



# Central Institute of Post Harvest Engineering and Technology, Ludhiana

Our Slogan: Produce, Process and Prosper

**CIPHET E – Newsletter for November 2006**  
**Vol. I No. 5**

## **CIPHET offers consultancy to Sri Lanka**

Dr. R.K. Goyal, Sr. Scientist visited Sri Lanka Institute of Post Harvest technology, Anuradhpura as a Indian Consultant on food Processing Engineering under ICAR – CARP work plan for the year 2006 – 07. He provided consultancy on various aspects of Post Harvest Engineering & Technology, which include drying, pulse milling, rice milling, tomato and onion grading, and product development. Besides, he delivered a lecture on Appropriate technologies and agro processing for value addition to Agricultural produce to post graduate students of Agriculture at Peradeniya University Kandy and also made a presentation on status of post harvest engineering and technologies in India" to the national committee on Post harvest Technology of Sri Lanka at Colombo. Dr. Goyal's visit to Sri Lanka has marked a beginning of long standing collaboration between two institutes and countries.



**Dr. Goyal with Prof. HPM. Gunasena, Executive Director, CARP and Director, IPHT, Sri Lanka**

## **CIPHET participates in celebration of INDIA-GFAR-APAARI DAY.**

CIPHET Participated in INDIA-GFAR-APAARI DAY (Pre conference event) held at NASC auditorium on November 2006. Institute displayed postures, value added production in the exhibition. The response was encouraging and

it was stressed that institute presentation should be included in multimedia presentation of ICAR.

### **CIPHET scientists gets advanced training in USA**

Dr. Harinder Singh Oberai successfully completed international Norman Borlaug Fellowship programme in the area of biofuels at Auburn University, Auburn, Alabama, USA from Oct. 9 – Nov. 9, 2006 under the Indo-US Knowledge Initiative. He got an opportunity to work with Dr. Oladiran Fasina and Dr. Steven Taylor, Department of Biosystems Engineering in the area of compaction of agricultural biomass. Besides, he worked in Dr. Y.Y Lee's laboratory in the Department of Chemical Engineering, Auburn University on different pretreatments given to the agricultural residus for delignification and amximum solubilization of cellulosic and hemicellulosic fractions of the lignocellulosic material. He also got an opportunity to learn advanced analytical techniques used in biomass compositional analysis. He also attended World Food Prize symposium from October 17-19, 2006 at Des Moines, Iowa, USA and conference on Energy solutions for Alabama at Auburn during October 23-24, 2006.

### **Observance of Communal Harmony Campaign and Fund Raising Week.**

Both campuses of CIPHET at Ludhiana and Abohar observed Communal Harmony Campaign and Fund Raising Week during 19<sup>th</sup> to 25<sup>th</sup> November 2006. Debate on maintaining communal harmony was organized on 24<sup>th</sup> November, 2006 as a part of the week at Abohar. Dr. D.B. Singh, Sr. Scientist, Dr. Rajbir Singh, Sr. scientist, Dr. A.K. Thakur, Sr. Scientist and Mr. Pawan Kumar, Assistant took part in the debate. Besides, organizing the debate, Flag Day was also observed during Communal Harmony Campaign on 24<sup>th</sup> November, 2006. Committee consisting Dr. D.B. Singh, Er. A.R.P. Kingsly and Shri V.K. Saharan collected the donations at Abohar and Dr. Nanda, Dr. Uppal and Dr. Jain at Ludhiana by distributing sticker flags among the institute staff as well as out side agencies who generously donated for the purpose.

