



Central Institute of Post Harvest Engineering & Technology Ludhiana

OUR SLOGAN: PRODUCE, PROCESS AND PROSPER

**CIPHET E – Newsletter for September, 2009
Vol. 4 No. 9**

Director's Column



Dear All,

CIPHET family joins rest of the world in expressing our sorrow and condolences on the sad demise of Prof. Norman Borlaug, father of green revolution in India and whose discoveries have been estimated to have saved over one billion lives worldwide.

The major event this month was transfer of the technology of Pomegranate Aril Extractor for commercial manufacture. We have been receiving requests for hand tool as well as for motorized machine from different parts of the country as well as from abroad and licensing of manufacturing to a firm will make available machines for commercial use.

The National Seminar on “Nutritional Strategies for Improving Quality of Life” was held GBPUA&T, Pantnagar. The Food and Nutrition Security of the growing population is a multi-disciplinary task and we all have to concentrate on conducting useful research on the crop commodities we grow. The example of voluminous processing research in case of wheat, rice and soybean versus little research on hundreds of our precious commodities like ber, pomegranate, amla, and millets should be an eye opener for us.

I was invited for inauguration of Agricultural Technology Week, which was celebrated by Krishi Vigyan Kendra, Nandurbar in Maharashtra. It is very good initiative started by Extension Division of Indian Council of Agricultural Research at all its KVKs. The KVK Nandurbar has been doing excellent work introducing new crops, production techniques, mechanization in production agriculture, developing and storing quality seeds with farmer participation etc. There is a great scope of Food Processing by SHGs to manufacture and supply puran poli, gujia, gum ladoos etc. using locally grown millets & pulses, which they can manufacture in rural area and supply to urban population.

We conducted two winter school this month one on Mathematical modeling and simulation of agricultural structure, process and product quality and another on Quality Assurance and Shelf Life Enhancements of Fruits and Vegetables through Novel Packaging Technologies

CIPHET has initiated the work on live stock product processing to improve the post slaughter handling and processing scenario of livestock products. The “Livestock Products Processing Lab” has started functioning with research activities on development of low cost, nutritionally improved meat products utilizing vegetable and fruits and locally manufactured equipment. The laboratory is having the facilities for pilot scale production of meat products, quality evaluation, and shelf life testing of livestock products. The technology flashed this month is also about the supplementation of vegetable and fruit with meat to get ready to eat chicken meat based product. The product thus prepared is lower in cost having high acceptability as well as nutritional significance.

WISHING YOU ALL A VERY HAPPY DIWALI

With best regards

**R.T. Patil
Director**

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National Seminar on “Nutritional Strategies for Improving Quality of Life

Dr. Patil, Director attend the National Seminar on “Nutritional Strategies for Improving Quality of Life” as Chief Guest at GBPUA&T, Pantnagar during 11-12 Sept 2009. This seminar was organized by Department of Foods & Nutrition, College of Home Science, GB Pant University of Agriculture & Technology, Pantnagar (Uttarakhand). The inaugural function was attended by the delegates and faculty of Pantnagar University. Those who spoke on the occasion of inaugural session were as follow:

1. Dr. B.S. Bisht - Vice-Chancellor, GBPUA&T
2. Dr. R.T. Patil, Director, CIPHET - Chief Guest

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|----|----------------------------|-------------------------------|
| 3. | Dr. Umesh Kapil | - Guest of Honour |
| 4. | Dr. Sarita Srivastava | - Organizing Secretary |
| 5. | Dr. Reeta Singh Raguvanshi | - Dean, Home Science, GBPUA&T |

Dr. Patil emphasized on the fact that Food and Nutrition Security of the growing population is a multi-disciplinary task and we all have to concentrate on conducting useful research on the crop commodities we grow. The example of processing research in case of wheat, rice and soybean versus hundreds of precious commodities like ber, pomegranate, amla, and millets was an eye opener to the audience. He also visited Department of Post Harvest Engineering & Technology and Food Science & Technology and interacted with the faculty on their ongoing programmes.



