



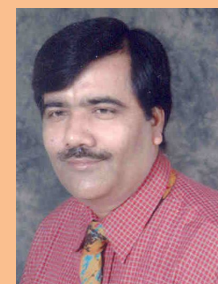
**Central Institute of Post-Harvest Engineering & Technology
Ludhiana**
Our Slogan: Produce, Process and Prosper

**CIPHET E - Newsletter for September - October, 2013
Vol. 8, No. 9-10**

Director's Column

Dear All,

You will see that last two months were full of activities in CIPHET. Parliamentary committee on Hindi visited CIPHET on 20 September and gave an appreciation letter for organizing and giving honor to members of parliaments and suggested to achieve the target of 100 % use of Hindi in CIPHET. BPD launch workshop was inaugurated on 13 September by Dr. N. S. Rathore the then DDG (Engg). He visited different facilities and saw demonstration of few newly developed machines and lauded the efforts of CIPHET. He also addressed all the CIPHETians. The Institute organized a special function on September 16, 2013 to inaugurate Hindi fortnight celebrations for promotion of Hindi. A series of events were organized in the Institute to mark this event.



Biennial workshops of AICRPs on PHT and APA were held at Udaipur and Junagrah, respectively during the period. Research Advisory Committee (RAC) meeting of CIPHET was held during September 27-28, 2013 under the chairmanship of Dr S. M Ilyas, former Director, CIPHET & Project Director, Distance Education, National Institute of Rural Development, Hyderabad. The twenty second Institute Research Council (IRC) Meeting was also organized during October 28-29, 2013 at CIPHET, Ludhiana. Dr. D.C. Joshi, Dean, faculty of Food Processing Technology and Bioenergy, Anand Agricultural University, Anand; and Dr. W.S. Dhillon, Director, Punjab Horticulture Post-harvest Technology Centre, PAU, Ludhiana were experts for the meeting. Members and experts complimented by saying that this IRC meeting was the best they have ever attended in last 14 – 15 years. QRT team on under-utilized crops visited CIPHET and expressed interest to have collaborative programme with CIPHET.

CIPHET is now on international demand. Many countries are selecting CIPHET as host institute for their research training fellowship in the field of Post-harvest Engineering & Technology and the same was initiated with an assistant professor from Gaston Berger University, Senegal. Thirty executives from Liberia, Kenya and Malawi visited CIPHET under US-India-Africa Triangular International Training programmes. Other Different National level trainings were also organized on post-harvest technologies for various entrepreneurs across the country; and BPD activities have been intensified during the period with a hope to make CIPHET financially self sustained Institute in the next 5 years.
With best regards,

**S.N. Jha
Director (Acting)**

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Visit of QRT team of AICRP on underutilized crops

QRT Team for AICRP on underutilized crops - networks project visited CIPHET on September 12, 2013. The team members included Dr. Bhag Mal, (Chairman) Dr. Masood Ali, (Member) Dr. I.D. Tyagi (Member) and Dr. B.S. Phogat (Member Secretary). The QRT members emphasized the need to develop complete package of practices for the utilization of important underutilized crops like buckwheat, quinoa and amaranth. The members expressed that CIPHET should take lead in developing machines for processing of these underutilized crops and also bring out the pilot scale version of the machines like millet dehuller, maize popping machine etc. in collaboration of this AICRP.

Biennial Workshop of AICRP on PHT



The 29th Workshop of AICRP on PHT was held during September 23-26, 2013 at MPUAT&T Udaipur. Around 120 participants from all the 37 Centres and senior officers from SMD (Engineering), ICAR and FCI and experts in the area of Post-Harvest sector participated in this workshop. In the Inaugural Session, Dr. O. P. Gill, Hon'ble Vice-Chancellors, MPUA&T Udaipur was the Chief Guest while the session was chaired by Dr. K. K. Singh, ADG (PE), co-

