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Mathematical Modeling of the Effect of Pretreatment on the Drying Kinetics, Energy Requirement and Physico-Functional Properties of Yam (Dioscorea Rotundata) and Cocoyam (Colocasia Esculenta)

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Abstract : The work was aimed at studying the effects of microwave drying (450 W) and hot air oven drying on the drying kinetics and physico-functional properties of yams and cocoyams species. The yams and cocoyams were cut into chips of thicknesses of 3mm, 5mm, 7mm, 9mm, and 11mm. The drying characteristics of yam and cocoyam chips were investigated under microwave drying and hot air oven temperatures (50oC – 90oC). Drying methods, temperature, and thickness had a significant effect on the drying characteristics and physico-functional properties of yam and cocoyam. The result of the experiment showed that an increase in the temperature increased the drying time. The result also showed that the microwave drying method took lesser time to dry the samples than the hot air oven drying method. The iodine affinity of starch for yam was higher than that of cocoyam for the microwaved dried samples over those of hot air oven-dried samples. The results of the analysis would be useful in modeling the drying behavior of yams and cocoyams under different drying methods. It could also be useful in the improvement of shelf life for yams and cocoyams as well as designs of efficient systems for drying, handling, storage, packaging, processing, and transportation of yams and cocoyams.

Keywords : coco yam, drying, microwave, modeling, energy consumption, iodine affinity, drying ate
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