



Central Institute of Post Harvest Engineering and Technology, Ludhiana

Our Slogan: Produce, Process and Prosper

CIPHET E – Newsletter for January, 2008
Vol. 3 No. 1

Director's Column



Dear All,

The New Year 2008 has brought in a new resolutions and enthusiasm among our staff with joyful celebration of Republic Day on Jan 26 at CIPHET Ludhiana and also at Abohar campus. We hope that coming year will bring in more rapid progress in post harvest sector. However one of the handicaps in agro-based industry is unreliable availability of electrical energy. To promote agro-processing industry in rural sector, assurance of quality power will be needed. However, the power situation by the conventional means is unlikely to improve in future. It is, therefore, essential that traditionally used renewable of sources of energy are exploited efficiently, particularly in the rural areas where agricultural biomass is available in abundance. Solar, wind, water, stream and biomass are free energy sources and need to be harvested as a complete package to provide assured power at reasonable cost for development and prosperity in villages. I had an opportunity to interact with scientists of All-India Coordinated Research Project on Renewable Sources of Energy for Agriculture & Agro-based Industries. Looking to the work done under AICRP on Renewable Sources of Energy, I feel that the time has come to promote entrepreneurship in rural energy production. The enterprises should be established to convert biomass and animal waste into electrical energy through bio-gas or producer gas and provide it to meet the energy requirement of the villages and agro industries in that catchment.

Another important concern for Indian agriculture is to gear up to meet the challenges of climate change, increasing population and food shortages. This can be achieved through precision farming or precision agriculture. It is a concept relying on the existence of in-field variability. It's about doing the right thing, in the right place, in the right way, at the right time. The initiative of NAARM in organizing a Brainstorming workshop on Curriculum Design for Precision Agriculture was a step in right direction and at right time. CIPHET has contributed to this cause through participation of Dr. PR Bhatnagar, PC (APA)

The technology developed by research institutes unless it is transferred to end user and put into practice the mission is not complete. One such technology on mustard sauce was earlier developed in the lab at CIPHET and transferred to M/s Cremica Ltd, Ludhiana. Now a pilot plant for extraction of mustard flour free from glucosinolates was fabricated by the company with consultancy from CIPHET for technical guidance in fabrication of the unit. The unit consists of a pre-grinder for mustard into grits, a bio reactor and decanter. The capacity of the unit is 30 kg of mustard grind per batch with process time of 20 min. The production of 12 kg of husk @ 2% moisture content, mustard flour of 20 kg @ 5% moisture content and water extract of 80 liters is obtained. Since at present mustard flour is being imported by the company, the production based on CIPHET technology will be an import substitute and will result in saving of valuable foreign exchange. The unit was tested successfully at CIPHET and installed at the factory premises for commercial production of mustard flour/paste.

This month another important event we had was meeting of Punjab State Agricultural Implements Manufacturers Association at CIPHET. This association of dedicated entrepreneurs was in away responsible for first green revolution of the country and we hope that with their support and cooperation we can achieve similar feat in increasing post harvest activity.

With best regards

R.T. Patil,

Renewable energy for agro processing

One of the handicaps in agro-based industry is unreliable availability of electrical energy. In the context, the work done under AICRP on Renewable Sources of Energy is highly useful to promote agro-based enterprises in rural catchments. For last three decades India is struggling with the problem of shortage of electric power. Small and medium industry in general and food processing in particular has been the worst sufferer. To promote agro-processing industry in rural sector, assurance of quality power will be needed. However, the power situation by the conventional means is unlikely to improve in future. It is, therefore, essential that traditionally used renewable sources of energy are exploited efficiently, particularly in the rural areas where agricultural biomass is available in abundance. Solar, wind, water, stream and biomass are free energy sources and need to be harvested as a complete package to provide assured power at reasonable cost for development and prosperity in villages. It has been estimated that 65-75% of the total energy consumed in rural sector is for its domestic activities and processing activities are confined only to cereal milling (stone mills) and rice milling with hullers. The processing activities in rural areas in post harvest management and value addition can be increased if proper arrangement for quality power is made.