chaired by Dr. R. P. Kachru, Ex-ADG (PE) and Chairman QRT (XI Plan), Project Coordinator Dr. S. K. Nanda. Besides, Dr. S. N. Jha, Director CIPHET, Dr. P. L. Maliwal, Director Research, MPUA&T, Dr. B. P. Nandwana, Dean College of Technology, MPUA&T, Dr. C. K. Narayana, IIHR, Bangalore, Dr. P.C. Sharma, HOD, HCP Division, CIPHET and Dr. R. K. Gupta, HOD, FGOP Division, CIPHET, Dr. S. K. Jain, Prof & Head, Process and Food Engineering, MPUAT and Dr. N. K. Jain, Research Engineer, MPUAT graced the occasion. The session started with lightening of the lamp by dignitaries. It was followed by a presentation of significant achievements of AICRP on PHT during the reported period by Dr. S. K. Nanda, PC (PHT) and valuable remarks of Chairman, Co-Chairman, Director CIPHET and Chief Guest. A good number of publications were released by the Chief Guest and other dignitaries on the dias.

Biennial progress reports were presented by the AICRP on PHT centres for the period 2011-2013 (till date) in technical sessions organized sector-wise, viz., Horticultural Crops, Food Grains, Jaggery and Livestock Produce sectors. Some of the technologies developed during reported period are (i) Food Grain Sector: Animal Feed Mill, Continuous Hot Air Puffing System, Barnyard Millet Husk Pillow, Probiotic Dahi from Millets, Millet Kurkure, etc. (ii) Horticulture sector: Onion Seed Extractor, Cashewnut Kernel Peeler, Walnut Cracking Machine, Black Pepper Decorticator, Continuous Carrot Washer, etc. (iii) Jaggery Sector: Improved Granular Jaggery Making Unit, Polyhouse Solar Drying of Granular Jaggery, Jaggery Pilot Plant, Jaggery Choco Nuggets, etc. (iv) Livestock Produce Sector: Mobile Poultry Processing Unit, Model Retail Meat Shop, Fish Vending and Display Unit, Model Retail Outlet for Chicken, Fish and Meat based Food Products (Nuggets, Ham, Patties, Sausage), etc.

Two special technical sessions were held on (1) ICAR-MOFPI sponsored project on 'Assessment of Quantitative Harvest and Post harvest losses of major crops/commodities in India', (2) ICAR-FCI sponsored project on 'Study on determining storage losses in food grains in FCI and CWC warehouse and to recommend norms for storage losses in efficient warehouse management'. Also, technical programmes for the following biennium were presented by the respective sectoral PIs. The plenary session was held on 26.09.2013 evening to list the recommendations emerging from the deliberations. A farewell was organized in honour of Dr. N. S. Rathore, outgoing DDG (Engineering), who has now joined as the Vice Chancellor of SKN Agricultural University, Jobner (Rajasthan).

Launch workshop of BPD



On September 13, 2013, Dr. Narendera S. Rathore, Deputy Director General (Engineering) of Indian Council of Agricultural Research inaugurated launch workshop of Business Planning and Development Unit at CIPHET. This workshop provided the opportunity to farmers, scientists, industrialists on a single platform. BPD is an initiative of ICAR in partnership with NAIP under World Bank funded scheme. Congratulating CIPHET for getting BPD unit, Dr Narendera S Rathore

hoped that BPD would go a long way in entrepreneurship development in Punjab and surrounding areas. He said that Indian agriculture has biggest challenge of meeting food requirement of growing population touching a figure of 123 crore people. He emphasized that gap could not be filled without checking post harvest losses and technological interventions

in the post harvest sector are immediately needed as production could not be stretched beyond certain limits. He added that future belongs to value addition technologies and farmers would have to look for secondary agriculture in order to increase their income.

Speaking on the occasion, Director CIPHET Dr S.N Jha informed that Institute has developed as many as 116 technologies so far and filed patents for 51 technologies. “The major goal for CIPHET is to enhance the agri/food processing levels in the country keeping in pace with the rapid advancements in the area of food processing. The Institute has developed numerous prototypes, processes, products and technologies in the area of processing, packaging, storage and by-product utilization which have been licensed to many entrepreneurs, government agencies and private firms”, he said, adding that number of visitors from abroad now wish to get training from the Institute. Director hoped that CIPHET will be financially self-sustaining institute in few years through BPD.

