduction

Honey is a sweet and viscous fluid produced by honeybees and is derived from the nectar of flowers. Honey is significantly sweeter than table sugar and has attractive chemical properties for baking. Honey has a distinctive flavor, which leads some people to prefer it to sugar and other sweeteners. Most microorganisms do not grow in honey because of its low water activity of 0.6. A main effect of bees collecting nectar to make honey is pollination, which is crucial for flowering plants. In the good old days honey was produced by naturally growing bees on trees. These days' beekeepers rear the honeybees in bee boxes for production of honey. This has become a commercial enterprise. The business of bee keeping requires quality queen bees to continue the colonies of honeybees so as to produce good quality honey.

The term queen bee is typically used to refer to an adult, mated female in a honeybee colony or hive; she is usually the mother of all the bees in the hive. The *queens* are developed from larvae selected by worker bees and specially fed in order to become sexually mature. There is normally only one adult, mated queen in a hive. Queen bee is the dominant reproductive female in a hive.

When conditions are favorable for swarming or when the old queen starts to fail, the worker bees of a colony will begin to develop one or more new queens. The queen will develop from an egg (or sometimes very young larva) identical to eggs, which will develop into worker bees. The young queen develops differently because she is more heavily fed royal jelly, a protein-rich secretion from glands on the heads of young workers. (All honey bee larvae are fed some royal jelly for the first few days after hatching but only queen larvae are fed on it exclusively.) As a result of the difference in diet, the queen will develop into a sexually mature female, unlike the worker bees.

Queens are raised in specially constructed queen cells, which are larger than the cells of normal brood comb and are oriented vertically instead of horizontally. As the young queen larva pupates with her head down, the workers cap the cell with beeswax. When ready to emerge, she will chew a circular cut around the cap of her cell. Often the cap swings open when most of the cut is made, so as to appear like a hinged lid. When a young queen emerges, she will generally seek out her rivals and attempt to kill them. Unlike the worker bees, the queen's stinger is not barbed. The queen can sting repeatedly without dying. The workers of the colony may, on occasion, thwart the young queen in her attempt to kill the rivals. For example, during the swarm season, workers may separate young queens, allowing the extra queen(s) to leave with after swarms. A honeybee colony is treated as single organism, and the individual bees as simply cells of the organism; they cannot survive on their own. The queen is responsible for the reproduction of the cells but also is responsible through her own pheromone production for the reproduction of the whole colony. This is called swarming.

Supersedure is the process by which an old queen bee is replaced by a new queen. Supersedure may be initiated due to old age of a queen or a diseased or failing queen. As the queen ages her pheromone output diminishes. Supersedure may be forced by a beekeeper. For example, by clipping off one of the middle or posterior legs from the queen, she will be unable to properly place her eggs at the bottom of the brood cell. The workers will detect this and will then rear replacement queens. When a new queen is available, the workers will kill the reigning queen by "balling" her — clustering tightly around her until she dies from overheating. (This overheating method is also used to kill large predatory wasps that enter the hive in search of food and may be used against a foreign



<b>Total Capital investment</b>		
1.	Fixed Capital	4,65,000-00
2.	Working Capital for 3 months	75,000-00
	<b>Total</b>	<b>5,40,000-00</b>
<b>Annual Cost</b>		
1.	Total working capital	3,00,000-00
2.	Depreciation @ 40%	1,62,000-00
3.	Interest on Total Capital investment @ 11%	59,400-00
	<b>Total</b>	<b>5,21,400-00</b>
<b>Total Sales (per annum)</b>		
1.	Queen bees 4000 nos.@Rs.200/queen	8,00,000-00
2.	Honey 2000 kg @Rs.50/kg	1,00,000-00
	<b>Total</b>	<b>9,00,000-00</b>
<b>Profitability</b>		
	Annual profit* (Annual sales-annual cost)	3,78,600-00*
	Profit on sale	42 %
	Return on capital investment	70.11 %
	Pay back period	2.76 years
<b>(*at 100 % capacity utilization)</b>		

