
Effects of vacuum microwave drying on drying characteristics and flavor of edible cricket

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Introduction: Edible insects are attracting attention as a new source of animal protein. However, in order to use edible insects as an alternative protein, their poor flavor must be improved. In addition, hot air drying, which is frequently used in the processing of edible insects, is concerned about low energy efficiency as well as poor quality of dried products. In this study, we applied vacuum microwave drying as a new drying method for edible insects and evaluated its effects on drying efficiency and quality.

Method: 10 g of house crickets (*Acheta domestica*) were dried using hot air drying, microwave drying, and vacuum microwave drying. Drying conditions were 70 °C, 600 W, 200 W and 30 hPa for hot air, microwave, and vacuum microwave drying, respectively, and crickets were dried until weight reached equilibrium. During each drying, crickets were weighed at regular intervals and moisture content was calculated. Dried crickets were powdered by using food mill. Then, GC-MS analysis was performed for aroma components.

Results and Discussion: The drying characteristic curves were obtained from the moisture content vs. drying rate plots. For all drying methods, the drying process occurred only in the falling-rate period. Therefore, we fit an exponential model to the measured values of each moisture content change. The results showed a high coefficient of determination of 0.99 or higher, indicating that this model was appropriate. The drying rate constants k were determined as 0.023, 0.337, and 0.235 h⁻¹ for hot air, microwave, and vacuum microwave drying, respectively. In other words, the use of microwaves was shown to be useful in improving the drying efficiency of crickets. GC-MS analysis showed that significantly fewer aroma components were detected from the cricket powder dried by vacuum microwave drying than those by hot-air and microwave drying. Vacuum microwave drying allows drying under low oxygen conditions, which was thought to be related to the lower number of aroma components detected.