

## CLEAN AND FAST SOLAR DRYING OF ORGANIC RED CHILLIES

R. SHYAMALA

Red Chilli drying in open sun is a challenging task for the Chilli farmers of Andhra Pradesh and Telangana. Red Chilis are generally harvested in winter months and dried directly under open sun in the field for long periods ranging from 20 to 25 days to effectively bring down the moisture content to a safe level to facilitate reasonable shelf life to the commodity. Direct sun drying requires large open area in the field to spread the crop evenly and extended drying time. Due to slow drying, the crop is exposed to microbial contamination leading to discoloration as well as contamination with soil, dirt and other foreign matter resulting in loss of quality and marketability.



### ORGANIC RED CHILLIES DRYING PROCESS IN SOLAR DRYER

Drying Chillies in **Solar cabinet dryers** under controlled conditions helps significantly reduce drying time to 4 to 5 days

## CONGRATULATIONS

TO  
KRUTIKA AGRO PRODUCE PVT LTD.,  
RAJKOT, GUJARAT

FOR SUCCESSFULLY ESTABLISHING SOLAR FOOD  
PROCESSING UNIT WITH  
SEED SOLAR CABINET DRYER – SDM-200 MODEL

and preserve the quality without any external contamination or internal deterioration. This would help the farmers realize higher value for their produce and ensure food safety through prevention of contamination during processing.

SEED has successfully demonstrated the innovative process and unique advantages of solar drying of Red Chillies to an organic Chilli farmer from Suryapet, Mr. Srinivas. He procured a Cabinet dryer and experienced the advantages of drying Chillies in the Solar dryer. He testified to the excellent quality and marketability of chillies dried in the Solar dryer fetching him faster and higher returns at the market place. We congratulate him and his wife Smt. Nagamani for getting the award '**Mahindra – Agri Award**' for best Mahila farmer in successfully raising organic chilli crop and dried in 'SEED' Solar Cabinet Dryer, in 4- 5 days in clean and high quality environment.

## IN FOND MEMORY OF



### Late Mrs Lalitha Balakrishnan.

Chairperson of the Rural Energy department of All India Women's Conference (AIWC), New Delhi. A great promoter of 'SEED' Cabinet Dryers in AIWC branches of Delhi, Trivandrum, Chennai and Hyderabad for income generation of women in those places.

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## NEW INNOVATIONS IN SOLAR CABINET DRYERS

**G. Harikrishna, M. Chakravarthy, C. Srinivasa Rao & M. Ramakrishna Rao**

The novel solar cabinet dryers of Society for Energy, Environment & Development (SEED) have become very popular in its applications of solar dehydration process among micro enterprises as well as medium scale industries in reducing post-harvest losses with value addition of fruits, vegetables and other food products. In light of its excellent performance in solar drying applications, SEED has planned further innovations by introducing advanced instrumentation in the cabinet dryer technology which effectively results in increasing the dryer temperature. It also facilitates dryer operation on non- sunny hours in the day and hence increases the output of the dried products.

### Innovations in Solar Cabinet Dryers:

#### 1. Higher Temperature in dryers

Temperature increase was accomplished by introducing suitable insulating material for the inner walls of the dryer in solar radiation mode thereby reducing thermal losses. This has resulted in raising the temperature in the dryer by 10° C more than the previous temperature levels.

#### 2. SOLAR Cabinet dryer operates during NON-SUNNY HOURS

The dryer operates during non-sunny hours in the day with hybrid solar photovoltaic power. The drying time is half of the total of drying time on sunny day. As a result, the total drying hours of the product are reduced by 50%. It yields double the production in shorter time. The necessary digital temperature controls are provided for maintaining the constant temperature.

#### 3. Moisture Measurement in Solar Dryer

Another innovation introduced is to estimate the moisture content in situ in wet product which is subjected to solar dehydration process in the dryer. This is achieved by introducing **LOAD CELL TECHNOLOGY** in cabinet dryer to constantly monitor the reduction of the weight of the specified product continuously until the permissible limit of the moisture is achieved. The necessary instrumentation is designed to interfacing Load Cell Technology with solar cabinet technology.

With these improvements and innovations, the use of solar cabinet dryers will be enhanced substantially.

The above innovative results are being studied further in relation to the performance parameters of solar dryers, cost benefit analysis, and the ultimate quality parameters of the dried foods.

This new generation of **Solar Hybrid Cabinet dryers** will be introduced in 2017 through '**SoLR Dryers & Foods LLP**' Company belonging to "SEED" group.





## 2<sup>nd</sup> INDIA INTERNATIONAL SCIENCE FESTIVAL & EXHIBITION - 2016 'SEED' DISPLAYED THE HIGH QUALITY SOLAR DRIED FOOD PRODUCTS

SEED has successfully participated in IISF-2016. This was held at CSIR-National Physical Laboratory (NPL) Campus, New Delhi from 7-11 December, 2016. The event was formally inaugurated by Shri Rajnath Singh, Hon'ble Home Minister, Government of India on 8th December 2016 at 2.00 pm.

