

Effect of compression on mechanical properties of ready-to-eat (RTE) spinach varieties

ABSTRACT

Compression-induced injury is frequently encountered during handling, packaging, transporting, and storage. In this study, compression test was performed using a mechanical tester, Universal Testing Machine Z030 (Zwick/Roell, Germany). Spinach varieties (Teen, Organic, Salad, and Baby) were used to study the response of spinach varieties towards stress. For single loading/unloading compression, maximum work (MaxW) and area under the curve (AUC) required to compress Organic spinach were found to be the highest followed by Teen and Salad spinach. The MaxW and AUC were found to be decreasing after storage which showed that the total work generated to compress the leaves was reduced due to texture degradation of the product after storage. For multiple loading/unloading compression, as the number of compressions increased, the MaxW decreased. Similar trend was observed at day 6. Apart from that, the MaxW for all the three spinach types were found to be similar at the 5th compression. This shows that regardless of the spinach types, they reached maximum resistance towards stress after the 5th consecutive compression. Under 200 N compression, leaves with stem required higher energy to compress compared to leaves without stem. However, for leaves compressed under 50 N and 100 N, the difference was only noticed on the 1st compression. The MaxW was found to be similar for leaves with stem and without stem starting from the 2nd compression till the 5th compression. The irregular and larger cell size of Organic spinach as compared to round-shaped and smaller cell size of Teen and Salad spinach may contribute to the ability of the Organic spinach tissue to have higher resistance towards mechanical stress during compression.

Keyword: *Spinacia oleracea*; Spinach; Ready-to-eat (RTE) vegetables; Mechanical property; Loading/unloading compression