



Analysis of Impact Bruise Data of Selected Fruits

Ibrahim, A.G.

Department of Physics, Federal University of Technology, Minna.

Abstract

Impact bruises on fruits during harvesting results in major fruit losses. In this work, an electronic device, a fruit transducer, was used in generating impact bruise data to serve as avenue for obtaining bruise parameters which are measurable quantity that determine critical points at which a fruit is bruised. Three most produced fruits in Benue State were considered namely; Tangerine (*Citrus reticulata*), common mango (*Mangifera indica*) and Julie mango. Analysis of the bruise data shows damaging drop heights of 3.75m, 3.50m and 3.25m, damaging bruise energy of 3.00J, 3.50J and 5.85J and damaging bruise voltages of 7.80V, 9.50V and 12.20V for Tangerine, common mango and Julie mango respectively.

Introduction

In an earlier work, design and construction of a Pseudo-fruit transducer for the measurement of impact bruises on fruits (Ibrahim, 2006), a device known as the fruit transducer was designed and constructed using state of the art electronic components. Transducers converts one form of signal to another (Sa, 1990), in this case, convert pressure during fruit impact into an equivalent electrical signal. Impact bruise on the other hand refers to a mark or knock on a fruit or vegetable as a result of impact or pressure such that the fruit or vegetable is not injured. The said device has the ability to measure the degree of impact bruise on fruits especially during the process of harvesting. Differentiating it from others (Tennes etaal, 1988) is its ability to measure bruise parameters such as safe and damaging drop height, safe and damaging bruise energy and its electrical equivalent, the bruise voltage all at a time for various fruit of interest. With these parameters determined, necessary precautions can then be taken by fruit farmers at such points. In this work which is another contribution of electronics to agriculture, the said device was used to generate bruise data for Tangerine, common mango and Julie mango being the most cultivated fruits in Benue State (Akinboro, 1988).

Methodology

Ten fruits each of tangerine (*Citrus reticulata*), common mango (*Mangifera indica*), and another bigger variety of mango, "Julie" mango were used. Each of known masses were harvested and allowed to fall freely on an appropriate impact table of the fruit transducer. The height through which a fruit falls (drop height) is noted. The parameter of interest can then be worked out or electronically read as the case may be. At this point it is necessary to explain these parameters and their measurements.

Safe and damaging bruises: Bruises which do not cause economic damage to fruits as it still retains its firmness after impact are called safe bruises, while those which when sustained renders a fruit economically useless although without physical injury is termed damaging bruises. Both safe and damaging bruises are both determined via inspection.

Safe and damaging drop height: The height through which a fruit falls from a tree and sustains safe or damaging bruises are respectively called safe drop height or damaging drop height. In this work, a drop height of 1.75 meters to 4.00 meters was considered being the average heights of most improved varieties of selected fruits. Also, an interval of 0.25 meters was chosen to allow for faster detection of