Performance of a solar dryer with limited sun tracking capability

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Abstract

A small solar dryer with limited sun tracking capabilities was designed and tested. The dryer had a mild steel absorber plate and a polyvinyl chloride (pvc) transparent cover and could be adjusted to track the sun in increments of 15°. The performance was tested by adjusting the angle the dryer made with the horizontal either once, three, five or nine times a day when either loaded with coffee beans or under no load conditions. The temperature distribution in the plenum and also the drying rate of parchment coffee were determined. The temperature inside the plenum chamber could reach a maximum of 70.4 °C and the dryer could lower the moisture content of coffee beans from 54.8% to below 13% (w.b.) in 2 days as opposed to the 5–7 days required in sun drying. Tracking the sun though allowing a faster rate of drying did not offer a significant advantage in terms of length of drying duration.

Keywords: Solar dryer; Tracking; Coffee; Temperature distribution; Drying