Director, CIPHET Dr. R.T.Patil, visited Bhopal during January 10, 2008 and co-chaired a session on operational research projects of All-India Coordinated Research Project on Renewable Sources of Energy for Agriculture & Agro-based Industries. The operational research projects presented in sessions were on biogas production, efficient burners, use of poultry waste for biogas production, solar tunnels dryers for agricultural produce etc. Looking to the work done under AICRP on Renewable Sources of Energy, the time has come to promote entrepreneurship in rural energy production in production catchments. The enterprises should be established to collect the biomass/animal waste and convert it into electrical energy through bio-gas or producer gas and provide it to meet the energy requirement of the villages from where biomass is collected. Such project could be viable if upcoming enterprises are trained and motivated in installation and operation of renewable energy units with financial and technological support from AICRP on Renewable Sources of Energy and Ministry of New and Renewable Energy, Government of India.

Project Coordinator (PHT) visits, IISR, Calicut

Dr. S.K. Nanda, PC (PHT) chaired the session on Post Harvest Technology in the Institute Research Council meeting of Indian Institute of Spices Research, Calicut on 22 January 2008. He also presented an overview of AICRP on PHT with emphasis on achievements with regard to spices viz. Garlic, Ginger, Cardaman, Pepper and cumin.

Project Coordinator (APA) Visits Junagarh

Dr. Bhatnagar PC (APA) visited Junagadh centre at Junagadh Agricultural University, Junagadh on 16-18 January 2008 to review the on-going experiments on climate control of greenhouses with different cooling systems i.e. natural ventilations, partially or fully evaporative cooling system with automatic electronic control systems. The system is equipped with temporal strategies (month-wise) to maintain suitable climate throughout the year for best floriculture and vegetable production inside the greenhouse. Another experiment was on plastic mulching. He interacted with the farmers at village Vadal to undertake participatory research with active involvement of the farmers at the farmer's field.

Precision agriculture and IT Management in Agriculture

Precision farming or precision agriculture is a concept relying on the existence of in-field variability. It's about doing the right thing, in the right place, in the right way, at the right time. It requires the use of new technologies, such as global positioning (GPS), sensors, satellites or aerial images, and information management tools (GIS) to assess and understand variations. Collected information is used to more precisely evaluate optimum sowing density, estimate fertilizers and other inputs needs, and to more accurately predict crop yields. It will avoid applying inflexible practices to a crop, regardless of local soil/climate conditions, will help to better assess local situations of disease or lodging. Dr. P.R. Bhatnagar, Project Coordinator (APA) participated in Brainstorming workshop on Curriculum Design for Precision Agriculture and one year PG Diploma on IT Management in Agriculture at NAARM, Hyderabad on January 21-22, 2008. The inaugural session was chaired by Dr. S.M. Illyas, Director, NAARM and Dr. A. Alam, VC, SKUAS&T, Srinagar was the chief guest. The workshop was attended by more than 20 experts in the field of precision farming and information technology. The discussion was initiated with the presentation of Dr. Raj Khosla, Colorado State University, USA. He presented the concept of Precision farming and discussed about the need of it in present perspective. Dr. B.S. Bisht, ADG, also presented the precision farming systems, being researched in India related to production and post harvest processing. A course curriculum was prepared for inclusion in the various undergraduate degree programme in the State Agricultural Universities. The other topic of discussion was Information Technology in Agriculture. The discussion was initiated with the presentation by Dr. Raj Khosla, on Applied Information Technology in Agriculture conceptualized in Colorado State University.

CIPHET celebrated republic day

	
Cricket team for 26 th Jan games	Cricket in progress
	
Volleyball team for 26 th Jan games	Volleyball in progress



Flag hoisting



Children's games on 26th Jan 2008

हिन्दी की मासिक कार्याशाला एवं संगोष्ठी

राजभाषा कार्यान्वयन समिति की सिफारिश के आधार पर संस्थान में दिनांक 08.01.2008 को डॉ. के नरसईया, वरिष्ठ वैज्ञानिक द्वारा हिन्दी की मासिक कार्याशाला एवं संगोष्ठी का आयोजन सभा कक्ष में किया गया जिसमें डॉ. आर. टी. पाटिल, निदेशक सीफेट, लुधियाना द्वारा "देश की प्रगति में सीफेट का योगदान" शीर्षक पर सभी अधिकारियों एवं कर्मचारियों को संबोधित किया। सीफेट द्वारा विकसित उपस्कर एवं तकनीकों पर रोशनी डालते हुए भविष्य में और भी उज्ज्वल कार्य के लिए संस्थान के सभी अधिकारियों एवं कर्मचारियों को प्रेरित किया गया।