Business Planning and Development unit would help in establishment of food processing industry, and that the unit has been set up at CIPHET, Ludhiana to serve the budding entrepreneurs so that they could get management and marketing support along with scientific inputs, said Dr D.M Kadam. This is by supporting entrepreneurs with agri/food technology, consultancy, networking with management experts and physical infrastructure. The budding entrepreneur’s chances of success increase as we offer them to use the Institute facilities before they set up their own units,” informed Dr. Kadam. Mr. S M Karuppanchetty, Chief Operating Officer, Agri-Business Incubation (ABI) Program, ICRISAT, shared his experience regarding success of business incubation centre established in Hyderabad and its expansion to the other parts of the country. Dr. K. Narsaiah, Senior Scientist, proposed a vote of thanks.

Celebration of Hindi fortnight at CIPHET

The institute organized a special function on September 16, 2013 to inaugurate celebration of Hindi fortnight for promotion of Rajbhasha Hindi. A series of events were organised in the institute to mark this event. Speaking on the occasion, Director CIPHET Dr. S.N Jha said that all the employees of the Institute should participate in these events. He added that for last many years, the Institute was conducting number of programmes for the promotion of Hindi. Dr R.K Gupta, Chairman of the Hindi Pakhhwara Samiti, revealed details of various competitions to be held at the Institute. Dr. S.K Nanda, Project Coordinator (PHT) hoped that participants would be enjoying these events along with promotion of national language.



Researchers from across the country visited CIPHET

On September 18, 2013, a group of researchers/scientists from across the country visited CIPHET to get first hand information regarding various research activities initiated by the Institute. They were in the city in connection with three-week summer school on “Machinery for Natural Resource Management and Technologies” sponsored by the Indian Council of



Agricultural Research (ICAR) held at Punjab Agricultural University, Ludhiana. Speaking on the occasion, Director CIPHET Dr. S.N Jha informed the visitors about various technologies developed by the institute and answered their queries related to postharvest sector.

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RAC meeting organized at CIPHET, Ludhiana

Research Advisory Committee meeting of CIPHET was organized during September 27-28, 2013 under the chairmanship of Dr S. M Ilyas, former Director, CIPHET & Project Director, Distance Education at National Institute of Rural Development, Hyderabad. The objective of this meeting was to formulate strategies for future research and evaluate the progress made by the Institute in the on-going projects. The Chairman expressed the need for technological interventions in designing integrated pilot plants encompassing all the unit operations in a synchronized way so that the end-to-end approach could be followed. Chairman mentioned that all researches should be carried out keeping end consumers in mind. Dr K.K Singh, ADG (PE), ICAR stressed that recommendations of RAC should be strictly followed and CIPHET should become a global Institute in the years to come. The RAC team included Dr B. Ranganna, Emeritus Professor, University of Agricultural Sciences, Bangalore; Dr T K Srinivasa Gopal, Director, Central Institute of Fisheries Technology, Cochin; Dr AM Paturkar, Associate Dean, Bombay Veterinary College; Dr (Mrs) Maninder Arora, Senior Microbiologist, Department of Microbiology, PAU, Ludhiana; Dr. S. N. Jha, Director CIPHET and Dr. H. S. Oberoi member-secretary. The team also visited various research facilities at CIPHET and appreciated the technologies developed by the Institute.



