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“Filling gaps and removing traps
for sustainable resource management”

Greenhouse Solar Dryer with Biomass Furnace for Coffee Farmer Communities

ROMUALDO MARTINEZ, ROBELYN DAQUILA

Philippine Center for Postharvest Development and Mechanization, Philippines

Abstract

A greenhouse solar dryer with biomass furnace was developed to enable coffee farmer communities in the Philippines to dry harvested coffee even during prolonged rainy periods and with minimal contamination from dust, insects, animals and other sources. The dryer had parabolic-shaped, greenhouse-like structure, 7.2 meters long, 5.1 meters wide and 2.7 meters high and used twin-wall transparent polycarbonate sheets. It was installed on 0.1 m thick concrete pavement. Inside the dryer were two drying tables 6 meters long and 1 metre wide that could accommodate 180 kg of harvested coffee cherries or de-pulped coffee. Outside one end of the dryer was a biomass furnace with two heating ducts that passed across the dryer below the drying tables and connected to two chimneys outside the opposite end. It provided the needed heat during prolonged rainy periods. On one end of the dryer were three exhaust fans that simultaneously drew in ambient through vents on the opposite end of the dryer and drew moist air out. The fans were powered by a deep-cycle battery charged by solar cell panels. Dryers were installed in three coffee communities. Results of drying tests showed that on the average, the drying time of coffee cherries was reduced from 14 days to 7 days as compared against direct sun drying. Likewise, drying of de-pulped coffee was reduced from 7 days to 4 days as compared to direct sun drying. With the use of the biomass furnace, drying was unhampered by prolonged rainy periods. Occurrences of molds on coffee were prevented and product quality remained high because drying delays were minimised. Because of the dryer, coffee farmers were able to sell their dried coffee at a higher price.

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