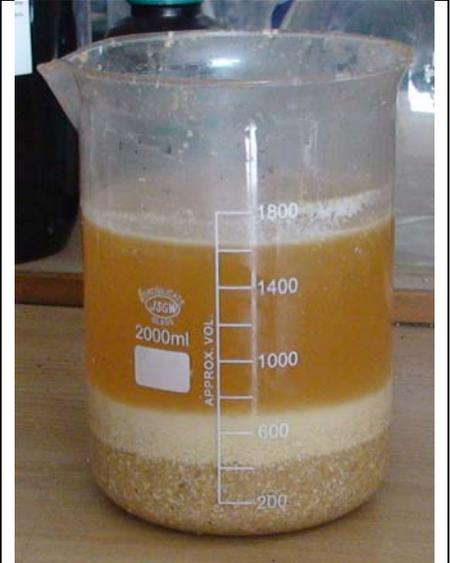
Pilot Plant for Mustard Flour in PPP mode

Based on the technology already transferred to M/s Cremica, a pilot plant for extraction of mustard flour free from glucosinolates was fabricated by the company with consultancy for CIPHET at Rs. 1 lakh for technical guidance in fabrication of the unit. The unit consists of a pre-grinder for mustard into grits, a bio reactor and decanter. The capacity of the unit is 30 kg of mustard grind per batch with process time of 20 min. The production of 12 kg of husk @ 2% moisture content, mustard flour

of 20 kg @ 5% moisture content and water extract of 80 litres is obtained. Since the flour of the mustard is to be used for making mustard sauce by the company it can be directly used in paste form at 60% moisture content and hence there is no need to dry it further. The unit was tested successfully at CIPHET and installed at the factory premises for commercial production of mustard flour/paste.



L to R Mr Surinder Singh (general Manager), Dr. Patil, Director, CIPHET, Dr. Tyagi, Sr. Scientist (Chem Engg) and PI and Mr. Promen Sharma, Manager (Quality Assurance) during testing and evaluation of the pilot plant.



Separation of different components in a beaker



CIPHET develops bioreactor for extraction and fractionation of mustard components for Pilot Plant

The reactor consists of an insulated steam jacketed pressure vessel of 0.18 m³ with stirrer, inlet for ground mustard, outlet for volatiles at the top and outlet for processed charge at the bottom. A pressure and temperature gauges are provided for process control and stirrer is operated at 60 RPM with 1 HP vertical shaft mounted electric motor. The charge along with required quality of water is fed in the reactor and processing along with stirring done at specific pressure and temperature. The volatiles are collected from upper outlet and condensed with circulating water. The processed material is then transferred in the decanter.



CIPHET Decanter for fractionation of mustard components

The processed mustard slurry from the bioreactor is collected in this decanter for fractionation. The slurry based on the sp. Gravity of each component settles in layers. The husk, which is a heavy component, settled at the bottom whereas the mustard flour particles suspended in the water along with fat float at the top, the central portion is that of water extract devoid of husk and flour. The size of the decanter is 60 cm in dia and 154 cm in height and made from food grade stain less steel. The outlets are provided for easy removal of the components at the bottom of their layer and husk is removed from the bottom. The conical bottom is easy for material removal and washing of the vessel.

Kinnow show at Ganganagar (Rajasthan)

Kinnow show (Kinnow Pardarshani) organized by Uttam Bhandan, a unit of Chambal Fertilizers and Chemical Ltd. Ganganagar on 23.01.2008. Dr. D.B. Singh, Sr. Scientist (Horticulture) CIPHET, Abohar acted as judge as well as delivered a lecture on “Post Harvest Management of Kinnow”. In his lecture orchardists were made aware about the post harvest operations like safe harvesting, sorting and grading, waxing and shrink wrapping and storage conditions for increasing the shelf-life and value addition of the kinnow.



