

Promotion Of Smoke Free Villages In Chittoor District & Employment Generation To Rural Youth Through Solar Food Processing.

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1. Introduction:

Energy is basic input for almost all the economic activities. In fact one of the indicators of economic growth has all along been the per capita consumption of energy. Fossil fuels such as coal and petroleum, and bio fuels like wood cow dung cakes and crop residue have been the energy sources of choice of the world for centuries. The resources of fossil fuels are not unlimited and the present rate of consumption they would not last very long. It has been conclusively proved that climate change, which has been resulting in global warming, is mainly caused by Green House gas emission from energy generating systems based on fossil fuels and bio fuels.

Biomass, such as fire wood, agricultural residues and dung cakes, is still the dominant source of fuel in our rural areas and women and girl children are the key players in collecting and using these fuels. However, inefficient burning of such fuels in traditional Chulhas is causing not only an economic loss to the nation but also a serious problem of indoor air pollution and consequent health hazards. An additional cause for concern in recent years has been the unsustainable level of consumption of fuel wood, which leads to deforestation and desertification. In this context, technological solutions, institutional arrangements, financial support and training schemes for ensuring adequate and affordable clean energy systems and services assume great significance in the rural energy policy and programmes. Therefore, the Central and State Governments have been promoting indigenously developed technologies for efficient utilization of biomass fuels with a focus on extraction of more energy, reduction of household consumption of fire wood, generation of employment and improvement in the living standards of rural people. It is in the context the Government has launched biogas programme for recycling cow dung to harness its value for fuel without destroying the value of the manure.

Solar cooking has been envisaged as a solution to mitigate the problems of fossil fuels to some extent. In India solar energy is abundantly available in most parts of the country. The daily average solar energy incident at many places ranges between five to seven KWH/m² and there are as many as 250 to 300 clear sunny days each year. Different types of solar cookers have therefore been developed which are being promoted in the country by the Government for use by the individuals and community kitchens. The parabolic dish solar cooker is a fast cooking device useful for homes and small establishments. The cooker can save 12 LPG cylinders per annum.

We are implementing the Biogas & Solar cookers programme in Chittoor District since 1982-83. In my supervision around 20000 family size biogas plants have been constructed. 1500 box type cookers and 450 SK-14 Solar cookers were sold in the District.

2. Abstract :

Promotion of Smoke free villages & Income generation to rural youth by Solar cookers

First Smoke free village: First I identified Bysanivaripalle in Kurabalkota Mandal in the District. 36 families are there in this village with total population of 223 members. They are all small and marginal farmers doing cultivation and allied activities such as Sericulture & milch animal farming. The village is generating 500 tonnes of cow dung and 50 tonnes of sericulture waste per annum, both are organic materials. Previously the dung has been used for cooking without harnessing the high Fertilizer and methane gas. To mitigate this problem Non Conventional Energy Development Corporation of Andhra Pradesh (NEDCAP), state nodal agency of Andhra Pradesh state has approached the village for promotion of Biogas technology. One progressive farmer has come forward during 1985-86 and constructed one biogas plant. On seeing the success of this biogas plant, other 22 farmers who are having cattle population constructed biogas plants in different years. Total 23 biogas plants exist in the village. On seeing the proper maintenance of biogas plants in that village I have got an idea to motivate the remaining 13 beneficiaries for utilisation of solar cookers, because they do not have cattle and other infrastructure for having biogas plants. With Government subsidy & Support of M/S Gadhia Solar Energy Systems Pvt Ltd., Valsad, Gujarat we supplied 26 SK-14 solar cookers to the villagers. No one is using either traditional stove using bio fuel or fissile fuels such as LPG kerosene etc for their basic energy needs for cooking and heating. Now it is a smoke free village. By these 23 biogas plants and 26 solar cookers we can save

- Reduction of CO₂ gasses emission /year 104000 Kegs
- Saving of fire wood/year 72000 kegs
- Saving of LPG/year 5832 Kegs.
- Generation of organic fertilizer 300 tonns
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We have given training to all the beneficiaries for assembling of cookers .All most all cookers were assembled by villagers themselves.

One woman by name Papulamma is cooking rice for 48 children in one cooker to serve for midday meals scheme in the same village every day.

One other physically handicapped person is using this cooker for cooking as well as ironing of new cloth, which was stitched by him regularly.

Further we are encouraging the women in the village to use these solar cookers not only for cooking but also for income generation. My wife Smt C.B.Padmaja has given training to the village women in making biscuits, cakes and other bakery products. We are making arrangements to supply the hygienic bakery items cooked in solar cookers to bakeries in Madnapally and Angallu for sales.

Second Smoke free village: Seeing the success story of Bysanivaripalli village the District Collector Sri S.S.Rawat got an idea to develop eco-friendly second smoke free village in the District and constituted a Committee with Sri C.B.Jagadeeswara Reddy, District Manager, NEDCAP, Chittoor & Sri S.N.Kukrety, Divisional Forest Officer (West Division), Chittoor to find the ways and means for fulfilling the idea of developing second smoke free village.

