CENTRE FOR ADVANCED FACULTY TRAINING IN HOME SCIENCE

Professor Jayashankar Telangana State Agricultural University
Post Graduate and Research Centre, Home Science
Rajendranagar, Hyderabad - 500 030

REPORT

"Emerging Food Processing and Packaging Technologies: A Drive for Economic Opportunities"

11th to 31st July 2018

Director, CAFT - Home Science &
Course Director
Dr. K. Uma Maheswari
Professor and University Head
Dept. of Foods & Nutrition

Course Coordinators

Dr. Jessie Suneetha W
Assistant Professor

Dr. B. Anila Kumari
Assistant Professor

Centre for Advanced Faculty Training in Home Science

Training programme on

"Emerging Food Processing and Packaging Technologies: A Drive for Economic Opportunities"

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Organized by

Faculty of Home Science
Professor Jayashankar Telangana State Agricultural University
Rajendranagar, Hyderabad

ACKNOWLEDGEMENT

The CAFT Director, Course Director and Course Co-Directors gratefully acknowledge the financial support provided by the Indian Council for Agricultural Research (ICAR) for conducting the 21 days training programme entitled "***Emerging Food Processing and Packaging Technologies: A Drive for Economic Opportunities*****" held from 11th to 31st July 2018**, under Center for Advanced Faculty Training in Home Science.

We are extremely grateful to Dr. V. Praveen Rao, Hon'ble Vice-Chancellor, Professor Jayashankar Telangana State Agricultural University for the encouragement and guidance to conduct CAFT – HSc activities under the Faculty of Home Science. Special thanks to him for sharing his valuable thoughts with us.

We express our sincere thanks to Dr. K. Sadasiva Rao, Dean of Agril. Engineering and Technology / Dean of Home Science i/c and Dr. A. Mrunalini, former Dean Faculty of Home Science for the total support and for the valuable inputs that were given to us before and during the training.

We deeply acknowledge the staff of ICAR-NRC on meat for the technical support and hospitality during the training programme. We place our regards to all the guest speakers who spared valuable time for sharing their experiences with the participants. Special thanks to the directors and heads of various institutes viz. ICAR – NRC on meat, Tamil Nadu Fisheries University (TNFU), Acharya NG Ranga Agricultural University (ANGRAU), National Academy of Agricultural Research Management *(*NAARM*),* Central Food Technological Research Institute *(*CFTRI), National Research Centre On National Fisheries Development Board (NFDB), National Institute of Nutrition (ICMR-NIN), Bunar Lipids Pvt. Ltd , Indian Institute of Packaging, Packaging Clinic & Research Institute (PCRI), Indian Instituite of Millet Reasearch (IIMR) and M/s VSR Agro food industries of for providing guest speakers and feild visits during the training programme.

We thank the Director, IOR (DOR) for providing boarding and accommodation facility for participants. We thank the non-teaching staff of CAFT-H Sc and PG&RC for their support and help rendered during the training programme.

Special mention of all the authorities of SAU's for nominating the participants and of all the participants, for attending the training programme.

The coverage of the programme by the University press is also acknowledged.

Dr.K. Uma Maheswari
Director, CAFT Home Science & Course Director

Dr. Jessie Suneetha W
Course coordinator

Dr. B. Anila Kumari
Course coordinator

CONTENTS

Centre for Advanced Faculty Training in Home Science
Training programme on
"Emerging Food Processing and Packaging Technologies: A Drive for Economic Opportunities"
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EXECUTIVE SUMMARY

The Indian Food Processing industry currently valued at about US$ 100 billion and is estimated to grow at 9-12 %, based on estimated GDP growth rate of >8% and increasing disposable income. Value addition of food products is expected to increase from the current 8 to 35% by the end of 2025. Fruit and vegetable processing, which is currently around 2% of total production will increase to 25% by 2025. High domestic demand and supportive policy provides significant opportunities across the food processing value chain in India.

In today's business environment, the innovations in farming and agri-food processing are important to remain competitive and optimize returns from an enterprise. It may entail producing a commodity for a special market; changing the form of the commodity before it is marketed; changing how a commodity is packaged and labeled for the market; changing the way a commodity is marketed and adding a new enterprise to an existing one. The course provides ideas and practices on deriving primary products, co-products and by-products from agro processed waste.

The way processed foods are packaged and label is important. The packaging not only protect or preserve the content, transport the product from one place to another and carry information about the product, but it should also entice consumers to purchase the product. Equally important is the food labelling. It is a way in which consumers can get knowledge about the food they are considering to purchase. Labels with correct information on the packaging can prevent consumers from unnecessary harms such as allergic reactions. Labelling requirements are put in place to protect the consumers. Therefore, it is important for manufacturers and suppliers to know these requirements in ensuring the right message is relayed to the consumer about the products through labelling on the packaging. In addition, the placement of the bar code on the packaging must be both aesthetic and within the printing specification required for a "good" scan.

The training curriculum has been developed in consonance with the needs of participants in order to provide thrust knowledge about trends in food processing technologies the right packaging and appealing design which are vital to raise the competitive edge of the product and determine its success in the market.

Objectives

- To impart knowledge on recent advances in food processing, food packaging and marketing of agricultural and livestock produce.
- To demonstrate and give hands on experience in innovative food processing technologies.
- To give insight on recent advances in food packaging and labelling techniques.
- To develop business modules for setting up of small and medium scale industries.

Course Content

The course is divided into three modules, which are further divided into different relevant topics of training programme:

- **Module I**: Lectures on thermal and non-thermal methods used for value addition, product development packaging and marketing.
- **Module II:** Hands on experience in grain processing with special reference to millets, bakery and confectioneries, nano food packaging technologies, meat processing technologies etc.
- **Module III:** Field visits to organizations related to food processing, packaging and marketing.

How do the participating organization benefit?

- Training in crop processing technologies with faculty will enable one to gain proper perspective and insight in all related topics including typical technologies, processes and operation used in secondary and tertiary levels of food processing like thermal and non thermal methods of food processing, importance of nano-particulation in food processing and packaging.
- For effective teaching and to inculcate entrepreneurial qualities in participants, the faculty concerned with foods and nutrition, food engineering, veterinary sciences, horticulture and related fields shall be the part of core team to share their expertise and knowledge about the emerging technologies in food processing sector.

Details of the participants

All the agriculture universities Vice-Chancellors, Deans of Home science and Directors of Extension, training coordinators of at least 45 were sent the training brochure and nomination form by post for deputation of at least two eligible faculty

members for the training. Initially there was a lot of response from faculty members from all over India and they also sent advanced copy of the nomination form. University officials were further contacted by email and telephone for deputation of staff. From all over India 38 applied for the programme, out of which 23 were approved and 20 applicants finally reported. They were from 13 Universities - Rajmata Vijayaraje Scindia Krishi Vishwa Vidyalaya (RVSKVV), Gwalior (M.P) - 1, Dayalbagh Educational Institute - 1, Sri Venkateswara Veterinary University - 2, Rajasthan University of Veterinary & Animal Science - 1, Navsari Agricultural University, Gujarat - 3, Vasantrao Naik Marathwada Krishi Vidyapeeth (VNMKY), Parbhani - 2, Chandra Shekhar Azad University of Agriculture and Technology, Kanpur - 1, University of Agricultural Sciences (UASB), Gandhi Krishi Vignana Kendra, Bangalore - 1, University of Agricultural Sciences, Dharwad - 2, Vasantrao Naik Marathwada Krishi Vidyapeeth (VNMKV), Parbhani, Maharashtra - 1, ICAR-Central Institute of Agricultural Engineering, Bhopal - 1 and Professor Jayashenkar Telangana State Agricultural University - 4. There are thirteen female and seven male participants. They are from five faculties - 8 Home Science, 6 - Agriculture 3 - Veterinary, 2 - Agriculture Engineering and 1-Horticulture.

Training faculty

This interdisciplinary composition made the training programme to have versatile speakers of varied specialisation. A total of 56 sessions were scheduled, out of which 35 (45 hours) were theoretical and 21 (63 hours) were practical. Speakers were invited from national institutions like Professor Jayashankar Telangana State Agricultural University (PJTSAU), ICAR – NRC on Meat, Tamil Nadu Fisheries University (TNFU), Acharya NG Ranga Agricultural University (ANGRAU), National Academy of Agricultural Research Management *(*NAARM*),* Central Food Technological Research Institute (CFTRI), National Research Centre On National Fisheries Development Board (NFDB), National Institute of Nutrition (ICMR-NIN), Bunar Lipids Pvt. Ltd , Indian Institute of Packaging, Packaging Clinic & Research Institute (PCRI), and other related food industries of repute. Eleven visits were arranged to institutes like ICAR – NRC on meat, Chengicherla, Hyderabad, Millet incubation center, ICAR-Indian Institute of Millet Research, PJTSAU library, QC Lab-PJTSAU, Rural Technology Park - NIRD, CSIR – Central Food Technological Research Institute Resource Center, National Fisheries Development Board, VSR agro foods, College of Home Science and Packaging Research Institute and Clinic.

Development of business modules by participants

As part of the training programme participants were asked to develop business modules and present at the end of the training programme. The participants were

divided into five groups and they were asked to develop a project on innovative ideas for development of business modules in food processing. The following business modules were developed and presented by the trainees

1. Utilization of underutilized jack fruit for food security through value addition
2. Project module on soymilk, paneer and curd
3. Value addition of dairy by-products
4. Small scale industry on fruit and fruit waste utilization
5. Banana products manufacture Pvt. Ltd.

Evaluation of the training

Pre and post evaluation report: Evaluation of participants was conducted before and after the conclusion of the training programme. Participants were provided with the pre and post evaluation schedule, to assess the existing knowledge and knowledge gained through the 21 day training on ***"Emerging Food Processing and Packaging Technologies: A Drive for Economic Opportunities"***. Clearly there was substantial difference in the test scores of the participants between the pre and post evaluation.

The impact of training is revealed through pre and post tests. On 25 multiple choice questionnaire the initial and final knowledge levels were measured, which revealed increase from 0 to 100 per cent. The minimum and maximum scores in pretest were 4 to15 (16 to 60%), while they were 13 to 23 (52 to 92%) respectively in post tests. Each question reflects the content outcome of a group of topics. On average the increase in knowledge is 70% as per the post evaluation test.

Participant feedback: Participant feedback on the training program too was obtained and most sessions were rated as either excellent or very good. They also stated that the topics covered were very useful to all the participants. The topics listed as most informative by the participants are

1. Applications of nanotechnology in food industry
2. Pseudo cereals for food security
3. Supply chain management for value added production enterprises
4. Extrusion technologies for employment generation
5. Recent advances in freezing and chilling techniques for meat processing
6. Need for value addition to foods and improved technologies for enhanced marketability
7. Current trends in ancient grain based technological applications
8. Germinated and malted foods for economic growth

Some of the participant suggested that if practical components like hands on experience in bakery and confectionary, novel food product development etc might be included.

List of Participants

S. No.	Name of the participant & Designation	Designation	Department College/Organisation University &Place	Mobile No.	Email
1	Dr. Rekha Tiwari	Scientist (Home Science)	Krishi Vigyan Kendra, Ujjain RVSKVV, Gwalior (M.P)	09425490471	rekhaup_2007@rediffmail.com
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4	Dr. Naveen Zillabathula	Assistant Professor	Department of livestock products technology. College of Veterinary Science, Sri Venkateswara Veterinary University, Tirupati.	09966978332 / 9849493600	naveenvetlpt@gmail.com
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6	Mr. Dilipbhai Manajibhai Damasia	Assistant Professor	Department of Agricultural entomology. College of Agriculture, Waghai, Navsari Agricultural University, Gujarat.	09979006676	dmdamasia@nau.in
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15	Dr. Maharshi Deepa	Scientist (Home	Krishi Vigyan Kendra, Guntur, Sri	09959920099	deepanarayana@ rediffmail.com

		Science)	Venkateswara Veterinary University (SVVU), Tirupati.		
16	Mrs. Rajani Dodlolla	Assistant Professor (Hort.)	Dept. of Horticulture Agricultural College, Palem, PJTSAU.	09553444589 / 08328385566	rajani.horti@gmail.com
17	Dr. S. Maheshwaramma	Scientist (Plant breeding)	Gentetics & plant breeding RARS, Palem, PJTSAU.	09492278817	mahiphd@gmail.com
18	Mrs. Rohini Bhagwanrao Shinde	Scientist (Home Science)	Krishi Vigyan Kendra, Mingoli VNMKV, Parbhani, Maharashtra.	09970996883 / 08830778042	rohi15684@rediffmail.com
19	Dr. Samlesh Kumari	Scientist (Dairy Microbiology)	Centre of Excellence for Soybean processing and Utilization, ICAR-Central Institute of Agricultural Engineering, Bhopal	09425948072/ 7974441314	samleshndri.kumari@gmail.com
20	Dr. Aruna Ramchandra Kharwade	Scientist (Home Science)	Krishi Vigyan Kendra, Vasantro Naik Marathwada Krisihi Vidhyapeeth, Pharbhani.	09403219848	kharwadearuna@gmail.com

List of dropped out participants

S. No.	Name	Desig nation	Depart ment	Address	Reasons for dropout
1	Dr. Shailendra Ramdas Mane	Assistant Professor	Horticulture	Lokmangal College of Agriculture	• Applied too late no permission from University on time • Health problems • Personal reason • No permission from University • No permission from Associate Dean due to shortage of staff • No information
2	Dr. Rekha Rani	Assistant Professor	Dairy Technology	Sam Higginbottom Institute of Agriculture, Technology & Sciences (SHIATS), Allahabad	
3	Ms. Pinki Surendra Dutt Sharma	Scientist	Home Science Extension	Junagadh Agricultural University (JAU), Junagarh	
4	Mrs. Farooqui Hafeez Farzana	Assistant Professor	Food & Nutrition	College of Home Science	
5	Dr. Shailaja Kola	Scientist	Soil Science-Soil Chemistry / Fertility / Microbiology	Professor Jayashankar Telangana State Agricultural University (PJTSAU), Hyderabad	
6	Mrs.Aysha Ch	Assistant Professor	Dairy Microbiology	College of Food Technology (CFT), Chalakudy	

ORGANISING COMMITTEE AND PARTICIPANTS

ORGANIZING COMMITTEE

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Center for Advanced Faculty Training in Home Science
Professor Jayashankar Telangana State Agricultural University
Post Graduate & Research Center, PJTSAU, Rajendranagar, Hyderabad
ICAR Sponsored 21 days training on
EMERGING FOOD PROCESSING AND PACKAGING TECHNOLOGIES: A DRIVE FOR ECONOMIC OPPURTUNITIES
11/07/2018 – 31/07/2018

Schedule of Events

Day	Date	Time	Topic	Name & designation of speaker / Institute
1	11/07/2018	9:45 to 11:00 AM	Registration	**Dr. Jessie Suneetha W** and **Dr. B. Anila Kumari**, Assistant Professors, PGRC, PJTSAU, Rajendranagar, Hyderabad
		11:15 AM to 12:30 PM	Inauguration	--
		1:30 to 2:45 PM	Pre-evaluation	**Dr. Jessie Suneetha W** and **Dr. B. Anila Kumari**, Assistant Professors, PGRC, PJTSAU, Rajendranagar, Hyderabad
		3:15 to 4:30 PM	Introduction to CAFT Home Science and PJTSAU, Rajendranagar, Hyderabad	**Course Director** **Dr. K. Uma Maheswari**, Professor & University Head, Dept of Foods and Nutrition, PGRC, PJTSAU, Rajendranagar, Hyderabad
2	12/07/2018	9:45 to 11:00 AM	Need for value addition to foods and improved technologies for enhanced marketability	**Dr. K. Uma Maheswari**, Professor & University Head, Dept of Foods and Nutrition, PGRC, PJTSAU, Rajendranagar, Hyderabad kumamaheswari2019@gmail.com
		11:15 AM to 12:30 PM	Current trends in ancient grain based technological applications	**Dr. T. V. Hymavathi**, Professor, PGRC, PJTSAU, Rajendranagar, Hyderabad hymasarathi@gmail.com
		1:30 to 2:45 PM	Supply chain management for value added production enterprises	**Dr. Seema Nath**, Professor & Head, SABM, PJTSAU, Rajendranagar, Hyderabad seemanath1@gmail.com
		3:15 to 4:30 PM	Practicals	**Dr. Jessie Suneetha W** and **Dr. B. Anila Kumari**, Assistant Professors, PGRC, PJTSAU, Rajendranagar, Hyderabad
3	13/07/2018	9:45 to 11:00 AM	Innovative processing technologies for meat value chain	**Dr. M. Muthukumar**, ICAR – NRC on meat, Chengicherla, Hyderabad muthukumar55@rediffmail.com
		11:15 AM to 12:30 PM	Recent advances in freezing and chilling techniques for meat processing	**Dr. Rituparna Banerjee**, ICAR – NRC on meat, Chengicherla, Hyderabad rituparnabnrj@gmail.com

		1:30 to 4:30 PM	Practical demonstration on value added meat products at ICAR – NRC on meat, Chengicherla, Hyderabad by **Dr. M. Muthukumar** and **Dr. Rituparna Banerjee**, ICAR – NRC on meat, Chengicherla, Hyderabad	**Dr. Jessie Suneetha W**, Assistant Professor, PGRC, PJTSAU, Rajendranagar, Hyderabad
4	14/07/2018	9:45 AM to 4:30 PM	Visit to SPAR super market for viewing of cold storage of processed foods	**Dr. Jessie Suneetha W** and **Dr. B. Anila Kumari**, Assistant Professors, PGRC, PJTSAU, Rajendranagar, Hyderabad
5	15/07/2018	9.30 AM to 4: 30 PM	Visit to millet incubation center, PJTSAU, Rajendranagar, Hyderabad	**Dr. T. V. Hymavathi**, Professor, PGRC, PJTSAU, Rajendranagar, Hyderabad **Millet incubation center in – charge**
6	16/07/2018	9:45 to 11:00 AM	Germinated and malted foods for economic growth	**Er. A. Poshadri,** SMS (Food Technology), KVK, PJTSAU, Adilabad poshadri_fst@yahoo.co.in
		11:15 AM to 12:30 PM	Skilled human resources requirement for processing sector	**Dr. Kalpana Sastry**, Professor, TISS and Former Joint Director, NAARM, Rajendranagar, Hyderabad
		1:30 to 2:45 PM	Skilled human resources requirement for processing sector (continued)	**Dr. Kalpana Sastry**, Professor, TISS and Former Joint Director, NAARM, Rajendranagar, Hyderabad
		3:15 to 4:30 PM	Practicals	**Dr. Jessie Suneetha W** and **Dr. B. Anila Kumari**, Assistant Professors, PGRC, PJTSAU, Rajendranagar, Hyderabad
7	17/07/2018	9:45 to 11:00 AM	Extrusion technologies for employment generation	**Dr. K. Aparna,** Sr. Scientist, QC Lab, PJTSAU, Rajendranagar, Hyderabad aparnakuna@gmail.com
		11:15 AM to 12:30 PM	Functional foods and Nutraceuticals	**Dr. Janaki Srinath**, Assistant Professor, College of Home Science, Saifabad, Hyderabad drjanakisrinath@gmail.com
		1:30 to 4:30 PM	Visit to Indian Institute of Millet Research, Rajendranagar, Hyderabad	**Dr. S. Suchiritha Devi,** Associate Professor, PGRC, PJTSAU, Rajendranagar, Hyderabad
8	18/07/2018	9:45 to 11:00 AM	Soya milk: its future as an alternative to milk	**Mrs. T. Supraja**, Assistant Professor, College of Home Science, Saifabad, Hyderabad suprajathoomati@gmail.com
		11:15	Post harvest	**Dr. S. Suchiritha Devi**,

