

Abstract

This paper presents the design, construction, and testing of an electronic device for measuring the volumes of selected fruit and vegetables. The device was designed with reference to the principle of capacitance measurement and consists of three parts: cylindrical casing, electronic circuitry and a personal computer. Volumes recorded by the device in experiments with watermelons, large cucumbers, wax gourds and guavas have been compared with measurements obtained from the water displacement (WD) method. The evaluated parameters included: (i) sample shapes, defined by the ratio of minor and major axes, ranging from 0.252 to 0.946, (ii) diameter of the cylindrical casing (25, 50 and 75 cm), and (iii) orientation of the sample in the casing. Results showed that the electronic device measured sample volumes at error margins ranging from 1.1% (watermelons) to 4.7% (large cucumbers). Varying the angular displacement of samples around the longitudinal axis (0, 90, 180 and 270°) did not influence error at the 1% significance level. However, variations in sample shape, cylindrical casing diameter and angular displacement of the sample around the vertical axis (0, 45, 90, 135 and 180°) significantly affected error at the 1% significance level. Minimum error was recorded when a 75-cm diameter casing was used and the longitudinal axis of the sample was aligned to that of the casing.