The Committee identified Singamanuburuju a tiny village in Thamballpale Mandal, peripheral of forests under the jurisdiction of Madanapalle Forest Range. This village consists of 38 families and all are small and walker section families and their main lively hood is agricultural. The forest department is adopted this village and implementing the various programmes of Vanasamrakshana Samithi, thus providing some employment and welfare

measures to the villagers. Under the supervision of FRO, Madnapalle they are collection forest products and earning some money. Previously they were largely depending upon fuel wood, crop residue to meet their basic energy needs. This has been caused deforestation. We constructed 26 biogas plants to the families who are having cattle population and supplied 13 SK-14 Solar cookers. In this village also we have given training to the village youth in making traditional sweets and biscuits in solar cookers. We are also making arrangements for selling these hygienically made biscuits & cakes in Government hostels and nearby towns. Thus the rural youth is getting additional income from Solar cookers.

We are planning to develop another 60 smoke free villages in the District in phased manner.

3. Project

Imparting training to Self Help Group Members for drying Fruits & Vegetables through Solar Dryer.

In Chittoor District, the farmers grow fruits and vegetables particularly Mango. These perishable commodities have to be sold in market immediately after harvest. When the production is high, the farmers have to sell the material at very low price, thereby incurring great loss. With the application of Solar technology for drying the agricultural produce, the material can be stored for longer time in less space.

I am with the support of District Administration, Chittoor regularly conducting training course on fruits & vegetable processing through Solar Dryer at DRDA Training Centre, Chittoor. For this purpose we are selecting Self Help Group members who are very active in our District. We are giving training to Self Help Group of Women in operation maintenance and repairs of Solar Dryer. We are also giving training in sun processed foods and snacks and Entrepreneurship management. Market access and links to supermarkets, college hostels and canteens and local shopping centres were established. Now the Self Help Group members in surrounding Chittoor Town make mango jelly and dried tomatoes.

TECHNIQUES OF FOOD PROCESSING IN SOLAR DRYER

In the preparation of a fruit bar the pulp or puree of a fruit or a mixture of fruits is usually used along with other ingredients. Sugar is used to enhance the taste. The fruit pulp with the added ingredients is dried in the form of a thin layer in stainless steel trays loaded in the solar dryer. During solar drying water is removed from the product under clean & hygienic conditions.

PROCESSING MANGO BAR

Mangos are one of the most important and most widely cultivated fruit in Chittoor District. Chittoor District produces around 40 varieties of mango fruits. Though variety of mango products are available in Chittoor market one of the important product manufactured in Chittoor is mango bar or "thandra".

In the preparation of a fruit bar the pulp or puree of a fruit is usually used along with other ingredients. Sugar is used to enhance the taste. The fruit pulp with the added ingredients is dried in the form of a thin layer in stainless steel trays loaded in the solar dryer. During solar drying water is removed from the product under clean & hygienic conditions.

Process Details

Composition of Mango Fruit pulp mix for one layer

Ingredients	Quantities
Thothapuri Mango Pulp (Kg)	9.30
Sugar +Glucose (Kg)	3.45
Citric Acid (g)	18.0
Pectin (g)	9.0
Potassium Meta Bi sulphite (g)	15.0

Method

Steps followed are given below:

- Canned mango pulp from Thotapuri or similar variety is best suited for making mango bar.
- Prepare Sugar syrup by adding 400 ml water & glucose.
- Add Citric acid & Pectin.
- Cool the syrup & mix the fruit pulps.
- Add potassium Meta bi sulphite.
- Using electrical hand mixer blend the pulp mix thoroughly
- Pour 900ml of fruit pulp mix in stainless steel trays & spread evenly.
- Carefully load the trays in Solar dryer for drying to make the first layer (Day 1), (at 40°-60° C)
- Repeat the above procedure on the second day & spread the mix on the dried up first layer to make the second layer (Day 2).
- Repeat the above procedure on the third day by spreading the mix on the dried up second layer to make third layer (Day 3).
- After the third layer is well set, cut into bars or small slabs of 3"x4" size / 100g / 150g / toffees of required size.
- Pack in polypropylene sachets & seal airtight.

Product specifications

Moisture 11-12%

Yield

Finished Mango bar 40%

Salient features

No. Of sunny hours for each layer 8-10hours
Cabinet temp 40-65° C

Cost Economics (one batch load)

Raw material weight	38kg
(Mango pulp, sugar, pectin, citric, acid etc)	Rs.1,200.00
Cost of Raw material & Other Expenses	
Mango Bar Yield / Out Put	17Kg
Sale Price Per Kg	Rs.110/-
Sale Price Per 17 kg	Rs.1870/-
Net Profit Per Load 17 Kg	Rs.670/-
Number Batches Per Annum	70
Net Profit Per Annum	Rs.46, 900/- Per family

Making mixed fruit bar:

