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Solar Drying of Fish (Bombay Duck) Using Solar Tunnel Drier

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Abstract

Field level experiments on solar drying of fish using solar tunnel dryer were conducted at Cox?s Bazar, Bangladesh. The dryer consists of a transparent plastic covered flat plate collector and a drying tunnel connected in series to supply hot air directly into the drying tunnel using four dc fans, operated by two solar modules. This dryer has a loading capacity of 120-150 kg of fish. The drying air temperature at the collector outlet varied between 38.2 ?C to 50.2 ?C in the month of December, 1999 and 29.5 ? C to 55.0 ?C in the month of December, 2000. The temperature inside the collector increased along the length of the collector while the drying air temperature decreased along the dryer length during the early stage of drying and then remains almost constant. In a typical experimental run Bombay duck was dried to a moisture content of 15% from 89.8% in 9 hours of drying in solar tunnel dryer as compared to 20 hours of drying in the traditional method of comparable samples to a final moisture content of 15%. Drying of Bombay duck in the solar tunnel dryer can be described by a single exponential equation. Drying behaviour depends on species and the resistance to drying in Bombay duck is much lower as compared to that of salt treated Silver jew fish. In all the cases, the use of solar tunnel dryer leads to considerable reduction of drying time in comparison to sun drying. The quality of the product dried in the solar tunnel dryer is better than sun dried products. The dryer is simple in design and can be constructed using locally available materials by a local craftsman. The solar tunnel dryer can be operated by two photovoltaic modules independent of electrical grid. The photovoltaic system has the advantage that the temperature of the drying air is automatically controlled by the solar radiation. In this work, altogether, a total of four experiments are conducted.