

## PROMOTION OF EMPLOYMENT GENERATION THROUGH SOLAR COOKERS AND DRYERS

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### ABSTRACT

Inspired and encouraged by my husband, Mr. C.B.Jagadeeswara Reddy, who is an eminent personality in the field of non-conventional energy sources in Andhra Pradesh State, India. we started Padmaja Food Products whereby we use only solar thermal technology for dehydration of fruits and vegetables.

Dehydration of fruits & vegetables is done in solar dryers by employing only rural women and educating them in solar drying. We are marketing the produce in local markets thus generating employment for the women as well as additional income for their families.

For marketing the solar prepared produce in super markets, bakeries and groceries in nearby towns, I am also imparting training to these rural women in packaging and transport etc.

Alongwith the involvement of my sisters in rural areas, we have conducted many experiments and trials, and have prepared several recipes for use in solar cookers and dryers.

**Keywords:** employment generation, rural India, solar thermal, solar dryers, SK14 solar cookers

### 1. INTRODUCTION

India's economy is predominantly agricultural. Nearly 500 million people are directly or indirectly dependent on agriculture, for its production, processing, storage and marketing. Proper handling of agriculture produce helps to increase its shelf and most importantly drastically reduce losses to the farming community.

In India 30-35% of the agriculture and allied food produce is wasted due to the lack of proper handling, value addition, and marketing and storage facilities. A number of steps can be taken to reduce these types of losses, one of them being to reduce the moisture content of the product by various technologies.

Eliminado: ¶

### 2. BACKGROUND

India is blessed with around 300 sunny days around the year, drying in the sun is inherently widespread and cheap. Open sun drying may be the most inexpensive and extensively used option of for the many of the agro products in rural India, but is un-hygienic, un reliable and time consuming. The organised sectors employ mechanized dryers fuelled through petroleum products, biomass or electricity for their drying applications. The incessant rise in cost, shortages and pollutants being added to the environment has resulted in a search for a safer alternative.

Solar dryers and SK14 Solar cookers can be the answer. The technologies are simple and therefore easily adopted by the farming community. This new agribusiness in rural & tribal areas generates additional income with wider profit margins.

Advantages of solar dehydration is detailed below;

- i. Safety and hygiene: Free from insect and bird contamination Clean & dust free products
- ii. Quality: More uniform quality product in colour, texture and appearance.
- iii. Evenness in drying: Moisture control to optimum levels and nutrient retention, especially beta carotene, giving longer shelf life to the products

iv. Economics: Suitable for small, cottage, medium & large commercial scale production and facilitates self employment and income generation in rural areas.

### 3. THIS PROJECT

Padmaja Food Products has been promoted since one year back with four 50 KG capacity solar dryers and two SK-14 Solar Cookers.

It is improving income generating livelihood options in the rural areas, which are characterized by pervasive poverty.

Chittoor District is famous for production of mango & tomato. I am identifying the rural women who are having zeal and giving training in setting of cottage level food dehydration unit, because it required a little capital and can use only local produce.

This activity is beneficial in multiple ways and can serve a major developmental objective of increased income to the rural poor. We are creating employment among rural women by training them in using solar technology for a sustainable business, namely by training them to solar dry their products and to prepare solar baked items like biscuits, and cakes, etc, in SK14 solar cookers.

In solar dryers they prepare mango bars, pineapple bars, almond candy, raw mango powder and coconut powder using locally available seasonable fruits.

In solar dryers they can dry fruits, vegetables, forest produce etc.

We are making arrangements for packing in metal zed foil/ply pack for marketing solar baked and solar dried products prepared by the rural women in super markets, bakeries and groceries in nearby towns.

**Process for Dehydration and Drying in Solar Dryers:**  
A brief description of dehydration of some products with necessary pre-treatment methods are given below:

**Mango Bars (Jelly): Process:** Take Mango pulp, preferably thotapuri,, add 50% sugar and citric acid and mix it well with mango pulp, and potassium metabisulphide (KMS). Spread the pulp in layers in closed trays of a solar dryer. Each layer will take one day to dry, and after three composite layers stop the drying. Cut them in required sizes and pack them well. The cabinet temperature is maintained 40-60° C and takes 20 hours to form a 12 mm thick bar.

**Mango-Guava Bars (Jelly): Process:** Prepare the mango pulp or ready made pulp and 20% guava pulp, 50% sugar, citric, and add mix it well and additives KMS and colour and essence. Spread 3 thin layers on 3 consecutive days as in mango bars in solar dryer trays. Cut the composite layers. Pack the pieces in the metallised pouches.

