Current MSU Recommendations for Honeycrisp Storage

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INTRODUCTION

The Honeycrisp apple continues to be a popular and valuable addition to the varietal mix grown in the U.S. Significant production acreage can now be found in Michigan, Minnesota, New York, Nova Scotia, Ontario, and Washington. Honeycrisp is the most profitable apple on a per fruit basis grown in the state of Michigan and the number of bearing acres is increasing dramatically each year. As the planted acreage continues to grow, the need to extend the marketing season intensifies. However, high sensitivity to a number of storage disorders that include chilling injury [e.g., soggy breakdown (Fig. 1) and soft scald (Fig. 2)] and CA injury (Fig. 3) poses a serious risk to successful storage. Research at MSU and other institutions has lead to the development of recommendations for the handling of Honeycrisp in order to minimize the risks of loss due to these storage problems

Figure 1. CHILLING INJURY: Soggy breakdown of Honeycrisp. Internal injury (left) can extend to the surface in severe cases, (right) leading to diffuse surface browning that differs from the clean, sharp edges of soft scald.

Figure 2. CHILLING INJURY: Soft scald on Honeycrisp. Injury begins as a ribbon-like light brown lesion with well-defined edges (left) and over time becomes dark brown as tissues degrade and decay begins (right). May or may not be associated with soggy breakdown.

Figure 3. CA INJURY: Internal controlled atmosphere injury from low O_2 and elevated CO_2. Injury can be in small patches or large sections, depending on severity (left). The disorder is usually accompanied by lens-shaped voids (right).

CONCLUSIONS FROM RECENT STUDIES (MI, NY, MN, WA, ONT)

Chilling injury increases with increasing maturity. Storage at 38 ºF reduces chilling injury. Chilling injury can be further reduced by preconditioning the fruit at 50 to 70 ºF for 5 to 7 days. However, bitterpit can sometimes be enhanced by the higher temperatures. Controlled atmospheres lead to the development of sometimes severe internal injury that is dependent on both low oxygen and elevated CO_2. CA injury is enhanced by 3% CO_2, but reduced dramatically by preconditioning. The intensity of the CA injury declines as preconditioning temperature increases, with a 5-day holding period of 70 ºF (20 ºC) essentially eliminating injury. Use of DPA inhibits CA injury (but not chilling injury), even without preconditioning. Air storage reduces, but does not eliminate disorder incidence. 1-MCP application may increase the intensity of CA injury. Importantly, there is great variability between orchards and years.

MSU RECOMMENDATION: CA Storage

PREHARVEST

- Manage bitterpit through Ca applications and crop thinning.
- Employ a good preharvest decay control strategy.
- Harvest fruit when the starch index (Washington Chart) is between 2 and 5 and before background color change is complete.

POSTHARVEST

- Precondition fruit between 50 and 68 ºF for 5 to 7 days.
- Monitor CO_2 levels in the storage and preconditioning rooms if possible.
- Keep CO_2 levels < 1% during preconditioning and storage.
- Use 3% O_2 and <1% CO_2 (may be able to increase CO2 after first 4 to 6 weeks).
- DPA (500 - 1000 ppm, preferably thermofogging) can be used to avoid CA injury (can use 3% CO_2 in storage).
- Store fruit at 38 ºF.

MSU RECOMMENDATION: Air Storage

PREHARVEST

- Manage bitterpit through Ca applications and crop thinning.
- Employ a good preharvest decay control strategy
- Harvest fruit when the starch index (Washington Chart) is between 2 and 5 and before background color change is complete.

POSTHARVEST

- Precondition fruit between 50 and 68 ºF for 5 to 7 days.
- Monitor CO_2 levels in the storage and preconditioning rooms if possible.
- Keep CO_2 levels < 1% during preconditioning and storage.
- Apply SmartFresh for extended storage as alternative to CA.
- Store fruit at 38 ºF.

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