


# Glass Glazed Solar Tunnel Dryer (STD)



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Drying is a complex and energy intensive process used for the preservation of food material. Due to the increasing cost of electricity and fossil fuels, application of solar energy for drying of various agricultural products has become the need of the time. It is not only economical but also ceases the gas emissions. By solar drying, huge amount of national revenue can be saved by avoiding the spoilage of agricultural products due to non-availability of conventional processing facilities. Open sun drying is the most commonly used method in tropical and subtropical regions which deteriorate the quality of the product due to variation in ambient humidity, dust, attacks from insects, rodents and other animals. On the other side, for the controlled drying Hi-tech. food dryers are powered by fossil fuels and are expensive so remain unavailable for the small farmers to process their product at farm where electricity is not available. Therefore, a low cost sustainable energy technology to process agricultural produce at farm should be developed. Keeping in view the energy crises and small farming community a new solar tunnel dryer (STD) has been designed and developed at University of Agriculture Faisalabad to meet the drying needs of small farmers and small co-operatives. Instead of forcing the air through the depth of product, it is just directed over the product spread in a thin layer. The distinct feature of this dryer is the use of glass windows instead of plastic material (polythene dryer) which become fade due to dust and temperature creating hurdle for the transmitting of sun rays into the collector and drying chamber. The glass can easily be washed in case of dust problems.

## Operational principle

Solar tunnel dryer (10m × 1.32m) consists of two major parts, heating unit (4m long) and drying unit (6m long). There is a black plate in the heating unit which acts as absorber of solar radiant energy and converts light energy into heat energy. During the process, the air gets warm while passing over and this heated air is then blown over the food products to be dried in the drying chamber. Sunlight coming to this part of the dryer (drying chamber) compensates the temperature drop due to moisture removal from the product. Hence a constant temperature throughout the dryers maintained. Three small fans (2.5 Watts each) powered by a photovoltaic module (PV) are used to get more air flow in order to maintain the temperature inside the dryer in case of increased solar radiations.

## Technology impact

- a) Energy efficient portable drying unit can easily be used at farm level.
- b) Low cost sustainable technology for easy multiplications in small farmers to process their agricultural products at farm gates.
- d) This dryer is simple in construction and it can be constructed using locally available materials by the local craft man.
- e) Utilization of solar energy in the form of thermal and power application
- f) Quality assurance of the product due to the provision of constant temperature during the drying process employing DC fans
- g) Diverse range of applications for the dehydration of chilies, apple slices, mango slices, apricots, dates, bananas, medicinal plants, seeds etc.