Dr. Desh Beer Singh, Sr. Scientist CIPHET evaluating the Kinnow samples

Training on drip irrigation equipment

Dr. Satyendra Kumar was invited by Krishi Vigyan Kendra, Sangaria, Rajasthan for providing the technical know-how to the unemployed youth about the Drip Irrigation Equipment. Program was organized under Rajasthan Mission on livelihoods for sprinkler and drip irrigation equipment technicians. Twenty five participants (23 men & 02 women) were the beneficiaries. During this programme, he delivered lectures on selection criteria of irrigation systems, development of layout plan for drip irrigation system and preparing a list of materials required for installation of drip irrigation system in orchard apart from field experience on fitting of pipes, emitters, valve etc; and precaution in operation and maintenance of drip irrigation system.

Participation in NAIP project preparation

CIPHET Scientists participated in preparation of following NAIP project for CIPHET as a Cooperating Centre;

1. Standardization of production technology, conserving biodiversity and development of value chain for underutilized fruits and vegetables of arid and tribal dominated areas (submitted by MPUA&T, UDAIPUR-RAJASTHAN).
2. Synergistic Effect of Cultivation Practices, Post Harvest Technologies and Supply Chain Management on the Quality and Marketability of Horticultural Crops of Commercial Importance (Submitted by AMU, Aligarh)

Tools and machinery for horticulture

Dr. R.K. Gupta, Head, Horticultural Crop Processing Division participated in the Interaction Meeting on Tools and Machinery for the Development of Horticulture held on 18th January 2008 at Central Institute for Subtropical Horticulture, Lucknow. Interaction Meeting consisted of Technical Session on Scenario of Machinery for horticulture and Tools and Machinery for Horticultural Crops Participants were from industry, farmers and scientists. In the plenary session. Dr. Nawab Ali, DDG (Engg.) and Dr. H.P. Singh, DDG (Horticulture) were also present. Dr. Gupta presented the technologies/equipments developed for various post harvest operations including the storage of horticultural crops for their value addition and enhanced shelf life.

National symposium on Bio-Entrepreneurship and Biobusiness opportunities

Dr. H.S. Oberoi, Scientist (Microbiology) at CIPHET, Ludhiana attended a two days National symposium on Bio-Entrepreneurship and Biobusiness opportunities at New Delhi on January 28-29, 2008. The symposium was organized by Biocore Technologies, New Delhi with the major objectives of promoting small and medium enterprises in Biotechnology, establishing linkages between industry, academia and entrepreneurs and providing platform for knowledge sharing and for creation of new enterprises. The sessions covered different aspects of Biotechnology such as Human and Animal Biotechnology, Entrepreneurship in Agriculture, Horticulture and Veterinary products, Industrial Biotechnology, Biotech product and services marketing and Regulatory Compliances. The prominent dignitaries present during different sessions through the symposium included Prof. Asis Dutta, Director NIPGR and Ex-VC, JNU, Prof MP Yadav, VC, Sardar Ballabh Bhai Patel University of Agriculture and Technology, Prof A.N. Maitra, Professor Emiratus, Department of Chemistry, University of Delhi, Dr. J.N. Verma, MD, Lifecare Innovations Pvt Ltd, Dr. P.K. Ghosh, Ex-Advisor, DBT and Dr. Goutam Ghosh, Director, Biocore Technologies and CE), PL&S Group, New Delhi. Dr. Oberoi made two presentations during the symposium, one on the CIPHET showcase highlighting the technologies developed by CIPHET for farmers, entrepreneurs and Industry and the other on Cost effective production technologies for enzymes used in food industry from crop residues.

