Evaluating the effect of harvest maturity on the quality characteristics of Gala and Honeycrisp apple cultivars grown under the Mid-Atlantic conditions

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Introduction

Gala and Honeycrisp apples are among the top-three cultivars produced in the US. Honeycrisp in particular has become very popular among consumers in the fresh fruit market due to its crisp texture and distinct flavor profile. Honeycrisp, therefore, is a high-value cultivar, sold for premium prices, especially in the Mid-Atlantic which is one of the first regions to harvest Honeycrisp each season. Nevertheless, overall apple fruit quality can be impacted by several factors, including environmental conditions, preharvest management practices, and stage of maturation at harvest, each affecting fruit marketability. The objective of this research was to evaluate one of these factors – the effect of maturity at harvest – on the quality characteristics of these two key cultivars grown under the Mid-Atlantic conditions and provide recommendations of maturity at harvest depending on the target market.

Materials and Methods

• Fruit from Honeycrisp/M26 and Crimson Gala/M9 was harvested at three different maturity stages (Fig. 1): (i) August 25th (ii) September 5th (iii) September 19th
• On August 27th, both cultivars received an application of ReTain® (an ethylene production inhibitor).

![Fig. 1: Whole fruit images of Gala and Honeycrisp cultivars at each stage of evaluation.](image)

Results

![Fig. 3: Fruit quality assessments for Gala and Honeycrisp apple cultivars at three different maturities, harvested on August 25th, September 5th, and September 19th, 2020. Values are means ± SE (n=4). Different letters indicate significant differences (p < 0.05). (SSC) = soluble solids content, DA = difference of absorbance, I_ab = index of absorbance difference.)](image)

![Fig. 4: (A) Starch content changes for Gala and Honeycrisp apple cultivars at three different maturities using the starch-iodine test (full starch all blue-black) and starch-free (no stain). (B) Cornell Scale utilized for quantification of starch patterns [2].](image)

Discussion

![Fig. 5A: Skin Hue (blush side):](image)
• Hue angle decreased during three harvest dates: yellow -> red skin coloration
• Gala statistically darker red than Honeycrisp at all harvest dates

![Fig. 5B: Skin Hue (unblush side):](image)
• Hue angle decreased at harvest dates: green/yellow -> darker yellow skin color
• Gala significantly darker yellow than Honeycrisp after August 25th

![Fig. 5C: Skin blush percentage:](image)
• Marketable blush (>50%) achieved: September 5th
• Maximum blush (>70%) observed: September 19th

Conclusions

1. Maturity at harvest plays a key role on the quality characteristics of Gala and Honeycrisp cultivars grown in the Mid-Atlantic region, influencing fruit marketability.
2. Fruit harvested at an advanced maturity will be tree-ripe and display darker red and yellow skin coloration, larger size, and higher soluble solids. Nevertheless, fruits will also display higher ethylene concentration, lower firmness, decreased storage capacity, together with increased susceptibility to cracking and rots.
3. Fruit destined for long-term storage should be harvested at the second date of maturity.
4. Cultivar-specific differences in Gala and Honeycrisp result in different quality characteristics in each cultivar.

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References