

A DNA test for high incidence of soft scald and soggy breakdown postharvest disorders in *Malus domestica* Borkh

Baylee A. Miller, John R. Tillman, Nicholas P. Howard, Sarah A. Kostick, Kate M. Evans and James J. Luby

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Abstract

The ‘Honeycrisp’ apple, an economically important cultivar and breeding parent, is prone to soft scald and soggy breakdown postharvest physiological disorders. Phenotypic evaluation of soft scald is time consuming and costly, making it an excellent target for DNA-informed breeding. The objective of this study was to develop a DNA test for a soft scald and soggy breakdown quantitative trait locus (QTL) on linkage group two (LG2) that was characterized in a previous study. ‘Honeycrisp’ is homozygous for the undesirable high disorder incidence haplotype (HDI) at this QTL. In this study, sixteen single nucleotide polymorphism markers were evaluated for their associations with the HDI haplotype in a set of 132 unique cultivars and important breeding parents. A DNA test was successfully developed utilizing KASP™ (Kompetitive Allele Specific PCR) chemistry to identify the number of HDI haplotypes in individuals. This test had a 100% accuracy for detecting homozygous unfavorable HDI individuals and has an expected 88% accuracy over all three haplotype copy groups across the evaluated germplasm. This DNA test is a promising tool for minimizing the chances of selecting individuals that exhibit high incidence of soft scald postharvest disorder in ‘Honeycrisp’-related germplasm.