

Accepted Manuscript

Ultrasonic based determination of apple quality as a nondestructive technology

Haydar Vasighi-Shojae, Mohammad Gholami-Parashkouhi, Davood Mohammadzamani, Ahmad Soheili



PII: S2214-1804(18)30080-1
DOI: doi:[10.1016/j.sbsr.2018.09.002](https://doi.org/10.1016/j.sbsr.2018.09.002)
Reference: SBSR 240

To appear in: *Sensing and Bio-Sensing Research*

Received date: 21 July 2018
Revised date: 1 September 2018
Accepted date: 6 September 2018

Please cite this article as: Haydar Vasighi-Shojae, Mohammad Gholami-Parashkouhi, Davood Mohammadzamani, Ahmad Soheili , Ultrasonic based determination of apple quality as a nondestructive technology. *Sbsr* (2018), doi:[10.1016/j.sbsr.2018.09.002](https://doi.org/10.1016/j.sbsr.2018.09.002)

This is a PDF file of an unedited manuscript that has been accepted for publication. As a service to our customers we are providing this early version of the manuscript. The manuscript will undergo copyediting, typesetting, and review of the resulting proof before it is published in its final form. Please note that during the production process errors may be discovered which could affect the content, and all legal disclaimers that apply to the journal pertain.

Ultrasonic based determination of apple quality as a nondestructive technology

Haydar Vasighi-Shojae, Mohammad Gholami-Parashkouhi*, Davood Mohammadzamani,
Ahmad Soheili

Department of Biosystems Engineering, Takestan Branch, Islamic Azad University, Takestan,
Iran.

* Corresponding Author: Gholamihassan@yahoo.com

Mobile: +989188120271

Abstract

This research, aimed to apply ultrasonic based technology and develop a portable system for determination of the apple (Golden Delicious) mechanical properties as the quality factor. The main components of the designed portable system are a pair of transmitter and receiver transducers with 40 kHz center frequency, a signal generation unit, a measuring unit of the gain ratio (dB) and phase difference of two signals (input and transmitted), a microcontroller (Atmega 32) and a 16×2 LCD display. Mechanical properties of the specimens were destructively measured by an Instron universal testing machine based on the Magness–Taylor method. By combination the physical and ultrasonic attributes and developing the multiple linear regressions, for firmness the model with a good ability of prediction was developed with R and RMSE values of 0.73 and 2.35 N, respectively. For the elastic modulus, the best model had R and RMSE values of 0.64 and 0.18 MPa, respectively. Also for the rupture energy, the model with a high ability of prediction was developed with R and RMSE values of 0.73 and 5.18 mJ, respectively. It was concluded that by using the nondestructive ultrasonic based system to measure the ultrasonic velocity and attenuation of apple, it might be possible to nondestructively assess its mechanical properties.

Keywords: Apple, Quality, Ultrasound, Nondestructive.

1. Introduction

Recently, extensive researches have been applied to develop non-destructive techniques for quality prediction of fresh fruits and vegetables. Firmness is a well-known quality indicator of fruits and vegetables that has been widely used as a useful criteria for producers and consumers. Firmness is used especially as an indication of the handling characteristics of many fruit, and

Download English Version:

<https://daneshyari.com/en/article/11031412>

Download Persian Version:

<https://daneshyari.com/article/11031412>

[Daneshyari.com](https://daneshyari.com)