Biennial Workshop of AICRP on APA at JAU, Junagadh

The annual workshop of AICRP on APA was held at JAU, Junagadh during 7-9 October 2013. Dr. N. C. Patel, Vice Chancellor, JAU, Junagadh presided over the meeting, Dr. Brahma Singh, President, ISPC, New Delhi was the chief guest and Dr. S.N. Jha, Director



(Acting), CIPHET, Ludhiana was the guest of honour for the Inaugural Session. The Session started with ICAR & JAU Geet and lighting of lamp by the VIPs. Dr C.J. Dangaria, Director Research, JAU, Junagadh welcomed eminent persons and participants of the workshop. He emphasized that the traditional application of plastics in Saurashtra region has to be thought

keeping in mind the rainfall pattern and terrain of the region. Dr P.R. Bhatnagar, PC (APA) presented the Coordinator's report based on the research conducted in the last two years 2011-12 & 2012-13 in the workshop. The VPKAS, Almora centre was recognized as best centre in ICAR and was awarded "Ch Devi Lal Outstanding AICRP Award 2012" along with a cash award of Rs 1.0 lakh. The award was handed over to Dr M.D. Tuti Scientist and Er. D.C. Mishra, Technical Officer of the centre jointly by the President and Chief Guest. Following two publications were released on this occasion by the VIPs on the dias.

- Plastics Research, research achievements during the decade (2003-12) under AICRP on APA, compiled and edited by Dr. P.R. Bhatnagar, Project Coordinator, AICRP Coordinating unit, CIPHET, Ludhiana.
- Plastics in Field, Success Stories of AICRP on APA. Compiled and edited by Dr. P.R. Bhatnagar, Project Coordinator, Coordinating unit, CIPHET, Ludhiana.

The VIPS on the dias Dr. D. Dhingra, Principal Scientist (ASPE), ICAR, Dr S.N. Jha, Director (Acting) CIPHET, Ludhiana, Chief guest Dr Brahma Singh, President, ISPC, New Delhi, and Dr N.C. Patel, VC, JAU, Junagadh and President of the Session addressed the delegates and expressed their views and concerns. Everybody congratulated the AICRP and its team for winning the ICAR Prestigious Award. Dr Brahma Singh expressed that plastic is contributing enormously in agriculture through irrigation systems, mulching, soil solarisation, and greenhouses. He advised that the success stories from the project and from elsewhere should be loaded on the ISPC website for larger benefits. Dr. N.C. Patel emphasized several other uses of plastics including rest houses for animals, bee-trays, mechanization of pond lining, etc.

After the inaugural session, achievements from a total of 58 research projects being operated at eleven centres were discussed in theme-wise sessions viz. surface covered cultivation, pond lining and irrigation systems, aquaculture and animal husbandry, plastic mulching, farm machinery, post harvest technology, and outreach activities and field evaluation. Out of these, 30 projects were continuing, while, 28 project have concluded during the period under review. Few new projects to replace the concluding projects were also discussed which were to be finalized in next Coordination Committee Meeting.

Scientists from different centres informed about publication status, budget utilization and other relevant issues during business session which were noted for further actions. The workshop ended with the vote of thanks by Project Coordinator, followed by vote of thanks by Dr. P.M. Chauhan.

CIPHET gives warm send off to African scientist

On October 18, 2013 CIPHET gave warm send off to Dr. Michel Bakar Diop, Assistant Professor at Gaston Berger University, Senegal, after completion of his one



month training on “Drying and Processing of Onion” at CIPHET. Dr. D. M. Kadam, Senior Scientist was the host scientist for Dr. Diop. Dr. Diop visited CIPHET in under the prestigious CV Raman International Fellowship Programme launched by Government of India for African Researchers-2012 which covers all areas of science and technology.

Visit of ASRB Chairman to CIPHET, Ludhiana

Dr. Gurbachan Singh, Chairman ASRB visited CIPHET on 23rd October, 2013 to inspect the arrangements for the ICAR NET Examination-2013 conducted by CIPHET on 28 October, 2013. He visited examination centre i.e. BCM Senior Secondary School, Shastri Nagar Ludhiana. Besides, he also visited ASRB online Examination Facility being created at CIPHET, Ludhiana under the NAIP Sub-project entitled “*Developing, Commissioning, Operating and Managing an Online System for Net/ARS-Prelim Examination*”.