Inaugural session of National Seminar at Pantnagar

Agricultural Technology Week

Dr. R. T. Patil inaugurated the Krishi Tantrayyan Saptah (Agricultural Technology Week), which was celebrated by Krishi Vigyan Kendra, Nandurbar in Maharashtra. It is a very good initiative started by Extension Division of Indian Council of Agricultural Research at all its KVKs. Nandurbar is one of the 150 disadvantage districts identified by Planning Commission. The KVK Nandurbar has been doing excellent work introducing new crops, production techniques, mechanization in production agriculture, developing and storing quality seeds with farmer participation etc. This KVK has been working in tribal area. On the day of function there were 300-400 participants and 40% of them were women. In my lecture Dr. Patil emphasized on the scope of Food Processing by SHGs to manufacture and supply puran poli, gujia, gum ladoos etc. using locally grown millets & pulses, which they can manufacture in rural area and supply to urban population who don't have time to prepare them. In the afternoon he addressed the agriculture business industrialist and food processing entrepreneurs from three districts to explain them scope of starting new enterprises & upgrading present ones based on products and technologies developed at CIPHET. He also visited a Devka Food Products Pvt. Ltd. and advised them for diversified value added product in addition to Futana, Dhaliya, Besan, Farsan flour and extruded nuggets which they are manufacturing.



Visit to KVK Nandurbar Farm



Interaction with farmers and farm women



Interaction with upcoming and existing food processing entrepreneurs at KVK Nadurbar

Training programme for village artisan to manufacture pomegranate hand tool

In order to meet the growing demand of “Hand tool for easy separation of arils from Pomegranate”, a two days training was conducted on “Skill development for manufacturing of hand tool for aril separation from Pomegranate” during 11-12 August, 2009 at CIPHET, Abohar. Five fabricators (turner & mechanic) were selected from the local area to make them skillful in understanding fabrication of this particular hand tools. The training was imparted on its design aspect and manufacturing process so that they can able to take the job of fabrication of hand tools without difficulty. The training was coordinated by Dr. A. K. Thakur and Dr. R. K. Gupta was the Co-coordinator.



Participants engaged in fabrication of hand tools for arils separation

Special training on Processing of Guava for manufacturing of value added products

Guava is a rich source of nutrient and is fair source of minerals like iron, calcium and phosphorus. Also there is glut in the market during peak season, so juice/pulp can be prepared from this fruit and stored by proper treatment for utilization in lean period for the preparation of various products. However due to unawareness about the processing and lack of facilities the people are moving away from Guava Farming to rice wheat. The Zamindara Farm Solutions at Fazilka has decided to promote the processing of guava in the region with scientific processing and organized marketing. Hence a special training programme on Processing of Guava for manufacturing of value added products was organized at CIPHET, Abohar during 10-16th September 2009. Four up-coming entrepreneurs/farmers (Three from Zamindara Farm Solutions, Fazilka and one from Farmers First Nursery, Mauzgarh, Abohar) had participated in the training. They were given training on preparation of several products such as guava leather, jelly squash, nectar, candies, fruit bars, canned pulp and slices. Dr. Ramesh Kumar, Scientist coordinated this training.



Discussion during special training programme on guava processing at CIPHET Abohar

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Inaugural session of Hindi Fortnight on Sept 14, 2009 at CIPHET Ludhiana



A team of journalists from Dainik Bhaskar were awarded for their work in Hindi for promoting rural food processing activities



Awardee of Hindi competition receiving prize from the Chief Guest, Mr. OP Sharma



Awardee receiving prize for Hindi Competition at CIPHET Abohar

भास्कर खबर से आगे

किसानों द्वारा खेतों में पैदा की गई कोई भी चीज विभिन्न चरणों से गुजरते हुए जब आम उपभोक्ता के पास पहुंचती है तो उसके दाम करीब दो गुने से ज्यादा हो जाते हैं। किसानों

पास पहुंचती है तो इसकी कीमत 34 रुपये प्रति किलो हो जाती है। भास्कर ने अपनी जांच पड़ताल के दौरान पाया कि बढ़ती महंगाई के बावजूद ब्रिचौलिये मालामाल, उत्पादक किसान फटेहाल और उपभोक्ता खस्ताहाल हो रहा है।

