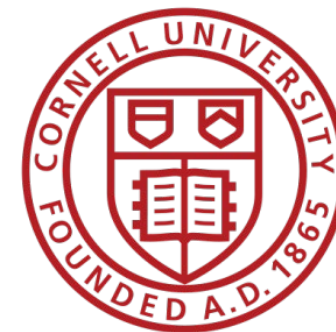


Harvest Maturity & PGR Use in Honeycrisp



Craig Kahlke, CCE-LOF, Fruit Quality Management, Team Leader

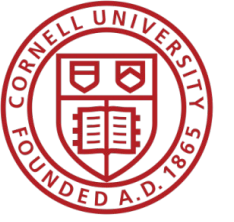
LOF Winter Fruit Schools

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)

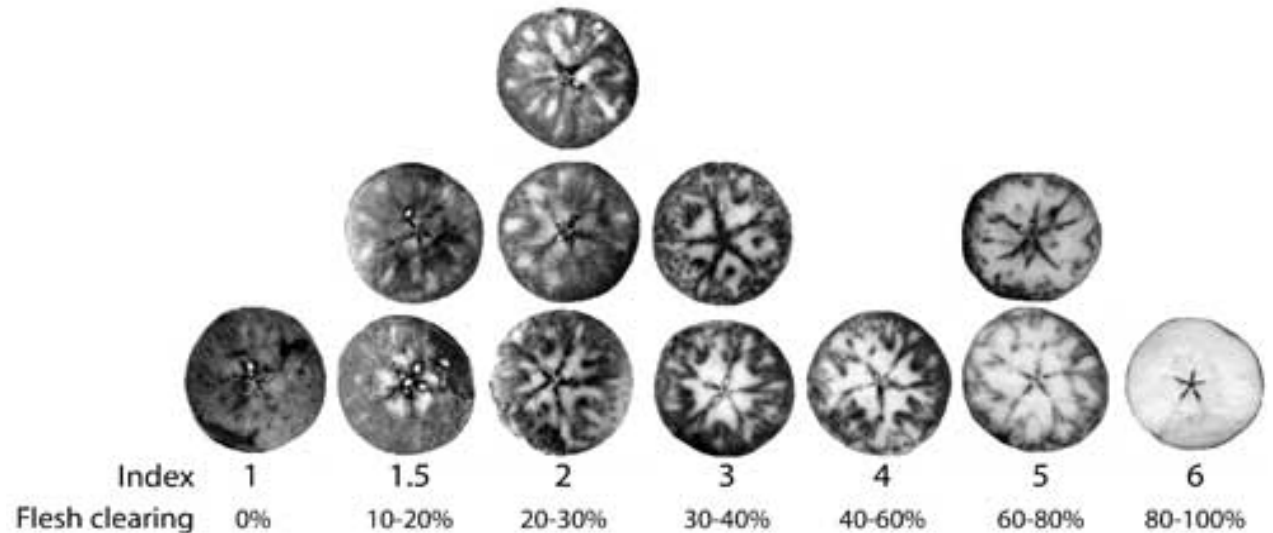
- For CA or Long-term RA
- target SPI 5-6 (Cornell chart)
- target SPI 4 (MSU-Beaudry HC chart)

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)

Starch Iodine Index for Honeycrisp



Photos and Development by Ives Hanrahan
(hanrahan@treefruitresearch.com) with starch clearing
estimates by R.M. Beaudry (beaudry@msu.edu)



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
 - $\geq 0.5\%$ to for LT CA or
 - $<.4$ TA – sell b4 Xmas
 - $.4-.6$ – length of storage determined when factor in CL, vigor, variation in orchard blocks, etc
 - $>.6$ – pretty much can store 10-12 months







Harvest Maturity – NY

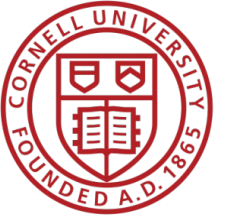
- Ideal Brix >14 %, good >13%
 - Firmness > 14 lbs
 - SPI not the most important, but generally 6.5-7.5 (Cornell 1-8 starch chart)
 - Color that “jumps out” when the yellow background color makes the red almost florescent or iridescent. Ideal is the ground color turning to cream with 80% bright red cheek.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





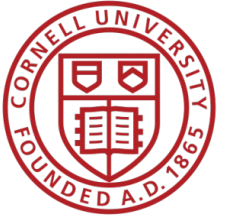
Future Harvest Maturity Aids?

- Models
 - Soft scald
 - Bitter Pit
 - Temperature/Climate
- Predictive Screening
 - AgroFresh, peel/mineral analysis, passive model, etc.
 - Other future tools?



