

Utilization of Solar Food Processing Technology for Chhattisgarh Women

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Abstract: *To provide good quality foods at low or no additional fuel costs in Chhattisgarh, solar food processing is an emerging technology. It is used as an alternative energy source for post harvest processing of food. It had created great opportunity for village and tribal people as cost of fuel is increasing day by day. For various steps in food processing and value addition, a number of solar dryers, collectors and concentrators are currently being used for various steps in food processing. Society for Energy, Environment and Development (SEED) developed Solar Cabinet Dryer which has been used for dehydration with forced circulation system and from locally grown fruits, vegetables, leafy greens and forest produce development of value added products could be done .Drying under simulated shade conditions using UV-reducing Blue filter helps retain nutrients better. It's simple design and ease of handling makes SEED Solar Dryer an ideal choice for eliminating the need for expensive transportation. It help in storage of fresh produce application of food processing in rural settings, closer to where the harvest is produced. It also creates employment opportunities among the rural population, especially women. Other gadgets currently being used at various steps of food processing are reviewed which are based on solar collectors and concentrators.*

Keywords: Solar cabinet dryer, Solar food processing, Forced circulation, SEED

1. Introduction

The village women of Chhattisgarh must be empowered to become agents of social change in their communities'. During the past decade numerous trainings were imparted to village women to empower them with knowledge, experience which will lead to socio-economic development. The main goal is eradicating extreme poverty and hunger and empowering women to promote gender equality. It will also help in breaking down gender barriers and elevate status within their respective communities. For this ,these rural women must be imparted training in these solar devices .By using solar food processing technology, the village women can generate income.

In Chhattisgarh, one of its priorities for sustainable development is training grassroots women for the promotion of solar food processing technologies in villages. The young women most of which are illiterate are peer tutored by their school dropout friends as volunteers, who are simultaneously being trained by previous trainees turned trainers as grassroots trainers. During the winter when there is a surplus of vegetables these vegetables are dried in low cost solar tunnel driers. During the dry season this will help in providing a supply of vegetables to the kitchen. Parthivi College,Sirsakala Bhilai 3 will promote the use of solar cookers in the nearby village as a part of corporate social responsibility programme. We will help villagers through government aids in designing a boiler that will give 1 liter of boiling water every 10 minutes while sun is shining. Clothes can be ironed with the old type irons heated on the solar cookers. House hold size reflectors will be made so that the cook can be kept under some shade while cooking. Scheffler solar cookers will be manufactured for this purpose.

2. Historical perspective

Dr. Arcot Ramachandran, Indian Solar Energy sector took initiative in the 1970s by owes much to the then Secretary of

Department of Science and Technology, Government of India and Dr Mahesh Dayal, the then Secretary, Ministry of Non-Conventional Energy Sources, MNES (later The Ministry of New and Renewable Energy, MNRE). In the present scenario the technology has reached a mature state and is now on a better footing after an initial turbulent start, (Ramakrishna Rao 2011). Many solar gadgets have been developed in recent years for a variety of applications in food processing. Boiling, steaming, blanching and roasting capabilities is provided by different solar concentrators. According to some estimates India occupy the second position in highest number of Solar Cookers in the world. Solar Food processing is totally new and cutting-edge technology in Chhattisgarh and it is highly creditable for an emerging economy to embrace .The role of rural economy, through utilization of solar energy in economies at large and food processing to be revisited for bringing improvement in the standard of living of the neglected sections of the society.



Figure 1: Solar dryer for vegetables



Figure 2: Solar oven

The solar cookers will be linked with making marketable food items like traditional homemade sweets and Namkeens, other food products in Self-help Groups and can serve as income generating vocation and some can use for earning by ironing the clothes on these cookers. By this the rural women learn that for a minimum cost they can turn low value food items into valuable food. Many spices and other medicinal herbs are also dried in these solar driers.

