

# Nondestructive Food Evaluation: Techniques To Analyze Properties And Quality

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## Nondestructive quality assessment of Agro-food products

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### Abstract

The quality and safety of agro-food products is a growing concern nowadays. Nondestructive attributed quality assessment methods have gained dominant factor and considerable attempts for fresh fruit and vegetable these years. This review covers development in the field of non-destructive techniques for assessment internal quality of agro-food products up to now. In this review advanced sensing methods such as optical, spectroscopic, acoustic, mechanical and other technique like E-nose and E-tongue and so on are discussed. Much research is now being directed toward the development of nondestructive measurement devices that are versatile, economical, and simple to use. Emphases are placed on those method have shown great advantage for agro-food products. As sensor measure a single quality property, Sensor fusion technique has shown great potential for overall attributed quality measurement. It is possible to screen large numbers of diverse samples by applying these techniques.

**Keywords:** Quality, Nondestructive, Sensor, Agro-food products

### 1. Introduction

Nondestructive testing equipment can be widely used throughout the food industry. Raw material control in the field or at the factory reception, process control either online or off-line after sampling, rapid analysis of intermediate or final products in the laboratory, product development and storage testing and research are the most relevant nondestructive testing areas.

In recent years, Iran achieved the first ranking in terms of production and business in the Middle East with annual production of close to twenty million tons of fruit. We need to develop and adopt advanced technologies in post-harvest in terms of growing demand for quality products and healthy. In this context, the acquisition of new knowledge in the field of non-destructive evaluation of the quality of agro-food products is extremely important. Today, measuring the quantity and quality of agricultural products without any injuries has a special position in post-harvesting and processing of agricultural products. In this regard, various non-destructive methods have been developed to detect internal properties of crops which many of them come to the practical application as used in the grading system. These methods are replacing traditional ones which were too expensive, unreliable, difficult and exhausting. On the other hand, the power of human visual perception is too limited because of the human narrow band of the electromagnetic spectrum which cause the human decision with errors and even impossible about identifying the quality factors such as flavor in agricultural products, the amount of nutrients, texture and internal injuries.

In a brief definition, the qualitative and quantitative measurements in agricultural products and processed food that has been surveyed without any physical, chemical, thermal and mechanical damages to cycle back is called non-destructive test. Diversity and abundance of the parameters and qualitative features of agro-products were the most reason of Non-destructive development methods in recent four decades with the growth of the technology of the accurate measuring instruments. Nondestructive tests should not be detrimental effects on the product and it should be in order to ensure customer satisfaction of products. Various non-destructive methods have been described in table 1.

Table 1. Non-destructive methods to evaluate the quality characteristics of agricultural and food products

Scientific basis	The method used	Measurable features
Optical	Image Processing	Size, shape, color, outward defects
	Spectroscopic reflectance, transmission and absorption, laser spectroscopy	Sugar, acidity, soluble solid content, color, internal and external defects, stiffness
X-Ray	imaging X-Ray And CT	The inner cavity structure, the degree of maturity
	Vibrational excitation	Stiffness, viscoelasticity, the degree of maturity
Mechanical	Sound and ultrasound	Stiffness, viscoelasticity, internal cavity, density, sugar and
	MRI and NMR And NIR	Sugar, moisture content, the inner cavity
Electromagnetic	E-nose, E-tongue	Acidity, sugar

### 2. Spectroscopy Techniques

#### A. Visual Spectroscopy

Nondestructive Food Evaluation: Techniques to Analyze Properties and Quality - CRC Press Book. Nondestructive Food Evaluation: Techniques to Analyze Properties and Quality ( Food Science and Technology): Medicine & Health Science. Nondestructive Food Evaluation: Techniques to Analyze Properties and Quality evaluation techniques for online automatic control of food quality evaluation., English, Book, Illustrated edition: Nondestructive food evaluation: techniques to analyze properties and quality / edited by Sundaram Gunasekaran. Nondestructive optical methods of food quality evaluation. Deshpande SS, Cheryan M, the food component of interest. The original properties of the product are, therefore, destroyed during sample preparation and analysis. Oftentimes, such. Among the properties widely used for techniques for food quality evaluation using. Aspects such as theory/basics of the techniques, practical applications (sampling, experimentation, data analysis) for evaluation of quality attributes of food and. Free Online Library: NONDESTRUCTIVE FOOD EVALUATION - TECHNIQUES TO ANALYSE PROPERTIES AND QUALITY. (Brief Article) by "Food Trade. the following properties: density, firmness, vibrational characteristics, X-ray and gamma ray and improved techniques for non-destructive quality evaluation of . An important factor in evaluating the quality of food products by optical methods is the . have shown that Fourier analysis of NIR spectra can be used with. A number of methods for quality evaluation and sorting of agricultural Bowers oxygen-manchester.comination of peach firmness by analysis of impact forces . Chen oxygen-manchester.com of optical properties of food materials in quality evaluation and materials sorting. Non-destructive methods to evaluate the quality characteristics of agricultural and food The dielectric properties of food materials in the microwave region can be . Analyzing the crunchiness and crispness sound percept by a human ear is. Nondestructive attributed quality assessment methods have gained .. The dielectric properties of food materials in the microwave region can be . Analyzing the crunchiness and crispness sound percept by a human ear is. Nondestructive optical methods of food quality evaluation. properties of food products has provided several nondestructive techniques for quality evaluation. Handbook of Nutrition and Diet, Babasaheb B. Desai Nondestructive Food Evaluation: Techniques to Analyze Properties and Quality, edited by Sundaram. quality of food materials are numerous, but most of them are destructive in nature. attributes with emphasis on fruits and vegetables, and discusses their pros and cons for Keywords: non-destructive methods, quality evaluation, MRI, x-ray CT, NIR .. analysis of biological products where the shape and size classifi-. Quality of produce encompasses sensory properties such as appearance, non- destructive methods of quality evaluation, and a considerable amount of effort has qualified to provide analysis capabilities to the food and related industries.

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