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PGR's for Harvest Management in Honeycrisp



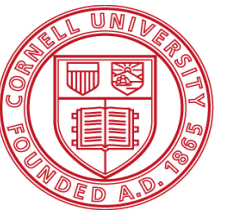
- ReTain™ - (AVG - aminoethoxyvinylglycine hydrochloride)
- Harvista™ (1-MCP - 1-Methylcyclopropene)
- PoMaxa, Fruitone N (1-NAA – 1-Naphthalene acetic acid)
- Combinations ReTain + NAA, Retain + Harvista

ReTain®
Plant Growth Regulator


Harvista™

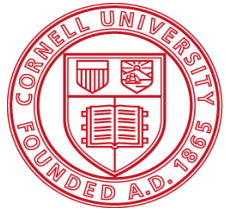

FRUITONE

NAA (1-Naphthalene acetic acid)



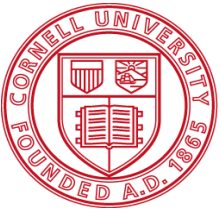
- For preharvest drop control
 - Can see effects in 1-3 days after application, for up to 2 weeks
 - Can advance maturity, soften apples
 - NAA controls genes that prevent drop but stimulates ethylene production and ripening.
 - Only recommended for use alone as a “rescue” treatment, storage potential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





ReTain™ - (AVG - aminoethoxyvinylglycine hydrochloride)

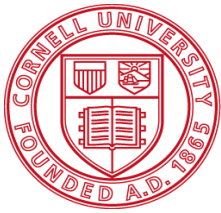
- Rates and use timings vary widely by variety and other factors
 - Normal rates delay color in Gala, Honeycrisp, & others
 - Timings 1-4 weeks before anticipated normal harvest date
 - Closer to harvest to take into account better weather forecast
 - Closer to harvest allows better stop-drop effect
 - 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

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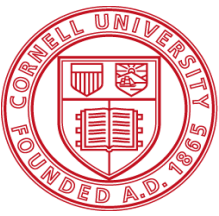


Retain & Harvista Biological Responses

- 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

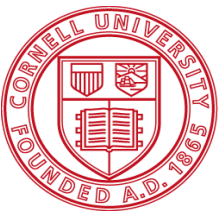
- Harvest management:
 - Promotes orderly harvest of large acreage of single varieties by treating portions of the crop with different rates/timings of these PGRs, delaying maturity and subsequent harvest of those blocks, allowing growers to harvest fruit of optimum quality over longer periods
 - In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

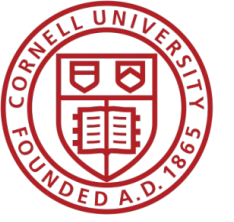
- Outside factors
 - Cultivar, Rootstock, training system, tree age, tree vigor, crop load, tree nutrition, application equipment
 - Once you approach the short application window, these factors can't be controlled
- There can be stronger influences, some you can control
 - Environmental conditions at application
 - Application timing, rate, and volume
 - Coverage, water quality, adjuvants

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- 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

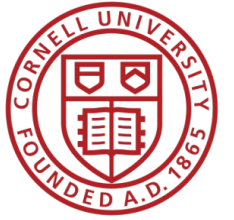
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Retain for Honeycrisp

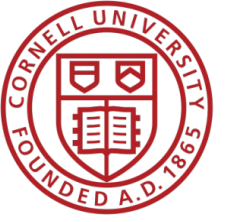
- Varies – what are your primary goals? Stop-drop? Reduce # picks? Harvest Mgmt?
 - Still can use ½ pouch/A @ 3-4 WBH
 - Color delay, unreliable weather forecast
 - Looking at closer to harvest ½ to 1 pouch A @ 7-10 DBH
 - Less color delay, better weather forecast
 - With NAA in spit applications?
 -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

Recommendations of Harvista for HC (Emily Follett, AgroFresh)

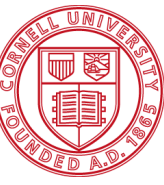


- Varies – what are your primary goals? Stop-drop? Reduce # picks? Harvest Mgmt?
- 1.5 - 2.5 SPI (using the Beaudry Honeycrisp starch chart) to reduce fruit drop and greasiness, especially of first pick fruit. If harvest isn't delayed, the first pick should hold well in storage.
- Spray 7 DBH to hold 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



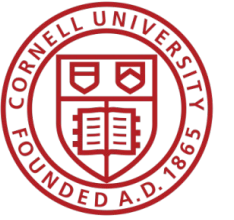
- Storage Effect with PGR's (Watkins)



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**