

Research Paper :

Economic evaluation of solar tunnel dryer for drying peeled prawns

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ABSTRACT

Fish is a very important food due to high protein content and nutritional value. Being a perishable product, preservation is essential. Drying is one of the efficient and cheap methods for food preservation. Besides the preservation purposes, the demand for dried fish has also been driven by the flavour of the products. In comparison to sun drying, minimum spoilage and microbial infestation, improved and more consistent product quality is obtained in solar drying. The economic evaluation of solar tunnel dryer was done in comparison with open sun drying methods. The cost economics of dried peeled prawns was proved better for solar tunnel dryer than open sun dried method. Thus, solar tunnel dryer can be proposed as a suitable alternative to the local method of drying fish.

Key words : Economics, Tunnel, Dryer, Peeled, Prawns

Fish is a very important foodstuff in most of the countries, due to its high protein content and nutritional value. Being a perishable product, especially in hot climates and tropical areas where cold preservation techniques are often missing, drying is one of the efficient and cheap method for food preservation. Fish salting/brining, open sun drying or smoking, are traditional techniques for improving preservation and storage. Besides the preservation purposes, the demand for dried fish has also been driven by the flavour of the products. Japan, Hong Kong, Singapore, Malaysia and Hawaii prefer dried squid, anchovy, sardines and cuttle fish (Dey, 1984). The sun dried salted fish like seer, tuna, perches, anchovies, bombay duck and other dried marine products are exported to Sri Lanka, South East Asian countries, Mauritius and the UK. The low cost incurred in employing traditional sun drying methods and convenience of utilizing petroleum based fuels for post harvest processing serves as a major impediment to the widespread deployment of solar dryers. Compared to sun drying, solar dryers can generate higher air temperatures and lower relative humidities, which improves drying rates and lower final moisture content of the drying material. This method has several advantages such as less spoilage and less microbial infestation, thus leads improved and more consistent product quality. Solar drying can also be a feasible alternative to those natural convection dryers that use wood or agricultural waste products as fuel.

Jain *et al.* (2004) conducted the economic analysis of forced convection type solar dryer for drying of groundnuts, ginger and garlic in comparison to an

electrically operated tray type mechanical dryer. The benefit cost ratio for the solar dryer and mechanical dryer was found to be 1.56 and 1.18, respectively. Seveda *et al.* (2004) techno-economic analysis of walk in type semi-cylindrical shaped tunnel dryer with two chimneys and exhaust fan. was carried out by using different economic indicators such as net present worth (NPW), benefit-cost ratio (B-C ratio), pay back period and compared with electrical drying system. They observed that commercial solar tunnel dryer is techno-economically better than electrical drying system. Reddy *et al.* (2004) explained the method of analyzing cost economics of a project by using economic indicators. The capital investment, income statement and expenditure statement are made to calculate the economic indicators. The detailed procedure to calculate the economic indicators (*i.e.* net present worth, benefit-cost ratio, pay back period and internal rate of return) should be followed to decide feasibility of project.

METHODOLOGY

The solar tunnel dryer mainly consists of a cover of U.V. stabilized polyethylene sheet of 200 μm fixed on the cladding material with the help of zig-zag springs. The dryer is large enough that one can enter inside to load and unload the raw fish to be dried. The floor of the solar tunnel dryer is constructed with cement concrete and painted black for absorbing more solar radiation to increase the temperature inside the dryer. The supports for the chimney, door and exhaust fan were welded. The north wall was placed at north side of solar tunnel dryer