

## **Nondestructive measurement of rockmelon fruit properties using Electrical Impedance Spectroscopy (EIS) technique**

### **ABSTRACT**

Electrical Impedance Spectroscopy (EIS) is a promising method that continuously develop in application of agriculture and food quality assessment. EIS sensor probe can be design to support non-destructive assessment which improve the conventional destructive method. Rockmelon is one of fruits with high demands in Malaysia thus the quality attribute such as moisture content, maturity, storage period and Brix Index are important to ensure high standard production. However, it is hard to assess these quality attributes on site because of current method and equipment are destructive and time-consuming. The objective of this study is to evaluate the feasibility of EIS to determine rock melonfruit postharvest quality parameters such as weight, moisture content and soluble solid content (SSC)using an impedance analyser board (AD5933) with a pair of electrocardiograms (ECG) electrodes at frequency range of 100 Hz to 100 kHz. The study shows that as the storage period is prolonged, the impedance value and moisture content of rockmelon are decreased while the weight-loss is increase but the SSC value shows inconstant pattern with storage period. The best frequency range of 400 Hz to 600 Hz was used to differentiate all samples based on their impedance value and storage period. The best prediction based on impedance value by linear regression model for storage period could be determined at frequency of 540 Hz with  $R^2=0.93$  and the root mean squareerror (RMSE)=2.48, while for moisture content is at 400 Hz frequency with  $R^2= 0.81$  and  $RMSE = 1.53$ . However, for SSC the impedance value could be determine using polynomial regression at frequency of 580Hz with  $R^2= 0.63$ . From all these results, it indicates that electrical impedance properties have a good potential to develop a sensing system that can measure the rockmelon storage period, moisture content and weight without destructing the fruit.

**Keyword:** Impedance; Rock melon; Moisture content; Soluble solid content; Storage period