

**Title** Thin layer drying kinetics of cocoa and dried product quality  
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### **Abstract**

Studies were carried out to investigate the cocoa drying kinetics and compare the quality of the dried beans produced from sun and artificial hot air drying. Currently, these are the methods commonly used by cocoa farmers and plantations to dry cocoa beans. Drying trials were conducted in thin layer using natural sun light and by hot air inside an air-ventilated oven at air temperatures of 60 °C, 70 °C and 80 °C. Comparison was also made against freeze-dried cocoa beans for quality assessment. The quality attributes assessed were colour ( $L^*$ ,  $a^*$ ,  $b^*$  and hue angle), texture (hardness and fracturability) and polyphenol content (total polyphenols, epicatechin and catechin contents). Theoretical modelling was performed on the drying kinetics using Fick's law of diffusion and to determine the effective diffusivity values. Reasonable values were obtained for the coefficient of determination ( $R^2$ ) between the experimental and predicted moisture ratio data (range 0.9845–0.9976). Effective diffusivity values were found within the range reported in literatures (range  $1.61 \times 10^{-10} \text{ m}^2 \text{ s}^{-1}$ – $8.01 \times 10^{-11} \text{ m}^2 \text{ s}^{-1}$ ). Quality assessment showed significant differences ( $p < 0.05$ ) among the sun dried, freeze-dried and oven dried samples in texture, colour and polyphenol content.