		AM to 12:30 PM	processing of horticulture crops	Associate Professor, PGRC, PJTSAU, Rajendranagar, Hyderabad sucharithadevi.hyd@gmail.com
		1:30 to 2:45 PM	Fermented foods: Its role in nutrient security and enhancing income generation	**Dr. S. Triveni,** Associate Professor & University Head, Dept. of Agricultural Microbiology & Bioenergy, College of Agriculture, Rajendranagar, Hyderabad 500 030 triveniagmsc@yahoo.co.in
		3:15 to 4:30 PM	Practicals	**Dr. Jessie Suneetha W** and **Dr. B. Anila Kumari**, Assistant Professors, PGRC, PJTSAU, Rajendranagar, Hyderabad
9	19/07/2018	9:45 AM to 4:30 PM	Pedagogy training	**Dr. I Srinivas Rao**, Professor & Head, EEI, PJTSAU, Rajendranagar, Hyderabad illuris@gmail.com
10	20/07/2018	9:45 to 11:00 AM	Blending oils for improved culinary properties and development of nutrient enriched products	**Mr. Praveen**, MD, Bunar Lipids Pvt. Ltd., Vidyanagar, Hyderabad bunargroup@gmail.com
		11:15 AM to 12:30 PM	Use of e –resources for enhancing business opportunities	**Dr. V. Veeranjaneyulu**, University Librarian, Central Library, PJTSAU, Rajendranagar, Hyderabad 500 030
		1:30 to 2:45 PM	Value chain analysis of Mango in Chittoor district of AP	**Dr. M .Uma Devi**, Honorable Board Member, PJTSAU and Director, Water Technology, PJTSAU, Rajendranagar, Hyderabad 500 030
		3:15 to 4:30 PM	Visit to PJTSAU library	**Dr. Jessie Suneetha W** and **Dr. B. Anila Kumari**, Assistant Professors, PGRC, PJTSAU, Rajendranagar, Hyderabad
11	21/07/2018	9:45 to 11:00 AM	Food Safety and regulations	**Dr. V. Sudershan Rao**, Scientist (Retd.), ICMR – National Institute of Nutrition, Hyderabad vemulasr@yahoo.com
		11:15 AM to 12:30 PM	Setting up small and medium enterprises	**Dr. G. Valentina**, Associate Professor & Head, Centre for Equity & Social Development, NIRD and Panchayati Raj, Rajendranagar, Hyderabad 500 030 myvaluei@gmail.com valentine.nird@gov.in
		1:30 to 2:45 PM	Irradiation for fetching better quality produce to enhance export market	**Dr. M. Sridhar**, Principal Scientist & Head, Quality Control Lab PJTSAU, Rajendranagar, Hyd

		3:15 to 4:30 PM	Visit to Irradiation unit	**Dr. T. Kamalaja**, Scientist, AICRP - HSc PJTSAU, Rajendranagar, Hyderabad 500 030
12	22/07/2018	9:45 AM to 4:30 PM	Practicals – development of food business modules by participants	**Dr. Jessie Suneetha W** and **Dr. B. Anila Kumari**, Assistant Professors, PGRC, PJTSAU, Rajendranagar, Hyderabad
13	23/07/2018	9:45 to 12:30 PM	Visit to QC Lab, PJTSAU, Rajendranagar, Hyderabad	**Dr. K. Aparna**, Sr. Scientist, QC Lab, PJTSAU, Rajendranagar, Hyderabad
		1:30 to 2:45 PM	Dehydration technologies for fruit and vegetable processing	**Dr. K. Uma Devi**, Professor, College of Home Science, Saifabad, Hyderabad uma_chsc@yahoo.com
		3:15 to 4:30 PM	Orientation to departments at College of Home Science, Saifabad, Hyderabad	**Dr. K. Uma Maheswari**, Professor & University Head, Dept of Foods and Nutrition, PGRC, PJTSAU, Rajendranagar, Hyderabad
14	24/07/2018	9:45 to 11:00 AM	An introduction to Nanoscience and Nanotechnology	**Dr. TNVKV. Prasad**, Senior Scientist, Nanotechnology Laboratory, Institute of Frontier Technology, RARS, ANGRAU, Tirupathi tnvkvprasad@gmail.com
		11:15 AM to 12:30 PM	Applications of Nanotechnology in food industry.	Dr. D. Kesavan, Assistant Professor, College of Fisheries Engineering, TN Fisheries University, Nagapattinam, dev.kesavan@gmail.com kesavan@tnfu.ac.in
		1:30 to 4:30 PM	Practical demonstration on development of nanoparticles for food usage	**Dr. D. Kesavan**, Assistant Professor, College of Fisheries Engineering, TN Fisheries University, Nagapattinam, TN
15	25/07/2018	9:45 to 11:00 AM	Biotechnology: its role in food processing	**Dr. Ch. V. Durga Rani**, Professor, Institute of Biotechnology, PJTSAU, Rajendranagar, Hyderabad ranivenkata@yahoo.com
		11:15 AM to 12:30 PM	Baking of foods for enhanced shelf life	**Mr. B. Srinivasan**, Retired Scientist, CFTRI resource center, Hyderabad bsrinivasan2003@gmail.com
		1:30 to 4:30 PM	Testing quality of packaging materials – followed by practicals by **Mr. B K Karna**, Director, Packaging Clinic & Research Institute (PCRI), 114/1st Floor, Amrutha Ville, Opp.	**Dr. B. Anila Kumari**, Assistant Professor, PGRC, PJTSAU, Rajendranagar, Hyderabad

			Yashoda Hospital, Raj Bhavan Road, Somajiguda, Hyderabad	
16	26/07/2018	9:45 to 10:45 AM	Value addition to underutilized foods	**Dr. K. Uma Maheswari**, Professor & University Head, Dept of Foods and Nutrition, PGRC, PJTSAU, Rajendranagar, Hyderabad
		11:00 AM to 12:15 PM	Role of media and advertisement in marketing of processed foods	**Dr. G. M. Subba Rao**, Scientist, ICMR – National Institute of Nutrition, Hyderabad gmsubbarao@yahoo.com
		12:20 to 1:35 PM	Recent innovations in packaging for food products	**Dr. G. Kandeepan**, Scientist (Sr. Scale), ICAR-NRC on Meat, Chengicherla, Hyderabad Telengana-500092, India drkandee@gmail.com
		2:30 to 3:45 PM	Emerging Technologies for processing and packaging of fish and fishery products	**Dr. M. Krishnan**, Principal Scientist and Head, Division of Educational Systems Management ICAR – NAARM, Rajendranagar, Hyderabad mkrishnan@naarm.co.in
		4:00 to 5:30 PM	Visit to Rural Technology Park, NIRD, Rajendranagar, Hyderabad	**Dr. B. Anila Kumari**, Assistant Professor, PGRC, PJTSAU, Rajendranagar, Hyderabad
17	27/07/2018	9:45 to 11:00 AM	Role of CSIR-CFTRI in food processing, technology transfer, human resource development and analytical quality control of food products	**Dr. (Mrs.) T. Jyothirmayi** Senior Principal Scientist CSIR-CFTRI Resource Centre, Habsiguda, Uppal Road, Hyderabad-500 007 jyothirmayi@cftri.res.in
		11:15 AM to 12:30 PM	Food packaging: An Overview	**Dr. Srinivasulu Korra** Scientist, CSIR-CFTRI Resource Centre, Habsiguda, Uppal Road, Hyderabad-500 007
		1:30 to 2:30 PM	Field visit to CFTRI Regional Centre to observe novel food processing technologies developed by CFTRI	**Dr. Jessie Suneetha W**, Assistant Professor, PGRC, PJTSAU, Rajendranagar, Hyderabad
		3:00 to 4:30 PM	State of art of IQF Technology for procurement, production, processing and marketing of baby corn, fruits and	**Dr. Jessie Suneetha W,** Assistant Professor, PGRC, PJTSAU, Rajendranagar, Hyderabad

			vegetables – Visit to VH Agro Foods Private Limited, Uppal, Hyderabad (**Mr. V K V. Prasad,** Managing Director, V H Agro Foods Private Limited, B-9/11, IDA, Hyderabad)	
		4:30 to 5:30 PM	Visit to Crepe Cones, B-9/1, IDA Uppal, Hyderabad 500039	**Dr. Jessie Suneetha W**, Assistant Professor, PGRC, PJTSAU, Rajendranagar, Hyderabad
18	28/07/2018	9:45 to 11:00 AM	Labeling and bar coding of packaged foods for better traceability	**Dr. Madab Chakravarti**, Joint Director and Regional Head, Indian Institute of Packaging, Sanath nagar, Hyderabad iiphyd.madhab@gmail.com
		11:15 AM to 12:30 PM	Pseudo cereals for food security	**Dr. B. Anila Kumari**, Assistant Professor, PGRC, PJTSAU, Rajendranagar, Hyderabad baniladr@gmail.com
		1:30 to 2:45 PM	Food industry byproduct utilisation for income generation	**Dr. Jessie Suneetha** W**,** Assistant Professor, PGRC, PJTSAU, Rajendranagar, Hyderabad wjsuneetha@gmail.com
		3:15 to 4:30 PM	Practicals	**Dr. Jessie Suneetha W** and **Dr. B. Anila Kumari**, Assistant Professors, PGRC, PJTSAU, Rajendranagar, Hyderabad
19	29/07/2018	9:45 AM to 4:30 PM	Practicals – development of food business modules by participants	**Dr. Jessie Suneetha W** and **Dr. B. Anila Kumari**, Assistant Professors, PGRC, PJTSAU, Rajendranagar, Hyderabad
20	30/07/2018	9:45 to 12:30 PM	Presentation of business modules developed by participants	**Dr. K. Uma Maheswari**, Professor & University Head, **Dr. T. V. Hymavathi**, Professor, Dept of Foods and Nutrition, PGRC, PJTSAU, Rajendranagar, Hyderabad and **Dr. V. Vijaya Lakshmi**, Professor, Dept of RMCS, AIRCP, PJTSAU, Rajendranagar, Hyderabad
		1:30 to 4:30 PM	Visit to National Fisheries Development Board, Hyderabad	**Dr. K. Uma Maheswari**, Professor & University Head, Dept of Foods and Nutrition, PGRC, PJTSAU, Rajendranagar, Hyderabad
21	31/07/2018	9:45 to 12:30 PM	Post evaluation and feedback from participants	**Dr. Jessie Suneetha W** and **Dr. B. Anila Kumari**, Assistant Professors, PGRC, PJTSAU, Rajendranagar, Hyderabad
		1:30 to 4:30 PM	Valedictory	

Day to day report of the training programme on "Emerging Food Processing and Packaging Technologies: A Drive for Economic Opportunities" held from 11th to 31st July 2018

Day 1: **11/07/2018**

CAFT training proramme on "Emerging food processing and packaging technologies: A drive for economic opportunities" was inaugurated on 11/07/2018 at Post Graduate & Research Centre, Rajendranagar, Hyderabad. Participants have come from ten different states belonging to the disciplines of Home Science, Agricultural Extension, Agricultural Engineering, Veterinary Sciences and Horticulture.

Former Dean, Faculty of Home Science Dr. A. Mrunalini precided over the function. Dr. M. Uma Devi, Member – Board of Management, PJTSAU, Dr. K. Veeranjayulu, University Librarian, Dr. V. Vijaya Lakshmi, Associate Dean, College of Home Science and Dr. K. Uma Maheswari, CAFT Director graced the occasion. The programme started with invocation song followed by lighting the lamp and welcome address by Course director Dr. K. Uma Maheswari. She highlighted the course objectives to the gathering. Dr. Jessie Suneetha W, Course coordinator briefly explained about the 21 days training programme. Dr. V. Vijaya Lakshmi, Associate Dean, College of Home Science presented the developments in food processing, packaging and storage technologies.

Dr. M. Uma Devi, Member – Board of Management, PJTSAU briefly spoke about the PJTSAU's drive for innovation in doubling the farmer's income by value addition, establishment of incubation centers and spreading university developed technologies to the farming community. Dr. K.Veeranjayulu, University Librarian spoke about the significant achievements of Faculty of Home Science in setting up of CAFT and other enterprising incubation centres. He emphasized the need to include IT as part of planning and marketing strategies. In her presidential address, Dr. A. Mrunalini, Former Dean of Home Science explained the budget allocations for food processing sector. She stressed on the cultural and educational transformations needed for exploring the economic opportunities, business models for the improvement of farmer's income. Dr. B. Anila Kumari, Course Coordinator proposed vote of thanks.

In the afternoon session, pre evaluation was conducted by course coordinators. They explained the guidelines for developing business modules to the participants and divided them into five groups with 4 members in each group. An introductory session about CAFT – H.Sc and the course was conducted by Dr. K. Uma Maheswari.

Day 2: **12/07/2018**

Total three lectures were covered during the entire day. First lecture was delivered by Dr. K. Uma Maheshwari, Professor and University Head, Dept. of Food and Nutrition, PGRC, PJTSAU, Hyderabad, followed by Dr. T.V. Hymavathi, Professor, PGRC, PJTSAU, Hyderabad and Dr. Seema Nath, Professor and Head, SABM, PJTSAU, Hyderabad. The details of the lectures were summarized below.

1) **Dr. K. Uma Maheshwari:** Course Director of CAFT training programme, Professor and University Head, Dept. F&N, PJTSAU, Hyderabad has been delivered a very informative lecture on "**Need for Value addition to foods and improved technologies for enhanced marketability"**. In her lecture she focused on the importance of food processing and its contribution in growth of GDP of the country. She further drew the attention towards how value addition can minimise the post harvest losses which account for upto 40% and benefit for doubling the income of farmer's family. The concept and aim of value added chain was also explained in detail.
2) **Dr. T.V. Hymavathi**, Professor, PGRC, PJTSAU, Hyderabad delivered a lecture entitled "**Current trends in ancient grains based technological applications.**" She discussed current trends of ancient grains and challenges in formulating products *viz.* high price, gluten free, health benefits, appeal in terms of sensory characteristics etc. She also discussed about the technologies can be used for product formulation. She talked about the millet based product available in market for example granola bars. She focused light on scope in research of millet based products in food industries.
3) **Dr. Seema Nath**, Professor and Head, SABM, PJTSAU, Hyderabad delivered a lecture entitled **"Supply change management for value added Production enterprises"**. She started her lecture with importance of food security and explained that food security is all about '3A' *i.e*. Availability, Accessibility and Affordability. She told about the target of year 2022 *i.e*. doubling farmers' income. She shared her experience with the participants about value chain added production enterprises. She emphasied that marketing starts with consumers and end with consumers. She enlightens the importance of supply chain management, changing trends in agriculture, food concepts in olden and modern days. She also described the importance of brand name and labeling to the end product. The present status of supply chain management for value added production was described through SWOT analysis.

Day 3: **13/07/2018**

The third day of the CAFT training programme was conducted at ICAR-NRC on Meat, Chengicherla, Hyderabad. The training programme started with a brief introduction by Dr. M. Muthukumar about the institution and regarding various activities being carried out at NRC on meat. NRC on Meat has facility to train personel associated with meat production under hygienic condictions for different species of animals. A complete package of practices for clean meat production like the live animal reception, lairage, hygienic slaughtering and dressing, ante-mortem inspection and post mortem inspection, personnel and plant hygiene, HACCP in slaughter house, meat borne zoonotic diseases, meat cut-up parts, meat quality, packaging and storage were demonstrated.

Dr. Rituparna Banerjee gave lecture on "Recent advances in freezing and chilling techniques for meat processing". She explained that preservation of meat can be done by 3 ways like control of temperature, moisture and inhibitory processes.

Then lecture on “Innovative processing technology for meat chain evaluation” was presented by Dr. M. Muthukumar. The innovative processing technologies include steps and measures to extend the shelf life, improving the quality of the products and imparting the health benefits to the consumer.

The afternoon session started with a visit to model slaughter house maintained at NRC on Meat which was semi-automatic and has a chill storage facility. A model retail shop was also displayed. There was a practical session with hands-on training on preparation of different value added meat products like preparation of ground chicken based meat products and emulsion based chicken sausages, kababs and crockets.

Day 4: **14/07/2018**

On day 4, the participants visited the Millet Inclubation center at PJTSAU which has taken a unique initiative to promote millets with public private sector collobration. Through this initiative, millet based valued added baked items are being supplied to school going children in 150 social welfare residential hostels. The millet products are regularly being supplied to functions at the university, super markets and hospitals.

Day 5: **15/07/2018**

Introduction to development of business modules was done by the course co-ordinators Dr. Jessie Suneetha W and Dr. B. Anila Kumari. The participants who were divided into 5 groups with 4 members in each were asked to discuss about the business

modules that they would like to develop as part of training programme. After the discussions were completed, five modules were finalised as given below:

1. Utilization of underutilized jack fruit for food security through value addition
2. Project module on soymilk, paneer and curd
3. Value addition of dairy by-products
4. Small scale industry on fruit and fruit waste utilization
5. Banana products manufacture Pvt. Ltd.

Day 6: **16/07/2018**

Er. A. Poshadri gave the guest lecture on the topic "Germination and malted foods for economic growth" in which he spoke on the need for carrying out simple processing for enhanced nutrient availability and inturn for better pricing of finished products.

