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An Integrated Energy and Quality Approach to Optimization of Green Pea Drying in a Hot Air Infrared-Assisted Vibratory Bed Dryer

Running title: “Green Pea Drying in a Hot Air Infrared-Assisted Vibratory Bed Dryer”

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In this study drying behavior of a small spherical product, green peas from moisture content of 75.34 ± 0.53 (%w.b.) to 20.02 ± 0.14 (%w.b.), was investigated in a hot air infrared- assisted vibratory bed dryer. The quality of dried product including roundness, shrinkage and color components was assessed using machine vision techniques. The experiments were conducted in drying air temperature levels of 30, 40, and 50 °C, infrared radiation intensity levels of 2000, 4000, and 9000 W. m⁻² as well as no radiation condition (control), green pea’s depths of 1, 2, and 3 layers, and two modes of vibratory and fixed bed. The specific energy consumption (SEC) of drying process was also measured. The results showed that drying time and SEC decreased significantly in the vibratory bed ($p < 0.01$). In addition, the original quality of dried green peas was considerably maintained in the infrared-assisted vibratory bed dryer. Finally, drying time, shrinkage, roundness, color and moisture content of green peas were simulated for vibratory bed mode using Artificial Neural Network.

Keywords: Hot air-infrared drying; Artificial neural network; Green peas; Vibratory bed; Machine vision

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