IRC Meeting conducted at CIPHET, Ludhiana

The 22nd Institute Research Council Meeting was held during October 28-29, 2013 at CIPHET, Ludhiana under the chairmanship of Dr. S.N. Jha, Director, CIPHET. Dr. D.C. Joshi, Dean, faculty of Food Processing Technology and Bioenergy, Anand Agricultural University, Anand; and Dr. W.S. Dhillon, Director, Punjab Horticulture Post-harvest Technology Centre, PAU, Ludhiana were experts for the meeting. The completed, ongoing



and new research project proposals were discussed. Dr. H.S. Oberoi, Pr. Scientist & Member Secretary, IRC welcomed the experts, Director, Project Coordinators, Head of Divisions and scientists of both the campuses. Member Secretary presented the Action Taken Report of the last IRC. It was followed by division-wise presentations of research projects. During IRC meeting, 11 RPP-I, 16 RPP-II and 16 RPP-III were presented and discussed. The IRC Meeting ended with formal vote of thanks by Dr. H.S. Oberoi, Member-Secretary & OIC PME Cell

CIPHET exhibits its technologies at Kisan Mela

CIPHET displayed its food processing technologies including ready to mix products during Kisan mela at Punjab Agricultural University (PAU) under the theme of ‘Save Punjab, Save Water’. Farmers/entrepreneurs from the region queued on stall of the institute. Large number of entrepreneurs/farmers showed interest in the extruded products prepared from pearl millet and barley which has potential for the development of entrepreneurship. Ready to mix products like barley dalia, pearl millet *pasta/halwa/upma* were also included in the list of the displayed products.



Dr. Indu Karki, Scientist said that this time lot of women also showed interest in the food processing technologies and they have been provided with literature and other relevant material regarding technologies and training programmes available to the institute. CIPHET on the occasion also displayed mechanically operated Pomegranate Aril Extractor (PAE) and hand held PAE. Prototypes like basket centrifuge, groundnut decorticator, rotary maize

sheller, banana comb cutter, model storage structures like the evaporative cooled room and value added ready-to- eat vegetables, makhana kheer mix, blended meat products were the other attractions at the CIPHET stall.

CIPHET radio programme started

CIPHET has started a new series of 'Do Dooni Chaar', an agricultural information based radio programme on All India Radio (AIR), Jalandhar every week from September 15, 2013 at 7.00 pm. Dr. Indu Karki, Scientist and CCPI, NAIP sub project on 'Mobilizing mass media support for sharing agro information' said that they would be broadcasting 13 series of programme every sunday which would inform the audience about different



processing technologies developed by the institute. Director CIPHET, Dr. S.N Jha hoped that these programmes would motivate farmers and budding entrepreneurs to adopt post harvest technologies for increasing their income through value addition. The first programme would be on newly established BPD unit at CIPHET, which has already been recorded. The programme would be broadcast through a powerful 300 KW of transmitter on medium wave frequency at 873 Khz and covers whole state of Punjab, while programme could also be listened in parts of Haryana, Himachal Pradesh, Uttranchal, J&K and Rajasthan.

Awareness Creation among potato growers

A team of experts from CIPHET delivered lectures to potato growing farmers during the meeting organized by the Canara Bank to bring farmers, experts, research Institutes and financial Institutes on common platform at Jalandhar. Officials from National Horticulture Mission, KVK of Noormahal also attended the meeting. Speaking on the occasion, Sh. Ajay Agrawal, Business Manager, Business Planning & Development (BPD) unit of CIPHET, informed the farmers about mandate of CIPHET and technologies developed by the Institute. Pointing out that about 25-30 percent losses occurred during the post harvest handling, he elaborated on technologies of low cost storage structures and cattle feed from potato wastes for reducing post harvest losses. He informed the farmers about other technologies available at the Institute including pomegranate aril extractor, maize degermer, processing of onion, chilli, garlic, ginger, tomato and cryogenic spice grinding system etc.