### **Institute-industry interface meeting & Sensitization Workshop on Food Processing under Indo-US Knowledge Initiative in Agriculture**

CIPHET organized two-day meet during Nov 14-15, 2006 at Ludhiana. Dr. SK Nanda and Dr. SN Jha coordinated this event in which about 75 delegates representing various food processing industries and scientists from northen, western and central India participated. Dr. Pitam Chandra, ADG (Process Engineering) ICAR, New Delhi was the Chief Guest and Dr.R.T.Patil, Director, CIPHET, chaired the function. In the inaugural session, Director, CIPHET emphasized the objective of meeting in modernization of food processing industry. He listed and explained all the technologies developed at CIPHET, Ludhiana that were ready for commercialization. Dr. P. Chandra, congratulated CIPHET for organizing such an important meeting at Ludhiana and advised the researchers to get the feedback from industries for refinement of technologies and insisted that the interface meetings should be conducted regularly. Project Coordinators of AICRP on PHT and APA also gave outlines of the technologies developed under their schemes, which are ready for

commercialization. Two letters of intents for collaborative developmental work with M/s Osaw agro, Ambala & Choudhary Agro Bio Tech, Jaipur were signed during the meeting. Dr. Pitam Chandra also presented the structure and framework of collaborative of projects being taken in Indo-US Knowledge Initiative Programme. He informed that food processing is an important area in a joint project on Indo-US Knowledge Initiative in Agriculture, in which both USA and India will work on cutting edge technologies in food processing by exchange of scientists, private entrepreneurs working in food processing sector.

In industry presentation M/s Neotel Systems & Services, Chandigarh presented the work done on commercialization of nondestructive sorting of mango based on maturity and total soluble solids contents taken from CIPHET, Ludhiana on license. Various industries working in the field of post-harvest technology and food processing presented their work and deliberated about their expectations from CIPHET, Ludhiana. M/s Osaw Agro, Ambala acknowledged the contributions of CIPHET in developing Tomato processing pilot plant which they have supplied to many entrepreneurs. Mr. Lalit D. Meisheri presented the dehydration aspects of the horticulture products including flowers, vegetables, herbs, and medicinal and aromatic product. The rural entrepreneurs from Abohar namely M/s Nissan foods and M/s Satguru Industries discussed about the problems in the processing industries especially in the sauce and ketchup Industry.

In session on presentation from other ICAR institutes, Dr. S. D. Deshpande from CIAE Bhopal presented the technologies developed at CIAE, Bhopal and Dr. B. S. Modi from DWR, Karnal gave presentation on seed processing.



The major recommendations/ decisions taken during this meeting were as follows:

1. CIPHET, Ludhiana should hold Institute-Industries interface meeting at least once in a year.

2. Technologies for drying of high value crops based on heat pump principle as developed by M/s Techno Consultant Mumbai is recommended for use by farmers/entrepreneurs for drying to meet the quality and food safety requirement for export.
3. For production of high quality food, good quality of raw material is essential. Companies engaged in food processing must help the farmers for producing quality raw materials.
4. CIPHET may hold Crop specific Institute- Industries interface meeting involving concerned commodity agencies such as Aonla growers associations, Guava growers associations etc.
5. Institute and Industry should work together to develop a long-standing relationship. CIPHET, Ludhiana proposed collaboration with private industries/ entrepreneurs for solving their problems related to Post-Harvest and food processing through a scheme of annual as well as 5 year membership (Rs.1000 for 1 year, Rs.5000 for 5 years).
7. CIPHET should conduct an interface meeting between CIPHET and progressive farmers in the country so that they can be motivated to adopt processing of their produce.
8. CIPHET should help entrepreneurs in testing quality of their produce at nominal charges.

### **Participation**

- i. Women play a very important role in value addition and processing of foods at domestic level. The skills available with them to effectively use the resources and various food ingredients to prepare various ethnic value added products has remained untapped for developing entrepreneurship. A two day workshop on " Women and Food Technology: Successful Micro-enterprise" held at IIT, Delhi on 29 – 30, November 2006 was step in that direction. CIPHET participated in this important event and shared the knowledge and experience in developing women operated micro-enterprises in food processing. Dr. Patil, Director delivered a key note address to the workshop participants on soy based women micro enterprise and also delivered a special lecture on technologies developed by CIPHET which can be adopted for empowerment of rural women through establishment of micro enterprises.
- ii. Dr. Patil, Director visited CIAE Bhopal on 18.11.2006 and had discussions with scientists of Agro processing division on various activities to be taken up in the 11<sup>th</sup> plan with active interaction of CIAE and CIPHET. He also delivered a special lectures on extrusion of legumes and modeling of extrusion process for process control to participants of the winter school on "Application of extrusion cooking technology for food processing with specific reference to Soybean" at Soybean Processing and Utilization Center, CIAE, Bhopal
- iii. CIPHET also collaborates with various agencies involved in spreading the knowledge in establishing rural agro processing enterprises. In the month of November NITCON, Chandigarh had organized Technology based Entrepreneurship Development Programme (TEDP) at CIPHET Abohar where the processing of various fruits developed by CIPHET was demonstrated and taught to upcoming entrepreneurs. Dr. Patil, Dr. DB Singh, DR. Rajbir Singh, Dr. Jangra delivered the lectures to the participants.

