

Title Non-destructive technologies for fruit and vegetable size determination – A review
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Abstract

Here, we review different methods for non-destructive horticultural produce size determination, focusing on electronic technologies capable of measuring fruit volume. The usefulness of produce size estimation is justified and a comprehensive classification system of the existing electronic techniques to determine dimensional size is proposed. The different systems identified are compared in terms of their versatility, precision and throughput. There is general agreement in considering that online measurement of axes, perimeter and projected area has now been achieved. Nevertheless, rapid and accurate volume determination of irregular-shaped produce, as needed for density sorting, has only become available in the past few years. An important application of density measurement is soluble solids content (SSC) sorting. If the range of SSC in the batch is narrow and a large number of classes are desired, accurate volume determination becomes important. A good alternative for fruit three-dimensional surface reconstruction, from which volume and surface area can be computed, is the combination of height profiles from a range sensor with a two-dimensional object image boundary from a solid-state camera (brightness image) or from the range sensor itself (intensity image). However, one of the most promising technologies in this field is 3-D multispectral scanning, which combines multispectral data with 3-D surface reconstruction.