Dr. Kalpna Sastry discussed about "Skilled human resources required for processing sector". She discussed about various on-going trends in markets related to food processing industry. The need for skilled human resources for better employment oppurntuties and enhanced productivity were discussed at large.

Day 7: **17/07/2018**

Dr. Aparna Kuna, Sr. Scientist, MFPI – Quality Control Laboratory, PJTSAU Hyderabad, Telangana gave lecture on "Extrusion technologies for employment generation". The growing demand for convenience foods resulted in development of extrusion technologies and these have brought in a variety of food items which were previously unknown to consumers resulting in better utilisation of farm produce and development of innovative foods.

Dr. P. Janaki Srinath, Assistant Professor and Senior Nutritionist, Department of Foods and Nutrition, College of Home Science, PJTSAU gave lecture on "Functional Foods and Nutraceuticals". She elaborated on food sources and health benefits functional food components, important phytochemicals and their medicinal uses, probiotics, prebiotics and nutraceutical formulation.

Day 8: **18/07/2018**

A lecuture on "Post harvest processing of horticulture crops" was presented by Dr. S. Sucharitha Devi, Associate Professor, PGRC, PJTSAU. She covered about existing scenario of horticulture crops production, processing, post harvest losses in the world and in India, factors responsible for loss and methods to overcome the loses in detail.

Ms. T. Supraja, Assistant Professor, College of Home Science, Saifabad, Hyderabad delivered a lecture on "Soya Milk: Its future as an alternative to milk". Soya fermented products, their benefits, market avenues, its SWOT analysis, limitations of soya use due to presence of trypsin inhibitors, soya phytates and methods to reduce them during processing were dealt with in detail.

The lecture on "Fermented foods: Its role in nutrient security and enhancing income generation" was delivered by Dr. S. Triveni , Associate Professor amd University Head, Department of Agriculture Microbiology and Bioenergy, College of Agriculture, Rajendranagar, Hyderabad. As part of this lecture, the history of fermented foods, its importance and health benefits, microorganinism involved in fermentation and their action were covered at length.

Day 9: **19/07/2018**

Dr. I. Srinivas Rao, Professor, Extension Education Institute, PJTSAU, Rajendranagar Hyderabad delivered sessions on Pedagogy. He focuced on methods to setup goals in life and for teaching along with need to balance professional and personal life during the morning session. The post luch session started with an interactive discussion on methods for effective teaching as most of the faculty are in teaching and at the beginning of their careers. He motivated, inspired and sensitized all participants to be best teachers with optimum utilisaiton of resources available.

Day 10: **20/07/2018**

The lecture on "Role of oil blends in development of nutrient enriched products" was delivered by Mr. Praveen, Managing Director of Bunar Lipids Pvt. Ltd., Vidyanagar, Hyderabad. He emphasized the importance of blending oils and its uses from industry point of view. The methodologies involved in development of these oil blends were discussed at large interactively.

Experiences on supply chain and value chain analysis for mango crop in chittoor district of Andhran Pradesh were shared by Dr. M. Uma Devi, Member-Board of Management, PJTSAU. This session gave a very deep insight on how to study an enterprise or value chain. Session was useful in development of business model by each group.

The participants visited to state of art PTJSAU library and "Different types of e-corners available for accessing the information" was presented by Dr. K. Veeranjayulu, University Librarian and followed by visit to different sections of library. It helped the participants to gain knowledge about the ways to use the various data bases presently

available along with getting information about various ICAR institutes. The participants were also shown as how the books are issued to students and avoid their theft using the latest technologies.

Day 11: **21/07/2018**

Dr. V. Sudharshan Rao, Deputy Director (Retd.), ICMR – National Institute of Nutriton, Hyderabad gave insights into "Food safety and regulations" in India. Major food safety concerns including microbial pathogens, misuse of additives, pesticide residues, veterinary drug residues, mycotoxins, parasites, natural toxins, genetically modified foods, zoonotic diseases etc.were discussed.

Lecture on "Irradiation for fetching better quality produce to enhance export market" was delivered by Dr. M. Sreedhar, Principal Scientist and Head, MFPI – Quality Control Laboratory, PJTSAU, Rajendranagar, Hyderabad. Information on isotops, radioactivity, modes of radioactive disintegration, gamma rays was covered. This was followed by visit to Irradiation unit, PJTSAU, Hyderabad. Information related to establishment of irradiation unit, radiation processing of foods, its working procedure, changes occuring in radiation processed foods, cost and fixing of dosage for different foods was delt at length.

A session on **"**Setting up small and medium enterprises" was delt by Dr. G. Valentine, Associate Professor and Head, National Institute of Rural Development and Panchayatraj, Hyderabad. In this session information related to enterprise and entrepreneurship was delivered by resource person. As well as information related to livelihood, assets of rural livelihood, establishment of small and medium scale enterprise, agencies or training centers which helps in establishment of enterprise was also covered.

Day 12: **22/07/2018**

Participants presented their ideas for development of business modules to the course director and course coordinators. Necessary changes needed to be done were discussed at length by the team with active inputs for the co-participants.

Day 13: **23/07/2018**

The participants visited MFPI – Quality Control lab, PJTSAU which is a NABL accredited lab and one of its kind in state agricultural universities. Dr. M. Sridhar, Head of the lab explained that **t**he project on establishment of Quality Control Lab which was funded in February 2006 by the Ministry of Food Processing Industires,

Govt. of India for purchase of analytical equipments. The infrastructure facilities, staff and other contingent expenditure involved with setting and running of the lab were sanctioned by the university.

The participants visited to College of Home Science located at Saifabad as it is one the oldest and the best college in SAUs. The participants visited major five deparments of Home Science and explained about the significant research activities, infrastructural facilities including equipments available in each department. This was followed by a session on "Dehydration technologies for fruit and vegetable processing" by Dr.K. Uma Devi, Professor, Department of Foods and Nutrition where in she delt in depth about the research activities carried out in the deparment using fruit and vegetables. The need for technology transfer was also emphasied.

Day 14: **24/07/2018**

Dr. T.N.V.K.V. Prasad**,** Principal Scientist, Nanotechnology Laboratory, Institute of Frontier Technology, RARS, ANGRAU, Tirupathi delivered a very innovative lecture on "An introduction to nanoscience & nanotechnology". In his lecture he focused on the basic principles of nanotechnology as it's an emerging field and many of the particpatnts are new to this concept. He discussed about his research work on nanoparticulation and its application in agriculture to increase quality and productivity of the crops like peanut and sweet sorghum as well as livestock and food products.

Dr. D. Kesavan, Assistant Professor and Head, College of Fisheries Engineering, Fisheries University, Nagapattinam delivered a lecture entitled "Applications of nanotechnology in food industry". He explained about the unique features of nanoparticles like high surface area, better penetration capacity, ecofriendly with no environmental contamination and so on. He discussed about the synthesis, properties and classification of nanocomposites. He also described the importance of nanotechnology in food industry *i.e*. to enhance the solubility of particles, to facilitate controlled release, to improve bioavailability and to protect micronutrients. He also discussed about nanoencapsulation, nanosensor and smart packaging.

During practical session, he demonstrated the synthesis of silver and zinc nanoparticals using beet root extract. Then nanoparticals were examined under spectrophotometer and scanning electron microscope in Central Instrumentation Laboratory, PJTSAU for their particle size.

Day 15: **25/07/2018**

A session by Dr. Ch. V. Durga Rani, Professor, Institute of Biotechnology on the topic "Biotechnology for nutritional improvement and food processing" was carried out. She emphasized on agritech, an area of agricultural science involving the use of scientific tools and techniques, including genetic engineering, molecular markers, molecular diagnostics, vaccines and tissue culture, to modify living organisms like plants, animals, and microorganisms.

The second session of forenoon was taken by Dr. B. Srinivasan on the topic "Baking of foods for enhanced shelf-life". He discussed about the broad classification of baked food which is bread, cakes / pastries, rusk, biscuits cookies (as conventional, center filled, chapati and pizza) and designer snacks. Also the quality attributes of various baked products that act as an indicator for the shelf life was dealt with. He also discussed about the approximate shelf life of various packaged foods available in the market.

During the visit to Packaging Clinic and Research Institute (PCRI), Hyderabad, the Director, PCRI gave lecture on "Food Packaging: An overview about the history of packaging". He spoke about functions of packaging, packaging material performance, the ways to select right material for packaging, packaging material testing, cost reduction, different labeling laws for products, different types of packaging along with role of packaging in food preservation and consumer appeal.

Day 16: **26/07/2018**

Dr. K. Uma Maheshwari delivered a very informative lecture on "Value addition to underutilized foods". In this she spoke about the need for use of underutilised foods to provide nutrition security as many of them are rich sources of vitamins , minerals, antioxidats and other functional or neutracetical. They are available at low cost and hence creating awareness about the use of these foods can be economical beneficial to farming community.

The next lecture was delivered by Dr. G.M. Subba Rao on "Role of media and advertisement in marketing of processed food". He spoke about the strange nutritional paradox where advertising is aiding in development of malnutrition leading to a variety of life style diseases.

The next lecture on "Recent innovations in packaging for food products" was by Dr. G. Kandeepan. He spoke at length about how innovatins in packaging technologies

have revolutionarised the food industry. The recent advances like self heating and self cooling systems, high barrier, bio-degradable, edible, intelligent and nano packaging were discussed. The need for use of biosensors and retort pouch packaging were also high lighted.

The afternoon session had a lecture by Dr. M. Krishnan on "Emerging Technologies for processing and packaging of fish and fishery products". Insights into preservation of fish was in vogue from times immemorial but lastest processing techniques help in extending this highly perishable food's shelf life tremendously by retaining orginal quality. The study of water activity as one of the parameters preservation helped in developing additives for better preservation of fish.

Day 17: **27/07/2018**

The visited to CSIR – Central Food Technological Research Institute Resource Centre, Hyderabad was a great learning experience. Dr. T. Jyothirmayi talked about the institute facilities available as an incubation center followed by a lecture on "Role of CSIR-CFTRI in food processing, technology transfer, human resource development and analytical quality control of food products". She dealt with constraints that are there for industrial growth in food sector, MoFPI union 2015 documents, product modification and need for obtaining a license by food manufacturer.

Mr. Srinivasulu Korra gave lecture on "Food Packaging: An Overview" where in he spoke on food preservation methods with special emphasis on techniques being followed at the CSIR – CFTRI resource center, how to select environmentally friendly packaging material for ethical consumers and CFTRI's Hurdle technology for improved shel life of Indian sweets. After the lecture, a visit to different laboratories present at CFTRI resource center *i.e*. processing laboratory, instrumentation laboratory and microbiology laboratory was carried out.

In the afternoon, post lunch, participants visited "V.H. Agro Foods Private Limited", Uppal, Hyderabad where baby corn preservation and packaging including storage in cold rooms were observed. Also the processing of cocounut kernels and preparation of chicken kebabs were viewed. This was followed by a visit to "Crepe Cones", B-9/1, IDA Uppal, Hyderabad where in participants viewed the automised method used for preparation of cones used in ice creams industry.

Day 18: **28/07/2018**

The morning session started with a lecture by Dr. Madab Chakravarti on "Labeling and bar coding of packaged foods for better traceability" in which importance

of labelling in food processing sector was addressed followed by an interactive session on the current scenario in labelling of processed foods.

The second session was delt by Dr. B. Anila Kumari on "Pseudo cereals for food security" wherein the nutritional importance of pseudo cereals in comparison to normal cereals and how these can help in alleviating food hunger in India was discussed. She also presented indepth research work carried in Department of Foods and Nutrition relating to these pseudo cereals.

The afternoon session started with the lecture on "Food industry byproduct utilisation for income generation" by Dr. Jessie Suneetha W wherein she presented on how food byproducts which are generally discarded as waste can be used for income generation. The extensive research work carriedout at Post Graduate and Research Centre in this area was presented for the participants to get newer ideas.

Day 19: **29/07/2018**

The participants were divided into 5 groups developed business modules on the following topics:

1. Utilization of underutilized jack fruit for food security through value addition
2. Project module on soymilk, paneer and curd
3. Value addition of dairy by products
4. Small scale industry on fruit and fruit waste utilization
5. Banana products manufacture Pvt. Ltd

The developed modules were refined and slides prepared for presentation.

Day 20: **20/07/2018**

In the morning session, the participants who were divided into 5 groups developed business modules and presented them to a panel consisting of 3 members which included Dr. K. Uma Maheswari, CAFT and course Director, Dr. T.V.Hymavathi, Professor and In-charge of Millet incubation center and Dr. V. Vijaya Lakshmi, Professor, ACRIP – Home Science. Among the modules presented, the one on banana byproduct utilisation was the best as this group has made a comprehensive effort in preparation of theri module.

In the afternoon session, the participants visited to National Fisheries Development Board, Hyderabad. The latest developments in fish processing, funding facilities available for training of interested farmers and financial assistance that can be provided through various governmemt organisations were explained by the team at NFDB.

Day 20: **20/07/2018**

CAFT participants logged into ICAR CBP portal and submitted their post evaluation feedback forms. Dr. Ramesh Bhat, Deputy Director (Retd.) of ICMR – NIN was the guest of honour at the valedictory function. He interacted with the participants to understand the effectiveness of the training programme and enquired if they faced any problems during the course of training. One participant expressed that cost of machinery, marketing facilities, arranging collaterals to the banks and registration with food licensing are some of the hindrances and the rural entrepreneurs are facing during the extension activities undertaken in villages.

Valedictory function was arranged in committee hall of University library. Honourable Vice Chancellor of PJTSAU was the chief guest of the function. The Dean of Agricultural Engineering and Technology and Dean of Home Science i/c, Dr. K. Sadasiva Rao and Deputy Director (Retd.) of ICMR – NIN Dr. Ramesh Bhat were the guests of honour. Event started with invocation of University song. The course coordinator Dr. B. Anila Kumari, Assistant Professor, PGRC, PJTSAU welcomed the guests.

Dr. K. Uma Maheswari, Course and CAFT Director briefed the gathering about the activities undertaken during the course of training programme. Dr. V. Vijaya Lakshmi, Associate Dean, College of Home Science congratulated the participants for successfully completing the 21 day training. She urged the participants to explore the possibility of implementing the processes and technologies learned during the training. Dr. Kashibai Sharanappa Khyadagi, Dr. Shamshad Begum. S, Er. K. Venkat Reddy, Dr. Chirag Singh and Dr. Samleshkumari gave the feedback remark.

Dr. Ramesh Bhatt, guest of honour in his remarks suggested including case studies in the training schedule. He insisted the participants and the gathering to commercialize simple technologies related to value addition of native food products. He asked the agricultural engineering professionals to make simple machines in a cost effective manner to reduce the imports.

Dr. K. Sadasiva Rao, Dean of Home Science i/c gave a brief insight into the industry scenario in food processing and food packaging technologies. He stressed on the importance of reducing the post-harvest losses to boost the income of the farmers. He elaborated on the economic opportunities the food industry is going to offer in near future so that the participants and other stake holders can contribute and grab the opportunities in taking the sector forward with advances in technology.

Honourable Vice Chancellor, Dr. V. Praveen Rao in his remarks advised the participants to commercialize the developed technologies. He emphasized on the need to work hard and explore various options to commercialize the technologies and usage of advanced technological innovations for increasing the income of the farmers. To encourage the participants for active participation in the training programme five best participants were selected and awarded. Participants felicitated Dr. K. Uma Maheswari, CAFT Director as a token of appreciation and contribution in the field of foods and nutrition for her impending retirement in 2019. Dr. Jessie Suneetha W, course coordinator proposed vote of thanks. The function was concluded with National Anthem.

EVALUATION

EVALUATION

Pre and post evaluation – Statistical interpretation on the impact of 21 days training programme

Part- A

The participants were administered with the pre and post evaluation schedules on 1st and 21st days respectively to assess the existing knowledge and knowledge gained through this 21 day training on " ***"Emerging Food Processing and Packaging Technologies: A Drive for Economic Opportunities"***. The impact of training was revealed through pre and post tests. On 25 multiple choice questionnaire the initial and final knowledge levels were measured, which revealed increase from 0 to 100 per cent. The minimum and maximum scores in pretest were 1 to15 (16 to 60%), while they were 13 to 23 (52 to 92%) respectively in posttest. Each question reflects the content outcome of a group of topics.

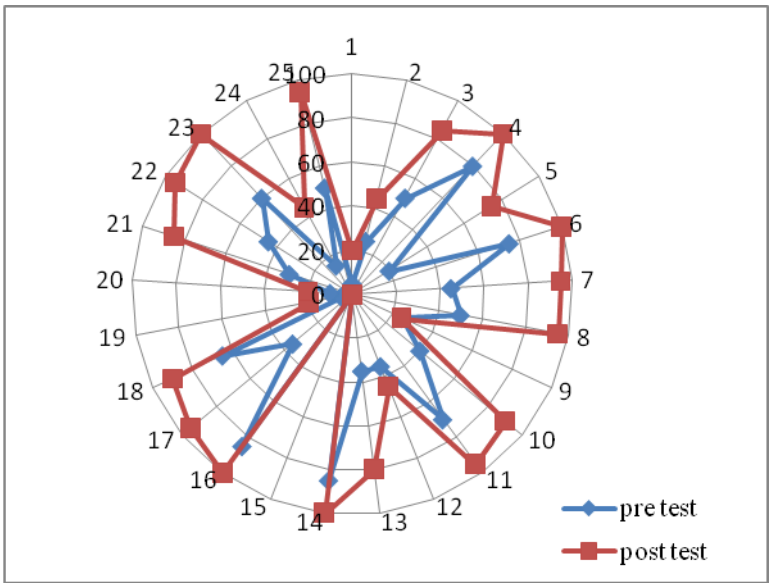


Figure 1: Percent change in knowledge of participants before and after the training programme

Statistical analysis was done on how many participants gave correct answers for each question in pre test and post test. The results are given in Table 1 and Figure 1. The results clearly indicated that the number as well as parcentage of participants answering the questions was increased in post evaluation for 90 % of the questions given.

