

Title Challenges associated with segregation of avocados of differing maturity using density sorting at harvest

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Abstract

The dry matter (DM) content in the flesh of harvested avocado is quite variable, ranging from low DM (<20%), poor-tasting fruit that should be removed from commercial sale, to high DM (>35%) fruit that are potentially suitable for processing. Currently, no suitable method exists for segregating these categories in harvested lines. Compositional analysis of the skin, seed and flesh of 1000 mature 'Hass' avocado (*Persea americana* Mill.) fruit was undertaken to determine the feasibility of employing a density technique to identify such fruit on the basis of their flesh DM. Measurements included whole-fruit density, and the mass, density and DM of both core plugs of individual tissues from unripe fruit, and the separated tissues of each fruit upon ripening. The proposition was evaluated by extending basic density theory to develop a generic multi-term expression for a whole-fruit system where the density of each component (the skin, seed and flesh) was characterized with regard to its water, DM and air content. At harvest whole-fruit densities ranged between 970 and 1018 kg m⁻³, and flesh DMs between 23 and 43%, with a correlation of $r = -0.29$; $P < 0.0001$. From theoretical considerations, the factors having the biggest impact on the variability in these data were: the magnitude of the internal airspace fraction within the flesh; the composition and density of the individual lipids in the lipid fraction; and, the seed/flesh volume ratio. Thus without any additional information on these factors, we conclude that whole-fruit density is a poor predictor of fruit DM, and grading fruit into even coarse categories would be unlikely to be successful. Density grading might be feasible however, if one wished to discriminate roughly between fruit on the basis of their seed/flesh volume ratio.