Searching Cold Hardiness Related Genes in Peach Tree (Prunus persica) Shoots by Comparative Transcript Analysis

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Cold hardiness and its related transcriptional expression were compared during cold acclimation in the shoots of ‘Soomee’ and ‘Odoroki’ peach trees (Prunus persica) at 2, 4, and 8 weeks from November 15, 2018. The level of cold hardiness was expressed as temperature representing 50% injury occurred (LT50), determined by electrolyte leakage analysis. The LT50 values of the shoots continuously decreased in both cultivars, indicating that cold hardiness increased during cold acclimation. The shoots of ‘Soomee’ were cold-hardier with lower LT50 than those of ‘Odoroki’ during cold acclimation. Transcriptome data constructed by RNA-Seq revealed that six differentially expressed genes were highly up-regulated during cold acclimation. Their relative expression levels of the genes were validated by quantitative polymerase chain reaction analysis. The six genes, including bidirectional sugar transporter sweet 1, polygalacturonase inhibitor, extracellular ribonuclease LE, pEARLI-like lipid transfer protein, 14 kDa proline-rich protein, and late embryogenesis abundant protein 2, were significantly up-regulated during cold acclimation. Five genes except for bidirectional sugar transporter sweet 1 were more highly expressed in the shoots of ‘Soomee’ than in those of ‘Odoroki’. The expressions of the six genes were correlated with cold hardiness. These results indicated that cold hardiness was associated with transcriptional expression during cold acclimation. (This research was supported by Cooperative Research Program funded by Rural Development Administration (PJ01272502-2019).)