

The Effect of Ultrasound as Pre-Treatment for Drying of Red Delicious and Golden Delicious Apples

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Abstract : Drying (dehydration) is the process of removing water from food in order to preserve the food and an alternative to reduce post-harvest loss of fruits. Different pre-treatment methods have been developed for fruit drying, such as ultrasound. If no pre-treatment is done, the fruits will continue to darken after they are dried. However, the effects of ultrasound as pre-treatment on drying of apples has not been well documented. This study was undertaken to investigate the effect of ultrasound as pre-treatment before oven drying of red delicious and golden delicious apples. Red delicious and golden delicious apples were dried in different temperatures. Before performing drying experiments in an oven at 50, 75 and 100 °C, ultrasound as pretreatment was applied in 5, 10, and 15 minutes. Colors of the dried apples were measured with a Minolta Chroma Meter CR-300 (Minolta Camera Co. Ltd., Osaka, Japan) by directly holding the device vertically to the surface of the samples. Content of total phenols was determined spectrophotometrically with the FolinCiocalteau assay, and the antioxidant capacity was evaluated by using 1,1-diphenyl-2-picrylhydrazyl (DPPH) assay. The samples (both red delicious and golden delicious apples) with longer ultrasound treatment produced higher weight loss due to the changes in tissue structure. However less phenolic content and antioxidant capacity were observed for the samples with longer ultrasound pre-treatment. The highest total phenolic content (TPC) was determined in dried apples at 75 °C with 5 minutes pre-treatment ultrasound and the lowest TPC was determined in dried apples at 50 °C with 15 minutes pre-treatment ultrasound which was subjected to the longest ultrasound pre-treatment and drying. The combination of 5 min of ultrasound pre-treatment and 75 °C of oven-drying showed to be the best combination for an energy efficient process. This combination exhibited good antioxidant properties as well. The present study clearly demonstrated that applying ultrasound as pre-treatment for drying of apples is an effective process in terms of quality of dried products, time, and energy.

Keywords : golden delicious apples, red delicious apples, total phenolic content, Ultrasound

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