The ‘Honeycrisp’ apple cultivar has attracted the attention of North American apple producers, marketers and consumers. This cultivar has an exceptionally crisp texture with a distinctive mottled red coloration over a yellow background. The northerly, but moderate, maritime climate in Atlantic Canada has proven to be ideal for growing premium-coloured ‘Honeycrisp’ fruit. This natural advantage has resulted in a valuable export market and has the potential to contribute to the rejuvenation of the Atlantic Canadian apple industry.

Harvesting considerations

‘Honeycrisp’ is vulnerable to disorders such as watercore, soft scald, sun scald, post-harvest internal breakdown, bitter pit and Jonathan spot. The fruit are also susceptible to high incidences of decay in storage (Please refer to factsheet entitled: ‘Honeycrisp’: Management for a unique cultivar in Nova Scotia). Decline in fruit flavour and development of undesirable off-flavours can also occur, predominantly in late-harvested fruit. Therefore harvesting ‘Honeycrisp’ at the optimum time is very important.

When determining maturity of ‘Honeycrisp’, harvest and storage supervisors must be aware of the unique internal characteristics of this cultivar, such as rapid conversion of starch to sugar, constant firmness and low levels of ethylene generation. When considering harvest, the change of fruit starch to sugar is a reliable initial indicator of ‘Honeycrisp’ readiness. The change in background colour from green to cream is a good visual indicator of when to begin harvest. Commercially, a difficult decision often occurs when the fruit maturity indicators are present yet red fruit colour development is less than what the market expects. The optimum harvest window for ‘Honeycrisp’ in Atlantic Canada, for storage greater than one month, generally occurs between September 25 and October 10 in most seasons. Late-colouring fruit are often harvested past the optimum harvest window, and this frequently results in higher incidence of disorders. Late-harvested fruit are not recommended for an extended storage period.
Pre-storage treatment

Retaining ‘Honeycrisp’ apples in a warm environment prior to cold storage is referred to as delayed cooling. The primary benefit of this pre-storage treatment is believed to be a reduction in intercellular moisture. In Atlantic Canada, the current delayed cooling treatment recommendation is to place harvested ‘Honeycrisp’ apples as soon as possible in a room at 20°C and ≤50% relative humidity (RH) for 6 days.

Research results indicate that the temperature and RH during this treatment are more critical than the duration. The objective of delayed cooling is to reduce fruit weight by a minimum of 1% through water loss. A possible explanation of how this works is that 20°C for 6 days coupled with a relative humidity of 50% during delayed cooling produces a higher driving force for water loss. Following the delayed cooling period a cold-storage temperature range of 3 to 5°C will maintain fruit quality. Handling fruit in this manner results in a reduction or complete suppression of soft scald and internal breakdown.

Recommemnations for delayed cooling vary amongst growing regions due to the cultivar’s adaptation to specific environmental conditions. As an example, the incidence of bitter pit is aggravated by warm temperatures in some growing regions prior to storage, thus requiring the postharvest delay to be longer. In contrast, soft scald and internal breakdown disorders may cause significant losses in Atlantic Canada and the control is dependent on pre-storage temperature and duration of this treatment.

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Disorders occurrence

Both soft scald and internal breakdown (a.k.a. low temperature breakdown or soggy breakdown) are chilling-induced disorders. The incidence of soft scald and/or internal breakdown can be as high as 20% if fruit are stored at less than 3°C. A storage temperature between 3 and 5°C is recommended to minimize these chilling-based problems. The predisposition of ‘Honeycrisp’ to disorders appears to originate in the orchard prior to harvest. Thus, the pre-storage treatment is necessary to prevent the expression of these disorders. The occurrence of internal breakdown can range from slight to severe yet it is difficult to detect without cutting the fruit open. The incidence of this disorder appears to be higher in fruit harvested after the optimum harvest period has ended. Therefore, success of a delayed cooling treatment prior to storage on these fruit may be diminished.

Storage conditions

Retention of constant firmness throughout the refrigerated air (RA) storage period may cause one to question the necessity for CA for ‘Honeycrisp’ apples. Controlled-atmosphere (CA) storage of ‘Honeycrisp’ at the AAFC- AAC post-harvest lab, AFHRC, Kentville, has demonstrated that normal CA conditions allow ‘Honeycrisp’ fruit to be successfully stored for a 12 month period or more.

Our research has demonstrated that ‘Honeycrisp’ fruit harvested during the optimum harvest window and delayed cool-treated at 20°C for 6 days prior to CA conditions of 2.0% O₂ and 3.0% CO₂ (CO₂ should initially be scrubbed for 4 to 6 weeks prior to allowing it to accumulate) results in superior fruit quality after storage. ‘Honeycrisp’ fruit do not have ultra low oxygen (ULO) sensitivity and fruit have been stored experimentally in Dynamic Controlled Atmosphere (DCA) at 0.7% O₂ without injury for 9 months. Storage operators must ensure that the desired storage temperature of the fruit is obtained prior to applying CA conditions to the sealed storage room. Controlled-atmosphere storage reduces the incidences of fruit decay, formation of a thick waxy cuticle and maintains juiciness and flavour when compared with cold-stored apples.

Conclusion

From production to consumption ‘Honeycrisp’ is a unique apple. Steps must be taken to provide the consumer with a consistently high quality ‘Honeycrisp’ eating experience. Producers and storage operators must provide the attention necessary to optimize quality during production, harvest, pre-storage and storage procedures to avoid any disappointment in the market place.

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