Training includes, material purchasing, production -time, calculate profit and loss, packing and presentation of finished product. This technical training incorporates assembling SK 14 kits, operating the cookers, their maintenance and making them understand the relevance and importance of these solar cookers. Further it will also help in creating self-help groups which will help in production and marketing solar processed indigenous food and beverages, identification of nutrients which is locally available, and inexpensive. In Madhya Pradesh such training is imparted by Barli Institute at



Figure 3: Large Scheffler Solar Cookers

Indore. This training not only benefits their families but also help them to utilize optimum skills of them in their villages. This training provides solar cooks for domestic kitchens and community solar kitchens, teachers for various NGOs and interested professionals and students from various institutions. The main aim to develop solar processing of food in Chhattisgarh is to eradicate extreme hunger and poverty, empowering women, reducing child mortality; improving maternal health; ensuring sustainability of environment; It will also help in developing a global partnership for development; and the quality of life of rural women of Chhattisgarh can be improved by helping to break down gender barriers and elevate status within their respective communities. Some precautionary measures and points to be taken for Solar Food Processing are:

- Pilots are ok, but may not be scalable.
- Option 1: large inputs of manpower, Limited area, concentrated efforts, monitoring and supervision. Gives you the satisfaction of achievement.
- Option 2: Partner with govt. wide area of application, no independent social workers/ manpower. Work to strengthen large scale impact and resources, monitoring but you need to let govt. be in the driver’s seat.
- Option 3: Pilot with limited resources, govt. manpower, so that it can be widely replicated.

The most important dimension of food processing is food safety. There should not be pathogenic bacteria and product should be bacteria free. The sanitary standards are maintained with these solar driers and yields enables to export worthy processed foods. Solar Dryer meets the defined standards and fulfills demand of all trademarks assuring production of best quality.

This is governing by Food processing industry which should get Fruit Products Order (FPO) license for processing fruits and vegetables from Government of India. In order to establish food processing unit: proper ventilation, aeration & lighting to be done. Rodent proof & insect proof work & storage areas must be Fly & mosquito proof, windows & doors (netted). Gas cooking facility, Clean & hygienic environment, Protected & assured water supply & bacteria free water and Size of the land area are some of the depending factors to be taken into consideration during food processing.

During Food processing, Personal & Hygienic Practices is to be followed such as Washing hands thoroughly & wearing gloves, Short cut nails, Wearing head gear / shower cap to prevent falling of hair, Wearing a clean apron / a coat to protect clothing, Washing feet & wearing separate foot wear before entering process room .This will lead to the pilot production of food products and also help in saving drying time over open sun drying.

The world in 21st century are facing with the two major problems, namely can be brought together and solved by Solar food processing: For an expanding global population how to generate enough energy? How expanding world population to be fed? In India, a section of the society being left behind and chronically poor due to growing population and unequal wealth distribution. The matter gets complicated due to lack of reliable and affordable energy sources. Food can be conserved and distributed to the poor women and children by faster, cheaper and safer methods by using solar food processing. It is sad to note that 30–40 % of food goes waste in India every year for lack of a systematic post-harvest processing and preservation in the face of such great demand for food to feed people.

Some distinguishing features of SEED developed solar cabinet dryer are:

- 1) The construction of the cabinet is done in such a way that under all weather conditions, the dryer can be left outside throughout the year and doesn’t get rusted because of the superior quality of the materials used.
- 2) For easy mobility the chamber is fitted with coasters.

- 3) For transportation purposes it can easily be assembled and disassembled.
- 4) It is scalable due to its modular nature. The current models range from 8 to 100 kg loading capacity. A 200 kg capacity dryer is being designed and their important features are:
 - a) 1. Like all the solar powered dryers, in the SEED Cabinet Dryer is the drying is ‘discontinuous.’ or “intermittent” and functional only during the day time .The dryer adds zero cost to the total drying process because it needs no other auxiliary power source for its full functioning. However, for any other emergency contingencies it is provided with electrical backup for continuous use.
 - b) The dehydration process in SEED Dryers is highly efficient, because of the dual function-design which provides forced air circulation along with direct thermal drying, capable of removing for example, 15 kg of water from a 50 kg sample
 - c) Through clean, green energy at no additional cost and without depending on conventional electric and/or fossil fuels the dryer can be made eco- friendly.
 - d) Because of its portability, the dryer can be easily used in remote areas where conventional energy supply is meager to nonexistent in most developing countries, including India.
 - e) The dryer’s average efficiency is around 90 %. The loss of heat through the top glass cover surface inside and out is approximate 10 %).

