

FRUIT NOTE: 2022 Honeycrisp Harvest and Storage Recommendations:

PRE-STORAGE

I. Color management

Honeycrisp, like most, if not all apple cultivars, typically store better if they are harvested early in the maturation, rather than later. To harvest Honeycrisp on the early side, use available tools (reflective ground covers, pruning for maximizing light penetration, use early coloring cultivars, avoid early ripening cultivars)

2. Bitter pit management

Manage crop load and minimize biennial bearing to even out production and reduce the risk of bitter pit. Provide adequate calcium using 5 to 8 sprays beginning shortly after fruit set. Avoid bitter pit promoting rootstocks and orchard sites. Use historical records to identify risky sites and avoid them for long term storage.

3. Harvest management

Use of early coloring cultivars (not early ripening cultivars like Premier and others) and growth regulators is encouraged. Use lower rates of ReTain (repeated applications can be OK) or Harvista - with or without NAA to control fruit drop. Better color might be obtained from Harvista-treated blocks since the inhibitory treatment is later in development and can interfere with red coloration less than ReTain.

AIR STORAGE

I. AIR Storage (no 1-MCP)

1. Harvest at optimal maturity - prior to 60% starch clearing (Starch Index < 6 on Cornell Starch Chart) and ground color change from green to yellow.
2. Precondition for 5 to 7 days at 50 °F to suppress chilling injury (make sure CO₂ levels do not exceed 1% - this is especially important for fruit from young trees).
3. Store at 36 to 38 °F for 3-4 months, slightly longer if initial maturity was less.

II. AIR storage (with 1-MCP)

1. Harvest at optimal maturity - prior to 60% starch clearing (Starch Index < 6 on Cornell Starch Chart) and ground color change from green to yellow.
2. Treat with 1-MCP (1 ppm, 24 hr) during preconditioning if possible. Repeat applications of 1-MCP are not helpful if the interval is 1.5 months or greater.
3. Precondition for 5 to 7 days at 50 °F to suppress chilling injury (make sure CO₂ levels do not exceed 1% - this is especially important for fruit from young trees).
4. Store at 36 to 38 °F for up to 5 months, slightly longer if initial maturity was less.

CA STORAGE

I. CA storage (no DPA, no 1-MCP)

OPTION 1 (mild preconditioning)

1. Harvest at optimal maturity - prior to 60% starch clearing (Starch Index < 6 on Cornell Starch Chart) and ground color change from green to yellow.
2. Precondition for 5 to 7 days at 50 °F to suppress chilling injury (make sure CO₂ levels do not exceed 1% - this is especially important for fruit from young trees).
3. Store at 36 to 38 °F for at least 1 month with CO₂ levels ~ 0.5 to 1% and O₂ between 1.5 and 3%. Then:
 - A. Standard CA: Store at 36 to 38 °F for an additional ~5-6 months (~6-7 months total) with CO₂ level 3% and O₂ between 1.5 and 3%. Fruit can be held longer if initial maturity was less.
 - B. Low O₂ CA: Store at 36 to 38°F for ~6-7 months (~7-8 months total) with CO₂ level of 1% and O₂ level of 0.5 to 1% (use DCA technology if available). Fruit can be held longer if initial maturity was less.

OPTION 2 (intense preconditioning to help control CO₂ injury)

1. Harvest at optimal maturity - prior to 60% starch clearing (Starch Index < 6 on Cornell Starch Chart) and ground color change from green to yellow.
2. Precondition for 3 to 5 days at 70 °F to suppress chilling and CA injuries (make sure CO₂ levels do not exceed 1% - this is especially important for fruit from young trees). Intense preconditioning will shorten storability somewhat and can enhance bitter pit development. Then:
 - A. Standard CA: Store at 36 to 38 °F for ~6 months with CO₂ level of <1% and O₂ between 1.5 and 3%. Fruit can be held longer if initial maturity was less.
 - B. Low O₂ CA: Store at 36 to 38°F for ~6-7 months with CO₂ level of 1% and O₂ level of 0.5 to 1% (use DCA technology if available). Fruit can be held longer if initial maturity was less.