- iv. Dr. D. Dhingra participated in 18<sup>th</sup> Indian Convention of Food Science and Technology (ICFOST - 2006) and present poster on " Studies on Osmotic Dehydration of Banana" held during 15.11.2006 to 18.11.2006, at Hyderabad.
- vii. Dr. Mridula D., Dr. R.K. Gupta and Dr. V.K. Bhargav Participated in International conference on " Post Harvest Technology and Value Addition in cereals, pulses & oilseeds held during 27 – 30, November, 2006.
- viii. Dr. D. B. Singh In charge CIPHET, Abohar and Sh V. K. Saharan attended one day Seminar on "Citrus Production" organized by Department of Horticulture under National Horticulture Mission on 17th Nov. 2006 at Abohar. Dr. D.B. Singh also gave a lecture on "Post Harvest Management of Citrus crop".

**Promotions:**  
 Sh Hardev Singh T-2 (Driver) promoted to T-3  
 Sh. Satwinder Singh, SSG-II promoted to T-1 (Lab Asstt.)

**Awards:**  
 Dr. S. N. Jha, Sr. Scientist of the institute has been awarded Dr. JC Anand Gold Medal for outstanding contribution and displaying leadership in Post Harvest Management of Horticultural Crops particularly fruits by Horticultural Society of India.

**Joining:**  
 Sh. Sanjay Kumar Gaur joined as LDC on 6.11.06

**Project Profile of the Month - Processing technology of major spices**

**Turmeric**

India is the largest producer, consumer and exporter of turmeric, which covers about 6 % of total area under spices. The flow chart for processing of turmeric rhizomes is shown in Fig.1

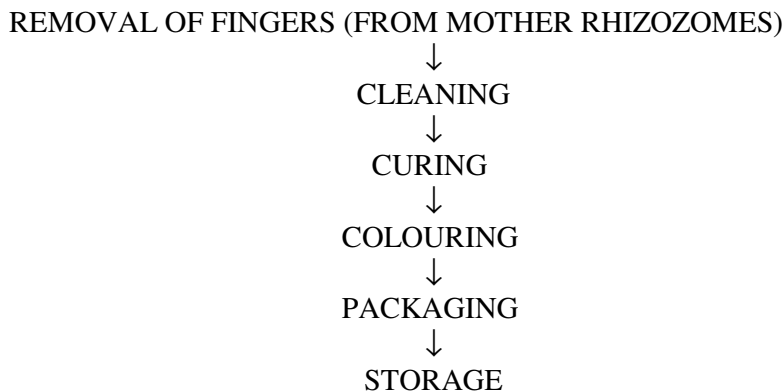


Fig. 1 Flow chart for processing of turmeric rhizomes

In case of ground turmeric care should be taken regarding the size of the ground particles. Following flow chart depicts the production methodology used to obtain ground turmeric powder.