CIPHET gives warm send off to technical officer

Faculty of CIPHET gave a warm send off to Technical Officer Sh. M.P. Singh on his superannuation. He served the various ICAR Institutes for more than 33 years including his 17 years of stint at CIPHET. Officiating Director, Dr. R.K. Gupta recognized the services of Mr M.P Singh in building the Institution and contributing in various capacities. Staff members from scientific, administration and technical streams of the institute also shared their experiences on the occasion.



Executives under the US-India-Africa Triangular International Training Programme visited

Thirty executives (10 each from Liberia, Kenya and Malawi) visited CIPHET along with the other dignitaries Dr. P. Chandra Shekhra, Co-ordinating Officer, MANAGE, Hyderabad and Director and Deputy Director from PAMETI, PAU, Ludhiana visited CIPHET under the US-India-Africa Triangular International Training Programme co-ordinated by MANAGE, Hyderabad. Director, CIPHET welcomed all the executives and introduced the scientists to the visitors. Technologies developed at CIPHET were introduced to all the dignitaries.

Trainings Conducted

- A five day training programme on “Post-harvest technologies on rural catchments” for farmers of Tamil Nadu was conducted at CIPHET during 10-14 October, 2013. The programme was sponsored by Agriculture Technology Management Agency (ATMA), Namakkal, Tamil Nadu. Dr S.N Jha, Director, CIPHET hoped that the farmers would have gained relevant knowledge and experience on post harvest technologies during the training programme. He encouraged the farmers to become entrepreneurs by selecting the technology relevant to their areas. Senior Scientist & Coordinator of the Training, Dr. A.U Muzaddadi took the feedback from the participating farmers. Dr. B.K Parthiban, Assistant Executive Engineer, Agriculture Engineering Department, Namakkal, who was heading the delegation of farmers from Tamil Nadu, termed the training as quite useful. Technical Officer, Mr. O.P Moondan and other dignitaries were also present on the occasion. The training programme was focused on post-harvest technologies including processing and value addition technologies for oilseeds, fish based value added products, cattle feed from potato, food quality and safety for income generation, value added products from meat, soybean processing technology, production of green chilli powder and puree, packaging system for meat, food processing & preservation, dehydration technologies, application of plastics in agriculture and marketing of agriculture produce etc.
- Three day training on onion drying, flakes and powder for farmers of Maharashtra and Punjab was concluded at the institute. The training was organised by the Business Planning and Development (BPD) unit of the CIPHET. Distributing certificates to the farmers, Dr S.N Jha, Director CIPHET, hoped that trained farmers would soon be setting up their businesses to produce value added products from onion. He added that there is lot of scope in food processing industry and farmers could generate more income with little extra effort. Senior Scientist and Principal Investigator-BPD Dr. D.M Kadam said that CIPHET would be providing all support to farmers even after the completion of their training programme.



- Business Planning and Development (BPD) unit of CIPHET has imparted training to Haryana based farmers in sorting, grading and minimal processing of fruits and vegetables. He was given certificate after completion of three days training programme. Speaking on the occasion, Director CIPHET Dr. S.N. Jha said that with change in lifestyle, there was a lot of scope for properly graded and packaged fruits and vegetables. “This could fetch much higher



value to the farmers with little extra input,” he added. Dr D.M Kadam, Senior Scientist and PI (BPD) at CIPHET, said that they were providing training to farmers in minimal processing of fruits and vegetables so that their income could be enhanced considerably. He invited interested farmers to come to CIPHET for such trainings. Mr.O.P Parkash, farmer who got training, said that it would empower him to increase the shelf life of fruits and vegetables as he wishes to set up his business in retail.

