Title Determination of watermelon volume using ellipsoid approximation and image processing

Author Ali Bulent Koc

Citation Postharvest Biology and Technology, Volume 45, Issue 3, September 2007, Pages 366-371

Keywords Volume; Watermelon; Ellipsoid approximation; Image processing

Abstract

Watermelon (*Citrullus lanatus*) volume was measured using water displacement, ellipsoid approximation and image processing methods. The length and major and minor diameters of each watermelon were used in the ellipsoid approximation method. Eight-bit surface images of each watermelon, captured with a low-cost CMOS camera, were utilized in the image processing method. The volume obtained from ellipsoid approximation and image processing was compared to the volume determined by the water displacement method using the paired *t*-test and the Bland–Altman approach. The volume estimated by ellipsoid approximation was significantly different from the volume determined by water displacement ($P < 0.05$), while the volume determined by image processing was not significantly different from the volume determined by water displacement ($P > 0.05$). There was a mean difference of −0.467 L (95% confidence interval: −0.625 and −0.310 L; $P < 0.0001$) between the water displacement and ellipsoid approximation methods. The mean difference between water displacement and image processing was −0.218 L (95% confidence interval: −0.603 and 0.166 L; $P = 0.243$). Image processing provides a simple methodology to estimate watermelon volume and can be easily implemented in monitoring the growth rate of watermelons in the field, monitoring yield during mechanical harvesting, estimating the weight of individual watermelons and postharvest sorting of watermelons indoors.