Table 1: **Number and percentage of participants given correct answers for each question in pre test and post test**

SNo.	Question	Pre test		Post test		Difference
		No.	%	No.	%	%
1.	The processing method which inactivates moisture in foods without affecting the physical, chemical and nutritive characters of food is	1	5	4	20	15
2.	According to FAO/IAEA/WHO Joint Expert Committee on food irradiation (JECFI) the radiation processing of food with an overall average dose of _____was safe and does not introduce any radiological, microbiological or nutritional problems in food	5	25	9	45	20
3.	Food or parts of food that provide medical or health benefit, including the prevention and treatment of disease is termed as	10	50	17	85	35
4.	The consumable films which provide supporting structures and protective layers to food are known as	16	80	20	100	20
5.	The linear symbology consisting of a pattern of bars and spaces to represent 12 digits of data to store limited information such as manufacturer identification number and item number is termed as	4	20	15	75	55
6.	The compact analytical devices that detect, record and transmit information pertaining to biological reactions are defined as	15	75	20	100	25
7.	The percentage of processed foods produced in India is	9	45	19	95	50
8.	MPACK, is a software package developed for design of packaging for_____ foods.	10	50	19	95	45
9.	Factor included under the 'vertical integration' a principle of value addition is termed as	5	25	5	25	0
10.	An alternative technique for health conscious consumers preferring low fat snacks is	8	40	18	90	50
11.	Packaging that contains an external or internal indicator to provide information about aspects of the history of the package and/or the quality of the food is termed as	14	70	19	95	25
12.	The most commonly used preservative in baking is	7	35	9	45	10
13.	The processing technique that	7	35	16	80	45

	promises non-thermal processing technology aiming towards microbiologically safe food while 2avoiding undesirable changes in physicochemical and nutritional properties is called as					
14.	The functions of the following food additive is to get better dispersion of fat in dough	17	85	20	100	15
15.	The mapping between message and barcode is called as		0		0	0
16.	A business where an individual is both the owner and conductor of the business affairs is termed as	17	85	20	100	15
17.	Financial feasibility analysis can be done by comparing with the estimated sales figure to	7	35	19	95	60
18.	The model for food safety standards is based on system called as	13	65	18	90	25
19.	To replace egg whites in the baking industry _____can be used.	1	5	4	20	15
20.	The cooling method used for quickly cooling a wide range of fruits and vegetables before packaging is termed as	2	10	4	20	10
21.	A plastic film developed by the pharmaceuticals company Bayer that uses clay nano particles that prevents oxygen, moisture and carbon dioxide from decomposing food products is termed as	6	30	17	85	55
22.	Extrusion cooking is a _____process.	9	45	19	95	50
23.	Vegetable ghee is manufactured by	12	60	20	100	40
24.	The following pseudo cereal can be used as thickening agent to reduce the percentage of oil or eggs in cakes	3	15	9	45	30
25.	The pseudo cereals are generally preferred due to their _____quality.	10	50	19	95	45

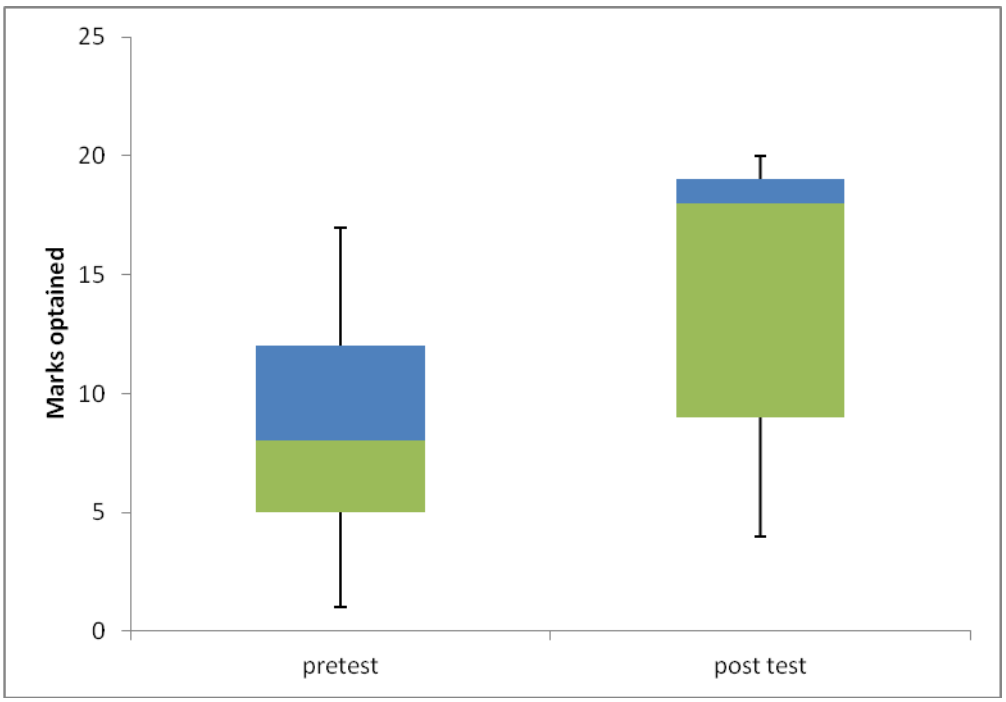


Figure 2: **Box and whisker plots displaying median, inter quartile range (box) and range (whiskers) of marks scored by the participants in pre and post evaluation**

Actual correct responses for 25 questions for both pre and post evaluation of 20 participants were taken and box-plot diagram was drawn. Boxplot descriptive statistics are presented in Figure 2. The box plot diagram clearly showed that the median (18) and maximum (20) values of post test were very high than the pre test (median - 8 and maximum - 17), thereby indicating that the shift of improving knowledge after training has gone to the higher (positive) side. Clearly there was significant difference in the test scores of the participants between the pre and post evaluation which is clearly indicated by the distribution of sample (shape of the histogram). The data indicated is very consistent and the frequency of post evaluation is very high to that of the pretest.

Part B

Feedback: Participant feedback on the training program too was obtained and most sessions were rated as either excellent or very good. They also stated that the topics covered were very useful to all the participants. The top 5 topics listed as most informative by the participants are

1. Applications of nanotechnology in food industry
2. Pseudo cereals for food security
3. Supply chain management for value added production enterprises
4. Extrusion technologies for employment generation
5. Recent advances in freezing and chilling techniques for meat processing

6. Need for value addition to foods and improved technologies for enhanced marketability
7. Current trends in ancient grain based technological applications
8. Germinated and malted foods for economic growth

All the participants were satisfied with the skill training imparted, demonstrations and the field visits. The participants felt that the methodology adopted for delivering the technical content was apt and adequate. All the participants felt that their objective of attending the training programme was extremely satisfactory. The overall impression about the course such as theoretical back-up and content coverage, resource materials provided, extent of involvement of the guest faculty and level of seriousness maintained all through the course were rated as excellent. The training facilities like learning environment and capacity of institute's faculty was rated as excellent. Other facilities like boarding and lodging arrangements were rated as good and very good respectively.

Suggestions by the participants: Some of the participant suggested that if practical components like hands on experience in bakery and confectionary, processing foods etc. to be included.

CAPACITY BUILDING PROGRAM
by
Agricultural Education Division, ICAR

PARTICIPANT EVALUATION PROFORMA

Programme title: **"EMERGING FOOD PROCESSING AND PACKAGING TECHNOLOGIES: A DRIVE FOR ECONOMIC OPPORTUNITIES**

Organized by : COLLEGE OF HOME SCIENCE (NA), HYDERABAD, TELANGANA

Organizers: **Dr. K UMA MAHESWARI, Dr. W. JESSIE SUNEETHA, Dr. B. ANILA KUMARI**

Date: 11/07/2018 TO 31/07/2018 (Duration: 21 Days)

1.	No. of participants (Applied)	:	41
2.	No. of participants (Approved)	:	26
3.	No. of participants (Attened)	:	20
4.	No. of participants (Evaluation performa filled reports)	:	20
5.	No. of participants (Evaluation performa not filled reports)	:	00
6.	Trainee details		

S.No.	Trainee Name	Institute Name	Discipline	Evaluation Performa Submitted Report
1	Sanjay Kumar Pradhan	Navsari Agricultural University(Navsari)	Animal Nutrition	True
2	Charul Chaudhary	Other Institute	Food Science & Technology	True
3	Chirag Singh	CV908: Arawali Veterinary College(Sikar)	Livestock Products Technology	True
4	Aruna Ramchandra Kharwade	Other Institute	Food & Nutrition	True
5	Rajendrakumar Premjibhai Bambharolia	College of Agriculture,Waghai(Waghai)	Microbiology	True
6	DILIPBHAI MANAJIBHAI DAMASIA	College of Agriculture,Waghai(Waghai)	Agricultural Entomology	True
7	Rohini Bhagwanrao	Other Institute	Home Management /	True

	Shinde		Family Resource Management	
8	Rekha - Tiwari	Other Institute(Others)	Home Management/Family Resource Management	True
9	KAVITHA C	University of Agricultural Sciences(Dharwad)	Food Science & Technology	True
10	NAVEEN ZILLABATHULA	College of Veterinary Science(Tirupati)	Livestock Products Technology	True
11	KULKARNI MADHUMATI VITHALRAO	Vasantrao Naik Marathwada Krishi Vidyapeeth(Parbhani)	Agricultural Extension	True
12	VENKAT REDDY KAMIDI	College of Agricultural Engineering(Sangareddy)	Agricultural Engineering	True
13	APARNA KUNA	Professor Jayashankar Telangana State Agricultural University(Hyderabad)	Food & Nutrition	True
14	S.Maheshwaramma	Agricultural Polytechnic College(Palem)	Plant Breeding	True
15	Dr. Samlesh Kumari	ICAR-Central Institute of Agricultural Engineering (CIAE) ,Bhopal	Dairy Microbiology	True
16	Kashibai Sharanappa Khyadagi	College of Agriculture(Bijapur)	Food & Nutrition	True
17	MAHENDRA PRATAP SINGH YADAV	Chandra Shekhar Azad University of Agriculture and Technology(Kanpur)	Dairy Technology	True
18	Shamshad Begum. S	University of Agricultural Sciences (Bangaluru)	Food & Nutrition	True
19	MAHARSHI DEEPA	Sri Venkateswara Veterinary University(Tirupati)	Home Science Extension	True
20	RAJANI DODLOLLA	Agricultural Polytechnic College(Palem)	Horticulture	True

Programme title: **"EMERGING FOOD PROCESSING AND PACKAGING TECHNOLOGIES: A DRIVE FOR ECONOMIC OPPORTUNITIES**

Organized by : COLLEGE OF HOME SCIENCE (NA), HYDERABAD, TELANGANA

Organizers: **Dr. K UMA MAHESWARI, Dr. W. JESSIE SUNEETHA, Dr. B. ANILA KUMARI**

Date: 11/07/2018 TO 31/07/2018 (Duration: 21 Days)

1.	No. of participants (Applied)	: 41			
2.	No. of participants (Approved)	: 26			
3.	No. of participants (Attend)	: 20			
4.	No. of participants (Not Attend)	: 0			
5.	Gender wise distribution of participant	: Male	: 7	Female	: 13
6.	ICAR / SAU wise distribution of participant	: ICAR	: 1	SAU (and Others)	: 19

7. State wise distribution of participant :

S. No.	State Name	No. of Participant
1	Andhra Pradesh	2
2	Gujarat	4
3	Karnataka	3
4	Kerala	1
5	Madhya Pradesh	1
6	Maharashtra	5
7	Rajasthan	1
8	Uttar Pradesh	3
9	Other	1
10	Telangana	5

8. Discipline wise distribution of participant :

S. No.	Discipline Name	No. of Participant
1	Agricultural Entomology	1
2	Plant Breeding	1
3	Soil Science-Soil Chemistry/Fertility/Microbiology	1
4	Animal Nutrition	1
5	Dairy Microbiology	2
6	Dairy Technology	2
7	Livestock Products Technology	2
8	Food & Nutrition	5
9	Home Management/Family Resource Management	2
10	Home Science Extension	2
11	Agricultural Extension	1
12	Food Science & Technology	2
13	Horticulture	2
14	Agricultural Engineering	1
15	Microbiology	1

I. **General information about training**

1. How did you come to know about this training program?
   a) CPB Portal / ICAR Website 16
   b) Colleague in the same department / organization 2
   c) Immediate superior (like HoD) 1
   d) Head of the organization 1
   e) Friend in other organization 0
   f) Personally contacted by CAFT Director / Faculty 0
   g) Any other 0
   h) Not Specify 0
2. What was your main motive to attend this training?
   a) Training theme was relevant to my job 12
   b) Training was releted to my subject area 3
   c) To update my knowledge and skills 2
   d) To fulfill CAS / promotion requirement 3
   e) Desired by Head of the Organization 0
   f) To seek change from daily routine 0
   g) Any other 0
   h) Not Specify 0
3. In your opinion what is your ranking with respect to knowladge / skills / attitude in the begining and at the end of this training programme?

a) Rank 1 15
b) Rank 2 4
c) Rank 3 0
d) Rank 4 1
e) Rank 5 0

II. **Opinion towards training design and delivery**

S. No.	Opinions	Excellent	Very Good	Good	Poor	Very Poor	Total
1.	Training program environment	16	4	0	0	0	20
2.	Laboratory facilities available for the training program	14	6	0	0	0	20
3.	Participation in decision making and planning of program in future	13	6	1	0	0	20
4.	Behavior of resource persons (faculty members)	15	5	0	0	0	20
5.	The course materials were designed as per the objectives of the training	16	4	0	0	0	20
6.	The tools / techniques used during the training	16	4	0	0	0	20
7.	Adequate resource persons involvment	17	3	0	0	0	20
8.	Boarding facilities	16	1	3	0	0	20
9.	Lodging facilities	16	3	1	0	0	20
10.	Transport facilities	19	1	0	0	0	20
11.	Exposure visits / practical exposue / field orientation	17	3	0	0	0	20
12.	Providing platform for future networking / applications	16	4	0	0	0	20
Total		191	44	5	0	0	

III. **Topics rating of training program**

S. No.	Very Well	Fairly Well	Pool Covered	Topic Name	Most Useful	Useful	Not Useful
1	18	2	0	Post harvest processing technologies for horticulture crops	16	4	0
2	18	2	0	Role of oil blends in development of nutrient enriched products	18	2	0
3	17	0	3	Visit to Bunar Lipids Pvt. Ltd., Vidyanagar, Hyderabad	14	5	1
4	20	0	0	Practical demonstration on value added meat products at ICAR – NRC on meat, Chengicherla, Hyderabad	18	2	0
5	19	1	0	Food industry byproduct utilization for income generation	18	2	0
6	20	0	0	Introduction to CAFT	19	1	0
7	20	0	0	Orientation to the course	19	1	0
8	19	1	0	Need for value addition to foods and improved technologies for enhanced marketability	19	1	0
9	18	2	0	Use of germination, malting and fermentation techniques for improved nutrition	17	3	0
10	19	1	0	Baking of foods for enhanced shelf life	19	1	0
11	19	0	1	Practical demonstration on preparation of baked items	17	3	0
12	19	1	0	Pseudo cereals for food security	19	1	0
13	20	0	0	Visit to Indian Institute of Millet Research, Rajendranagar, Hyderabad	19	1	0
14	18	2	0	Dehydration technologies for fruit and vegetable processing	17	3	0
15	19	1	0	Setting up small and medium enterprises	20	0	0
16	18	1	1	Fruit and vegetable export: A start up	18	2	0
17	16	3	1	Recent developments in legume and oilseeds processing for enhanced pricing and marketing	15	5	0
18	16	1	3	Visit to the incubation centers at ICRISAT, Patancheru, Hyderabad	16	3	1
19	16	3	1	Need for blending oils to improve culinary properties	18	1	1
20	18	2	0	Irradiation for fetching better quality produce to enhance export market	18	2	0
21	19	1	0	Visit to National Fisheries Development Board, Hyderabad	19	1	0
22	20	0	0	Applications of Nanotechnology in food	20	0	0

				industry.			
23	19	1	0	Role of media and advertisement in marketing of processed foods	20	0	0
24	19	1	0	Food Safety and quality assurance tools	19	1	0
25	20	0	0	Practicals – development of food business modules by participants	19	1	0
26	20	0	0	Post evaluation and feedback from participants	19	1	0
27	17	3	0	Skilled human resources requirement for processing sector	19	1	0
28	19	1	0	Supply chain management for value added production enterprises	19	1	0
29	19	0	1	Current trends in ancient grain based technological applications	20	0	0
30	20	0	0	Orientation to departments at College of Home Science, Saifabad, Hyderabad	18	2	0
31	18	0	2	Visit to SPAR super market for viewing of cold storage of processed foods	18	1	1
32	20	0	0	Visit to millet incubation center, PJTSAU, Rajendranagar, Hyderabad	20	0	0
33	20	0	0	Extrusion technologies for employment generation	20	0	0
34	18	1	1	Practical demonstration on cold extrusion technology	19	1	0
35	19	1	0	Soya milk: its future as an alternative to milk	19	1	0
36	20	0	0	Functional foods and Nutraceuticals	20	0	0
37	20	0	0	Recent advances in freezing and chilling techniques for meat processing	19	1	0
38	20	0	0	Innovative processing technologies for meat value chain	20	0	0
39	20	0	0	Practicals – development of food business modules by participants	20	0	0
40	20	0	0	An introduction to Nano science and Nanotechnology	20	0	0
41	18	1	1	Testing quality of packaging materials – followed by practicals	19	0	1
42	20	0	0	Labeling and bar coding of packaged foods for better traceability	20	0	0
43	19	1	0	Visit to Rural Technology Park, NIRD, Rajendranagar, Hyderabad	20	0	0
44	20	0	0	Presentation of Food business modules developed by participants	20	0	0
45	20	0	0	Post evaluation and feedback from participants	20	0	0
46	20	0	0	Visit to Irradiation unit	20	0	0

47	18	2	0	Advances in fish processing towards increased marketing	20	0	0
48	20	0	0	Practical demonstration on Synthesis of nanoparticles for food usage	19	1	0
49	19	1	0	Biotechnology: its role in food processing	19	1	0
50	19	1	0	Field visit to CFTRI Regional Centre to observe novel food processing technologies developed by CFTRI	20	0	0
51	19	1	0	Pedagogy training	20	0	0
52	18	2	0	State of art of IQF Technology for procurement, production, processing and marketing of baby corn, fruits and vegetables – Visit to VH Agro Foods Private Limited, Uppal, Hyderabad	20	0	0