• कठिनाई दिखाने में अंकड़े बीघे से ऊपर की ओर पढ़ें

चरण	मूंगा	अरहर	उड़द	सरसों तेल
पहला चरण: किसान	165 ₹	2100-2800 ₹	2000-3500 ₹	2100-2450 ₹
दूसरा चरण: मिलर	2100 ₹	2400-3200 ₹	2700-3900 ₹	48 रुपये
तीसरा चरण: स्टाकिस्ट	2900 ₹	2700-3500 ₹	3000-4200 ₹	50 रुपये
चौथा चरण: होल सेलर	3100 ₹	4200-5200 ₹	6000-4800-6500-4900 ₹	53 रुपये
पांचवां चरण: रिटेलर	3150 ₹	5600 ₹	6800 ₹	5600 ₹
छठा चरण: ग्राहक	3400 ₹	6800 ₹	8500 ₹	6000 ₹
पहला चरण: किसान	1500-2000 ₹	1500 ₹	2000 ₹	2000 ₹
दूसरा चरण: स्टाकिस्ट	5000-8800 ₹	5000 ₹	5000 ₹	5000 ₹
तीसरा चरण: मिलर	9500 ₹	7000 ₹	6500 ₹	
चौथा चरण: होल सेलर	10000 ₹	8500 ₹	6800 ₹	
पांचवां चरण: रिटेलर	10500 ₹	9000 ₹	7000 ₹	
छठा चरण: ग्राहक	14000 ₹	14000 ₹	12000 ₹	

हल्दी | लाल मिर्च | धनिया
ससाले

Awarded news item in Hindi about the value addition at each stage of handling

Training programme on ‘Food Analysis’

A special training programme on ‘Food Analysis’ was organized by Division of Food Grains and Oilseed Processing, CIPHET, Ludhiana during September 1-10, 2009. The programme was designed and organized for an Assistant Professor, from College of Home Science, Central Agricultural University, SANGSANGGRE, Tura, Meghalaya. This was a practical oriented programme that focused on the analytical aspects of various food components. During the 10 days programme, the participant learnt about the analysis of various important nutrients (viz. protein, fat, dietary fibre, calcium, irons, sugars, carotene, ascorbic acid, etc.), physical tests for determination of grain quality, and rheological properties of foods. During this exposure was also given on accreditation requirements for food quality analysis laboratories, quality standards for food analysis and bioassay for protein quality.



Trainee receiving the certificate of completion of Food Analysis special course at CIPHET Ludhiana

CIPHET sings MOU with Thomson Reuters for Technology Dissemination in Post Harvest Systems

The Central Institute of Post Harvest Engineering and Technology, (CIPHET) has signed an MOU with M/s Reuters Market Light, Reuters India Pvt. Ltd. on 17 September, 2009. Under this MOU, CIPHET will provide information on process, equipment, products and technologies on post harvest engineering and technology for farmers and entrepreneurs to Reuters for one year. The institute will also provide information related to its training programmes, advisory consultancy and pilot plant for custom hiring. Reuters will package the information in the form of short message service (SMS) and deliver it to the mobiles of farmers registered with the company’s Reuters Market light service. Dr R T Patil, expressed that this MOU will help in providing valuable information to the farmers of the country and help in reduction of post harvest losses. Mr Abhishek Singh, Regional Sourcing Manager and Mrs Jugraj Dhillon Sohi, Content Consultant with Reuters India Pvt Ltd and Dr D Dhingra, Senior Scientist, I/C ITMU, CIPHET, were also present on the occasion.



Exchanging the agreement between CIPHET and Thomson Reuters for dissemination of CIPHET technologies

CIPHET establishes Livestock Products Processing Laboratory

CIPHET’s endeavor to improve the post slaughter handling and processing scenario of livestock products has got a boost with the establishment of a new laboratory in the division of ASEC. The newly established laboratory is named as “Livestock Products Processing Lab”. The main objectives are research and development activities in the field of livestock products processing. The laboratory has started functioning with research activities on development of low cost, nutritionally improved meat products utilizing vegetable by-products and locally manufactured equipment. The laboratory is having the facilities for pilot scale production of meat products, quality evaluation, and shelf life testing of livestock products.



An inside view of Lab



Meat processing in action

CIPHET transfer aril extraction technology for commercialization

CIPHET developed a successful technologies related to Pomegranate aril extraction. The hand tool and industrial version of machine are in demands from every corner of the country and even we are continuously receiving enquires from abroad. Therefore, Institute was

making effort to identify some potential manufactures for commercial manufacturing of above prototypes to meet the demand. Now, transfer of manufacturing license is given to M/s Padmatech Engineering Systems, Plot No. 236, Sector No. 7, PCNTDA, Bhosari, PUNE-411 026 (Maharashtra) for manufacturing of (1) CIPHET-Pomegranate Aril Extractor and (2) Hand tool for easy separation of arils from Pomegranate

