Abstract

Sweet corn quality rapidly deteriorates from the time it is harvested-primarily because of reduction in kernel sugar concentration. High respiration rate is assumed the primary cause of postharvest quality deterioration. Postharvest deterioration of sweet corn quality can be reduced by cold storage. However, it is usually both difficult and expensive to accomplish-especially in the field. This thesis was designed to study sweet corn respiration during storage and investigate the effectiveness of controlled atmosphere (CA) storage at field temperature at preserving sweet corn quality.

Sweet corn 'Super Sweet 7210' (sh2) and 'Sugar Buns' (su se) were stored at 20 °C in 60% CO_2, 20% CO_2, and at air atmospheres at 20 °C for 12 days. Respiratory gas exchange in 'Sugar Buns' was higher than in 'Super Sweet 7210' throughout the storage period. As regards storage atmospheres, lower respiration rates were detected in elevated CO_2 atmospheres for both genotypes with higher concentration (60% CO_2) resulting in greater retardation at all stages of storage.

Kernel sugar retention during storage was affected by genotype, storage duration, storage atmosphere and temperature. 'Super Sweet 7210' showed both higher sugar content at the fresh corn stage and better sugar retention during storage. The total sugar content of both genotypes declined during storage at 20 °C, but the sugar concentrations were observed to decline more rapidly in 'Sugar Buns' than in 'Super Sweet 7210' during the treatments. However, the changes in phytoglycogen and starch during storage were not significant, except for a slight increase of phytoglycogen content during storage in 'Sugar Buns'.

These results show respiration accounts for most postharvest sugar depletion in sweet corn. Since no significant increase was observed in phytoglycogen and starch content during storage in 'Super Sweet 7210' (sh2), it is likely that substrate consumption during respiration is primarily responsible for kernel sugar depletion in shrunken sweet corn. In 'Sugar Buns' (su se) sweet corn, a higher respiration rate, along with the conversion of sucrose to phytoglycogen, results in increased and more rapid sugar depletion during storage. There is no evidence to show that the conversion of sucrose to phytoglycogen or starch was significantly affected by respiration in sweet corn.

Although controlled atmosphere storage at 20 °C affords some benefits in retarding sugar depletion and superficial mold growth, it simply slows down the respiration rates, but does not stop them completely. The data reported here didn't offer much promise that controlled atmosphere storage at field temperature can be used for long term storage of sweet corn. Breeding cultivars that retain sugar in combination with cold storage seems to offer more potential benefits than CA for long term storage.