IV. Overall opinion about training pogram

1. How was the daily program?
    a) Very tight 9
    b) Tight 6
    c) Comfortable 5
    d) Light 0
    e) Very light 0
    f) Not Specify 0
2. Have your expectations from the training program fulfilled?
    a) To great extent 19
    b) To some extent 1
    c) Not at all 0
    d) Not Specify 0
3. What should be the optimum duration of the training program? (Kindly suggest the optimum duration from 2 to 6 weeks)
    a) Two weeks 10
    b) Three weeks 8
    c) Four weeks 2
    d) Five weeks 0
    e) Six weeks 0
4. What would be your most preferred time to undergo training program? (Please name the month suit better for this training program)
    a) Janunary 7
    b) February 0
    c) March 1
    d) April 0
    e) May 2
    f) June 2
    g) July 3
    h) August 1
    i) September 3
    j) October 0
    k) November 1
    l) December 0
5. What is your overall opinion about the training program?
    a) Outstanding 1

b)	Excellent	19
c)	Very good	0
d)	Good	0
d)	Average	0
e)	Not Specify	0

PHOTO GALLERY

INAGURATION

REGISTRATION

Lighting of lamp

Dr. K. Uma Maheswari, Director, CAFT-H.Sc. welcoming the gathering

Address by Dr. V. Vijaya Lakshmi , Associate Dean, College of Home science

Presidential remarks by Former Dean of Home Science Dr. A. Mrunalini

Board member PJTSAU Dr. K. Uma Devi addressing the gathering

Dr. V. Veeranjaneyulu, University Librarian, addressing the group

Dr. Jessie Suneetha W, Course coordinator Introducing the training programme

Dr. B. Anila Kumari, Course coordinator proposing vote of thanks

PRE /POST EVALUATION

SESSIONS BY FACULTY ON FOOD PROCESSING

SESSIONS BY GUEST FACULTY ON FOOD PROCESSING

SESSIONS AT ICAR NRC ON MEAT

SESSIONS ON NANOTECHNOLOGY

VISITS TO VARIOUS INSTITUTIONS

Visit to CFTRI Resource Centre, Hyderabad

Visit to V. H. Agro foods

Visit to Indian Institute of Millet Research centre

Visit to Irradiation centre, PJTSAU

Visit to Millet Incubation centre, PJTSAU

Visit to Quality Control Lab, PJTSAU

Visit to College of Home Science *Visit to Central Library, PJTSAU*

GROUP DISCUSSION OF PARTICIPANTS ON DEVELOPMENT OF BUSINESS MODULES

VALEDICTORY

WELCOMING OF GUEST WITH FLOWER POTS

CAFT and Course Director presenting the report

Guest of Honor Dr. Ramesh Bhat addressing the Gathering

Distribution of Certificates

Distribution of Best Participant Awards

Participants feedback

Release of NEWS letter, CD and CAFT Manual by Honorable Vice Chancellor, Dr. V. Praveen Rao

Chief guest Dr. V. Praveen Rao, Hon'ble VC addressing the gathering

Vote of thanks by Dr. Jessie Suneetha W

APPENDIX

Appendix

Center for Advanced Faculty Training – Home Science
Professor Jayashankar Telangana State Agricultural University
Post Graduate & Research Center, Rajendranagar, Hyderabad
ICAR Sponsored 21 days training on
EMERGING FOOD PROCESSING AND PACKAGING TECHNOLOGIES: A DRIVE FOR ECONOMIC OPPURTUNITIES
11/07/2018 – 31/07/2018
PRE/POST EVALUATION

Dear participant,

Having attended the training course in "**Emerging Food Processing And Packaging Technologies: A Drive For Economic Oppurtunities**" please take a few minutes to complete this form:

1. Name of participant :

2. Designation :

3. Name of institution :

4. Was the overall training beneficial to your work? (Yes, No)
   If "yes," please explain why it was beneficial.
   i. _____
   ii. _____
   iii. _____
   If "no" or "don't know," please indicate?
   i. _____
   ii. _____
   iii. _____

5. Is there anything which has changed your perception, attitude or behaviour as a result of the training? (Yes, No)
   If "yes," please provide at least one concrete example:

6. What kind of support would you look for from the CAFT- H Sc centre for your future work?
   i. _____
   ii. _____
   iii. _____

7. Briefly indicate your responses to the following:

   i. List any 5 topics you found most informative and useful?

      1. _____
      2. _____
      3. _____
      4. _____
      5. _____

8. Which topics did you find not relevant for the training?

   1._____
   2._____
   3. _____
   4. _____
   5. _____

9. Are you satisfied with the field exposure related to training?

   Yes / No

10. Were you satisfied with the skill training / demonstrations?

    Yes / No

11. Was the methodology adopted for delivering of technical content adequate?

    Yes / No

12. How far have the objectives of the training been fulfilled? What is your overall impression about the course?

Content	5 Excellent	4 Very good	3 Good	2 Average	1 Poor
Theoretical back-up and content coverage					
Opportunities for hands-on experience					
Resource material provided					
Extent of involvement of guest faculty					
Level of training seriousness maintained					
Training facilities					
Boarding facilities					
Lodging arrangements					
Transport facilities					
Learning environment					
Capacity of institute's faculty					

Kindly give your rating (√) about the CAFT program/ centre based on your present experiences.

POST EVALUATION

PRE/POST EVALUATION

Choose the correct answer:

1. The processing method which inactivates moisture in foods without affecting the physical, chemical and nutritive characters of food is ( )
   a) Ohmic heating b) Infrared heating
   c) Pulse electric field d) Freezing
2. According to FAO/IAEA/WHO Joint Expert Committee on food irradiation (JECFI) the radiation processing of food with an overall average dose of _____was safe and does not introduce any radiological, microbiological or nutritional problems in food. ( )
   a) 40 kGy b) 10 kGy
   c) 30 kGy d) 20 kGy
3. Food or parts of food that provide medical or health benefit, including the prevention and treatment of disease is termed as ( )
   a) Functional food b) Pharmaceutical
   c) Neutraceutical d) Dietary enzyme
4. The consumable films which provide supporting structures and protective layers to food are known as ( )
   a) Controlled atmospheric packaging b) Edible packaging
   b) Modified atmospheric packaging d) Hypobaric packaging

5. The linear symbology consisting of a pattern of bars and spaces to represent 12 digits of data to store limited information such as manufacturer identification number and item number is termed as ( )
   a) Universal Product Code b) Expanded Barcode
   c) Reduced Space Symbology d) All of them
6. The compact analytical devices that detect, record and transmit information pertaining to biological reactions are defined as ( )
   a) UV sensors b) Physico-sensors
   c) Multiple sensors d) Biosensors
7. The percentage of processed foods produced in India is ( )
   a) 20% b) 10% c) 30% d) 40%
8. MPACK, is a software package developed for design of packaging for_____ foods. ( )
   a) Micro sensitive b) Cold sensitive
   c) Heat sensitive d) Moisture sensitive
9. Factor included under the 'vertical integration' a principle of value addition is termed as ( )
   a) Taxation b) Climatic changes
   c) Price d) Licensing
10. An alternative technique for health conscious consumers preferring low fat snacks is ( )
   a) Vacuum frying system b) Dry heat system
   c) Moisture frying system d) Deep fat frying system
11. Packaging that contains an external or internal indicator to provide information about aspects of the history of the package and/or the quality of the food is termed as ( )
   a) Polypropylene packaging b) Smart packaging
   c) Aseptic packaging d) LDPE packaging
12. The most commonly used preservative in baking is ( )
   a) Benzoate b) Propionate
   c) Sorbate d) All the above
13. The processing technique that promises non-thermal processing technology aiming towards microbiologically safe food while avoiding undesirable changes in physicochemical and nutritional properties is called as ( )
   a) High pressure processing b) Low pressure processing
   c) Vacuum processing d) Dehydro processing
14. The functions of the following food additive is to get better dispersion of fat in dough ( )
   a) Emulsifer b) Hydrocolloid c) Enzyme d) Humectant
15. The mapping between message and barcode is called as ( )
   a) Symbology b) Stenography c) Checksun d) Decoding
16. A business where an individual is both the owner and conductor of the business affairs is termed as ( )
   a) Corporation b) Sole proprietorship c) Partnership d) Managers

17. Financial feasibility analysis can be done by comparing with the estimated sales figure to ( )
    a) Cash flow statement b) Balance sheet
    c) Break – even point d) Profit and loss statement
18. The model for food safety standards is based on system called as ( )
    a) Hazard Analysis Critical Control Point b) Public Health Plan (PHP)
    c) Good Manufacturing Practices d) Government regulations
19. To replace egg whites in the baking industry _____can be used. ( )
    a) Blood plasma b) Fruit pulp c) Milk d) Blood serum
20. The cooling method used for quickly cooling a wide range of fruits and vegetables before packaging is termed as ( )
    a) Forced air cooling b) Vacuum cooling
    c) Room cooling d) Hydro cooling
21. A plastic film developed by the pharmaceuticals company Bayer that uses clay nano particles that prevents oxygen, moisture and carbon dioxide from decomposing food products is termed as ( )
    a) Modified atmosphere packing b) Durethan
    c) Micro film d) Edible packing
22. Extrusion cooking is a _____process. ( )
    a) High temperature –Short time b) Ultra high temperature-short time
    c) Low temperature -long time d) Low temperature -Short time
23. Vegetable ghee is manufactured by ( )
    a) Reduction polymerisation b) Hydrogenation
    c) Oxidative polymerisation d) Saponification
24. The following pseudo cereal can be used as thickening agent to reduce the percentage of oil or eggs in cakes ( )
    a) Quinoa b) Chia c) Buckwheat d) Corn
25. The pseudo cereals are generally preferred due to their _____quality**.** ( )
    a) Gluten free b) Low fat c) High fiber d) Low protein

Kindly give your rating (√) about the CAFT program/ centre based on your present experiences

Date	Topic	Name & designation of speaker	5 Excellent	4 Very good	3 Good	2 Average	1 Poor
12/07/2018	Need for value addition to foods and improved technologies for enhanced marketability	Dr. K. Uma Maheswari, Professor & University Head					
	Current trends in ancient grain based technological applications	Dr. T. V. Hymavathi, Professor					
	Supply chain management for value added production enterprises	Dr. Seema Nath, Professor & Head					
13/07/2018	Innovative processing technologies for meat value chain	Dr. M. Muthukumar, ICAR – NRC on meat					
	Recent advances in freezing and chilling techniques for meat processing	Dr. Rituparna Banerjee, ICAR – NRC on meat					
	Practical demonstration on value added meat products at ICAR – NRC on meat, Chengicherla, Hyderabad	Dr. M. Muthukumar and Dr. Rituparna Banerjee, ICAR – NRC on meat					
15/07/2018	Germinated and malted foods for economic growth	Er. A. Poshadri, SMS (Food Technology),					
	Skilled human resources requirement for processing sector	Dr. Kalpana Sastry, Professor					
17/07/2018	Extrusion technologies for employment generation	Dr. K. Aparna, Sr. Scientist					
	Functional foods and Nutraceuticals	Dr. Janaki Srinath, Assistant Professor					
18/07/2018	Soya milk: its future as an alternative to milk	Mrs. T. Supraja, Assistant Professor,					
	Post harvest processing of horticulture crops	Dr. S. Suchiritha Devi, Associate Professor					

	Fermented foods: Its role in nutrient security and enhancing income generation	Dr. S. Triveni, Associate Professor					
19/07/ 2018	Pedagogy training	Dr. I Srinivas Rao, Professor & Head, EEI,					
20/07/ 2018	Blending oils for improved culinary properties and development of nutrient enriched products	Mr. Praveen, MD, Bunar Lipids Pvt.					
	Use of e –resources for enhancing business opportunities	Dr. V. Veeranjaneyulu, University Librarian,					
	Value chain analysis of Mango in Chittoor district of AP	Dr. M .Uma Devi, Honorable Board Member, PJTSAU					
21/07/ 2018	Food Safety and regulations	Dr. V. Sudershan Rao, Scientist (Retd					
	Setting up small and medium enterprises	Dr. G. Valentina, Associate Professor & Head					
	Irradiation for fetching better quality produce to enhance export market	Dr. M. Sridhar, Principal Scientist & Head					
23/07/ 2018	Dehydration technologies for fruit and vegetable processing	Dr. K. Uma Devi, Professor					
24/07/ 2018	An introduction to Nano science and Nanotechnology	Dr. TNVKV. Prasad, Senior Scientist					
	Applications of Nanotechnology in food industry.	Dr. D. Kesavan, Assistant Professor					
	Practical demonstration on development of nanoparticles for food usage	Dr. D. Kesavan, Assistant Professor,					
25/07/ 2018	Biotechnology: its role in food processing	Dr. Ch. V. Durga Rani, Professor					

	Baking of foods for enhanced shelf life	Mr. B. Srinivasan, Retired Scientist,					
	Testing quality of packaging materials – followed by practicals	Mr. B K Karna, Director, Packaging Clinic & Research Hyderabad)					
26/07/ 2018	Role of media and advertisement in marketing of processed foods	Dr. G. M. Subba Rao, Scientist					
	Recent innovations in packaging for food products	Dr. G. Kandeepan, Scientist (Sr. Scale), ICAR-NRC					
	Emerging Technologies for processing and packaging of fish and fishery products	Dr. M. Krishnan, Principal Scientist and Head					
27/07/ 2018	Role of CSIR-CFTRI in food processing, technology	Dr. (Mrs.) T. Jyothirmayi Senior Principal Scientist CSIR-CFTRI					
	Visit to VH Agro Foods Private Limited, Uppal, Hyderabad	Dr. V K V. Prasad, Managing Director, V H Agro Foods Private					
28/07/ 2018	Labeling and bar coding of packaged foods for better traceability	Dr. Madab Chakravarti, Joint Director and Regional Head					
	Pseudo cereals for food security	Dr. B. Anila Kumari, Assistant Professor,					
	Food industry byproduct utilisation for income generation	Dr. Jessie Suneetha W, Assistant Professor					

BUSINESS MODULES DEVELOPED BY PARTICIPANTS

Project: 1

Value added dairy byproducts as a sustainable enterprise
(Whey & Ghee residues)

GROUP 3

Dr. Shamshad Begum

Mr. D. M. Damasia

Dr. Samlesh Kumari

Dr. Maharshi Deepa

Introduction

- Every component of MILK must be judiciously processed into edible form.
- Problem of by-products utilization in India, especially that of whey and ghee residue in an economical manner.
- Lack of organized manufacture of products
- Lack of adequate technology, high cost of new technologies, lack of in-house R & D, lack of proper infrastructure, lack of equipment and plants indigenously etc. are the host of problems associated with the production and utilization of by-products in India.

Why whey ??

- Whey is a dilute, highly perishable greenish yellow fluid and the largest by-product of the dairy world produced during the manufacture of cheese, casein, *chhana*, *paneer*, *chakka* and co-precipitates.
- It is a source of precious nutrients like lactose, whey proteins, minerals and vitamins.
- Rich source of lactose, whey is a good fermentation media for a number of fermented products.
- Such lactose hydrolyzed syrups, generally after condensing, are mostly utilised in sweet confectionery products and in ice cream.

"Future growth is expected to be led by the industry's increasing focus on nutritional products, particularly in the dietary, sports and clinical segments of the market".

INTRODUCTON

ignou THE PEOPLE'S UNIVERSITY

What is Whey?

- Whey is a by-product obtained during the production of cheese, paneer, Chhana and casein precipitates.
- The watery portion of the milk remaining after milk coagulation and removal of the curd.
- Whey contains about half of the total solids of milk and is a source for many nutrients such as Whey Proteins, Lactose and Minerals.

GHEE RESIDUE

- Ghee residue is a by-product of ghee industry and is produced in large quantity in India. This nutritious by-product has been studied for its physico-chemical characteristics and for its utilization in a number of food products like chocolate burfi.
- Most of the ghee residue goes to waste. A sincere R & D work and a strong willingness on the part of manufacturer is required to develop food uses of ghee residue and put it in the market place.

What is ghee residue

Production of whey

- The current world production of whey is estimated at about 165 million tonnes.
- Cheese whey accounts for nearly 95% of total whey.
- In India, the major source of whey is from the production of chhana and paneer.
- In the absence of systematic surveys/statistics, the predicted value for whey production is estimated at 5 million tonnes per annum.
- In view of the low solids content of whey, there has been a gross lack of interest in its utilisation compared to other fluid by-products of dairy industry.

OUR products

1. Mango flavored drink from whey (% mango pulp)

2. Chocolate Burfi

REQUIREMENT FOR APPROVAL OF PROCESSING PLAN FOR DAIRY PRODUCT

- HACCP / GMP/GHP
- Minimum test facilities
- Waste disposal/Effluent treatment mechanism
- Record keeping mechanism
- Competence of technical man power
- Conformance of products to standard
- Facilities as per GOI notification

IMPORTANT REQUIREMENTS QUALITY CONTROL FOR OUR PRODUCTS.

Products and packaging

- The products manufactured are whey drinks and ghee residue chocolate burfi. Whey drinks and chocolate burfi are packed in glass bottles (200ml) and paper boxes (500 gm) respectively.

Market

- The whey drinks and ghee residue chocolate burfi have a very good nutritional value and they are innovative products. The products could be sold out through all MARKET outlets, bakeries , self -service, departmental stores and supermarkets.

Production capacity

- The plant operates in 3 shifts and one shift of eight hours duration.
- The time period required for achieving full capacity utilization is six months.
- The processing capacity is estimated to 500 liters of *paneer* whey per day. The average yield is estimated to 475 liters of drink, 100 kg of ghee residues per day and the average yield is estimated 130kg chocolate burfi.
- The estimated processing capacity per annum of 300 working days is 1,50,000 liters *paneer* whey and 30000 kg ghee residues.

SALES REVENUE PER DAY

- Four hundred and seventy five liters of whey drink can be packaged to 2,375 bottles, each of 200 ml capacity.
- One hundred and thirty kg of chocolate burfi can be filled to 260 paper box.

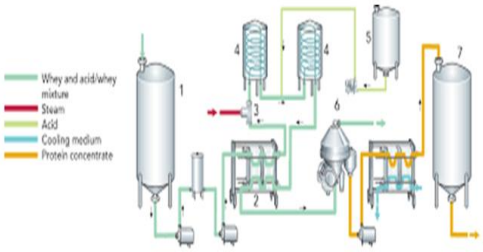
The sales revenue per annum comprises:

a. Rs. 85.50 lakhs fifty thousand through sale of whey drink @Rs.12.00 per bottle MRP Rs.15

b. Rs.70.20 lakhs and twenty thousand through sale of chocolate burfi @Rs.90 per box MRP Rs.100

Production process outline

- The paneer whey will be deproteinized via pasteurization and filtered through filtration unit.



