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Evaluation of root firmness and cell wall components in sugarbeet lines for reducing sugar loss during post-harvest piling storage.

Roots of sugarbeet (*Beta vulgaris* L. ssp. *vulgaris* Doell.) are easily injured during harvesting or making piles for storage prior to processing in sugar factory, which not only increases the risk of roots being infected by pathogens to cause root rot and affecting sucrose extraction, but also enhances respiration of root tissue to provide energy for wound healing and causing significant sugar loss. Increase root firmness to reduce root injuries during harvesting and post-harvest piling storage will provide a solution to reduce post-harvest sugar loss. Root tissue firmness is determined by strength of tissue cells and cell wall structure could be a key determinant of tissue texture. Analyzing content of pectin types (mainly water-soluble pectin, sodium-carbonate-soluble pectin and chelator-soluble pectin) in cell wall will provide critical information of increasing root firmness via breeding selection focuses on cell wall components. In this study, we will evaluate root tissue firmness and cell wall components in 360 sugarbeet genotypes to find out the relationship between root firmness and cell wall pectin compositions before and after roots were cold stored for three months. A genome-wide association study (GWAS) will be conducted to identify genomic regions associated with root firmness and cell wall pectin components to develop markers linked to genes that increase root hardness. This research will identify genetic sources and develop markers for efficiently creating new germplasm with enhanced root hardness towards reducing sugar loss during harvesting and post-harvest piling storage.