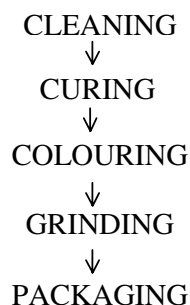


Fig. 2 Flow chart for ground turmeric

### **Black Pepper**

Black pepper is also known as “king of spices”. It has the highest position in the international market. Usually whole pepper is marketed. The method employed to get the marketable whole pepper is shown in Fig. 3



Fig. 3 Flow chart for processing of marketable whole pepper

In small scale industries, winnowing or use of blowers are used for cleaning whereas in large-scale industries multiple sieve cum air classifier type are used. The grading is according to Compulsory Grading Scheme, for exports in India. The pungent principle alkaloid piperine having a melting point (129-130<sup>0</sup>C) is approximately 4 - 10% in pepper. It is responsible for its biting taste. The adulteration comprises of dust, dirt, stem, chaff, and papaya seeds. Pepper with moisture content of 10-11% (w.b.) is packaged in high-density polyethylene (H.D.P.E.) pouches of 200 gauge. The method of preparation of ground pepper is illustrated in Fig. 4.

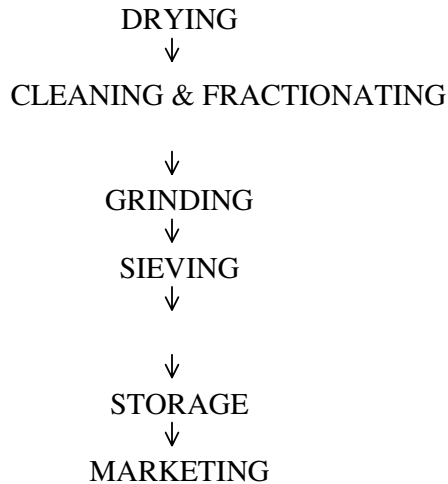


Fig. 4 Flow chart for processing of ground pepper

### Chillies

Primary processing of chillies essentially consists of drying and spiking. Better retention of colour and higher yield of finished product, avoiding breakage of pods and loss of seeds are achieved by adopting improved technologies. The flow chart for processing of chillies into whole dried chillies is illustrated in Fig. 5

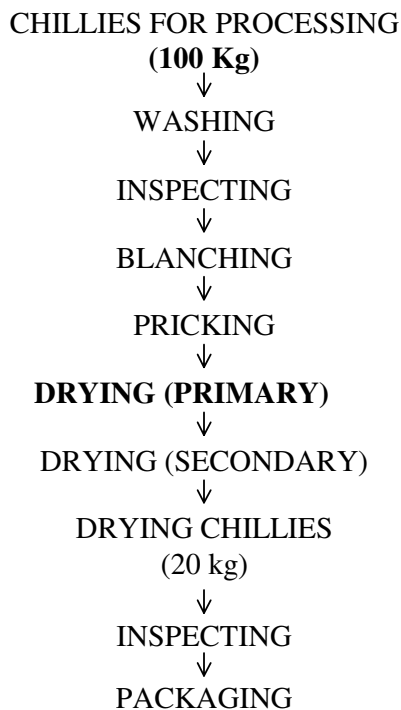


Fig. 5 Flow chart for dehydration of chillies

Artificial drying has advantages over traditional sun drying in that the product is more consistent and of a better quality, the time taken is less and crop losses are also minimized. The dried chillies are ground and packed into retail containers.

## BENEFIT COST ANALYSIS

The benefit cost analysis of the project has been done on the basis of the following assumptions:

- Land and building will be obtained on rent.
- Average capacity of the unit: 1.5 tonnes/month (75% of the rated capacity 2 tonnes/month)
- Recovery: 98 %
- Monthly repair and maintenance charges: 1 % of the cost of machines.
- Depreciation on machines and equipment: 10 % p.a.
- Depreciation on furniture and tools: 20 % p.a.
- Rate of interest: 11% p.a.
- No. of working days in a month: 25
- Total no. of working days in year: 300
- Working hours per day: 8
- Boiled dried turmeric, dried chillies, coriander and pepper will be obtained from market.
- Capacity utilization: 1<sup>st</sup> yr 50%; 2<sup>nd</sup> yr 60%; 3<sup>rd</sup>yr 70%; 4<sup>th</sup> yr 80 %; 5<sup>th</sup> yr onwards 90%.