Whey

↓

Dissolved the sugar and stabilizer

↓

Filtered

↓

Mixed filtrate and mango pulp and then blended uniformly

↓

Bottled in pre-sterilized glass bottles with 2.5 cm headspace

↓

In bottle sterilized

↓

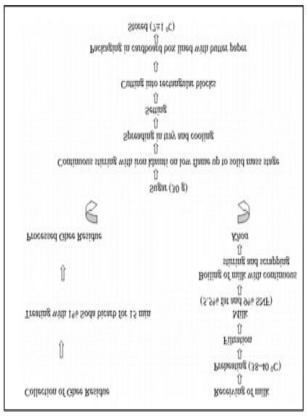
Cooled

↓

Labeled

↓

Stored at 5-7°C temperature



CHEE RESIDUE CHOCOLATE BURFI

Quality specifications

- The manufacturer must obtain a Health Authority license.
- Mold and fungal growth should be absent.
- The product should not have a fermented odour and should not provide and acidic sour taste.
- Addition of harmful flavoring and coloring substances are prohibited.
- Addition of artificial sweeteners is prohibited.
- The product should be free from coliforms, salmonella and streptococci bacteria.

Pollution control measures

- Not necessary as there are no pollutants are effluents. However, as it is a dairy product, the processing area has to be kept sterile by washing with a solution of sodium hypochlorite for prevention of external pollution.

Pollution Control

Area and construction proposed unit

Sl.No	Description	Sq.feet
1	Reception dock	100
2	processing area and packaging unit	500
3	Refrigeration room	150
4	Washing area	150
5	office space	50
6	Toilets	50
	Total	1000

Costing of machinery and equipment

Sl	Description	Rs.lakhs
1	Filtration unit with pasteurizer	1.600
2	Mixer and blender unit	0.500
3	Packing machine	0.300
4	Autoclave	0.500
7	Refrigerator (2 nos)	1.500
8	Stainless steel storing vessels	0.750
9	Freezer	1.000
10	slat conveyers and sealers	0.250
12	stainless steel working tools	0.100
13	weighing scales, dispensers, fillers etc	0.250
15	Total	6.750
16	Laboratory equipment	0.500
17	Grand total machinery and equipment	07.250

Project cost on fixed capital

Sl	Description	Rs.lakhs
1	Land	on lease
2	Civil works	on lease
3	plant machinery	6.750
4	Laboratory equipment	0.500
5	Transport vehicle	1.800
6	cost of power connection	0.100
7	cost of electrification	0.250
8	Erection and commissioning	0.220
9	cost of machinery spares	0.100
10	cost of the office equipment	0.500
11	Deposits if any	0.200
12	company formation expenses	0.170
13	Gestation period expenses	0.500
14	Sales tax registration expenses	0.100
15	Initial advertisement and publicity	0.300
16	Contingencies	0.350
17	Working capital margin money	0.400
18	Total fixed capital	12.240

Working capital requirements per month

Sl	Description	No of persons	Total salary/month (Rs. lakhs)
1	Production manager	1	0.100
2	Unskilled labour	3	0.075
3	Driver	1	0.060
4	Assistant driver	1	0.040
5	Accounts and Administration	1	0.100
6	Total	7	0.375

Raw material required per month

Sl	Description	Qty (kg/lit)	Rate/(kg/lit) (Rs.)	Value (Rs.lakhs)
1	Whey	15000	4	0.600
2	Ghee residues	30000	50	1.500
2	Sugar	3000 kg	45.00	1.350
3	Flavour	200 kg	220.00	0.440
4	Mango pulp	625 kg	20.00	0.125
5	Total raw material			4.015

PACKAGING MATERIAL REQUIRED PER MONTH

	Description	Qty	Rate/unit (Rs.)	Value (Rs.lakhs)
1	200 ml glass bottle for whey drink	71,250	2.50	1.782
2	500 g paper box for chocolate burfi	7800	1.25	0.098
3	Labels	79050	0.25	0.198
4	Glass-bottle caps	71250	0.40	0.285
	Total			2.363

Total raw + packaging material = Rs. 6.378 lakhs

Sl	Description	Rs.
1	Power 1500 kwh @ Rs.3.50 per unit	5000
2	water	1000
3	fuel(LPG)	7500
4	Total utilities	13500

Contingencies per month

Sl	Description	Rs. lakhs
1	Rent for processing shed	0.080
2	postage and stationery	0.010
3	Telephones, fax etc.	0.050
4	consumable stores	0.020
5	Repairs and maintenance	0.066
6	Local transports, loading and unloading	0.100
7	Advertisement and publicity	0.133
8	Insurance	0.005
9	Sales expenses & trade incentives	0.027
10	Miscellaneous expenses	0.027
11	Taxes @ 5%	0.276
12	Total contingent expenses	0.794

Total working capital per month

Sl	Description	Rs.lakhs
1	Salaries and wages	0.375
2	Raw material and packaging material	6.378
3	Utilities	0.135
4	Contingent expenses	0.794
5	Total	7.682

- Total project cost
- Fixed capital +Working capital (one month)
- =12.240 + 7.682
- =19.922 Lakhs

FINANCIAL ANALYSIS:

S.No	Particulars	Rupees (In lakhs)
1	Total recurring expenditure / Cost	92.184
2	Depreciation on machinery @ 10%	0.725
3	Interest on total capital investment @14%	33.469
	Total	126.378

Turnover (Per Annum)

PARTICULARS	RUPEES (IN LAKHS)
Whey drink (7,12500) @ Rs.12.00 per bottle	85,50000
Chocolate burfi 78000(500 gms) box @Rs. 90-00	70,2000
Total	**15570000**
Less marketing Expenses	**(-) 952800**
Net Turn over	**14617200**

NET PROFIT (Per annum) Before Taxation:

Turn Over (-)	14617200/-	
Cost of Production	12637800/-	**Rs. 1979400/-**

Project: 2

UTILIZATION OF UNDERUTILISED JACKFRUIT (*Artocarpus heterophyllus*) FOR FOOD SECURITY THROUGH VALUE ADDITION

Submitted by

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Introduction

- Jackfruit is a seasonal fruit found in almost all the humid tropical regions of the world
- Served as a good construction material and widely used in temple carving works
- The jack tree and its fruit have been noted for high versatility
- Every part of the tree is valuable, useful. In fact, it qualifies for the title 'kalpavriksha'- the wish fulfilling celestial tree

Introduction

Its multiple uses,

1. Food for humans and animals
2. Construction material/timber
3. Support for perennial climbers (like pepper)
4. Medicine
5. Environment protection and spiritual solace

Uses of Jack Fruit

1. Nutritious food
2. Fruit
3. Value added processed food
4. Timber
5. Firewood
6. Ecological and environmental use
7. Medicinal value
8. Cultural value

Nutrition Value of Jackfruit (100 gm)

Constituents	Pulp		Mature Seed
	Tender	Ripe	
Moisture (%)	84.0	77.2	64.5
Carbohydrate (g)	9.4	18.9	25.8
Protein (g)	2.6	1.9	6.6
Fat (g)	0.3	0.1	0.4
Fibre (g)	4.4	1.1	1.3
Total Mineral Matter (g)	0.9	0.8	1.2
Calcium (mg)	50.1	20.0	21.0
Phosphorous (mg)	97.0	30.0	28.0

Contd.....

Nutrition Value of Jackfruit (100 gm)

Constituents	Pulp		Mature Seed
	Tender	Ripe	
Potassium (mg)	206.0	350.0	246.0
Vitamin A (IU)	0.0	540.0	17.0
Thiamin (mg)	0.2	30.0	0.2
Riboflavin (mg)	0.2	0.4	0.3
Nicotinic acid (mg)	0.2	0.4	0.3
Vitamin C (mg)	11.0	7.0	11.0
Calorific value	50.0	84.0	139.0

(Source: Farm Guide 2008-2009, Farm Information Bureau, Dept. of Agriculture, GoK)

EMERGING PROBLEMS / ISSUES

1. Low awareness and appreciation of the value and importance of jackfruit
2. High percentage of wastage of a natural resource with high development potential
3. Improper harvesting and handling, leading to high wastage
4. Lack of need-based R&D
5. Development of suitable varieties for small households
6. Cumbersomeness of processing, due to spikes, leather, gum etc. of the fruit
7. Low level of awareness and skills for value-addition
8. Prejudices and disregard/ treating it as a minor fruit etc.

EMERGING PROBLEMS / ISSUES

9. Low level of information, communication, exchange, coordination and networking among individuals and groups interested in jackfruit promotion
10. Unavailability of appropriate technology/ low level of technological development
11. Odour
12. No proper supply chain
13. No assured market for fruit and products
14. Unavailability of suitable/good quality variety of fruits round the year for regular production of value added products

Vision of the Project

Creation of a new era of local food security as well as economic security of small farmers through the promotion of scientific practices of cultivation, harvesting, processing, value-addition and marketing of jack fruit

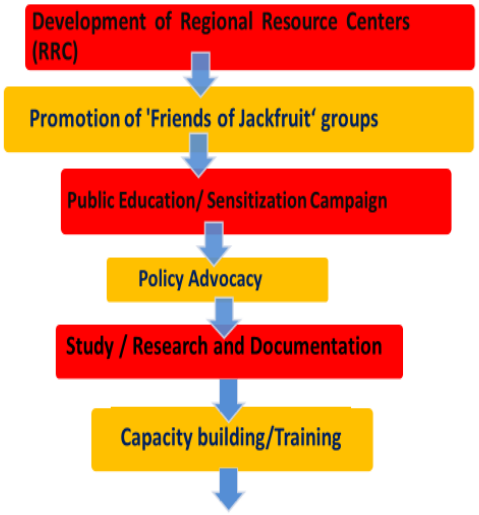
Mission

To empower, capacitate and equip the small farmers and small scale entrepreneurs

Objectives

- Revival and enhancement of interest among the different participants/stakeholders in regard to production, consumption and value-addition of jack fruit
- Generation and promotion of knowledge as well as skills in regard to all aspects of 'jack fruit management' (farming, harvesting, processing, value-addition, marketing etc.)
- Accessing, introduction, development, exchange and propagation of appropriate technologies related to all aspects of jackfruit management
- Creation of employment, income and prosperity for the families of farmers and entrepreneurs

PROGRAMMES



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PROGRAMMES

FUNCTIONS AND ROLES

1. Functions and Roles of CAFT trainee team

- ❖Developing RRCs
- ❖Master Training Of Trainers (MTOT)
- ❖Study/Research and Documentation
- ❖Exposure visits
- ❖Accessing, trial, adoption and propagation of appropriate technologies
- ❖Information dissemination (News letters, booklets)
- ❖Lobbying and advocacy

2. Functions and Roles of JPC

- ❖Linkage & Networking with agencies at state, national and international levels
- ❖State level Coordination, Monitoring and Evaluation
- ❖Conducting state and national jack fruit festivals
- ❖Arranging exposure visits- interregional and international
- ❖Exploring export potentialities
- ❖R and D
- ❖Generation of fund

FUNCTIONS AND ROLES

3. Functions and Roles of RRC

- ❖ Survey and study on the present supply chain of jackfruit, tender jackfruit, seeds, etc.
- ❖ Information dissemination at the regional/local level
- ❖ Capacity building in plant propagation techniques Conducting study on local jack fruit status Promotion and provision of safe harvesting technology
- ❖ Setting up and facilitating units of value-added products, including innovative products (minimum 3 value-added products to be made)
- ❖ Providing information, guidance and referral service to farmers and entrepreneurs
- ❖ Organizing exhibitions cum sale, cookery and quiz competitions and honoring persons as well as trees
- ❖ Conducting regular training in value-added products
- ❖ Extension work in educational institutions (classes for students etc).
- ❖ Linking and networking with LSGIS, NGOs, groups, etc.

Contd...

FUNCTIONS AND ROLES

- ❖ Networking with catering agencies, hotels, bakeries, etc for facilitating, promoting, manufacturing, and marketing of products.
- ❖ Lobbying and advocacy effort with three-tiered local governments
- ❖ Promotion of model mini jack fruit orchards
- ❖ Participating in R& D based activities organized by CAFT trainee team and JPC
- ❖ Exploration into the scope of value-addition of other seasonal fruits and vegetables
- ❖ Renting out the technologies available with the Center for value-addition activities
- ❖ Value-addition of other seasonal fruits

TIME FRAME

The project spans for a period of three years. Within this period, the project will develop into a self-sustainable program, not needing any more external funding.

SUSTAINABILITY PLAN

1. Sustainability of RRC : It is possible for the regional Resource Center to generate income from a number of services, including:

- ✓ Renting out of facilities
- ✓ Training charges
- ✓ Sale of products
- ✓ Marketing support
- ✓ Exhibition cum sale
- ✓ Sale of publication
- ✓ Consultancy charges

2. Sustainability of JPC

- ✓ Project consultancy
- ✓ Training
- ✓ Publication

CONTEMPLATED VALUE- ADDED PRODUCTS

Traditional products (with good shelf-life)	Products for immediate use
Jack fruit chips with sugar , gaggery	Jack fruit vada
Jack fruit varatty (sugar , Jaggery)	Jack fruit Aviyal
Jack fruit Halwa	Jack fruit cutlet
Jack fruit pappad	Jack fruit manchurian
Dehydrated Jack fruit	Jack fruit peda
	Jack fruit seed payasam
	Jack fruit seed Chammanthi
	Jack fruit Sweet idly

CONTEMPLATED VALUE- ADDED PRODUCTS

Innovative products	Innovative products
Jackfruit nector / wine	Chakka thoran / upperi* (Botted)
Ready to cook (RTC- minimal process) *	jackfruit pulp* (Botted)
Dehydrate jackfruit*	Squash and Jam
Dehydrate tender jack*	jackfruit Ice cream
Phanas- poli * (sweet JF mat)	Jack fruit Sip-up
Osmo dehydrated (OD) jack fruit *	jackfruit Peda
Vacuum dry jackfruit chips *	Jack fruit seed Powder
Tender jack in brine* (Botted)	Jack fruit seed in brine* (Bottled)
Tender jack curry (RTE) * (Botted)	Jack fruit seed – fried*(Bottled)
Tender jack thoran* (Botted)	Jack fruit seed Avalosupodi

CONTEMPLATED VALUE- ADDED PRODUCTS

Innovative products	Innovative products
Jack fruit seed Avalosunda	Chakka chappathi
Jack fruit seed Chocolate	Chakka payasam mix (Bulb + Seed)
Jack fruit carpel flour	Chakka mixture
Dosa mix (Carpel powder / seed flour)	Chakka Idly Mix
Allied products	
Other seasonal fruits and vegetables	

IMPLEMENTING AGENCY

CAFT trainee group and Jackfruit Promotion Council (JPC)

BUDGET ABSTRACT

Sr. No	Description	Year I	Year II	Year III	Total Amount Rs.
A.	Development of State Facilitation centre				
	Personal cost	2040000	2244000	2590800	6874800
	Operational cost	622000	862800	1283400	2768200
	Capital Cost	489000	15000	15000	519000
	Program cost	15300000	12750000	10200000	7650000
	Total	18451000	15871800	14089200	17812000

CONCLUSION

- This is a path-breaking and innovative project, calculated to lead to multiple sustainable results with positive impacts not only on the food security status but on farming, employment, income, health and environment status as well.

- The project will also set models of participation among farmers, entrepreneurs, CBOs, NGOs, Government Departments/agencies.

- Positive impacts on farming, industries, research, networking, technological innovations and so forth.

- Every way the project deserves the attention of planners and decision makers.

Project: 3



Project Proposal
On
Small Scale Industry on Fruit and Fruit Waste Utilisation

Group – 4
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INTRODUCTION

- India is the second largest producer of fruits and vegetables in the world after China.
- 2 per cent of perishable horticultural produce is processed to value added products.
- Fruits are processed to prepare RTS, Squash, Syrup, Pulp, Jam, Jelly, candy etc.

- Food Processing wastes are those end products of various Food Processing Industries that have not been recycled or used for other purposes.
- These wastes could be considered valuable by products.
- The utilization of by-products contributes to reduced amount of waste and thus to sustainable production.