## **Women Entrepreneurship Development Programme by NITCON and CIPHET**

Women Entrepreneurship Development Programme (Sponsored by Ministry of Science and Technology) and was organized by North India Technical Consultancy Organization (NITCON) Chandigarh with technical collaboration with CIPHET, Abohar during October to December, 2007. This period included promotional phase, which was done by NITCON, and during instructional phase of training (20.11.07 to 31.12.07), CIPHET was involved for providing technical help in training of food processing segment of EDP. Dr. R.K. Gupta, Head, Horticultural Crop Processing Division was one of the Coordinator for above Entrepreneurship Development Programme.



Women upcoming entrepreneurs undergoing training in fruits and vegetable processing at Abohar

## **Entrepreneurship Development Programme on processing of guava into novel value added products**

Entrepreneurship Development Programme on processing of guava into novel value added products was conducted at CIPHET, Abohar from 10-16 December 2007. Dr. Ramesh Kumar, Scientist (Horticulture) coordinated the training programme and provided the hands on experience for processing and preservation of guava into guava leather, guava bar, dehydrated ring, squash, whey based RTS beverages, guava pulp and jelly. There were two participants from Maharashtra and one from West Bengal in this training programme.



The guava products made by the EDP trainees

## **Entrepreneurship Development Programme on grading and shrink-wrap packaging of fruits and vegetables**

Entrepreneurship Development Programme on grading and shrink-wrap packaging of fruits and vegetables for urban marketing was conducted at CIPHET, Abohar from 10-16 December 2007. Dr. R.K. Gupta, Head, Horticultural Crop Processing Division was the Coordinator and Dr. Ramesh Kumar; Scientist (Horticulture) was Co-coordinator for this programme. The participants were exposed to grading and shrink packaging of kinnow, guava, apple, peach, pomegranate, tomato and capsicum. The participant was also provided with hands on experience on tray wrapping and modified atmosphere packaging of selected fruits and vegetables.



EDP trainees having hands on experience with ISWP (Individual Shrink Wrap Packaging)

## **CIPHET Establishes Facility for Evaluation of Packaging Film Properties**

Modified atmosphere packaging is a technology which along with low temperature storage helps in creating an appropriate headspace inside the polymeric film packages containing a fruit or vegetable. The technology helps in extension of shelf-life and retention of physic-chemical constituents of the stored produce. However, for successful implementation and sustenance of the headspace atmosphere, it is necessary to know the characteristics of the packaging films before hand. Thickness and gas permeability are two important parameters of plastics/ polymeric film packages, which are the pre-requisite for a successful design, and application of modified atmosphere. At Central Institute of Post Harvest Engineering and Technology, Ludhiana, a microprocessor controlled thickness and a gas permeability tester for polymeric films has been commissioned and the facility is a state of the art facility for this purpose. While the thickness tester can accurately estimate the exact thickness of any polymeric film, the gas permeability tester can evaluate the gas permeability characteristics of the film at any temperature for oxygen, carbon dioxide and nitrogen in a short period of time and can display the results in different units of measurement as per the requirement of end user. The instruments are being used for research and training purposes and the facility is also open to scientists/ researchers from other organizations on payment basis.