This company has got experience in fabricating stainless steel equipment used in food processing sector. They are already manufacturing and supplying Food, Fruit Juice / Pulp, Dairy Distillery / Breweries Chemical, Pharma, Textile, Material Handling, Fabrications Machinery for the food processing sector. The agreement of technology transfer as per the IPR guidelines was exchanged between CIPHET and M/s. Padmatech Engineering Systems. Dr. R.T. Patil, Director, CIPHET formally transferred the manufacturing license to Mr. Kishore Nawale, MD of Padmatech in a glorious Technology Release function held at CIPHET, Abohar on 7th September 2009. On this occasion, Dr. J.S. Josan, Director, PAU Fruits Research Station, Abohar, representatives of Punjab Agro Juices Limited, Abohar and Zamidara Farm Solutions (P) Ltd, Fazilka were present. Besides, progressive fruits growers, Govt. officials and press media personnel were also present during this function. Further, Director, CIPHET also presented appreciation certificates to the technology developing team comprising of Dr. AK Thakur, Dr. R.T. Patil, Dr. R. K. Gupta and Dr. D.B. Singh. Dr. R.K. Gupta, Head, HCP welcomed all the participants and briefed about the other prototypes under development at the Division for the value addition of fruits.



Exchange of MOU between CIPHET and Padmatech Engineering Pune

Winter school on Mathematical modeling and simulation of agricultural structure, process and product quality

Food process modeling applies a variety of theories to solve practical problems relevant to research and teaching of food process engineering. The winter school organized at CIPHET during Sept 3-23, 2009 on “Mathematical modeling and simulation of agricultural structure, process and product quality” was intended to educate and upgrade the skills of researcher, scientist/ teacher and extension specialist in area of agriculture structure and process modeling. The course included the basic study of design of greenhouses, mechanism of drying, texture, storage and quality aspects of agricultural products. The course provided the

knowledge of development of mathematical models, algorithm of solution and computer programming. Dr. R.T. Patil, Director, CIPHET inaugurated the winter school on 03rd September 2009. Total 19 participants attend the winter school.

The winter school was concluded on 23 September 2009. Cdr. V.R. Dahake, Scientist in-Charge, Mechanical Engineering Research and Development Organization, Ludhiana was the Chief Guest for closing ceremony of winter School. He expressed that research and development could not be conducted in isolation and experiments are becoming very costly thus the simulation techniques are playing important roles. Certificates were distributed to participant on successful completion of winter school. The school was coordinated by Dr. Dilip Jain and Dr. Devinder Dhingra.



Concluding function of winter school on mathematical modeling by Chief Guest, Cdr Dahake



Group photo of participants of winter school

Winter school on "Quality Assurance and Shelf Life Enhancements of Fruits and Vegetables through Novel Packaging Technologies"

The Central Institute of Post Harvest Engineering and Technology (CIPHET) inaugurated a winter school on theme of "Quality Assurance and Shelf Life Enhancements of Fruits and Vegetables through Novel Packaging Technologies" at CIPHET, Ludhiana campus on Sept 25, 2009. Experts from ICAR institutes and various state universities are participating in the school to be concluded on October 15. CIPHET director Dr RT Patil and CIPHET head, transfer of technology (TOT), Dr DR Rai welcomed the chief guest. Dr RP Kachru, chief guest, former assistant director general, ICAR, New Delhi, said there was a paradigm shift globally from growing field crops to horticulture. "Global share in the horticulture has increased significantly, especially during the second half of the last quarter," he said, adding that India was one of largest growers of fruits and vegetables but not able to earn profits due to less attention to packaging and marketing. "We are third in potato production in the world and second in onion production, but sadly export only 0.7 per cent of vegetable crops," he said. Saying that Indian agriculture needs to work on supply chain and value addition, Dr Kachru cited examples of some of the most successful farmers, who are doing wonders by growing fruits on small land. "One of them is earning Rs 22 lakh a year from just 3.25 acre of land by exporting pomegranates," he said, emphasizing that maintaining both, quality and establishing brands, were important for successful marketing.

Dr R.T Patil said CIPHET had just 34 scientists but they were doing remarkable work. "We have 44 projects and 45 research papers were published in reputed journals last year. The institute has filed seven patents in 2008-09, two companies were given consultancies and students from various institutions completed their 40 dissertations in the CIPHET." He emphasized the importance of good packaging by example that by just holding packing in hands, one gets idea what is inside. He added that "We produce 40 per cent of world's mangoes but not able get global market." He added that there was a need to work on improving transportation, packaging and above all maintaining quality. Dr. DR Rai and Dr. Pranita Jaiswal coordinated the course.