OBJECTIVE

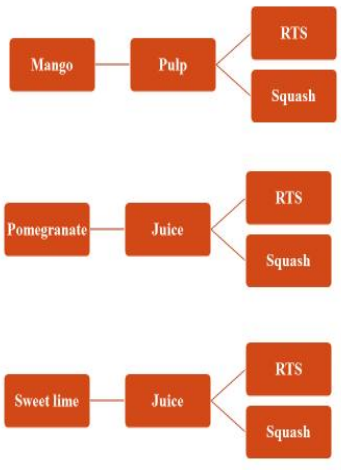
To utilize seasonal fruits and fruit waste for value addition

Company Profile

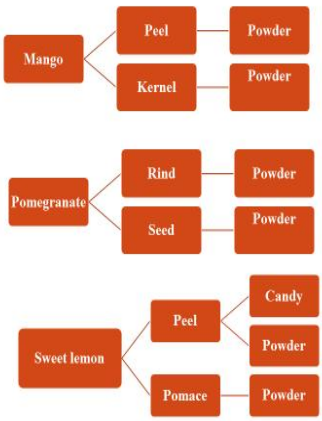
Company name	Unique foods
Company Name	Unique Foods
Sector	Food & Beverages
Segment	All age groups Lower, middle and upper class people
Location	
Turn over annual	One crore by five years
Worker	11
Products	RTS, Squash, Candy and Powder



Fruits and Core Products



Major Wastage & By Products



Unique Food Products

Name	Qty	Price
Mango RTS	200 ml	Rs.15
Mango Squash	1 lt	Rs.150
Mango Powder	100 gm	Rs.30
Pomegranate RTS	200 ml	Rs. 25
Pomegranate Squash	1 lt	Rs. 150
Pomegranate Powder	100gm	Rs.50
Sweet Lime RTS	200 ml	Rs.20
Sweet Lime Squash	1 lt	Rs.100
Sweet Lime peel candy	200 g	Rs.40
Sweet Lime powder	100gm	Rs.25

Table 1 Project Cost

S. No.	Particulars	Unit	Qty.	Rate (Rs.)	Amount (Rs. Lakh)
1	Land	acre	0.5	500000.00	2.50
2	Land Development	Sqft	20000	LS	5.00
3	Civil Work	Sqft	3850	600.00	23.10
4	Plant and Machinery	--	--	--	40.23
5	Miscellaneous Fixed Assets	----	----	----	2.00
6	Preliminary and Preoperative Expenses	---	---	--	1.95
	TOTAL				74.78

Equipments

Name	Cost
Fruit washing machine	2.00 Lakh
Sorting or inspection conveyer	1.75 lakh
Screw feeder	2.00 lakh
Twin pulper	2.70 lakh
Steam jacketed kettle	1.80 lakh
Dryer	1.33 lakh
Miscellaneous small equipment	2.00 lakh
Total	13.58 lakh

Table 2. Manpower required of fruit and vegetable processing unit

	Salary	Number	Salary (Per Month)	Total (Rs. Lakh)
Plant manager		1.00	15000.00	1.80
Manager – Technical		1.00	10000.00	1.20
Supervisors		3.00	7000.00	2.52
Accountant		1.00	8000.00	0.96
Electrician		2.00	6000.00	1.44
Peon		1.00	5000.00	0.60
Guard		2.00	5000.00	1.20
Total		11		9.72

Table 3 Depreciation Schedule

Sr. No	Particulars	Yr 1	Yr 2	Yr 3	Yr 4	Yr 5	Yr 6	Yr 7	Yr 8	
1	Capital Cost	74.78	0.00	0.00	0.00	0.00	0.00	0.00	0.00	
2	Recurring Cost	37.60	90.18	113.12	113.27	113.42	113.42	113.42	113.42	
3	Total Cost	112.38	90.18	113.12	113.27	113.42	113.42	113.42	113.42	Rs. 490.18
4	Benefits	47.52	110.88	142.56	142.56	142.56	142.56	142.56	142.56	
5	Depreciated value of structures								3.16	
6	Total Benefits	47.52	110.88	142.56	142.56	142.56	142.56	142.56	145.72	Rs. 534.15
7	Net Benefits	-64.86	20.70	29.44	29.29	29.14	29.14	29.14	32.30	
8	Discounting Factor	15%								
9	NPW @ 15 % DF	43.96								
10	IRR	36.73%								
11	BCR	1.09								

Govt. Approvals/ Clearance Required

Prior to establishment

1.Registration of concern with Registrar of Companies (ROC)
2.NOC from Local Bodies like Gram Sabha/ MC etc. - mandatory
3.Consent to establish from State Pollution Control Board - mandatory
4.Approval of Layout plan for construction - mandatory
5.Permission to dug bore well from Ground Water Survey and Development Authority (GSDA)
6.Registration with District Industry Centre (DIC) for as Small and Medium Enterprise
7.Application to State Electricity Board/ Authority for sanction of requisite power load

After establishment

1.Licence from FSSAI
2.Permission to commence production from State Pollution Control Board
3.Licence from Boiler Inspector

Swot Analysis

Company Name	Unique Foods
Sector	Food & Beverages
Segment	All age groups Lower, middle and upper class people
Strength	• Health Oriented • Less Competition • Distribution & Advertisement
Weaknesses	Need to recruit all new staff and provide training
Opportunities	To supply more job opportunities
Threats	High barriers of entry

OUTCOME

- ✓Increase in area of fruit production
- ✓Increases income of fruit growing farmers
- ✓Increase in waste utilization reduces pollution
- ✓Availability of health foods will enhance the nutrition security (non communicable diseases)

Project: 4

CAFT-HOME SCIENCE
MODULE ON

VALUE ADDED PRODUCTS FROM BANANA

Dr. M.S. Yadav, Associate Professor
Dr. Madhumathi, Asst. Professor
Dr. Rekha Tiwari, Scientist
Er. K. Venkat Reddy, Asst. Professor

Group V

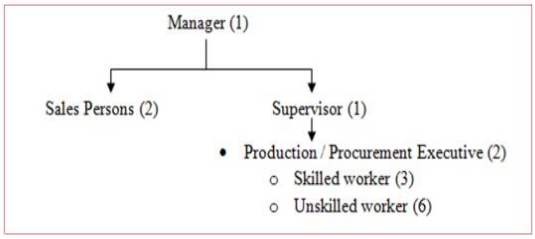
PROJECT DESCRIPTION

- Name of the firm: **Banana Products Manufacturers Pvt Ltd., Hyderabad**
- Name of the Head of the Unit: **CAFT Home Science**
- Geographic location of the Corporate Office: **Hyderabad**
- Nature of business: **Food Processing**
- Year of Establishment: **2018**
- Annual turnover of the firm: **New firm**

Range of products and their brand names

- Core products
  - Banana chips: BaniChips,
  - Banana powder: BaniPowder
- By Products
  - Banana **peel powder products for cosmetics and animal feed** : BaniPeelsPowder:

Organizational chart



Contents

Introduction

- Banana is an edible fruit come from two wild species – Musa acuminata and Musa balbisiana
- Grown in 135 countries
- Fruit, Fiber, banana wine, and banana beer and as ornamental plants
- **India and China – World's largest producers** - - accounted for 28% of total production.

Nutrition of banana

- Raw bananas (not including the peel)
- Water - 75%
- Carbohydrates - 23%
- Protein - 1% and contain negligible fat.
- 89 calories per 100 g
- Rich source of vitamin B_6, folate, and Choline providing 31% of the US recommended Daily Value
- Moderate amounts of vitamin C , Manganese and dietary fiber .
- In small quantities - Potassium, Magnesium, Iron, Sodium and Zinc

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Goal

- To be innovative and successful in bringing new technologies to add value to the Agricultural produce to increase the farmers income

Mission

- Help in setting up successful agro-processing centres to increase the value of farm produce.

Vision

- To increase the value of food processing industry and help increase its share in country's GDP and contribute as a foreign exchange earner in a sustainable manner by conserving the scarce resources of the country.

MARKET PROSPECT

- Retail outlets, Paan shops, bus-stands, railway stations, roadside eateries etc.
- Departmental stores, super markets and self service counters.
- Institutional market consisting of clubs and other institutions, school & college canteens, army establishments, bars & pubs, railway and airlines caterers etc.
- Competition from organised sector may be there but local and small units have distinct advantages in terms of less overheads, lower transportation costs, longer shelf life, quick access to market and economy in terms of cost.
- Malls, Software company canteens
- Exploring or tying up with government agencies like Mid day meals schemes, Anganwadi centers, NGOs, SHGs, Social welfare hostels, hospitals etc.

Marketing plan

- Good quality maintenance
- Promotional campaign like offering special discounts, referrals, advertisement and tying up with buying houses.
- Personalized campaigns to the Institutions and Governmental agencies and public establishments
- Adhering to the Government regulations like FSSAI

Special Features

- Adding nutritional supplements
- Making functional foods like Banana puree for kids, Banana halwa etc.

Marketing plans

TECHNOLOGIES - Banana chips

RAW GREEN BANANAS
↓
WASHING/SORTING/PEELING OF BANANAS
↓
SLICING/CUTTING
↓
WASHING AND DRYING
↓
FRYING
↓
SEASONING
↓
PACKAGING
↓
STORING/LOADING/SUPPLY

Fig. Process flow chart for banana chips

TECHNOLOGIES - Banana powder

RIPE BANANA
↓
WASHING
↓
DIPPED IN HOT WATER AT TEMPERATURE OF 65 TO 75°C FOR 10 MIN (FOR UNRIPE BANANA)
↓
COOLING BANANA (23°C)
↓
PEELING
↓
SLICING
↓
STEEPING IN 0.2% CITRIC ACID SOLUTION FOR 10 MIN
↓
DRAINING THE SOLUTION
↓
DRYING THE SLICES IN TRAY DRYER AT 60°C UNTIL THE FINAL MOISTURE 8-10%
↓
GRINDING
↓
SIEVING (250 µm)
↓
BANANA FLOUR
↓
PACKAGING AND STORAGE (LDPE THICKNESS 80 µm)

Fig. Process flow chart for banana powder

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TECHNOLOGIES - Banana peel powder

BANANA
↓
PROCESSING → MAIN PRODUCTS
↓
BANANA PEEL
STEEPING IN 0.2% CITRIC ACID SOLUTION FOR 10 MIN
↓
DRYING THE PEELS IN SUN DRYING UNTIL THE FINAL MOISTURE 8-10%
↓
GRINDING
↓
PEEL POWDER OF UNIFORM SIZE
↓
PACKAGING AND STORAGE

Fig. Process flow chart for banana peel powder

Banana chips making machinery

Banana Slicer Machine | Banana Slice Blanching Machine | Dewatering Machine

Banana Chips Fryer Machine | Deoiling Machine | Flavoring Machine

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Banana powder making machine

Tray Dryer

Flour water cooling grinder machine

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Banana peeling machine

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QUALITY CONTROL AND STANDARDS

BIS STANDARD

- Related to processing of banana chips:
  - IS 12574: 1989
- **FSSAI LICENSE**
- **POLLTUION CONTROL**
- **EFFLUENT DISPOSAL**

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CONSUMABLES, POWER AND UTILITY

- **CONSUMABLES**
  - The major consumables required are as follows;
  - Raw banana for chips and ripened banana for powder making
  - Edible oil, salt, spices, flavours, citric acid and natural colors
  - Packaging materials, printing and labelling materials

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Contd....

- **POWER**
  - Plant & Machinery - **14.92 KW**
  - General Lighting - **2.00 kW**
- **UTILITY**
  - WATER – Potable water at a pressure of 3 kg/sqcm
- **Other Utilities**
  - Fuel etc

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INSTALLED CAPACITY

- Minimum Wastage
- High Productivity
- Maximum flexibility in operation
- Adequate stock by provision wherever necessary
  - **Banana Chips - 40 tons,**
  - **Banana powder – 12 tons**
  - **Banana peel powder – 4.8 tons**
- Capacity utilization (in %)
  - **I year – 50%**
  - **II year – 60% and**
  - **III year onwards – 70%**

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BASIS AND PRESUMPTIONS

- The project is based on a single shift basis and 300 days of working schedule in a year, working for 8 hours a day, 25 days a month
- Power rate is assumed at Rs.6.00 per unit and monthly fixed rental charges
- Interest rates considered is 8% on term loan and 12.00% on Working capital loan for financial assistance.
- For repayment, a period of 6 years is planned with moratorium period of one year
- Depreciation shown has been calculated on Straight Line Method
- Break Even Point & Rate of Return is calculated on optimum production conditions

SWOT ANALYSIS

Strengths

- Wide acceptance of the products by consumers
- People perceive banana products as healthy
- Availability of raw material

Weaknesses

- Banana chips flavour is not liked by all the consumers
- High marketing cost of introducing the new food products

Opportunities

- Growing habits of consumers to eat healthy foods
- Very less processed products in banana
- Scope for more marketable and useful products from banana

Threats

- Many players in the market from local vendors to large established brands
- Unorganized retail market
- Chips made from potato are more preferred

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PROJECT COST ESTIMATES AND MEANS OF FINANCE

- TOTAL PROJECT COST
  - Rs. 30,70,000.00
- LAND, BUILDING AND CIVIL WORKS
  - Rs. 3,60,000.00
- PLANT & MACHINERY
  - Rs.13,55,200.00
- Misc. FIXED ASSET
  - Rs. 2,59,600.00
- PRELIMINARY & PRE-OPERATIVE EXPENDITURE
  - Rs. 8,00,000.00
- CONTINGENCY AND ESCALATION
  - Rs. 1,30,000.00

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Contd....

- **MEANS OF FINANCE**
- Proposed Project Cost - **Rs. 30.70 lakhs**
  - LOAN FROM BANK/FI @ 60% = **18.42 lakhs**
  - PROMOTERS CONSTRIBUTION @ 40% = **12.28 lakhs**
  - **DEBT-EQUITY RATIO : 1.5:1**

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Contd....

- **FINANCIAL CHARGES**
  - The interest on proposed term loan amount of **Rs. 18.42 lakhs** has been calculated **@8% per annum**
- **SALES REALISATION**
  - Based on 70% capacity utilisation
  - Total turnover is estimated at **Rs. 62.51 lakhs in third year**
- **NET PROFIT**
  - expected to generate profit from the first year of operation itself and will gradually increase with increase in capacity utilisation.

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Contd...

- **FINANCIAL ANALYSIS**
  - The break-even point of the proposed project is **35.85% at 70%** operating capacity in third year
- The Debt Service Coverage Ratio (DSCR) of the project - **1:2.62**
- The **internal rate of return** of the project -
  - **25%**

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COST OF LAND AND BUILDING

Covered Area – 2000 Square feet (on Rental basis)

Particulars	Area (Sqft)	Rate (Rs) per month	Months	Amount (Rs)
Work Shed, Store House cum Office	2000	10/-	12	2,40,000/-
Add: Electrification, Water supply, Sanitation and Drainage	LS	10,000/-	12	1,20,000/-
			Total	3,60,000/-
			Say (in lakhs)	3.6

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COST OF PLANT AND MACHINERY

Particulars	Qty	Amount (Rs)
Banana Peeling Machine	1	10,00,000/-
Slicing Machine	2	
Electrically Operated Dryer Machine	1	
Banana Slice De-watering Machine	1	
Banana Chips Frying Machine	1	
Chips De-oiling Machine	1	
Sealing Machine	2	
Tray dryer	1	
Grinder	1	
Washing Tanks, SS Utensils, Weighing Scales, Aluminium Trays and Laboratory Equipment	LS	50000/-
Miscellaneous Equipment	LS	50000/-
Sub total		11,00,000/-
Add transportation, installation etc @ 10%		1,10,000/-
Sub total		12,10,000/-
Add GST@12%		1,45,200/-
TOTAL		13,55,200/-
Say (Rs. in lacs)		**13.6**

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MISCELLANEOUS FIXED ASSETS

Particulars	Qty	Rate (Rs)	Amount (Rs)
Electrical Load Security and Transformer	LS	--	1,00,000/-
Furniture's and Fixtures including Working Tables	LS	--	50,000/-
Miscellaneous items	LS	--	50,000/-
Sub total			2,00,000/-
Add transportation and installation etc @ 10%			20,000/-
TOTAL			2,20,000/-
GST@18%			39,600/-
Total			**2,59,600/-**
Total (in lakhs)			**2.6**

MANPOWER REQUIREMENT & COST

Particulars of Employee	Numbers	Salary/ Month (Rs)	Months	Amount (Rs.)
Manager	1	25,000/-	12	3,00,000/-
Sales Person	2	15,000/-	12	1,80,000/-
Supervisor	1	18,000/-	12	2,16,000/-
Production/Procurement executives	2	13,000/-	12	1,56,000/-
Skilled Workers	3	11000/-	12	1,32,000/-
Unskilled Workers	6	9000/-	12	54,000/-
Expenses on salary in the 1st year (Rs.)				10,38,000/-
Total (Rs. in lakhs)				**10.4**

Increase of 5% has been considered every subsequent year.

PRELIMINARY AND PRE-OPERATIVE EXPENSES

Particulars	Amount (Rs. in lakhs)
Travelling Expenses	5,00,000/-
Non Refundable Deposits and Professional Fees	1,00,000/-
Miscellaneous expenses	2,00,000/-
TOTAL	8,00,000/-
Total (Rs. in lakhs)	**8.0**

POWER AND UTILITY

Expenses on Power			
Particulars	**Quantity**	**Power (kW)**	**Total (kW)**
Plant & Machinery (Total HP of 20)	1	14.92	14.92
General Lighting	20	0.10	2.00
Total power requirement/ day (kW)			16.92 say 17.00 kW

No. of hrs/ day	8
Nos. of days/annum	300
Annual power requirement (kWh) (2400 hours)	40800 units
Rate per unit (Rs)	6/-
Expenses on power (Rs)	2,44,800/-
B: Estimate of Utility	
Expenses on Water/Gas Cylinders (1 cylinder per 30 hours)/Other Utilities (Rs.)	25,000/-+80000/-+45,000/- =1,50,000/-
Expenses on Power & Utility at 100% capacity (Rs.)	3,94,800/-
Total (Rs. in lakhs)	**3.95**

REPAIR AND MAINTENANCE COST

(Rs. in lakhs)

Particulars	Cost (Rs)	Contingencies (Rs)	Total (Rs)	Rate	Amount (Rs)
Building & Civil Works	3.6	0.50	4.10	1.00%	0.04
Plant & Machinery	13.6	0.50	14.10	2.00%	0.28
Misc. Fixed Assets	2.6	0.30	2.90	1.50%	0.04
Expenses on repair & maintenance in year 1	19.8	1.30	21.10	-	**0.36**

ESTIMATES OF INCOME (Basis-100% Capacity Utilisation)

Particulars	Qty	Price per ton (Rs.)	Amount (Rs.)
Banana Chips (20 kg per hour)	48 tons	1,50,000/-	72,00,000/-
Banana powder (5 kg per hour)	12 tons	1,20,000/-	14,40,000/-
Banana peel powder (2 kg per hour)	4.8 tons	60,000/-	2,88,000/-
Total Sales per annum at 100% capacity (Rs)	**64.8**	-	**89,28,000/-**
Sales (Rs. in lakhs) per annum			**89.3**

Cost of Raw Material

- **Weight of banana fruit before peeling**
  - 183 g at the rate of Rs. 30/- per kg
- **Weight of banana after peeling**
  - 119 g (moisture content 75%)
- **Weight of peel**
  - 64 g (moisture content 75%) (35% of whole banana)
- **Raw (vegetable) banana required per annum for chips making**
  - 40 / (0. 65) = 61.54 tons (say 62 tons). 62 * 30,000 = 18.6 lakhs
- **Banana fruit required for banana powder and banana peel powder**
  - 12 / (0.25) = 48 tons, 48 * 30000 = 14.40 lakhs
- **Total raw material cost = 18.6 + 14.4 = 33 lakhs**

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INTEREST ON WORKING CAPITAL

(Rs. in lacs)

Particulars	Year 1	Year 2	Year 3
Total Current Assets	6.39	6.71	7.05
Bank Loan (75%)	4.79	5.03	5.29
Interest @ 12%	**0.57**	**0.60**	**0.63**

DEPRECIATION SCHEDULE

(Rs in lakhs)

Description	Cost (Rs)	Contingencies	Total (Rs.)	Rate	Amount/ annum (Rs)
Building & Civil Works	3.6	0.50	4.10	5%	0.21
Plant & Machinery	13.6	0.50	14.10	10%	1.41
Misc. Fixed Assets	2.6	0.30	2.90	10%	0.29
TOTAL	19.8	1.30	21.10		**1.91**

ESTIMATED COST OF THE PROJECT

	(Rs. in lakhs)
Land & Site development	Own Land/ On Lease
Building & Civil Works	3.60
Plant & Machinery	13.60
Misc. Fixed Assets	2.60
Preliminary & Pre-operative Expenses	8.00
Contingencies & Escalation @ 5%	1.30
Working Capital	1.60
TOTAL	**30.70**