The detailed calculations are presented as follows:

### Total Capital Investment

(i) Fixed capital	Rs. 83,000
(ii) Working capital for 1.5 months	Rs. 1,22,775
<b>Total</b>	<b>Rs. 2,05,775</b>

### Cost of Production / Annual Cost

Total working capital	Rs. 9,82,200
Depreciation on m/c's & equipment (10% p.a.)	Rs. 6,300
Depreciation on office furniture & tools (20% p.a.)	Rs. 1,000
Interest on total capital investment @ 11 % p.a.	Rs. 22,635
<b>Total</b>	<b>Rs. 10,12,135</b>

### Total Sales (per annum)

Black pepper (150x12x0.98 = 1764 kg)	@ Rs 110/kg	Rs. 1,94,040
Turmeric (450x12x0.98 = 5,292 kg)	@ Rs 70/kg	Rs. 3,70,440
Chillies (450x12x0.98 = 5,292 kg)	@ Rs 70/kg	Rs. 3,70,440
Coriander (450x12x0.98 = 5,292 kg)	@ Rs 40/kg	Rs. 2,11,680
<b>Total sales</b>		<b>Rs. 11,46,600</b>



### **Profitability (per annum)**

Annual Profit = Annual Sales – Annual Cost  
= Rs. 11,46,600 - Rs. 10,12,135  
= Rs. 1,34,465

Profit on sale = 11.73 %

Return on capital investment = 65.34 %

### **Break Even Point (B.E.P.) and pay-back period**

Fixed Cost

I.	Interest on total capital investment @ 11%	= Rs. 22,635
II.	Depreciation	= Rs. 7,300
III.	40% of annual wages = 0.4x4000x12	= Rs. 19,200
IV.	40% of overheads (incl. utilities) = 0.4x8350x12	= Rs. 40,080
V.	Rent = 12 x 2000	= Rs. 24,000

Fixed cost = (i)+(ii)+(iii)+(iv) = Rs. 1,13,215

B.E.P. =  $1,13,215 / (1,13,215 + 1,34,465) = 0.457$  or 45.7 %

Pay-Back Period = total cost of project / profit =  $83,000 / 1,34,465 = 0.62$  years

### **LIST OF MACHINERY MANUFACTURERS AND SUPPLIERS**

1. Vishal Machinery Store, GT Road, Opp. Jagraon Bridge, Ludhiana – 141 008.
2. Grewal Agencies, GT Road, Opp. Jagraon Bridge, Ludhiana – 141 008.
3. Kapur Mill Gin Store, Gurudwara Dukh Niwaran Road, Ludhiana – 141 008.
4. Nalanda Agro Works, Nalanda Nagar, Kurji, Patna – 800 010.
5. DP Pulveriser Works, Modi & Modi Building No. 2, II nd Floor, 76 Nagindas Master Road, Fort Mumbai – 400 023.
6. Punjab Engineering Works, Phase IV, Mohali, Punjab.
7. Kaps Engineers, 831, GIDC Makarpura, Vadodra - 390 010, India.
8. Premium Engineers Pvt. Ltd., 603, Chinubhai Center, Nehru Bridge Corner, Ashram Road, Ahmedabad – 380 009.
9. Argus Industries, K 19, Industrial Estate, Ambattur, Chennai – 600 058.
10. Meakins Agro Products Private Ltd., “MEKINS HOUSE” 6-3-1090/B/2 Rajbhavan Road, Somajiguda, Hyderabad – 500 482.

