

Title Drying kinetics of the individual layer of cocoa beans during heat pump drying
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Abstract

Investigation was carried out to study the drying kinetics of the individual layer of cocoa beans, namely the testa and cotyledon, during heat pump drying. The cocoa beans were dried in thin layer using dehumidified air at 28.2 °C, 40.4 °C and 56 °C. Moisture contents of the bean, testa and cotyledon were recorded during drying. Reduction in moisture content was relatively fast at the testa as compared to the cotyledon in the initial two hours of drying. Subsequent drying showed a crossover region where the moisture content of the testa was higher than the cotyledon. The final moisture content of the testa was found to be higher than the inner cotyledon at the end of drying. This showed that moisture migrated from the cotyledon (lower moisture content) to the testa (higher moisture content) during drying. Although such transfer mechanism seems contradict but this can be further explained by the mass transfer potential concept as postulated by Luikov where the transfer of moisture is due to moisture potential difference instead of moisture content difference. Product quality analyses showed percent retention of cocoa polyphenols ranged from 44% to 73% as compared to freeze dried sample. Bean hardness was found reasonably comparable to the commercial sample and increased with decreasing moisture content.