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PROPOSED MEANS OF FINANCE

Particulars	Percent	Amount (Rs. lakhs)
EQUITY		
A. Equity from Promoters	40%	12.28
B. Subsidy from Central/ State Govt.	-	
DEBT		
Term Loan from Banks/ FIs	60%	18.42
TOTAL	100%	**30.70**

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WORKING CAPITAL ESTIMATES

			(Rs. in lakhs)	
		Total Current Assets		
Period (Days)		Year 1	Year 2 (5% increase)	Year 3 (5% increase)
Raw Materials	15	0.72	0.76	0.80
Power & Utility	30	0.33	0.35	0.37
Salary	30	0.87	0.91	0.96
Finished Goods	15	4.47	4.69	4.92
	Total	**6.39**	**6.71**	**7.05**
Working Capital Margin in Year 1 (25%)			**1.6**	

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COST AND PROFITABILITY ESTIMATES

						(Rs. in lakhs)
Particulars	**Yr 1**	**Yr 2**	**Yr 3**	**Yr 4**	**Yr 5**	**Yr 6**
A. INCOME						
Production Capacity (Ton/ annum)	64.8	64.8	64.8	64.8	64.8	64.8
Capacity utilisation	50%	60%	70%	70%	70%	70%
Production/ annum at capacity utilisation	32.4	38.88	45.36	45.36	45.36	45.36
Total income/ annum	**44.65**	**53.58**	**62.51**	**62.51**	**62.51**	**62.51**
B. OPERATING EXPENSES						
Raw Materials	16.5	19.8	23.1	23.1	23.1	23.1
Power & Utility	1.98	2.37	2.77	2.77	2.77	2.77
Salary	10.40	10.92	11.45	12.04	12.64	13.27
Repair & Maintenance	0.18	0.22	0.25	0.25	0.25	0.25
Cost of land and building	3.60	3.60	3.60	3.60	3.60	3.60
Other Expenses	7.00	7.35	7.72	8.10	8.51	8.93
Total Operating Expenses	39.66	44.26	48.89	49.86	50.87	51.92
Operating profit	4.99	9.32	13.62	12.65	11.64	10.59
C. FINANCIAL EXPENSES						
Depreciation	1.91	1.91	1.91	1.91	1.91	1.91
Interest on Term Loan	1.47	1.18	0.88	0.59	0.36	0.3
Interest on Working Capital Loan	0.57	0.60	0.63	0.63	0.63	0.63
Net Profit	1.04	5.63	10.2	9.52	8.74	7.75
Net Cash Accruals	2.95	7.54	12.11	11.43	10.65	9.66
Principal Repayment	0.00	2.46	2.46	2.46	2.46	2.46

DEBT-SERVICE COVERAGE RATIO

						(Rs. in lacs)
Year	**1**	**2**	**3**	**4**	**5**	**6**
Profit After Tax (Net Profit) (Ann. D)	1.04	5.63	10.2	9.52	8.74	7.75
Depreciation	1.91	1.91	1.91	1.91	1.91	1.91
Interest	1.47	1.18	0.88	0.59	0.36	0.3
Total	**4.42**	**8.72**	**12.99**	**12.02**	**11.01**	**9.96**
Interest	1.47	1.18	0.88	0.59	0.36	0.3
Loan Repayment	0.00	3.68	3.68	3.68	3.68	3.68
Total	**1.47**	**4.86**	**4.56**	**4.27**	**4.04**	**3.98**
DSCR	**3.01**	**1.79**	**2.85**	**2.81**	**2.73**	**2.5**

Average DSCR = 2.62

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BREAK-EVEN ANALAYSIS

			(Rs. in lakhs)
Year	**1**	**2**	**3**
A. Net sales (Rs. lakh)	44.65	53.58	62.51
B. Variable cost			
Raw Materials	16.5	19.8	23.1
Power & Utility	1.98	2.37	2.77
Other Expenses	7.00	7.35	7.72
Interest on Working Capital Loan	0.57	0.60	0.63
Total variable cost	26.02	30.12	34.22
C. Contribution (A-B)	**18.63**	**23.46**	**28.29**
D. Fixed & Semi-fixed Costs			
Salary	10.40	10.92	11.45
Repair & maintenance	0.18	0.22	0.25
Interest on Term Loan	1.47	1.18	0.88
Depreciation	1.91	1.91	1.91
Total fixed cost	**13.96**	**14.23**	**14.49**
E. BREAKEVEN POINT	**74.93%**	**60.66%**	**51.22%**
F. BEP at operating capacity	**37.47%**	**36.40%**	**35.85%**
G. Cash BEP	**64.68%**	**52.51%**	**44.47%**

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Conclusion

- The project is an innovation in using locally available materials to run a successful venture for providing employment to the rural youth and will be a model for setting up of such small enterprises by the entrepreneurs.

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RMRM

Er. Reddy, KV
Asst. Professor
CAE, Kandi, SRD
PJTSAU, TS

Dr. Madhumathi,
Asst. Professor,
Parabhani, MH

Dr. Rekha
Tiwari, Scientist,
KVK (RVSKVV),
Ujjain, MP

Dr. Mahendra S.
Yadav,
Assoc. Professor,
CSAUAT, Kanpur, UP

Future Prospects

- Banana is a very important crop of India.
- Only 2-3% of banana is processed
- Many products can be prepared from banana from fruit, stem, flowers, leaf and root.
- Banana processing can be profitable venture with right kind of marketing plan.

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Project: 5

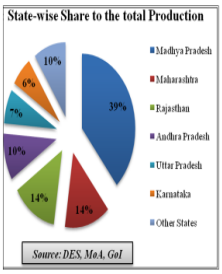
PROJECT ON SOYA MILK, PANEER & CURD

PREPARED BY

1. D. Rajani, Asst. Professor (Horticulture) Agricultural College, Palan, PJTSAU, Hyderabad.
2. Mrs. Rohini B. Shinde, Subject Matter Specialist (Home Science), KVK, Hingoli
3. Mr. Rajendra P. Bambharolia, Asst. Professor (Microbiology), College of Agriculture, NAU, Waghai
4. Mrs. Kavitha. C, Asst. Professor, Department of Food Processing Tech., College of Community Sci. UAS, Dharwad.

Introduction

- Soybean (*Glycine max*) is known as the "**GOLDEN BEAN**". It belongs to the legume crop family and are basically native to East Asia. The start of commercial exploitation of soybean in India is nearly four decades old. In this period, the crop has shown unparallel growth in area and production.
- Introduction of soybean has resulted in an enhancement in the cropping intensity and resultant increase in the profitability per unit land area. In India, soybean will continue to remain a major rainfed (Kharif) oilseed crop . The top three Soya bean growing states are Madhya Pradesh, Maharashtra and Rajasthan.
- Soybean is an exceptionally nutritive and rich in protein, oil, minerals, B vitamins and isoflavones (diedzein and genistein) along with this it has antinutritional factors.



Health Benefits of Soybean:-

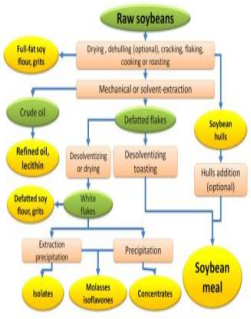
- Soybean contains essential heart friendly **omega-3 and 6 fatty acids** with no cholesterol helps in lower the cholesterol and also heart related risks.
- Soybean provides important minerals such as calcium, magnesium, iron and selenium.
- Soya is rich in probiotics in the form of fermented soy products, such as **tempeh, miso, and soy yogurt and lactose free**.
- Soybean is an excellent source of dietary fiber.
- Soybean is a good source of enriched Calcium and Vitamin B12.
- Soybean is a complete protein food, containing all the amino acids essential to human body.
- Soybean contains **isoflavones** and **phytoestrogens** which are good in reducing risk of various cancers, heart disease and osteoporosis.

Nutrition Facts: Soybeans, cooked, boiled - 100 grams

contents	Amount
Calories	**173**
Water	63 %
Protein	16.6 g
Carbs	9.9 g
Sugar	**3** g
Fiber	6 g
Fat	9 g
Saturated	1.3 g
Monounsaturated	1.98 g
Polyunsaturated	**5.06 g**
Omega-3	**0.6 g**
Omega-6	**4.47 g**
Trans fat	~

Soya is processed into various products such as

- Soy milk
- Soya chunks (meal maker)
- Soy paneer (tofu)
- Soy sauce
- Soy curd
- Soy protein isolates
- Meso
- Natto



MARKET POTENTIAL

- Increasing health consciousness among the people. Soya milk, tofu, curd are lactose free, cholesterol free, low calorie and very good source of isoflavones.
- Soya bean is getting accepted in the form of textured vegetable protein, Soya fortified wheat flour, Soya milk, Tofu and Soya curd.
- Being mainly the country of vegetarians, India has indeed a very great potential of vegan foods.
- Experts predict that the Soya food industry will grow 20% annually over the next few years.
- Some of the key players identified across the value chain of the global soy milk market include Vitasoy Australia, Alpro, Provamel, DREAM, Furama, NOW Foods, Palsgaard, Pacific Foods of Oregon, Inc., The Hain Celestial Group, Inc.,

BASIS & PRESUMPTIONS

I. This project is based on single shift basis and 300 working days in a year.

II. The cost of machinery & equipment /materials indicated refer to a particular make and the prices are approximate to those prevailing at the time of preparation of this profile.

III. The cost of packaging, forwarding tax etc and installation electrification of machinery is taken @ 25% and non-refundable deposits, project cost, trial production, fees etc are considered under pre-operative expenses.

IV. Depreciation has been taken as an –

a) On building @ 5%

b) On machinery & equipment @ 10%

c) On office furniture & fixture @ 20%

V. Interest on total capital investment has been taken @ 14% per annum

VI. Minimum 40% of the total investment is required as margin money.

VII. Pay back period of the project will be 7 years, with half yearly instalments.

VIII. Break even point has been calculated at the full capacity utilization.

IX. It is presumed that that 1 kg of soya bean may yield 7.5 litre of soya milk and 1 litre soya milk can be converted into 200 gm. of soya paneer

IMPLEMENTATION SCHEDULE:

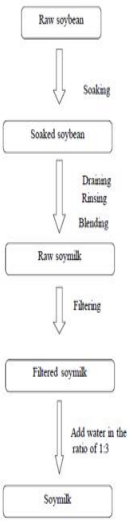
The following steps involves in the implementation of the project

I. Selection of Site.
II. Form of Ownership.
III. Feasibility Report.
IV Registration With DIC (District Industries Centre)
V. Arrangement of Finance
VI. Construction of Factory Shed & Building
VII. Plant Erection and Electrification
VIII. Recruitment of Manpower
IX. Arrangement of raw materials including packaging materials.
X. Selection of marketing channel.
XI. Miscellaneous power and water connection, Pollution Control Board clearance

TECHNICAL ASPECTS

Process of Manufacture

Soya Milk



Flow chart of soya tofu (paneer)

Soyabeans
↓
Soaking (8-12 hrs)
↓
Draining
↓
Grinding
↓
Cooking (slurry 110 ° C for minutes)
↓
Cooling
↓
Filtering
↓
Soymilk
↓
Boiling
↓
Addition of lemon juice
↓
Curdling
↓
Whey separation
↓
Paneer

Soya curd

Clean and Soak Soybeanse
1 kg. Beans 3.3 litre Water
↓
Airless grind and cook 5.2 litre water and 1.3 kg steam.
↓
Extract Soya milk Base 7.5 litre Soya milk 1.4 kg Okra.
↓
Add Sweetener Salt and culture

- **Quality Control and Standards:**

  Product should conform to the PFA (Prevention of Food Adulteration), Act, 1955 and FSSAI 2006 .

- **Pollution Control**:

  Though no industrial effluent is released in the manufacturing process even then a NOC from State Pollution Control Board is to be obtained before commercial production

- **Energy Conservation**:

  Suitable measures should be adopted to use appropriate amount of fuel and electricity

PRODUCTION CAPACITY

Item	Quantity (kg)	Rate/kg/lit.	Values(Rs)
Flavoured milk	60000	40	2400000
Tofu (paneer)	6000	120	720000
Soya curd	12000	35	420000
			3540000

FINANCIAL ASPECTS:

A) Fixed Capital:

(i) Land & Building:

Built up area including manufacturing 200 sq. mtr.

finished store and office etc (Rented)

Rs. 12,000/- per month

Machinery & Equipment

Sl. No	Particulars of Machines	Qty. (Nos.)	Amount (Rs.)
1.	Soya Machine for soya milk and paneer (Tofu) consisting of grinder cooker, Manual Boiler, Filter Press, Tofu Box, Tofu Press, Tools, Flushing Chamber	1	3,00,000/-
2.	Deodorizer	1	1,00,000/-
3.	Vacuum Packaging Machine	1	1,25,000/-
4.	Freezer @ 25,000/-	2	50,000/-
5.	Pouch Sealing Machine	1	10,000/-
6.	Tables with AL Top @ 10,000/-	3	30,000/-
7.	Plastic Trays/Tubes and other misc. items.	LS	30,000/-
8.	Water Storage Tank	2	20,000/-

Soya milk making machine

Vacuum packing machine

soya paneer press

freezer

Conti.....

iii)	Packaging, forwarding, Tax etc.		56,500/-
iv)	Electrification and installation @ 10%		56,500/-
v)	Office Furniture and Equipment's		50,000/-
vi)	Pre-operative Expenses		20,000/-
	Total Fixed Investment (ii to vi):		8.84,000/-

B) Working Capital (Per Month)

(i) Personnel (Salary & Wages):

Sl. No.	Designation	No.	Rate	Total (Rs.)
1.	Manager	1	10000/-	10,000/-
2.	Skilled Workers	1	6000/-	6,000/-
3.	Unskilled Workers	1	4000/-	4,000/-
4.	Sweeper	1	3000/-	3,000/-
			Total:	23,000/-
	Perquisites @ 10%			2,300/-
			Total:	25,300/-

Raw Material

Sl. No.	Item	Qty.	Rate (Rs.)	Value (Rs.)
1.	Soya bean	1100 Kgs	40/-Kg.	44,000/-
2.	Chemical s, flavours, colour and other material etc.	LS	-	30,000/-
3.	Packaging material for milk and paneer	LS	-	16,000/-
			Total:	90,000/-

iii) *Utilities:*

1.	Power	9,000/-
2.	Fuel/LPG	20,000/-
3.	Water	3,000/-
	Total:	32,000/-

iv) *Other Contingent Expenses (P.M.):*

1	Rent	12,000/-
2	Postage & Stationery	1,500/-
3	Consumable Store	2,000/-
4	Repairs and Maintenance	2,000/-
5	Advertisement & Publicity	5,000/-
6	Sales Expenses	4,000/-
7	Telephone/Mobile	2,000/-
8	Miscellaneous Expenses	5,000/-
	Total:	**33,500/-**

v) *Working Capital / Total Recurring Expenditure (P.M.):*

1.	Salary & Wages	25,300/-
2.	Raw Materials	90,000/-
3.	Utilities	29,300/-
4.	Other Contingent Expenses	33,500/-
	Total:	177,800/-

TOTAL CAPITAL INVESTMENT:

SI no.	Particulars	(Rs.)
I.	Fixed Capital	8,48,000/-
II.	Working Capital for 2 months	3,55,600/-
	Total:	12,03,600/-

Cost of Production (Per annum)

Particulars	Value (Rs.)
Total Recurring Expenditure /Cost	13,47,600/-
Depreciation on machinery and equipment @ 10%	56,500/-
Depreciation on Furniture @ 20%	10,000/-
Interest on Total Capital Investment @ 14%	1,36,164/-
Total: -	15,50,264/-

Turnover (Per Annum)

Item	Value (Rs.)
Flavoured Soya milk 60,000 Ltrs. @ Rs.40/- Ltr	24,00,000/-
Tofu (Paneer) 6000 Kgs @ Rs. 120/-Kg	7,20,000/-
Soya Curd 12000 Kgs @ Rs. 35/-Kg	4,20,000/-
Less marketing Expenses	(-) 6,00,000/-
Less marketing Expenses	(-) 6,00,000/-
Net Turn over:	34,20,000/-

vi) Total working capital for 12 months 1,77,800 X 12 = Rs. 2133600/-

C) *TOTAL CAPITAL INVESTMENT*:

Sr. no	particulars	Amount in Rs
I.	Fixed Capital	8,48,000/-
II.	Working Capital for 12 months	2133600/-
	total	2981,600/-

- **FINANCIAL ANALYSIS:**
- **i) Cost of Production (Per annum)**

Sr no	particulars	Amount in Rs.
1	Total Recurring Expenditure /Cost	13,47,600/-
2	Depreciation on machinery and equipment @ 10%	56,500/-
3	Depreciation on Furniture @ 20%	10,000/-
4	Interest on Total Capital Investment @ 14%	1,36,164/-
5	Total: -	15,50,264/-

Turnover (Per Annum)

Sr no	particulars	Amount in Rs
1	Flavoured Soya milk 60,000 Ltrs. @ Rs.25/- Ltr	2,40,0000
2	Tofu (Paneer) 6000 Kgs @ Rs. 80/- Kg	7,2,0000
3	Soya Curd 12000 Kgs @ Rs. 25/-Kg	4,20,000
4	Total:	35,40,000/-
5	Less marketing Expenses	34,20,000/-
6	Net Turn over:	34,20,000/-

NET PROFIT (Per annum)

Turn over	(-)	Cost of production	=	Rs 18,69,736
3420000	(-)	1550264		

BREAK EVEN POINT
Fixed Cost:

Particulars	Amount
Depreciation on machinery	56500
Depreciation on furniture	10000
Rent	72000
40% of other expenses	43200
40% of salary and wages	121440
Interest on total investment @14% per annum	136164
Total	661244

Names & Addresses of Machinery & Equipment Suppliers:

1. M/s SSP Limited,

19, DLF Industrial Area – IV, 13/4, Mathura Road, Faridaabad – 121003. (Haryana)
Phone: 0129 – 527544, 5277730. Fax: 91 – 129 – 527744.

2. Pristine Plants India Pvt. Ltd.,16, Gurukual Industrial Area,12/6, Mathura Road, Faridabad – 121 003. Phone: 91 – 0129 – 4136901 – 05.

Fax: 91 – 129 – 4136901. Mob. No. 09811062230

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