

Title Electrical conductivity for quality evaluation of popcorn kernels subjected to mechanical damage

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Abstract

This study was carried out to evaluate the effect of the mechanical damage on popcorn kernels under controlled impacts upon the popcorn quality during storage, as well as to analyse the electrical conductivity test as a simple, fast and low-cost alternative for evaluating the commercial quality of the popcorn. The kernels were manually harvested and husked, then dried in the shade until reaching $\pm 13\%$ wet basis and subjected to the mechanical damage, by using different impact times with the Stein Breakage Tester device (CK2-M model). Afterwards, they were stored in low-density polypropylene sacks over a 6 month period under uncontrolled environmental conditions. The quality of the kernels were analysed at the beginning of the experiment and every subsequent month by applying the popping expansion capacity test. The mechanical damage level was evaluated by applying the electrical conductivity test. The results indicate that the popping expansion capacity is considerably decreased as the impact time is increased, with a slight increase in these values for all treatments during the storage period. In relation to the electrical conductivity test, the values increased as the impact time and the storage period increased, indicating that the damage to the kernel pericarp causes the integrity loss with a lower expansion of the kernels and higher electrolytic leaching of the cellular kernel solutes to the deionised water solution. Therefore, an equation was adjusted to the data of the popping expansion capacity as a function of the electrical conductivity and demonstrated the potential of the electrical conductivity test as a basis for estimating the popcorn quality.