

Efficiency Analysis of Solar-Assisted Drying System

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Abstract: *The global surge in food and energy demands necessitates sustainable preservation methods to reduce spoilage, which is often caused by bacterial growth in moisture-laden foods. This study presents a cost-effective solar-assisted greenhouse dryer designed with locally available materials. Tested over three days in forced convection mode, mass flow rates of 0.10, 0.16, and 0.22 kg/s showed average heat gains of 1.69 kW, 2.02 kW, and 2.21 kW, respectively, while average heat losses were 0.62 kW, 0.51 kW, and 0.43 kW. The modifications yielded an R^2 of 0.99, confirming significant efficiency improvements. This dryer offers an eco-friendly, reliable drying alternative.*

Keywords: Solar-assisted greenhouse drying system, no load, heat gain, heat loss, forced circulation, thermal performance.