

Mathematical Modeling of Eggplant Slices Drying Using Microwave-Oven

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Abstract : Eggplant (*Solanum melongena* L.) is considered one of the most important crops in summer season, and it is grown in most cultivated area in Egypt. Eggplant has a very limited shelf life for freshness and physiological changes occur after harvest. Nowadays, microwave drying offers an alternative way to drying agricultural products. microwave drying is not only faster but also requiring less energy consumption than conventional drying. The main objective of this research was to evaluate using the microwave oven in Eggplant drying, to determine the optimum drying time of higher drying efficiency and lower energy consumption. The eggplants slices, having a thickness of about 5, 10, 15, and 20 mm, with diameter 50 ± 2 mm was dried using microwave oven (KOR-9G2B) using three different levels were 450, 630, and 810 Watt (50%, 70%, and 90% of 900 Watt). The results show that, the initial moisture content of the eggplant slices was around 93 % wet basis (13.28 g water/g dry matter). The results indicated that, the moisture transfer within the sample was more rapidly during higher microwave power heating (810 watt) and lower thickness (5 mm) of the eggplant slices. In addition, the results show that, the drying efficiency increases by increasing slices thickness at power levels 450, 630 and 810 Watt. The higher drying efficiency was 83.13% occurred when drying the eggplant slices 20 mm thickness in microwave oven at power 630 Watt. the higher total energy consumption per dry kilogram was 1.275 (kWh/ dry kg) occurred at used microwave 810 Watt for drying eggplant slices 5 mm thickness, and the lower total energy consumption per dry kilogram was 0.55 (kWh/ dry kg) occurred at used microwave 810 Watt for drying eggplant slices 20 mm thickness.

Keywords : microwave drying, eggplant, drying rate, drying efficiency, energy consumption

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