National convention of agricultural engineers

The Institution of Engineers (India) is the largest multi-disciplinary engineering professional society, established with a view to promote and advance the science, practice and business of engineering. The Institute of Engineers has got fifteen different engineering divisions. Agricultural Engineering

Division is one of among them. The National Convection of Agriculture Engineers with a theme “Ergonomics and safety management in agricultural machinery and equipments” was organized by The Institute of Engineers (India) Udaipur local centre during Jan 18-20, 2008. Dr. Jain presented a research paper titled "Determination of convective heat and mass transfer coefficient of green chilli under natural and forced convection of solar drying"

High resolution imaging in agriculture

High resolution imaging techniques is helpful in exploring structural, molecular and nano-realms and would aid in development of nanotechnologies relevant to agriculture and food systems, animal and human health, and material and industrial products. Dr. K. Narsaiah, Senior Scientist, AS&EC Division, attended the training on “High Resolution Imaging in Agriculture” at PAU, Ludhiana during 9-01-2008 to 23-01-2008. The training included hands on training on Scanning Electron Microscopy (SEM), Transmission Electron Microscopy (TEM), Energy dispersive Spectroscopy (EDS), Atomic Force Microscopy (AFM), Ultracut microtome, Ion Sputter Coater, Critical Point Dryer and other high resolution imaging techniques. During the training carbon nanotubes and viruses were imaged using TEM, profiling of bacteria using AFM and seed morphology using SEM. During the training demonstrations were also held on the state of the art imaging technologies such as live cell imaging and cell tracking using co focal laser scanning microscopy and fluorescence microscopy.

Applications of food biotechnology

Dr. K.Narsaiah, Senior Scientist, AS&EC Division, attended National Seminar on “Food Biotechnology- Present Scenario” as invited speaker on 30 January 2008 at MCMDAV College for Women, Chandigarh and gave presentation on microencapsulation of probiotic microorganisms as lead speaker in the technical session on Probiotics and Prebiotics.

The market for this food biotechnology continues to expand, in parallel with growing consumer awareness of the role of diet in health maintenance, and represents an exciting market opportunity for the Food and Dairy Industries. Nutraceutical and functional foods including foods containing probiotic and prebiotics represent the largest segment of the processed foods market. Many reports indicate that there is poor survival of probiotic bacteria in probiotic foods. Further, the survival of these bacteria in the human gastro-intestinal system is questionable. The encapsulation of probiotics in hydrocolloid beads is helping improve their survival rate right through processing and digestion. Providing probiotic living cells with a physical barrier against adverse environmental conditions is therefore an approach currently receiving considerable interest. The technology of micro-encapsulation of probiotic bacterial cells evolved from the immobilised cell culture technology used in the biotechnological industry. Several methods of micro-encapsulation of probiotic bacteria have been reported and include spray drying, extrusion, emulsion and phase separation. None of these reported methods however, has resulted in the large numbers of shelf-stable, viable probiotic bacterial cells necessary for use in industry for development of new probiotic products. The most commonly reported micro-encapsulation procedure is based on the calcium-alginate gel capsule formation. Kappa-carrageenan, gellan gum, gelatin and starch are also used as excipients for the micro-encapsulation of probiotic bacteria. The currently available equipment for micro-encapsulation is not able to generate large quantities of uniform sized micro or nano capsules. There is a need to design and develop equipment that will be able to generate precise and uniform micro or

nano capsules in large quantities for industrial applications. The incorporation of prebiotics in shell materials of microcapsules provides symbiotic effect to probiotics. There is also need to validate the health benefits scientifically.

Punjab state agricultural implements manufacturers association meeting at CIPHET

Monthly meeting of the Punjab State Agricultural Implements Manufacturers Association (Regd.) was held at CIPHET on 26th January, 2008. The meeting was held at CIPHET to provide information on machines and equipment for food processing. Eleven members attended the meeting. Dr. R.T. Patil, Director, CIPHET, addressed the manufacturers, and highlighted the achievements of CIPHET in the area of post harvest technology. He explained the machines, hand tools and products developed by CIPHET. Dr. Matthew Prasad, Head, Transfer of Technology Division, CIPHET, explained the various entrepreneurship development programmes being organized by CIPHET and the membership programme of CIPHET for entrepreneurs. Sh. Tehal Singh Seehra, Chairman and Sh. Harbans Singh, General Secretary appreciated the activities of CIPHET and thanked Dr. Patil and Dr. C.J.S. Pannu for their efforts in arranging the programme at CIPHET. It was decided in the meeting that in future representative from CIPHET will always attend the meeting of the association to strengthen the activities of the association and to motivate the members of the association to take up manufacturing of post harvest equipments.



