Harvest Maturity & PGR Use in Honeycrisp

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LOF Winter Fruit Schools
Lockport, 2-3-20
Farmington, 2-4-20
Overview

- Harvest Maturity
  - Current Best Management Practices
  - Future Technologies
- PGR Use for Harvest Mgmt & Enhancement of Fruit Quality
  - Functions & Uses of ReTain™, Harvista™, NAA
  - Recs of Valent (ReTain), AgroFresh (Harvista)
  - Grower Suggestions?
Harvest Maturity – Current BMP’s

- HC Doesn’t Behave like a “Normal” Apple!
  - Internal ethylene production does not correlate with maturity (Gala & Evercrisp™ also)
- Firmness range is more allowable than other varieties
- Flavor balance (brix/acid ratios) paramount
- Starch Pattern Index (SPI)
- Major harvest indicator is color
  - Weather – driven
  - Cultural practices impact
Harvest Maturity – Other Regions

Ontario (Jennifer DeEll)
• For CA or Long-term RA
• target SPI 5-6 (Cornell chart)
• target SPI 4 (MSU-Beaudry HC chart)

WA (Jim Mattheis)
For Long-term CA
• Breaking of ground color
• target SPI 4.5-5 (WA 1-6 chart)
• target SPI 3.5? (MSU-Beaudry)
Honeycrisp Harvest Maturity – WA Large Grower/packer

• For most varieties, firmness or SPI
  • Standard Deviation >1 is cause for concern
  • Must consider short-term storage

• Harvest based on careful examination CL mgmt. – background color, shoot growth/vigor

• In process developing a model – rating on 1-4, 1 best - store long term, 4 poorest– pack within 60 days
Honeycrisp Harvest Maturity – another WA Large Grower/packer

- Sending samples to QC lab
  - Background color, firmness, SPI, Brix
  - Brix/Acidity Ratios (ATAGO pocket kit), auto titrator, or with test strips used for grapes
- > 0.5% to for LT CA or
  - <0.4 TA – sell b4 Xmas
  - 0.4-.6 – length of storage determined when factor in CL, vigor, variation in orchard blocks, etc
  - >0.6 – pretty much can store 10-12 months
Harvest Maturity – NY

- Ideal Brix >14 %, good >13%
- Firmness > 14 lbs
- SPI not the most important, but generally 6.5-7.5 (Cornell 1-8 starch chart)
- Color that “jumps out” when the yellow background color makes the red almost florescent or iridescent. Ideal is the ground color turning to cream with 80% bright red cheek. (minimum 50%)
- Varietal flavor!

- Multiple Picks
  - Usually 3-4
Is There a Better Way?

- DA Meter

- Brix/Acid Kit
  - Easier/cheaper/faster than titration method
  - Still not practical for in-field use, large sample numbers?
  - Use in WA storage determination/segregation tool
Future Harvest Maturity Aids?

- Models
  - Soft scald
  - Bitter Pit
  - Temperature/Climate
- Predictive Screening
  - AgroFresh, peel/mineral analysis, passive model, etc.
  - Other future tools?
PGR’s for Harvest Management in Honeycrisp

- ReTain™ - (AVG - aminoethoxyvinylglycine hydrochloride)
- Harvista™ (1-MCP - 1-Methylcyclopropene)
- PoMaxa, Fruitone N (1-NAA – 1-Napthalene acetic acid)
- Combinations ReTain + NAA, Retain + Harvista
NAA (1-Napthalene acetic acid)

• For preharvest drop control
  • Can see effects in 1-3 days after application, for up to 2 weeks
  • Can advance maturity, soften apples
  • NAA controls genes that prevent drop but stimulates ethylene production and ripening.
    • Only recommended for use alone as a “rescue” treatment, storage potential reduced
• Can be used in combo with ReTain for increased stop-drop potential
ReTain™ - (AVG - aminoethoxyvinylglycine hydrochloride)

• Rates and use timings vary widely by variety and other factors
  • Normal rates delay color in Gala, Honeycrisp, & others
  • Timings 1-4 weeks before anticipated normal harvest date
  • Closer to harvest to take into account better weather forecast
  • Closer to harvest allows better stop-drop effect
  • Further from harvest increases color delay
  • Delays harvest 7-14 days
Harvista™ (1-MCP - 1-Methylcyclopropene)

