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Jalal Eskandari, Ali M. Kermani, Shahriar Kouravand, Payam Zarafshan



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Design, fabrication, and evaluation a laboratory dry-peeling system for hazelnut using infrared radiation

Jalal Eskandari¹, Ali M. Kermani^{1*}, Shahriar Kouravand¹, Payam Zarafshan¹

¹ Department of Agrotechnology, Aburaihan Campus, University of Tehran, Tehran, Iran

* Corresponding author: Department of Agrotechnology, College of Aburaihan, University of Tehran, Imam Reza blvd., Pakdasht, Tehran, Iran. E-mail address: amkermani@ut.ac.ir (Ali M. Kermani); Tel./Fax.: +98 21 360 406 14.

Abstract

A laboratory scale dry-peeling system for hazelnuts using infrared radiation was designed and constructed. This system consisted of two main units, the infrared radiation unit for loosening peels and the abrasive unit for removing them. The performance of each unit in the peeling process was evaluated separately. The effects of infrared emitter power at three levels of 800, 1200 and 1600 W, radiation time at three levels of 2, 3 and 4 min, and the moisture content of hazelnuts at four levels of 4, 6, 8, and 10 g/100g wet basis investigated. The performance of abrasive unit was evaluated by the effect of its functional parameters, such as the clearance between rotor and cylinder, rotor speed, and abrasive path length. The most appropriate conditions the IR radiation unit was determined to be radiation power at 1600 W, the radiation time 3 min, and the moisture content of hazelnuts 4 g/100g. For the abrasive unit the optimal conditions determined to be the clearance of 4 mm, the rotor speed of 200 rpm, and the abrasive path length of 36 cm. Overall, the performance of the IR dry-peeling system for hazelnuts is determined the peeling efficiency 81.6% with kernel breakage 0.87%.

Keywords: Dry-peeling; Hazelnuts peeling; Infrared radiation; Image processing, Polishing

1. Introduction

Hazelnut is one of the horticultural dried fruit with high nutritional value (Koksal, Artik, Simsek, & Gunes, 2006), commercial value and export worth. According to FAO-2014 statistics, Iran ranked fourth on cultivation area and seventh in the production of hazelnuts in the world. Due to Iran proper climate, it could been one of the major producer countries of the

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