



# SEED COMMUNICATIONS

A Quarterly News Letter from  
Society For Energy, Environment & Development

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FROM THE DESK OF EDITOR

APRIL-JUNE 2017

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## SOLAR POWERED MICRO FOOD PROCESSING SYSTEM INTERFACING FOOD PROCESSING EQUIPMENT

In the series of innovations in solar drying and solar food processing technologies, this is another innovation in application of Solar Energy operating with zero energy cost for processing of food products by Society for Energy, Environment & Development (SEED), Hyderabad.

Solar Energy which is given as boon to the power sector is an excellent solution for solving the problem. If one could design the necessary technology and instrumentation to interface food processing equipment, it will reduce the running and energy costs with a little investment. This is the holistic approach to the food industry for solar energy applications and benefits to the rural entrepreneurs especially for youth and women in addition to reducing the post-harvest losses of agri-horticultural produce in the country.

### PROJECT OBJECTIVES:

- ◆ To develop the sustainable Energy System to operate food processing machinery with uninterrupted power supply based on renewable energy.
- ◆ To provide net meter to pump the new energy into the grid when the system is idle.
- ◆ To explore the alternate energy in A.C. mode as well as in D.C mode with energy efficiency for processing fruits and vegetables to reduce the post-harvest losses.
- ◆ To design the network of sub-systems for all equipment and processes in detail and integrating with the total energy system.
- ◆ To demonstrate the solar energy application with zero energy cost for processing of fruits & vegetables.

### ROOF TOP SOLAR POWER SYSTEM

With the previous experience in building up Solar Power Systems, SEED R & D has designed and developed a model Solar Power System for application in food processing technology. This is a roof top 10 KW Solar Power System. This is divided into two parts - 5 KW is connected battery backup and another 5 KW is connected on grid. This mode will facilitate the machinery to operate with solar power only when grid is on and also when the grid is off. In other words, this is connected with the string inverter and also hybrid (or) dual input inverter. The machinery will draw a

power from the battery bank. Our system will generate 50 - 55 units of power per day.



10KW Solar Photovoltaic Power System

Total Solar power generated is distributed through 3 sections namely, R & D Section, Food Processing Section and Solar Dryer - SDM-50 (solar drying system). This is successfully operating micro food processing machinery so that total solar power drawn and used with varying series of operations. The system was tested with load at variable times so that the total solar power drawn equivalent to about 10 KW limit. All practical purpose to complete the process of the product from pulping stage to finished product is tested successfully.

This system provides zero energy cost and entirely depends on Solar Energy. It is a great boom for food processing enterprises irrespective of conventional electricity and this avoids power cuts or power failures.

This project is aimed at conducting the application of Solar Energy for food processing industry on micro level for the first time in India. This experience will be the forerunner for the application of large industrial requirement by scaling up the operation the technology.

This project was implemented by the team consisting by Prof. M. Ramakrishna Rao, Mr. G. Harikrishna, Sri. P. Sreerama Raju and Sri Surender Reddy.

This project is Catalyzed & Supported under Core Support Programme, Science for Equity, Empowerment & Development Division, Department of Science & Technology, New Delhi.

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## TRAINING PROGRAMS

### Solar Food Processing Technology – SEED conducts Training Programs for Entrepreneurial Development

Food Processing is increasingly becoming a profession of choice for many entrepreneurs exploring opportunities with small and medium scale enterprises. In the current scenario of self employment emerging as a potential future gainful occupation, there is considerable interest among the students and youth to go through additional learning programs to enhance their knowledge and skills. Keeping this in mind with the Innovated Solar Dryer technology developed by SEED, offered Solar Processing Technology-Entrepreneurship opportunities training program.

During the quarter, SEED conducted 2 four-day training programmes on Solar Food Processing Technology-Entrepreneurship Opportunities.

#### First Training Program:

From 16 – 19 February 2017 SEED conducted a 4 day program on Solar Food Processing Technology for Entrepreneurial opportunities specially tailored for the students of Bhavan's Vivekananda College.