## Technology of the month

### LOW COST POLYHOUSE TECHNOLOGY FOR OFF-SEASON VEGETABLE PRODUCTION

#### Procedure of erecting polyhouse in field (15x4.5m)

- A 4.5x15 meter rectangle is marked on the site oriented in East-west direction. Make sure that the two diagonal of the rectangle are equal.
- Mark four points on the four corners of the rectangle, marking a point every 1.5 m distance until reaching the other corner. The same procedure is repeated in the center and on the other side of the rectangle.
- Dig 15 cm diameter holes to 50 cm depth on all marked points with the help of auger. This way you will get 13 holes each in both side of rectangle and in center of the floor.
- The central pole (9 cm Dia, 8 ft height) will be put in the central line of rectangle and the side pegs (6 cm dia, 3ft length) will be put in holes after treating with charcoal on both side of rectangle. After putting the poles and pegs as discussed, fill sand around the central poles and pegs and compact it well.
- The bamboo strip (20 ft length) will be fixed on side pegs and central pole in such a way that it becomes straight and make shape of quonset and tightened on both side and at center with the help of GI wire (across the length).
- The bamboo strip will also be fixed laterally on the structure (length wise) at a distance of 1.5 meter to give more strength to the structure. The strips are then tightened with poles with the help of GI wire. Ordinary plastic is tightened on each strip to reduce the sharp edges which otherwise will damage/tear the plastic film.
- After fabrication of the frame, spread the calculated length of polyethylene film over the structure from one end to the other without wrinkles and keeping the edge together. Extreme care should be taken while spreading the sheet to avoid any puncture or tearing.
- The film should be buried carefully on each side with sufficient amount of soil. Two gates should be installed in east and west direction by putting one more central pole on each side. The film is tied with these poles.

#### Do's and Don'ts in Greenhouse Construction

- a) Structure should be properly oriented and sufficiently strong to withstand the wind pressure.
- b) Film must be stretched and secured to the frame tightly, to avoid tearing the film.
- c) Sagging of the film could be avoided by drawing GI wire over the arches tightly.
- d) Sufficient ventilation should be given for exchange of air/heat.
- e) All ventilation must be provided with insect proof mesh.

#### MATERIAL REQUIRED FOR POLYHOUSE (15 x 4.5 m) Effective area of polyhouse for cultivation is 50m<sup>2</sup>

		Length	Quantity	Price
<b>A. Bamboo</b>				
i)	Central pole ( 9 cm dia)	8.0 ft	15	300.00
ii)	Side pegs (6 cm dia)	3 ft	26	350.00
iii)	Split bamboo strips	20ft	30	550.00

<b>B. Cladding Material</b>		
UV Stabilized sheet (200 micron, 7 18 M m width)	25 kg	2800.00
<b>C. Other Materials</b>		
Tarkol 5 kg, GI. Wire 3kg, nut - bolts, ordinary plastic film ( 5kg)	-	250.00
<b>D. Labor</b>	8 man days	600.00
	<b>Total</b>	<b>4850 .00</b>
	<b>Cost Per m<sup>2</sup>= 71.8</b>	
	<b>Rs.</b>	
	<b>Say 72 Rs/ m<sup>2</sup></b>	



## Director's Column



**Dear All,**

Women play a very important role in value addition and processing of foods at domestic level. The skills available with them in effective use of resources and food ingredients to prepare various ethnic value added products has remained untapped for developing entrepreneurship. A two day workshop on " Women and Food Technology: Successful Micro-enterprise" held at IIT, Delhi was a step in that direction. CIPHET participated in this important event and shared the knowledge and experience in developing women operated micro-enterprises in food processing.

CIPHET also organized two-day Institute industry interface meet during Nov 14-15 at Ludhiana. About 75 delegates representing various food processing industries and scientists from northern, western and central India participated. There was a good interaction between the scientists and industry personnel and it was felt that CIPHET should hold such meetings at least once in a year. Another important suggestion that emerged was to hold Crop specific Institute-Industries interface meeting involving concerned commodity agencies and also interface meeting of scientists and progressive farmers from different parts of the country so that they can be motivated to adopt processing of their produce on their farms. A scheme for more active collaboration of CIPHET with private industries/ entrepreneurs for solving their problems related to Post-Harvest and food processing through annual as well as 5-year membership (Rs.1000 for 1 year, Rs.5000 for 5 years) was also launched during this meeting.

The spices are important crop of our country and though they are produced mostly in Kerala, the spice milling is an important micro enterprise in every town or city. This is because the spices in raw form are generally traded in bulk and hence their milling separately or in combination offers potential for micro enterprise especially for women. Hence **project profile** given this month is on spice milling. The **Technology of the month** is on low cost poly house, which also offers promise for micro enterprise.

**WISHING YOU A VERY HAPPY AND PROPSEROUS NEW YEAR 2007**

**R.T. Patil**  
**Director**

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