II. CA storage (no DPA, with 1-MCP)

OPTION 1 (mild preconditioning)

1. Harvest at optimal maturity - prior to 60% starch clearing (Starch Index < 6 on Cornell Starch Chart) and ground color change from green to yellow.
2. Treat with 1-MCP (1 ppm, 24 hr - at same time as preconditioning).
3. Precondition for 5 to 7 days at 50 °F to suppress chilling injury (make sure CO₂ levels do not exceed 1% - this is especially important for fruit from young trees).
4. Store at 36 to 38 °F for up to 1 month with CO₂ levels below 1% and O₂ between 1.5 and 3%. Then:
 - A. Standard CA: Store at 36 to 38 °F for ~6-7 months (~7-8 months total) with CO₂ level <1% and O₂ between 1.5 and 3%. Fruit can be held longer if initial maturity was less.
 - B. Low O₂ CA: Store at 36 to 38°F for ~7-8 months (~8-9 months total) with CO₂ level of <1% and O₂ level of 0.5 to 1% (use DCA technology if available). Fruit can be held longer if initial maturity was less.

OPTION 2 (intense preconditioning)

1. Harvest at optimal maturity - prior to 60% starch clearing (Starch Index < 6 on Cornell Starch Chart) and ground color change from green to yellow.
2. Treat with 1-MCP (1 ppm, 24 hr - at same time as preconditioning).

3. Condition for 3 to 5 days at 70 °F to suppress chilling and CA injuries (make sure CO₂ levels do not exceed 1% - this is especially important for fruit from young trees). Intense preconditioning will shorten storability somewhat and can enhance bitter pit development. Then:
 - A. Standard CA: Store at 36 to 38 °F for ~6-7 months with CO₂ level <1% and O₂ between 1.5 and 3%. Fruit can be held longer if initial maturity was less.
 - B. Low O₂ CA: Store at 36 to 38°F for ~7-8 months with CO₂ level of <1% and O₂ level of 0.5 to 1% (use DCA technology if available). Fruit can be held longer if initial maturity was less.

III. CA storage (with DPA, no 1-MCP)

1. Harvest at optimal maturity - prior to 60% starch clearing (Starch Index < 6 on Cornell Starch Chart) and ground color change from green to yellow.
2. Precondition for 5 to 7 days at 50 °F to suppress chilling injury (make sure CO₂ levels do not exceed 1% - this is especially important for fruit from young trees). Then:
 - A. Standard CA: Store at 36 to 38 °F for ~6-7 months with CO₂ level <1% and O₂ between 1.5 and 3%. Fruit can be held longer if initial maturity was less.
 - B. Low O₂ CA: Store at 36 to 38°F for ~7-8 months with CO₂ level of ~1% and O₂ level of 0.5 to 1% (use DCA technology if available). Fruit can be held longer if initial maturity was less.

IV. CA storage (with DPA, with 1-MCP)

1. Harvest at optimal maturity - prior to 60% starch clearing (Starch Index < 6 on Cornell Starch Chart) and ground color change from green to yellow.
2. Treat with 1-MCP (1 ppm, 24 hr - at same time as preconditioning).
3. Precondition for 5 to 7 days at 50 °F to suppress chilling injury (make sure CO₂ levels do not exceed 1% - this is especially important for fruit from young trees).
 - A. Standard CA: Store at 36 to 38 °F for ~8 months with CO₂ level of 3% and O₂ between 1.5 and 3%. Fruit can be held longer if initial maturity was less.
 - B. Low O₂ CA: Store at 36 to 38°F for ~9-10 months with CO₂ level of ~1% and O₂ level of 0.5 to 1% (use DCA technology if available). Fruit can be held longer if initial maturity was less.

Our recommended storage temperature remains 36 to 38 °F, lower temperatures may be successful sometimes, but we can and have seen problems following long-term storage at 32 °F. We recommend some form of protection from CA injury and we have previously had very good success for three successive years with 5 days at 68 °F. However, the more recent data shared here suggests a shorter conditioning period (3 days) at higher temperatures may be similarly effective, but additional testing is required. It is also worth noting that DPA is very effective at suppressing CA injury in Honeycrisp and would certainly be able to substitute for a preconditioning treatment in terms of controlling CA injury. However, since DPA has only a very slight suppressive effect on chilling injury, a

minimal prestorage conditioning treatment (5 days at 50°F) is still advisable in air or CA storage. Another alternative to CA storage is the use of 1-MCP to suppress ripening. Results so far have been quite favorable, but there may be a slight enhancement of sensitivity to CO₂ injury and an injury known as leather blotch, which is orchard-specific and little is known about causes of this injury. We strongly recommend monitoring CO₂ levels during room loading and the initial cooling period, venting the room if necessary.

-R.M. Beaudry, MSU
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