L to R: Dr. Matthew Prasad, Head TOT, Dr. Pannu, Chairman Punjab Chapter of ISAE, Dr. Patil, Director CIPHET and Sh. Harbans Singh, General Secretary



Sh. Tehal Singh Seehra, Chairman addressing the participants

Patent awareness workshop

A patent awareness workshop was held on 18.01.2008 at Ludhiana College of Engineering and Technology (LCET), Ludhiana. It was inaugurated by Dr. R.T. Patil as Chief Guest. The workshop was organized by LCET in collaboration of PIC, Chandigarh and TIFAC, New Delhi. Participants from various industries institutes and R&D organizations attended the workshop. Dr. Patil in his inaugural speech highlighted the importance of patent, copy right and similar documentations on indigenous knowledge and literature. He put example of how India fought the patent of turmeric & neem taken by US firms in absence of proper documentation of our indigenous knowledge. Dr. Neelima Jeerath, additional director (Environment) and incharge, PIC, acquainted the audience with the basics of patenting as she disclosed that simple innovations like safety pin, sewing machine needle, tumleric powder etc could be patented if the same were original in nature. He urged the Indians to lead in number of patents, which is must for financial as well as social development of our country. Other experts presented their papers and showed the path to get patents even for simplest new finding. Patent examiner, Mr. P.P. Singh gave the tips of writing patent. Dr. S.N. Jha, Sr. Scientist presented a paper on Technology Management and Patenting process at CIPHET, Ludhiana.



L to R: Dr. RT Patil, Director, CIPHET; Mr. VK Gupta Chairman, LCET, Pawan Kumar, Principal, LCET and Mr. Satpal Sharma, CEO, Emson Gears, Ludhiana

Technology of the month

LAC SCRAPING MACHINE

Introduction

Lac is a natural, resinous complex secreted by a tiny, primitive soft bodied insect, through a large number of glands situated all over its body. The present lac production of about 20,000-22,000 t in India is mostly contributed by states of Jharkhand, Chhattisgarh, M.P., Orrisa, West Bengal, Maharashtra, Assam, A.P., and Gujarat. India is world leader in lac production, installed processing capacity and export. Lac is the only source of natural resin besides wax and dye, all of which are safe for different applications especially, related to human consumption and contact. Being natural, easily available, non-toxic in nature, soluble in common solvents, very good film forming ability, adhesive and moulding properties, lac resin find applications in diverse areas: Surface coating (furniture polish, paint, varnish), printing ink, handicraft, jewellery, gasket cement, sealing wax, micanite,

leather finishing, insulating varnish etc. Some of the emerging areas where lac resin and dye find usage are – coating of fruits, vegetables; synthesis of fine chemicals (aleuritic acid, isoambrettolide etc.); coating of candy and chocolate; lac dye as food colour in beverages and sausages etc. The insect which secretes the encrustations of lac as a protective coating is theoretically an injurious insect cultivated on account of the commercial value of its protective secretion. Palas (*Butea monosperma*), Ber (*Ziziphus mauritiana*) and Kusum (*Schleichera oleosa*) are the major hosts for this insect. Lac is a major foreign exchange earner for the country, since around 90% of lac produced in India is exported in the form of processed products like seedlac, shellac/buttonlac, dewaxed and decolorized lac. Lac dye which is a by-product of lac processing is used for coloring of various food and animal products.

After harvesting from trees, lac is in the form of sticklac (Encrustations of lac surrounding the sticks of host plants). Traditionally, lac is scrapped from the sticks with the help of a knife and then it is sent to the factories as such without any grading for processing into shellac, bleached lac, dewaxed or decolorized lac. The process is very laborious, time consuming and lot of impurities such as sand, dirt, stick and fine wood particles also get mixed with the scrapped lac encrustations. On an average, a person can scrap about 10 kg of lac in a day, manually. Separation of the impurities is carried out by additional unit operations such as sieving and winnowing, which increase the processing cost. The scrapped lac encrustations are non-uniform in size and require further crushing /grinding in the factories to obtain the desired size of raw lac suitable for making different products.

