

ABSTRACT

Drying is a crucial stage in coffee bean processing, as it affects the physical quality, flavor, and final aroma. In Indonesia, the traditional method of sun-drying is still predominantly used; however, it is often hindered by weather conditions, particularly during the rainy season, which slows down the process and reduces the quality of the harvest. To address this issue, this study developed a solar-powered coffee bean dryer prototype with an enclosed drying chamber designed to maximize heat capture from sunlight. A solar panel is used to power an air circulation fan, ensuring a more even distribution of heat throughout the drying chamber. This system enables the drying process to run faster and more consistently, even under less favorable weather conditions. Test results showed that the drying time was shorter compared to the traditional method, with drying efficiency consistently higher—reaching a maximum of 89.99% and a minimum of 41.06%, compared to the traditional method's maximum of 60.64% and minimum of 39.11%. The enclosed design also minimizes heat loss, optimizes energy efficiency, and reduces operational costs by utilizing renewable energy. This prototype has the potential to be further developed into larger-scale or portable units, offering an efficient, economical, and environmentally friendly solution for coffee farmers in tropical regions.

Keywords: Drying machine, Solar panels, Coffee beans