investment in solar gadgets, lack of confidence in the technology are some of the hurdles faced due to the wider use of solar energy in food processing .Limited support of government agency and high cost of solar gadget creates a big communication gap between solar researchers and food technologists in spite of such incentives and many technical developments. Due to unawareness of Food technologists of different processes followed in food processing and solar technologists are not able to operate new breed of solar gadgets like solar concentrators, ovens and dryers, improvements in the quality of product is not maintained properly. Solar equipment developers need to be integrated with the food processing industry is the prime need today through international and government agencies, as well as the expert bodies in these fields. With the promise of reduced cost of photovoltaic and collectors is realized solar power generators may produce most of the world’s electricity in the next 50 years and can become reliable and affordable as newer technologies. In the coming future the major source of electricity will be concentrated solar power along with photovoltaic cell which can dramatically reduce the pollutants emitted by greenhouse gases that harm the environment. In future: solar food processing will certainly be a beneficiary as well as a contributor.

For small and micro-entrepreneurs nominally the solar gadgets can help to reduce the pay-back time. In food-processing industry application of solar energy has not progressed at fast speed. In spite of such incentives and many technical developments a big communication gap exists between solar researchers and food technologists’ .New breed of solar gadgets like solar concentrators, ovens and dryers, are still not known to Food technologists while solar technologists have no idea about technical requirements of different processes followed in food processing. Big improvements in the quality of product should be substantiated apart from huge energy savings .The food processing industry need to be integrated with solar equipment developers which is the prime need today through governmental, international agencies, as well as the expert bodies in these fields. Food processing not only conserved the surplus harvest but it is also reducing problem of unemployment.



Figure 4: Solar Cabinet Drier

3. Conclusion

In food processing, solar energy based technologies are currently playing an important role. The goal of future studies is the feasibility of using them on large scale can and should be studied. As the mechanized equipments solar dehydration/drying offers an alternative at low or no cost. Herbs has been found for improved nutritional and medicinal quality through Infra Red (IR) drying of fresh produce such as Paakkonen et al. (1999) have shown that IR drying improves the quality of herbs. Similar findings have also been reported by Carroll and Churchill (1986), Dostie et al. (1989) and Kian and Siaw (2005).

With changing life styles in India and elsewhere solar food processing can be a major contributor to meet a great demand for ready-to-eat (RET) foods. Initially high cost of

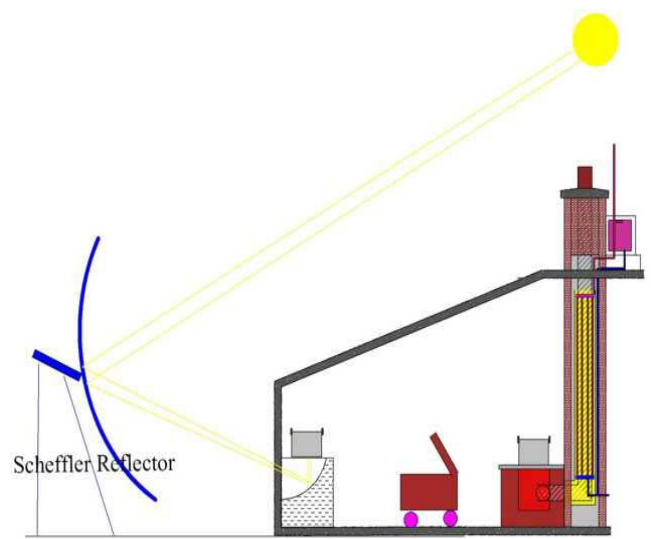


Figure 5: Section view of kitchen

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Author Profile



Dolly Sharma received the M.A English degree from Guru Ghasidas University Bilaspur. and pursuing PhD degree in American Literature from N.I.T Raipur. Have 18yrs. of teaching experience. Area of research is feminism, communication skill dev. Asian & Afro-American literature and Women empowerment.