Hence two machines have been developed by a team of scientists led by Dr. Rai at CIPHET Ludhiana. The machine known as lac scrapping machine is suitable for scrapping of lac encrustations, faster than traditional manual process, and combined lac scrapper cum grader (20 and 50 kg capacity per hour) is suitable for production of graded raw lac at individual lac grower's level.

Advantages of the invention as compared to traditional process

- Test results have shown that lac scrapper cum grader has capacity of 20 kg/h for kusum lac sticks having a moisture content of 3% (dry basis) which is higher than the prior art of traditional scrapping, manually. Thus in a shift of 8 hours one can roughly scrap and grade 160 kg and 400 kg of lac sticks by 20 kg/h and 50 kg/h capacity lac scrapping cum grading.
- The quality of graded lac received from the machine is much better as compared to prior art since the graded lac does not get a chance to get mixed with the stick fragments.
- The scrapped and graded lac obtained by this machine can be stored by the lac grower and can be later sold at suitable market price.
- The machine is likely to reduce human drudgery and increase the profits of an individual lac grower, since the machine not only scraps the lac, it also crushes and grades it in to different required grades. Further, use of the machine for scrapping and grading would enable a lac grower to have sufficient time at his disposal for other agricultural operations.
- The machine is powered by a 1.5 kW, 3-phase electric motor and requires one person for its operation. The machine is portable and can be easily transported from place to place as per the requirement of the user. The 50 kg/h capacity machine needs 2 persons for operation.

	
CIPHET Lac scrapper cum grader (20 kg/h)	High capacity Lac scrapper cum grader (50 kg/h)

Job opportunities at CIPHET – Abohar

Name of the post	Qualification
Programme Officer, Pay: @ Rs. 10,000-500-11000 pm (fixed)	Essential: M. Tech. (Agril. Processing)/ M. Tech. (Food Engg. And Technology) Desirable: Working Knowledge of computer
Project Assistant Rs. 8000-500-9000 pm (Fixed)	Essential: B. Tech. in Agril. Engg./B.Tech. (Food Engg. And Technology)/ M. Sc. (Food Technology)/Master Degree in Chemistry/ Bio-Chemistry/ M.Sc. in Bio-Sciences with specialization in Chemistry / Bio-chemistry. Desirable: Working Knowledge of Computer

Project duration: 2½ Years

Name of the project: Development of process and equipments for value addition of small millets at rural level. Sponsored by: DST, New Delhi.

The project will commence from 1st April 2008 at CIPHET, Abohar. The Walk-in Interview will be held at CIPHET, Ludhiana on 26th March 2008 at 2.30 PM. The interested candidates may send their bio-data through post or through E-mail (ram_k_gupta1959@yahoo.co.in) to Dr. R.K. Gupta, Head, Horticultural Crops Processing Division, CIPHET, Malout Hanumangarh Bye Pass, Abohar – 152116 (Pb.) latest by 20th April 2008.

Job opportunities at CIPHET – Ludhiana

Name of the post	Qualification
Senior Research Fellow (Food Processing) – 1 Rs. 10,000/-per month + HRA as per norms	Essential : M.Sc in Food Technology / M.Tech in Agril. Processing. Desirable : Experience in conducting training & demonstration Programmes in Food Processing in rural areas. Age limit : 30 years (with relaxation in case of SC/ST/OBC as per existing rules)
Senior Research Fellow (Soil & Water Conservation) – 1 Rs. 10,000/- per month + HRA as per norms	Essential : M. Tech in Soil & Water Conservation Desirable : Experience in conducting demonstration of Polyhouse and Plastic mulching technologies on farmers' field Age limit : 30 years (with relaxation in case of SC/ST/OBC as per existing rules)

Project duration: 2 Years

Name of the project: Farmers Participatory Action Research Programme

Application with passport size photograph and bio-data in the following format (1) Name of the candidate (2) Father's Name (3) Date of birth (proof to be enclosed) (4) Present address (5) Permanent address (6) Educational Qualifications (7) Experience in the field (8) Publications etc. should reach Prof. (Dr) MATTHEW PRASAD, Principal Investigator CIPHET, P.O. PAU, Ludhiana-141004 by 12.03.2008 through post or through E-mail (matthewprasad@sify.com). Short listed candidates will be called for personal interview at CIPHET, Ludhiana.

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