**GROUP OF STUDENTS - PARTICIPANTS**

This was done at the express desire of the college to showcase the potential entrepreneurial opportunities in the area of Solar Food Processing to the passing out graduate students of the college. SEED trained 25 students and two professors with the objectives of imparting the basic knowledge about solar dehydration as a food processing technology; processing of fruits and vegetables for value addition and preservation and to impart skills with respect to the physico-chemical, organoleptic, microbiological analysis of solar dried products for quality control in theory and practical classes. This is the first training program conducted for the college students by SEED. In this programme the students were also exposed to techniques like osmo-solar dehydration, product development using solar dried products and processing of fruit bars using solar energy.

#### Second Training Program:

Subsequently another Training program was conducted from 21<sup>st</sup> – 24<sup>th</sup> of February on the same topic. This program was designed for the entrepreneurs who have already chosen to start their own Solar Food Processing unit.



**TRAINERS IN ACTION**

#### Training Program Content

For both the training programs, the emphasis was more on practical sessions. Processing of Mango, Tomato, Carrot, Spinach and Osmo-Solar Processing of Pineapple slices etc., were included as hands-on practical work. The theoretical and knowledge/ skill areas covered in the programme include concept of commercialization of Solar Cabinet Driers; General methods of dehydration vs solar dehydration – application of green energy technology for value added fruits; vegetables and forest produce; health and wellness with solar dried foods, their nutritional and nutraceutical benefits; packaging and shelf stability; project feasibility and economics; quality management and food safety of solar dried foods; chemical, microbiological and sensory analysis of solar dried foods; food fortification using solar dried foods; marketing and new product development using solar dried foods etc..

#### Expert Faculty:

The Course faculty included invited subject matter experts from SEED and other invited experts from Institutions of repute working in respective areas.

The training concluded with a valedictory program and there was overwhelming overall appreciation for the program, from the participants included suggestions for easy understandable method along with classes for practical operation of the dryers.

By R. Shyamala



## Hygienically Processing of Amchur (Mango powder) in Solar Cabinet Dryers

Mango (*Mangifera indica* L.) belonging to Family Anacardiaceae is the most important commercially grown fruit crop of the country. India ranks first among world's mango producing countries accounting for about 50% of the world's mango production. Mango has been grown in India since long and is considered to be king of fruits. February - July is considered as mango fruiting time in Andhra Pradesh and Telangana.

The recent rains in major parts of South and North India could have great negative impact on mango crop contributing to economic losses of growers.



**RAW MANGOS**

SEED's solar dryer technology has rescued a women mango grower, C. Rajyalakshmi from Keesara, Telangana. Unseasonal rains accompanied by heavy wind has struck mango plantation at her farm in May 2016, who is expecting good yield and economic benefits in another couple of months. SEED helped her in processing raw mangoes in solar dryer.

About 500 kgs of raw mangoes were dried using Solar dryers for 3-4 days to produce Amchur powder.



**SOLAR DRIED AMCHUR POWDER**

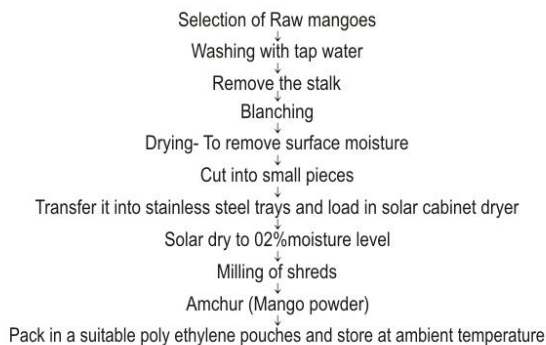
However open sun drying takes 7 - 9 days for complete drying. Also Mangoes that were dried using solar dryers are without microbial

contamination which help improving quality and marketability. Amchur has high iron content, so pregnant women and people suffering from anemia are advised to consume it regularly. It combats acidity and improves digestion. Mangoes contain phenols, phenolic compounds have powerful antioxidant and anticancer abilities. Amchur (Mango Powder) is finely ground, sour-sweet tasting and tangy fruit flavor with slightly earthy fragrance. Hence its taste is very much appreciated by children and



**RAW MANGOS - SOLAR DRYING**

pregnant women. Other names of Amchur are Umchoor, Aamchoor, Aamchur, Aam-Papar (Dried Mango Sheets), Manguely, Dried Mango Powder, Dried Green Mango.