• Sprayable 1-MCP
• Can generally be applied closer to harvest than Retain
  • 3-14 days
• Allows more accurate weather forecasts prior to application
• May be difficult to get good coverage (gas)
• Delays harvest 7-14 days
Retain & Harvista Biological Responses

- Ethylene production reduced
- Starch to sugar conversion slowed
- Fruit softening slowed
- Fruit drop reduced/delayed
- Cracking reduced/delayed
- Greasiness reduced/delayed
- Delays background color shift
- Delays red color development in some varieties
Retain & Harvista Practical Impacts

• Harvest management:
  • Promotes orderly harvest of large acreage of single varieties by treating portions of the crop with different rates/timings of these PGRs, delaying maturity and subsequent harvest of those blocks, allowing growers to harvest fruit of optimum quality over longer periods
  • In PYO situations: extend the availability of popular varieties over more weekends

• Labor management:
  • More efficient use of smaller crews to harvest fruit at optimum quality
  • The use of these PGRs can help eliminate the “crunch periods” for more orderly harvest.
Plant Responses to PGR’s can be highly variable

- Outside factors
  - Cultivar, Rootstock, training system, tree age, tree vigor, crop load, tree nutrition, application equipment
  - Once you approach the short application window, these factors can’t be controlled

- There can be stronger influences, some you can control
  - Environmental conditions at application
  - Application timing, rate, and volume
  - Coverage, water quality, adjuvants
• Environmental Conditions
  • Temperature, humidity, sunlight, and rain before, during, and after application can have a great influence on plant response to PGR applications
    • These tend to be more important during post-bloom thinning sprays
  • Extreme heat (for comparison, that causes sunburn necrosis of fruit) can reduce response to subsequent PGR applications
  • PGR absorption temps
    • Range 60-90F
    • Optimum 70-75F
  • Higher temps following application tend to:
    • Increase fruit ripening response to NAA & Ethephon
    • Decrease stop-drop response to AVG
Retain for Honeycrisp

- Varies – what are your primary goals? Stop-drop? Reduce # picks? Harvest Mgmt?
  - Still can use ½ pouch/A @ 3-4 WBH
    - Color delay, unreliable weather forecast
  - Looking at closer to harvest ½ to 1 pouch A @ 7-10 DBH
    - Less color delay, better weather forecast
    - With NAA in split applications?
    - Without NAA in split applications?
- More to follow this summer
Recommendations of Harvista for HC
(Emily Follett, AgroFresh)

- Varies – what are your primary goals? Stop-drop? Reduce # picks? Harvest Mgmt?
- 1.5 - 2.5 SPI (using the Beaudry Honeycrisp starch chart) to reduce fruit drop and greasiness, especially of first pick fruit. If harvest isn’t delayed, the first pick should hold well in storage.
- Spray 7 DBH to hold fruit for better color and to reduce greasiness. This has been shown to reduce a pick.
- Spray 3 days before harvest to reduce drop and greasiness in second pick. Allows you to hold the fruit on longer for better color, and can reduce a pick. This spray will also hold acidity and condition on first pick fruit going into storage.
- Spray after first pick to allow second pick to hold the fruit on the tree longer to gain color, while maintaining condition. This can reduce a pick.
PGR’s Don’t End with Harvest

• Storage Effect with PGR’s (Watkins)
Thanks!

- Valent - Greg Clarke, Jim Wargo, and Mike Keller
- Liz Tee – LOFT Technician
- AgroFresh - Keith Culver, Ken Silsby, Nick Michalisin, Emily Follett, Chelsea VanAcker
2 Shameless Plugs

- NYFVI Biter Pit Project (Dan Donahue, CCE-ENYCHP)
  - Looking for more cooperating farms in 2020
  - Looking for more WNY survey respondents
  - Online Producer Honeycrisp Bitter Pit Survey - link will be in our future newsletter and online

- A Comprehensive Acreage & Variety Survey for Commercial Apple Growers in NY – we still need more survey respondents - link will be in our future newsletter and online