**Gas permeability tester for plastic films**



**Thickness tester for plastic films**

## Technology of the month

### Shrink-Wrap Packaging of Fruits and Vegetables

Individual shrink-wrap packaging is a new technique for post harvest handling of fruits and vegetables. A team of scientists at CIPHET, Abohar has standardized this novel packaging technique for various fruits like kinnow, peach, guava, apple, pomegranate and vegetables such as tomato and capsicum. The individual shrink-wrap packaging extends the shelf-life by preventing the moisture loss, maintaining firmness and reducing the respiration rate. It also delays the physiological deterioration of fruits some times even better than the low temperature storage. In general 10-20% reduction in transpiration rate is possible by shrink-wrap packaging under ambient condition. Such unit pack provides protection against abrasion and maintains an attractive appearance of the product. It avoids condensation of droplets within the package. One of the biggest advantages of individual shrink-wrap packaging is that it prevents secondary infection, which is important for long-term storage. Individual fruit wrapping also provide the optimum gas and humidity condition for maintaining the quality during transit and storage. As a result, it doubles or at times triples the shelf life of fruits and vegetable without any refrigeration. The extent of benefit from shrink-wrap packaging depends upon the type of produce, its physiological maturity and initial quality. Fruits having large surface to volume ratio are particularly more susceptible to water loss and this technique has been found to be a boon for extending storage life of such produce. The machine with window size of 350x200 mm and conveyer speed of 1-2 meter per minute can give an output capacity of 80-100 kg fruits per hour. However, the cost of film packaging varies with the commodity to be wrapped or films to used for wrapping. In practice, it adds a packaging cost of Rs 0.80-1.25 to one kg of fruit and vegetable depending upon their sample size. This cost can be reduced further if tray wrap packaging of 6-10 units per pack is made. The shelf life of selected fruit and vegetables as a result of individual shrink-wrap packaging is given below

Commodity	Film thickness	Shelf life			
		Ambient storage (days)		Cold storage (weeks)	
		Unwrapped	Wrapped	Unwrapped	Wrapped
Kinnow	25 $\mu$	15	30	6	10-12
Capsicum	20 $\mu$	5	17	3	6-7
Tomato	15 $\mu$	9	19	3	5-6
Guava	25 $\mu$	5-7	12	2	3-4
Peach	20 $\mu$	6-7	15	2	4-5
Apple	25 $\mu$	12	30	14	18-20
Pomegranate	20 $\mu$	10	25	6	12

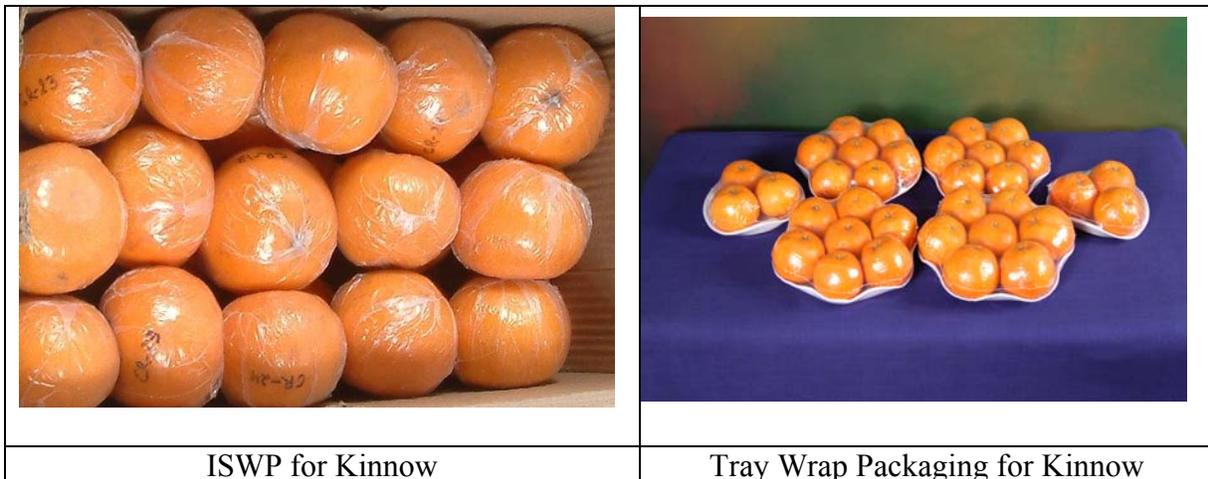
Shrink-wrapping enhances the effectiveness of fungicide by slowing down its dissipation rate when fungicide treated fruits are shrink-wrapped. Individual shrink-wrapping thus produces a micro atmosphere that can be enriched with a suitable volatile fungicide and may acts as a fumigation chamber to control decay over a prolonged period. Recent advances in design and manufacturing of heat shrinkable films have stimulated interest in shrink-wrap packaging. Machinery is now commercially available that automatically applies film to farm produce of various sizes and shapes at rapid rates. The following few equipment are required for shrink wrap packaging of produce:

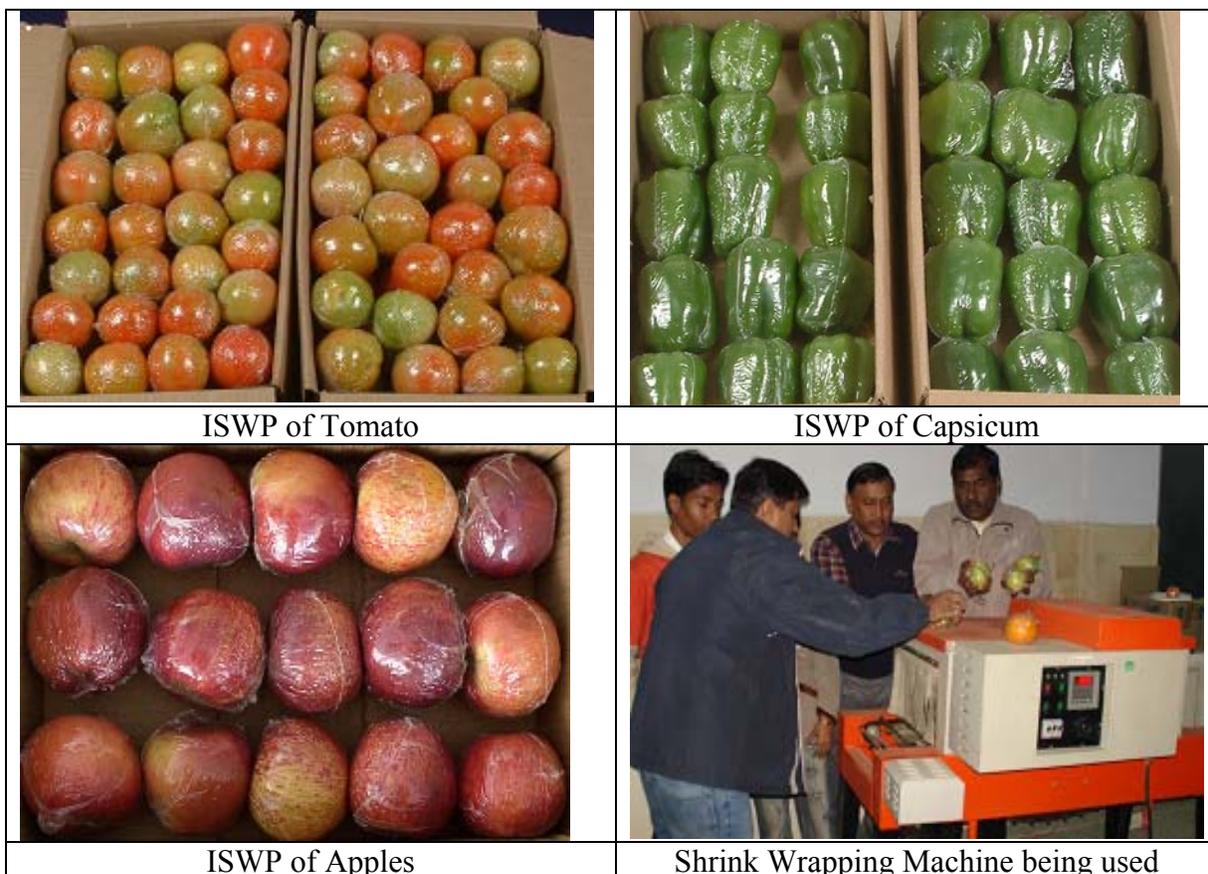
1. Shrink wrapping machine or hot gun
2. L-sealer or impulse sealer
3. Heat shrinkable polymeric film

The film for shrink packaging should be low in water permeability, low in thickness but having high tensile strength, low permeability to O<sub>2</sub> and high permeability to CO<sub>2</sub>, glossy and transparent and should have ability to shrink at low temperature.