Dr R P Kachru delivering lecture to the participants of winter school



Group photo of participants of winter school

CIPHET gets funding from DBT for a project entitled “Development of technologies for pelletization, delignification and saccharification of cellulosic biomass

The conversion of lignocellulosics to ethanol holds great promise as these residues can be enzymatically saccharified to hexose and pentose sugars after certain pre treatments required for making the residues amenable for enzymatic action. However, all the above residues (substrates) have a low bulk density and thus are not easy to handle or transport and bulk handling requires densification of the biomass for facilitating easy transportation to the processing site. The quality of pellets obtained from a pellet mill is affected by parameters such as moisture content, temperature, particle size, dye size, use of binders and pellet mill speed. Therefore, a study to analyse the effect of these parameters on pellet quality during pelleting (at pilot scale or industrial level) is needed to provide data for the design of biomass handling and processing facilities. Compaction studies are a good way to investigate the effect of these parameters on the densification of the above substrates and can be carried out by means of a single-pellet apparatus system. Though different pretreatments such as acid hydrolysis, alkali treatment, ammoniation, liming etc are being tried out for different residues, no single cost effective treatment for each residue could become a reality and this is one of the cost intensive operations in the cellulosic ethanol production process. However, extrusion processing along with use of chemicals could be thought as an alternative to the traditional methods since a high temperature and pressure could be achieved in an extruder. The Department of Biotechnology has funded the above project at a cost of Rs 48.49 lakhs for development of simple and low cost technologies for pelletization, and delignification of rice straw, cotton stalk, sweet sorghum, switch grass, *Prosopis julifera* and *Lantana camara* and optimization of saccharification parameters using cellulolytic enzymes. Dr. H.S. Oberoi, Sr. Scientist (Microbiology) is PI of this project.

CIPHET Scientist on Foreign Training

Dr. S.N. Jha Principal Scientist has been deputed for advanced training in the area of “Advances in NIR Spectroscopy” at University of Wisconsin, Madison, USA for 120 days from 14/9/2009. He will be working in the University with Prof. S. Gunasekaran, Dept of Biological System Engineering. The training was approved and sanctioned by NAIP under Project “Non destructive system for evaluation of microbial and physico – chemical quality parameter of mango” under Comp – 4.

Upcoming Events

1. **ICAR sponsored Winter School on “Recent developments in post harvest processing and value addition to livestock produce”** will be held at CIPHET, Ludhiana during October 22 to November 11, 2009. The Course Director is Dr. K. Narsaiah, Senior Scientist (ASPE). You can contact him on Tel: +91 - 161-2313124, 09417143925 (Cell), Email: knarsan@yahoo.com Fax: 0161-2308670.

2. **ICAR sponsored Hindi Seminar** on “*खतफे.क म्लु; u ea df" k iz l dj .k m | ks dh Hkfedk fo" k; ij fglnh ea jk"Vh; l æks" Bh dk vk; kst u uoEcj 13&14] 2009 dks l hQV] yf/k; kuk ea fd; k tk, xkA l æks" Bh ds fy, i athdj .k , oa vl; dkbz Hkh l puk i klr djus ds fy; s vki fuEu irka ij l Ei dZ dj l drs g&*

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3. **EDP on Processing of Aonla**

HCP Division, CIPHET, Abohar will be organizing Entrepreneurship Development Programm on Processing of Aonla for value added products during November 13-19 as per the Institute EDP Calendar. The fee for the programme is Rs. 2000/- per participant. The loading and boarding charges will be approx. Rs. 150/day. The interested person may contact Dr. R.K. Gupta, Head, HCP (Cell: 9872859024) regarding participation in the EDP.

Job Announcement

WALK-IN-INTERVIEW

Applications are invited for two posts of Research Associates under a DBT sponsored project on “Development of technologies for pelletization, delignification and saccharification of cellulosic biomass such as rice straw, cotton stalk, sweet sorghum, switchgrass, *Prosopis julifera* and *Lantana camara*” at Central Institute of Post-Harvest Engineering and Technology, Ludhiana (Punjab). The appointments will be purely temporary on contractual and co-terminus basis, following the prescribed procedure for a period of six months or till completion of the project. The appointment may be terminated at any time without notice or assigning any reason thereof.