**Ginger: General :** India is the largest producer of ginger in the world. Ginger is used extensively to shreds. The sliced pieces are then blanched in 2% salt solution for 3-4 minutes at 93°C. Then soak them in 2% starch solution for 15 minutes. The blanched carrots are then dried in trays in a solar dryer. The time taken to reach 4% moisture content is 10-12 hours on good sunny days. After removing from the dryer, the dehydrated carrots are packed and sealed in high density pouches.

**Tomatoes:Process:**  
Red ripe hybrid variety, fresh tomatoes (Moisture 94%): Wash thoroughly. Cut/slice to 5mm thickness on a horizontal axis. Steam blanch for 1-2 minutes. Spread evenly in single layer on steel trays at the rate of 5kg/sqm. Place in dryer for 8 hrs (Moisture 4%) Pack as such or in powder form in high density, metallised pouches under nitrogen gas. Note: Yield 10% of original wet weight

Eliminado: ¶

### 4. TRAINING AND INCOME GENERATION:

The experience of food processing was acquired during training for smokeless villages which was undertaken by NEDCAP along with Eco Center ICNEER.

During demonstrations, hundreds of women have been exposed to solar cooking and food processing so that income can be generated by using solar cookers during the time when they are not being used to cook.

At Padmaja Food Products, since the Unit is new at present we are employing the rural women and will gradually work on models where women can work from home and supply the goods of desired quality to our Unit.

There are already models of women's co-operatives doing papads, pickles and soaps and bidis in India and we are looking at such models to learn from them and adopt them to meet local conditions

At present batches for trials are made and being sent to various target groups for market seeding and the feedback has been positive.

We are now working on packaging and drawing long term arrangements for procuring raw materials with

[sellers and also with buyers so that atleast the break even point is assured. Once that is achieved we would take up exports as we envisage big markets for solar processed foods in Europe and other western countries which are willing to pay premium prices for organically and solar processed foods.](#)

[We are aware that we would have to go for certification of FDA and also inspection agencies registered with IFOAM, etc., so that claims made are believable, to flavour various kinds of foods like bread?, cakes, cookies pies, puddings and beverages. It is a constituent of many spice mixtures and is used in ayurvedic medicines also. Dehydrated and ground ginger is more](#) convenient to use than fresh and whole ginger. Dehydrated ginger powder can be stored for longer periods without deterioration. Thus dehydrated ground ginger is finding increasing applications in various fields.

**Process :** The ginger is first soaked in water overnight. After they are thoroughly washed in water, the outer skin is removed carefully with a split of bamboo knife/wooden scrapers to preserve the pleasing aroma in dried ginger. The scraped ginger is then cut into small pieces and spread on a tray at a rate of 5kg/sqm in a solar dryer. This process can be continued for 2 sunny days (16 hrs) in a solar dryer. The dried ginger is again ground into powder form and is well packed in suitable pouches. The initial moisture content of ginger was about 80.9% and the final moisture content should be 4% or less. The yield of dry ginger should be 16-25% of wet weight.

**Desiccated coconut; Process:** Select fresh matured coconut and dehusk and desh. Wash the pared[?] of the kernel ball in fresh water to remove invert sugars. Cut into small pieces; Calculate the net weight of the product. Blanch coconut pieces with steam for 20 minutes. Smash the pieces into small bits. Spread the pieces on a muslin cloth over a mesh tray to a depth of 6 mm and dry them in the dryer. Periodically turn the product for uniform drying. Continue the process till the moisture is 2-3 percent. The yield is 51-52 % by weight.

**Mint Leaves: General:** The dried mint powder is used in food preparation and for medicinal and cosmetic applications. It is used extensively to flavour foods. The initial moisture content of mint was about 85%. For preservation and to improve the storage conditions, the final moisture content should be 4% or less and the yield is 17% by weight.

**Process:** Matured mint leaves are washed and blanched at 90°C for 1 minute with addition of magnesium oxide to retain colour and nutritional values. It is then spread in a tray at a rate of 3 Kg/sqm and dried in a solar dryer for

12 hours. The dried leaves are then ground into powder and packed in pouches of suitable thickness. The moisture content is reduced to less than 4% and the yield is 17%.

**Carrots:** One of the vegetable products dried in solar dryer is carrot in the form of cubes and shreds. The initial moisture content of carrot was 86. % and the final moisture content should be less than 4% for preservation and long shelf life.

**Process:** Generally large carrots, high in solids but free from woody fibre, should be selected for dehydration. Clean/wash them and peel and slice into pieces or

## 5. CONCLUSION

Solar dryers and SK14 solar cookers are simple, easily adaptable technologies for women in rural areas. They can solar dry or solar bake using products grown in their village. This gives value-addition to their products through this modern yet simple food processing technology. I would like to share my experience about working with rural women of Chittoor District on generating employment through solar thermal technology. I am planning to intensify my activities in remote villages of Chittoor District Andhra Pradesh State, India.

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