A stall was set up by SEED at the Exhibition displaying the



Product Tasting

high quality solar dried food products formulated and developed by SEED with special solar processed foods prepared with region specific fruits and vegetables. A number of eminent scientists, industry leaders and other delegates visited the stall and appreciated the quality and taste. We are happy to share the views expressed by the distinguished visitors:

- *"The products are good & very tasty. It will help SHGs for their employment generation. Keep it up. All the best."* - **Dr. Ng. Iboyaima Singh, Sr. Principal Scientist, CFTRI, Mysore.**

- **Dr. Chander Mohan, Scientist 'G' SEED Division, DST, New Delhi** was also observed  
*"What a privilege to meet the next generation of SEED. It's always a pleasure to learn more about SEED and every time there is a new innovation or intervention to learn about. Keep up the outstanding work."*

SEED was allotted a stall under UBA Pavilion namely Unnat Bharath Abiyan. UBA is a group of IITS along with core groups of DST. The Unnat Bharat Abiyan Pavilion Hall was inaugurated by Danish Minister of Higher Education 'Mr. Soren Pind' in presence of Dr. Vijay P. Bhatkar (Chairman, NSC UBA), Dr.D.K.Aswal (Director, NPL CSIR), Sh.A.Jayakumar (Secretary General, Vijnana Bharati), Dr. Sunil K. Agarwal (Scientist E, DST) on 08.12.2016.



Dr. Chander Mohan, Scientist 'G', DST  
interacting with SEED Scientists at the Stall.

The scientific expo was a great success with the participation of more than 3000 young scientists across the country.

### Future Programmes

- Jointly (SEED & ESCI) conducting Faculty Development programme on **"Solar Food Processing Technology"** on 27-29<sup>th</sup> April 2017 at ESCI Campus, Hyderabad.
- Training Programme on **"Solar Food Processing Technology - Entrepreneurship opportunities"** from 20 – 23<sup>rd</sup> February 2017 at SEED, Hyderabad.

## 'DEVELOPMENT OF NUTRITIVE SUPPLEMENT FOR PREGNANT AND LACTATING WOMEN BASED ON SOLAR DRIED FOOD INGREDIENTS'

**Introduction:** Pregnant and lactating women form the most vulnerable segments of the population from nutritional point of view. Numerous studies in India and elsewhere have shown that chronically undernourished women subsisting on inadequate dietary intake, during pregnancy and lactation have an adverse effect on maternal and foetal health manifesting in low birth weights, infant mortality, under five mortality etc. According to NNMB report nearly 75% of the infants and their mothers are below their optimal weights. In this regard nutrient dense supplements are important in addition to the regular diets. A balanced Nutritional Supplement was formulated and developed by Society for Energy, Environment & Development (SEED), Hyderabad to provide supplemental Protein, energy, folic acid, Vitamin A, Vitamin C, Iron and Calcium to pregnant and lactating women. This was developed by using solar processed natural foods to increase the bio availability of vital nutrients for the target group to provide supplemental Protein, folic acid, Vitamin A, Iron and Calcium. Ingredients used in developing the supplement included Wheat rava, Ragi, Green gram, Defatted Soy flour, Curry Leaf Powder, Dehydrated Cauliflower, Spinach Powder, Coriander Powder, Onion Flakes and Desiccated Coconut.

### Process flow chart:

Selection of ingredients  
↓  
Processing of solar dehydration of the ingredients  
↓  
Mixing and blending all the ingredients in a vertical mixer  
↓  
Boil 7 times of water in a vessel.  
↓  
Add the kichadi mix to boiling water and cook for 15 mins at 60-70 °C  
↓  
Serve hot

The nutritional supplement product was evaluated for sensory and nutritional attributes and the data is presented below and below.

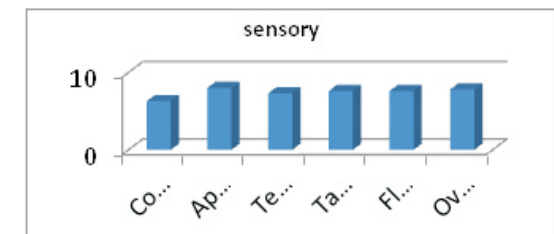


Figure 1: sensory evaluation graph

S.NO	NUTRITIONAL FACTS	PER SERVING(100G)
1	Protein	18.6 g
2	Energy	419 kcal
3	Calcium	272.5 mg
4	Iron	10 mg
5	Folic acid	80.5 µg
6	Vitamin -c	173.2 mg
7	Carotene	3254.3 µg

Table 1: (nutritive information of the supplement)

It may be seen from fig 1 that the sensory attributes are found to be highly acceptable and the nutritional data contained in table 1 indicates that the supplement meets the additional nutritional requirements of pregnant and lactating women significantly.

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