Product	Drying Conditions					
	Loading capacity kg/m <sup>2</sup>	Yield (%)	Moisture (%)	Drying Hours	Cabinet Temp (°C)	Ambient Temp (°C)
Solar dried Mango	20	16.5	5.02	24-32	56°C	34.2°C

By R. Shyamala

### VIP Comments:

"I am grateful to you for the information you have sent on the work of SEED. They are very relevant to our current priorities in agriculture and food technology. I hope your innovations in Solar Dehydration will receive wide spread application".

- Prof. M.S. Swaminathan

Founder Chairman and Chief Mentor

UNESCO Chair in Ecoethnology

M S Swaminathan Research Foundation, Chennai.

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## Society for Energy, Environment & Development (SEED) 30 years of "SEED" Journey

Dr. M.M. Krishna

"SEED" successfully completed 30 years of its existence (1987 - 2017) with great innovations and achievements to its credit in helping improve rural prosperity and sustainable incomes to the rural women.

### First Decade

Prof Ramakrishna Rao and the team of dedicated Scientists and Engineers focused on community development and enhancing the quality of life in rural areas. They worked on development & operation of community Biogas plants in villages, Water harvesting and management technologies for the cultivation of Wastelands, Farmers Camp on Solar Photovoltaic Water Pumping Systems, Science and Technology through Jana Vignana Sammelan in Janagaon and Project on Construction of improved Chuhalsin villages of Krishna District, Andhra Pradesh. These technologies were popularized and promoted in the country.

### Second Decade

The second decade heralded a period of planned action and execution to bring solar energy to the doorsteps of the rural community, particularly the farmers, unemployed youth and self help groups in rural areas in a bid to raising farmer incomes through value addition to their produce. The period saw conceptualizing and defining the path forward for the Organization through appropriate long term Vision and Mission Statements as well as initializing a structured R&D effort towards designing an efficient and effective Solar Dryer and develop appropriate technologies for solar food processing of foods - fruits, vegetables, forest produce etc. The renewed R&D emphasis led to designing and patenting a Solar Cabinet Dryer and relevant processing technologies. Thus, birth of SEED Solar Cabinet Dryer took place in 1999 under sponsorship of a UNDP Project. Many training programs were conducted in the rural areas for solar energy application for food

processing. Food processing R&D activities started in 2000. SEED established an Analytical & Quality Control Laboratory for food products with the financial support of MNES (now MNRE) in 2003.

### Third Decade

The third decade started consolidating the design and development of various sizes of dryers and application of solar food processing technology by processing 92 products of Fruits, Vegetables, Forest produce and medicinal products. This was achieved through core support funding from Department of Science & Technology for 5 years starting from 2009. This enabled SEED to develop more innovative food products based on Solar drying and providing viable and socially relevant opportunities to small and marginal entrepreneurs across the country and abroad.

These achievements at SEED were well recognized by the Country through the prestigious NABARD Award for Rural Innovations - 2012 as well as a further extension of core support by DST.

10KW Roof Top Solar Photovoltaic power system was successfully installed and commissioned at SEED for interfacing down stream Food Processing equipment and other packing infrastructure. This is indeed a unique and highly innovative achievement for SEED in its 30th year of existence.

### Future

SEED is a progressive and futuristic organization with its objectives well entrenched to accomplishing significant service to the rural people to mitigate their poverty and empower them with appropriate technologies to transform their lives.

### TO COMMEMORATE 30 EVENTFUL YEARS OF SERVICE

"SEED" Celebrating a function on **Saturday 22<sup>nd</sup> April 2017 at 4.30 PM** at  
FTAPCCI Auditorium, Red Hills, Hyderabad -500 004

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