Non-Destructive Evaluation of Fruits and Vegetables for Their Maturity and Ripening

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The state of maturity of a fruit or vegetable is crucial to its subsequent storage and shelf life. Correctly identifying the state of maturity of fruits or vegetables can reduce the post-harvesting loss in the supply chain and lower artificial ripening after the harvest. However, visual inspections are the most widely used method to determine the maturity stage of most fruits and vegetables even today. The visual grading schemes are subjective and thus unreliable. Therefore, more scientific non-destructive methods to define maturity state are needed for 'high-tech' horticulture. The life span of harvested fruits or vegetables can be separated into three stages: maturation, ripening, and senescence. Maturation is indicative of the fruit being ready for harvest. The edible part of the fruit or vegetable is fully developed by this time, although it may not be ready for immediate consumption. Though generally, ripening follows the maturation stage, there can be some overlaps between these two stages. Once the product is ripened, it is ready for even immediate consumption, as indicated by taste. Senescence is the last stage. Natural degradation of the fruit or vegetable begins to appear at this stage, as it loses texture, flavor, etc. This study aims to identify the state of maturity of fruits and vegetables by non-destructive tests.

Keywords: Double layer, Differential capacitance, Surface roughness.