Prediction of fruit firmness across multiple southern highbush blueberry cultivars using sugars and acids

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Blueberries (*Vaccinium spp*.) have a shelf-life of between 1 to 7 weeks depending on cultivar, harvesting, handling, and storage method. The aim of this proposed work was to identify relationships between metabolites, fruit quality attributes, and fruit firmness. Fruit samples were collected during postharvest storage at regular intervals from southern highbush (SHB) and rabbiteye cultivars in 2015-2018. In addition, fruits samples from southern highbush cultivars, Suziblue, and Rebel in 2015 and seven other cultivars (Suziblue, Rebel, Farthing, Miss Jackie, Miss Alice Mae, Miss Lilly, and Emerald) in 2017 were collected for the metabolites analysis. Fruit quality attributes such as fruit firmness, total soluble solids content (TSS), titratable acidity (TA), fruit weight, pH, and visual quality were determined during the various postharvest storage times. Our stepwise linear regression model suggested that fruit compression is associated with the puncture values, healthy berries (%), TA, fruit weight, TSS, and pH. Similarly, fruit puncture is significantly associated with compression, TA, Type (SHB), and percent healthy berries. We further predicted the fruit firmness from metabolites data using LASSO regression model. Model indicated that quinate and citrate were positively associated and major sugars were negatively associated with the fruit firmness. This valuable information can inform and guide future breeding programs to enhance fruit firmness in blueberries.