The proportions of ingredients used are shown in the following table

Composition Of Mixed Fruit Bar For Layer Ingredients	Quantities
Thothapuri Pulp ()	3.72
Guava pulp (kg)	1.86
Sapota pulp (kg)	1.86
Pineapple juice (kg)	1.86
Sugar+ Glucose (kg)	3.600
Citric acid (g)	18g
Pectin (g)	9g
Potassium Meta Bi sulphite (g)	15g



Method

- Weigh different fruit pulps separately
- Prepare Sugar syrup & add citric acid & pectin
- Cool the syrup & mix the fruit pulps
- Add potassium meta bi sulphite
- Pour 900ml of mixed fruit pulp in stainless steel trays & spread evenly
- Carefully load the trays in Solar dryer for drying to make the first layer (Day 1) (40-65 °C).
- Repeat the above procedure on the second day & spread the mix on the dried up dried up first layer to make the second layer (Day 2) (40-65 °C)

- Repeat the above procedure on the third day by spreading the mix on the dried up second layer to make the third layer (Day 3) (40-65 °C)
- After the third layer is well set & dried cut into bars or small slabs of 3"x 4" size 100g /150g / toffees of required size.
- Pack in polythene sachets & seal airtight

Product Specifications

Moisture	11-12%
Yield	
Finished Mango bar	40%
Drying Time & Temperature:	
No. of sunny hours for each layer	8-10hours
Cabinet temp	40-65° C

Cost Economics (one load)

Raw materials Per load	38kgs
Cost of Raw material per load & Other Expenses	Rs.1,050/-
Mixed Fruit Bar yield / Out put	17Kg
Sale price per Kg	Rs.110/-
Sale price per 17kg	Rs.1870/-
Profit per load 17kg	Rs.820/-
Number of Batches Per Annum	70
Net Profit Per Annum	Rs. 57,400/-

Students to popularise use of solar cookers University roundup



In a novel attempt to reach the gross roots, we are giving training to the students of Sri Padmavathi Women's University, Tirupathi . The students will soon be donning the role of an ambassador for solar cookers and help take the message on environment across to the masses. M/S ICNEER, NGO, Valsad has donated 3 SK-14 solar cookers to the Home Science Department Sri Padmavathy Women University, Tirupathi. Students of Home Science will prepare various recipes like bread, roasted peanuts etc. and compare the nutritive value with conventional food to highlight the advantages of solar cooking. The MBA students will help prepare a business plan with the help of case studies and costing techniques for marketing the solar-cooked products. The Centre for Women's Studies will disseminate the solar cooking technology among women SHGs to make them not only economically self-sufficient, but also a partner in eco-conservation. Similarly, the students of Social Work will guide the entire process in understanding the public psychology, social

acceptance, inhibitions etc. Padmaja Reddy, a solar entrepreneur will coordinate the efforts. Shirin Gadhia, president of Eco Centre ICNEER, Valsad has inaugurated the programme during the month of June 2008.

Students of Sri Padmavathi Women's University (SPMVV) will soon be donning the role of an ambassador for solar cookers and help take the message on environment across to the masses. In a novel attempt to reach the grass roots, SPMVV has tied up with the Chittoor district unit of Non-conventional Energy Development Corporation of Andhra Pradesh (NEDCAP) to involve students to promote the use of solar cookers. Apart from adopting an inter-disciplinary approach, the varsity will also act as a nodal agency in promoting the eco-friendly measures among the community. Students of Home Science will prepare various recipes like bread, roasted peanuts etc. and compare the nutritive value with conventional food to highlight the advantages of solar cooking. The MBA students will help prepare a business plan with the help of case studies and costing techniques for marketing the solar-cooked products. The Centre for Women's Studies will disseminate the solar cooking technology among women SHGs to make them not only economically self-sufficient, but also a partner in eco-conservation. Similarly, the students of Social Work will guide the entire process in understanding the public psychology, social acceptance, inhibitions etc. Padmaja Reddy, a solar entrepreneur will coordinate the efforts. She will also impart training to the students in preparation various items in solar cookers. Smt Shirin Gadhia inaugurated the programme and explained the need to protect our planet earth by reducing carbon emission. Finally, the products prepared in solar cookers like snacks, cakes and other Indian local preparations will be sold to inmates of the Women University consisting of 2000 students. The profit generated from the sale of solar cooked items will be utilising for purchase of SK-14 solar cookers and in turn will be donated to the other universities. The other universities who receive cookers by this method will follow the same and denote the solar cookers to the third university like chain link. The Main aim of this programme is to disseminate solar cookers technology to all the students, who are future hope of India.

4. Conclusion

To promote Solar Energy and Solar food Processing it is vital that lot of awareness work is undertaken by government agency like ours (State nodal agency) and also involve NGOs and grass root workers to demonstrate the same and than impart them necessary skills and demonstrates the same. It is also very important that marketing support be provided to the self help groups that will be needed to be built at village levels to help them market the solar processed food products . The Self help groups would have to be also trained in quality maintenance of food production