University of Zabol
Graduate school
Faculty of Agriculture
Department of Horticulture
The Thesis Submitted for the Degree of Master of Science
(In the field of Medical plants)

Study of different drying methods on drying time and some appearance and biochemical properties of *Artemisia annua*, *Artemisia sieberi*, *Origanum majorana*, and *Plantago ovata* medicinal plants

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January 2022

Abstract

The present study was conducted to investigate the effect of different drying methods on drying time, percentage and components of essential oil and some appearance and biochemical properties of medicinal plants of Artemisia annua, Artemisia sieberi, Origanum majorana, and Plantago ovata. In this research, different drying methods such as shading, oven at 70 ° C and microwave at 3 levels of 540, 720 and 900 watts was used to dry the samples up to the moisture content of 10% (wet basis). The changes of product color due to drying was studied using image processing technique with ImageJ software.

The results showed that drying conditions have a significant effect on the biochemical properties of the products. Based on the mean compariio results, the highest amount of chlorophyll a, chlorophyll b, phenol, flavonoids, carbohydrates and carotenoids were obtained in *Plantago ovata* in shade, shade, oven, microwave 900W, shade, microwave 900 W, respectively. For *Artemisia annua*, the high values of the above properties were obtained using the methods of microwave 540 W, microwave 540 W, shadow, shadow, microwave 720 W and microwave 50 W, respectively. These highest values for *Origanum majorana* were obtained in shade, shade, microwave 540 W, shade, microwave 900 W, and shade methods, respectively. Also, in *Plantago ovata*, the highest amount of chlorophyll a, chlorophyll b, carotenoids, carbohydrates and flavonoids were obtained in the microwave 90 W drying method and the highest amount of phenols was obtained in the oven drying method. It was found that drying method has significant effect on product color changes. In general, less changes in the color were recorded for the samples that were dried in the shade and also low microwave powers. The values of Δl^*, Δa^* and Δb^* were estimated for the products which dried in different microwave powers (540, 720, and 900 W), shade and oven. Then the amount of ΔE was calculated. The lowest amount of ΔE for the mentioned plants was obtained at microwave 900 W and in drying in the shade. Also, the consumed energy for the drying of samples in different microwave powers was estimated. Results showed, the drying energy were less by implementing the microwave powers of 900, 540, 720, and 720 for *Artemisia annua, Artemisia sieberi, Origanum majorana, and Plantago ovata* respectively.

Keywords: Biochemical properties, Drying, Image processing, Microwave, Moisture ratio