

Title Application of the General Stability Index method to assess the quality of butter lettuce during postharvest storage using a multi-quality indices analysis

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Abstract

A modified version of the Global Stability Index (GSI) methodology applicable to follow the variation of multi-quality indices during butter lettuce storage at optimal conditions was developed. Lettuce is a highly perishable vegetable whose quality and shelf life are mainly limited by dehydration, so the control of water loss is critical to minimize lettuce quality degradation. Consequently, in order to study the loss of lettuce stability, physical indices such as the relative water content (RWC), the water content (WC), the free water (FW), the bound water (BW) and the ratio of free to total water (FW/TW) were analyzed as a function of the storage time. Moreover, greenness and nutritional indices represented by total chlorophyll content (TC) and ascorbic acid content (AA) were also analyzed. In the present modification, the determination of the threshold values when the quality indices do not have a defined standard limit of acceptability was proposed using a linear correlation with the lettuce overall visual quality (OVQ) values. Furthermore, a method to calculate the weighing factors in the case of multi-quality indices was developed. The proposed methodology allowed the determination of a GSI for each lettuce zone (external, middle and internal) that best describes the stability of its quality during storage. In addition, models were developed to describe the dependency of GSI with OVQ and storage time for each lettuce zone. The advantages of the application of the modified GSI method with respect to the classical real time shelf life testing were the reduction in the number of experimental determinations as well as the estimation of the maximum storage time through the presented models. Moreover, the use of a GSI index in a global fashion rather than a single criterion allows the study of butter lettuce shelf life taking into account the most relevant indices that affect the product quality during storage.