

Analysis of Fish Fillet Drying Rates under Three Solar Energy Drying Systems

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Publication date

2009/2/20

Journal

Advanced Materials Research

Volume

62

Pages

518-524

Keywords : Fish fillet, solar energy, drying rates, alternative methods

Abstract. A small Box type solar dryer with controllable air inlet was designed and tested. The dryer had a mild steel absorber plate and a polyvinyl chloride (pvc) transparent cover and could be adjusted to allow variation in airflow rate through the drying chamber. A convectional green house covered with transparent pvc and into which a drying tray stand at a height of 90 cm above the ground was placed made up the second drying method. The rate of air flow through the green house could be controlled by adjusting the opening at either end of the tunnel. The third method of drying which also served as the control is sun drying in which case the drying trays was placed 90 cm above the ground but left unenclosed to allow free flow of ambient air. The air temperature at points just above the drying rack was monitored for all three drying systems under no load conditions from morning to late afternoon. The temperature was also monitored during drying when the trays were loaded with fish of different fillet thicknesses. The rate of loss of moisture was also monitored by weighing the fillets at regular interval until the moisture dropped to 20%, dry basis or lower. The average temperature inside the plenum chamber of the box type solar dryer was found to have a high daily value of 71.1 OC although an absolute maximum value of 74.4 OC was recorded. This maximum value could be reached on cloudless days between the hours of 13:00 and 1400. The green house recorded a slightly lower average temperature and its peak value occurred latter in the day. Both the green house and the box-type solar dryer had average drying chamber temperatures that were more than 30 centigrade degrees above ambient conditions. Both the box-type and green house type solar dryer could dry thin slices of fish fillet in 1-3 days as opposed to the 7-9 days normally required under sun drying conditions. The quality of the dry fillet was satisfactory and CIE LAB colour values did not change significantly during drying.