

Title High throughput metabolic phenotyping of apple fruit
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Abstract

Precise high throughput (HT) phenotyping is a crucial facet of breeding programs directed towards producing superior fruit crops. Desirable but complex traits, such as flavor, color and ‘health’, may be more effectively characterized by HT metabolite-based phenotyping. This evaluation is complicated by the sensitivity of many traits and metabolites to the environment, fruit maturity and to postharvest storage, and by the need to balance sample throughput and analytical precision against the practicalities of time and cost in HT analysis. Aspects of a HT metabolic phenotyping strategy for the analysis of complex quality traits in apple fruit are described. Volatiles and primary metabolites are measured by GCMS, color by UHPLC and digital image analysis, and polar and phenolic compounds by UHPLC-MS. Application of these techniques to fruit from ‘Royal Gala’ × ‘Granny Smith’ and ‘Royal Gala’ × ‘Braeburn’ apple crosses has resulted in the mapping of QTL near genes responsible for flavor and phenolic biosynthesis.