

## Solar Drying for Food Preservation

The food problem in Tanzania and most other developing countries worldwide is due largely to the inability to preserve food surpluses rather than to low production. Food crops are usually for immediate consumption needs, resulting in wastage of food surpluses during the short harvest periods and scarcity during post harvest periods. Drying is one of the methods used to preserve food products for longer periods. It has been established as the most efficient preservation technique for most tropical crops.

### Traditional Sun Drying

The traditional method of drying, known as 'sun drying', involves simply laying the product in the sun on mats, roofs or drying floors. Major disadvantage of this method is contamination of the products by dust, birds and insects – Some percentage will usually be lost or damaged, it is labour intensive, nutrients loss, such as vitamin A and the method totally depends on good weather conditions. Because the energy requirements - sun and wind - are readily available in the ambient environment, little capital is required. This type of drying is frequently the only commercially used and viable methods in which to dry agricultural products in developing countries. The safer alternative to open sun drying is solar dryer. This is a more efficient method of drying that produces better quality products, but it also requires initial investments. If drying conditions such as weather and food supply are good, natural circulation solar energy, solar dryers appear to be increasingly attractive as commercial proposition.

### Solar Dryer

A solar dryer is an enclosed unit, to keep the food safe from damage, birds, insects and unexpected rainfall. The food is dried using solar thermal energy

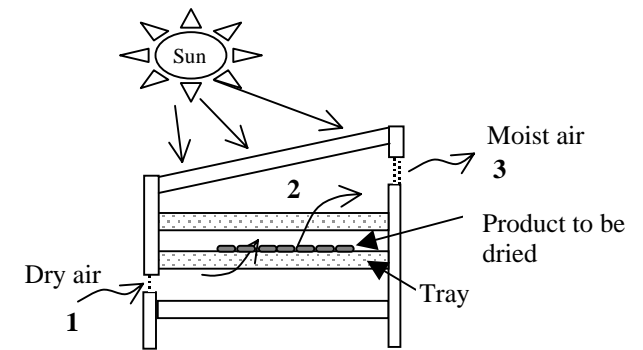
in a cleaner and healthier way. Basically, there are four types of solar dryers;

- Direct solar dryers – in these dries the material to be dried are placed in a transparent enclosure of glass or plastic. The sun heat the material to be dried and enclosure causes a heat build up due to the “green house effect” the drier chamber is usually painted black to absorb the maximum amount of heat.
- Indirect Solar Dryers – in these dryers, sun does not act directly on the material to be dried, thus making them useful in the preparation of those crops whose vitamin content can be destroyed by sunlight; the products are dried by hot air heated by the sun.
- Mixed Mode Driers – in these dryers the combined action of solar radiation incident on the material to be dried and the air preheated in solar collector provide the heat required for the drying operation.
- Hybrid solar dryers – in these dryers, although sun is used to dry products, other technologies are used to cause air movement in the dryers. Example fan powered by solar PV can be used in these type of dryers

### The Drying Process

The process of dehydration consists of removal of moisture from the food by heat, usually in the presence of a controlled flow of air. Initially the food is washed, peeled, prepared and placed on flat-bottomed trays that are placed into the dryer. The solar rays enter the cabinet through the cover material. When reaching the solar collector or the tray surface, they are converted into heat energy raising the temperature inside. The heat energy is transferred to the food to be dried. The heated food gives out water vapour and dries up. Gradually the heated moist air goes up and leaves the drying

chamber through the air outlet at the high end of the drier.



1. Cold dry air enters the drying chamber through the air inlet.
2. The solar rays enter the cabinet through the transparent cover material where they are converted into heat energy, thereby raising the temperature inside. The heated food gives out water vapour and dries up.
3. Gradually the heated moist air goes up and leaves the drying chamber through the air outlet at the high end of the dryer.

As a result of a natural and conventional process, dry air will enter the drying chamber through the air inlet that is situated at the lower end of the drying chamber. The efficiency of drying of the solar dryer is influenced by relative humidity in the air, the moisture content of the materials to be dried, their amount and thickness. The solar radiation intensity on the materials varies with seasons, time of the day and length of exposure. Ambient air temperature and wind speed are important factors.



*Dried products*

## Solar Drying for Income Generation

Experience in similar solar dryer projects for fruits and vegetables prove that solar drying can be attractive as a method for food preservation and also as a commercial proposition. Drying conditions in Tanzania are very favourable and initiation of a solar dryer project can in more than one way improve the standard of life in rural areas. First of all, it will provide employment for people particularly women – in rural areas by creating sustainable income generating opportunities at low cost. The solar dried fruits and vegetables can be sold as ‘natural’ (untreated) products, for which is increasing demand and market price advantage – also as ‘fair-traded products’ on international markets. But also locally there is a market for dried products, if promoted sufficiently

### Solar Drying Services

Initiating a project in the field of solar drying, TaTEDO has planned activities in the following areas

- Training in dryer operation including food processing, business management and market development
- Promotion, demonstration and dissemination of solar drying technology to potential producers.
- Supporting of commercial solar drying enterprises by provision of information on solar drying technology, trouble shooting and assistance in market development activities.
- Carrying out studies regarding solar drying technology and market opportunities.

In solar energy, TaTEDO also provides services in the field of solar PV and solar cookers. In addition, TaTEDO offers technical services in Bio-energy technologies, wind energy technologies, small hydropower and tree growing.

## About TaTEDO

TaTEDO is a coalition of individuals, professionals, artisans, farmers, Community Based Organisations (CBOs) and micro enterprises involved in the development and promotion of renewable energy systems for enhancing sustainable environment and socio-economic development of communities. The organisation was registered in 1990 as a national non-governmental, non-profit energy and environment organisation.

Renewable energies are mostly indigenous and traditional energy source, which are regenerated during the annual solar cycle. Technologies for their conversion and utilization are environment friendly. The long-term objective of TaTEDO is of offer a wide range of services in renewable energy technologies and practices

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TaTEDO contributes to poverty alleviation efforts through promotion of improved energy services

## Tanzania Traditional Energy Development and Environment Organisation



***Solar Drying  
Technology for Poverty  
Alleviation, Environment  
Conservation and  
Sustainable Rural  
Development***