Position	No. of positions	Qualification	Date and venue of interview
Research Associate (RA)	One, CIPHET, Ludhiana	i) Essential : Ph D in Microbiology/ Biochemistry or relevant fields or MSc in above fields with two years research experience Desirable : Experience in different aspects of process optimization and enzymatic hydrolysis of cellulosic biomass	23.10.2009 11:00 am at CIPHET, Ludhiana
	One, CIPHET, Ludhiana	ii) Essential : PhD in Agricultural Engineering / Biochemical Engineering/ Food Engineering or MSc in above fields with two years research experience. Desirable : Experience in different aspects of biomass handling, logistics and conversion Working knowledge of Computer for both the posts.	

Eligible candidates may send their application through mail/registered post on plain paper along with bio-data with attested passport size photograph affixed on it and copies of certificates if any, to Dr. Harinder Singh Oberoi, CIPHET, P.O. PAU, Ludhana-141004 (Pb.) and attend the WALK-IN-INTERVIEW as per above schedule at Central Institute of Post Harvest Engineering and Technology (CIPHET), Behind Radhaswami, Satsang, Hambran Road, PAU Campus, Ludhiana, Tel: 0161-2313126.

E-mail: hari_manu@yahoo.com, vkbciphet@gmail.com

Technology of the Month

Low-cost, nutritious and tasty chicken meat products blended with vegetables

Chicken meat is very popular and important meat in the Indian non-vegetarian diet. Rapid urbanization and change in life style has increased demand for chicken products. However, high cost of these products makes it difficult for an average consumer to use these products regularly in their diet. Therefore development of technology for production of low-cost chicken products is need of the hour. The major cost factors in the chicken meat based value added products like fried-chicken, chicken nuggets are the price of raw meat, ingredients and imported equipment. The reduction in cost of production to more affordable level can be achieved by careful selection of ingredients, reformulation with unconventional food ingredients and using indigenously available equipment.

Green vegetables play an important role in human nutrition as they provide essential minerals and vitamins. They are rich in dietary fiber, β -carotene, calcium and other phytochemicals that are natural antioxidant and possess health-improving properties. Huge amount of fresh fruits and vegetable are available in India all year round. Thus efficient, inexpensive and environmentally sound utilization of them and their products is possible by using them as functional ingredients in meat products. This will reduce production cost, improve nutritional quality (dietary fibre, essential minerals and vitamins) and thus provide an opportunity to formulate healthier and functional chicken meat products.

Hence nutritious and tasty chicken nuggets were developed utilizing indigenous equipments and reformulating the formulation of chicken nuggets. In the formulation, some percent of meat was substituted with different vegetables and other ingredients were suitably reformulated to produce acceptable chicken nuggets. Formulation of chicken nuggets with vegetables namely (cauliflower, curry leaves, onion powder, and banana powder) lead to nuggets with improved texture and acceptability. Formulation of chicken nuggets with vegetables had favorable effects on hydration levels, emulsion stability and binding. Furthermore products with vegetables showed substantial cost reduction (by 35 percent) and could be named as low cost chicken nuggets. The color, chewiness and other textural properties were minimally affected by the addition of vegetables. Further when tested by a panel of about 25 consumers, the acceptability of low-cost nuggets was very high and they ranked flavor and overall acceptability of the product as very high. As a result of incorporating the vegetables in the nuggets formulation, an increase in dietary fiber and decrease in fat and calorie levels could be achieved. This could lead to a favorable response from health conscious consumers. Further the natural phytochemicals in the vegetables lead to increase in shelf life of chicken nuggets.

Salient features of this technology are; 1) Utilization of indigenous equipment, 2) Efficient and economic use of vegetable by-products, 3) Substantive cost reduction of chicken products, 4) Improved products quality, sensory attributes and stability, 5) Low-cost and low fat chicken products could be prepared and 6) Increase in dietary fiber and natural antioxidants in the meat products.

The technology is available for licensing to the meat products retailing industry. At CIPHET, we have also planned an entrepreneurship training programme on this technology for upcoming entrepreneurs and retail meat products producers and vendors. Interested persons may contact Dr. Suresh Devathkal, Sr. Scientist (Mob. 9417460662) for technology licensing and also to get the details of the training programme.



Ready to eat chicken-vegetable sandwich slices



Ready to eat chicken-vegetable nuggets.



Vacuum packed chicken-vegetable nuggets.

Publication of the Month

<p>CIPHET Annual Report</p>	<p>Compendium of Winter School on Mathematical Modeling</p>	<p>Compendium of Winter School on novel packaging technologies</p>

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