Meetings attended

- Dr. S. N. Jha, Director, CIPHET participated in the training programme on MDP for leadership development from August 26, 2013 – Sept 6, 2013. He attended 12 days training comprising of about 25 sessions of lectures, group discussions, experience sharing practice sessions etc. The training was very useful in inculcating leadership qualities and insight into managing the manpower, materials and other resources effectively to give higher output, said Dr. Jha. The training ended with valedictory session on 06.09.2013 afternoon under the chairmanship of Dr. N.H. Rao, Director, NAARM, Hyderabad.
- Dr. R.K. Gupta Head, FG&OP visited Singapore during 09-11 September 2013. He attended 13th ASEAN Food, which was organised by the Singapore Institute of Food Science & Technology (SIFST), in conjunction with the ASEAN-Committee on Science & Technology (ASEAN-COST) and the Federation of the Institute of Food Science and Technology (FIFSTA). The theme of this conference was “Meeting Future Food Demands: Security & Sustainability”. It aims to reflect the challenges of future food demands due to natural disasters such as earthquakes and typhoons; global warming and population growth. He presented a paper on Innovative Functional Foods: Needs and Significance (With specific reference to India) in Technical session on Functional Foods on 11th September 2013. Further, Dr. Gupta as one of the members of the Indian Scientific team participated in associated meeting with ASEAN-SCFST (Sub Committee on Food Science and Technology) at Singapore during 9-11 September 2013 for developing ASEAN-India Research proposals on Food Science and Technology. Visit of Dr. Gupta was sponsored by the International Multilateral and Regional Cooperation Division, Department of Science and Technology, GoI, New Delhi.
- Dr. S. N. Jha, Director, CIPHET participated in the foundation day celebration of AgrIndia Innovative Ltd at NASC, New Delhi. Dr. Jha met Dr. M.M. Pandey, CEO of AgIn and other dignitaries during the foundation day. The function was chaired by Honourable DG, ICAR and chief guest of the inaugural session was Dr. Abhijeet Sen, member Planning Commission, Govt. of India. Various issues related to BPD were also discussed. The chief guest delivered inaugural lecture and emphasized about AgIn and

Secondary Agriculture. Later on, panel discussion was held to make AgIn a profitable venture. An exhibition with our technologies was also organised in AgIn.

- Dr. K. Narsaiah attended NAIP sponsored National Training Workshop on "Scientific Report Writing and Presentation" (October 17-22, 2013) at NAARM Hyderabad. The training provided guidelines/concepts and tips on preparation of winning research reports that can meet donors requirements and also the needs of the stakeholders.

Technology of the month

Multigrain Based Health Food Using Extrusion Technique

Extrusion is a promising technology to achieve the goal of making healthy food products, which are nutritious and rich in phyto-factors. There are different kinds of extruded products, available in the market; but cereals being the main ingredient are poor in nutritional quality. Ever increasing awareness of impact of healthy diet on quality of life and cost effectiveness in health care; demand for development of health foods is increasing tremendously. Health foods can be successfully developed by judicious mix/ proper formulation of food materials from different food groups to attain the goal of good nutritional profile and digestibility along with the desired product attributes in the final product.



Supplementary effect of the different nutrients present in multigrain based formulation will not only improve the nutritional quality but nutritional quality is also required for desired physical properties in the end product. Maize is a good source of starch, hence important for developing health foods using extrusion technique. Being rich in protein, defatted soy flour is a valuable food material for enhancing the protein content in the food products. Millets are relatively rich in iron and starch, and are a good source of energy. Further sprouting of millets improves the digestibility and enhances the bioavailability of protein and micronutrients. In view of this, CIPHET has standardized the process protocol for development of high protein health foods using extrusion technique. High protein health foods were developed using twin screw extruder utilizing food materials having maize, sprouted sorghum and pearl millet, defatted soy flour and sesame seeds in them. Overall sensory acceptability score for multigrain based health foods with 19% protein was 8.64 on a 9 point hedonic scale. This health food provides 382 kcal calories, 2.03g crude fibre, 2.49 mg iron, 206 mg calcium per 100g sample and 19.27% protein with 67% *in vitro* protein digestibility. Overall sensory acceptability score for multigrain based health foods with 22% protein was 7.82 at 9 point hedonic scale. This product provided 381kcal calories, 2.19g crude fibre, 2.36mg iron, 234mg calcium per 100g sample and 22.7% protein with 67.8% *in vitro* protein digestibility.

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