Initially the fruits or vegetables are loosely sealed in polymeric film with the help of impulse sealer. These fruits are placed on the conveyer belt by providing a base support so that the fruit may not come in direct contact with the conveyer belt. They are then passed through heat-shrunk tunnel where fruits are exposed to hot blown air for a short period. The film is then shrunk tightly around the produce. In case of tray wrap packaging, produce is first sealed in a consumer pack of suitable size and then passed through the hot tunnel to form a tight wrap. Besides, different films have different sensitivity to heat shrinkage and ultimate wrap depend upon the temperature of hot air, airflow rate and duration of produce kept in the hot tunnel. In any case, temperature of tunnel should not be more than 180-210°C for individual wrap and 140-145°C for tray wrap packaging. Subjecting the produce beyond this temperature will result in tissue injury. Further, the produce should be kept for minimal possible time in the tunnel and the duration of such exposure must not exceed 15-30 seconds depending upon the type of film used. A basic principle is that the fruits or vegetables should be maintained for an adequate period of time inside the tunnel at the lowest temperature that will provide an effective shrinkage of film around the produce. Shrink-wrapped fruits are immediately cooled to remove the excess heat for 2-3 hours at 5-10°C or by rapid ventilation. Thereafter such fruits can be packed in plastic crate for further storage/transportation.

At **CIPHET** we provide 7 days duration hands on training for the upcoming entrepreneurs who would like to take this up as a micro enterprise.



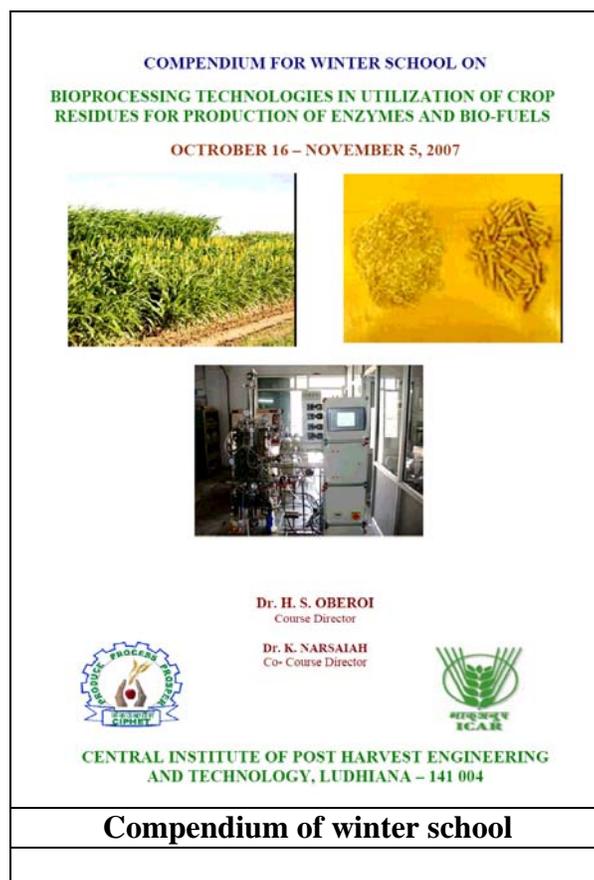


### **CIPHET scientist receives fellowship of the National Academy of Agricultural Sciences (NAAS)**

Dr. K. K. Singh, Head, Food Grains & Oilseeds Processing Division, has been elected as Fellow of the National Academy of Agricultural Sciences (NAAS) during the year 2008. Dr. Singh has received the recognition for his overall contribution in the area of Agricultural Processing and Food Engineering. He has made significant contribution in cryogenic grinding of spices. He has a number of good publications in high impact journals, a textbook, awards and fellowship to his credit. Congratulations to Dr. KK Singh from CIPHET family.



## Publications of the Month



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