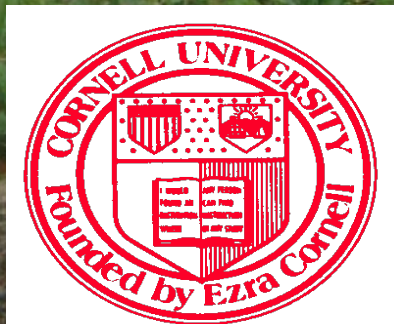


Options for Use of ReTain and Harvista with an Eye to Improved Post-Storage Results

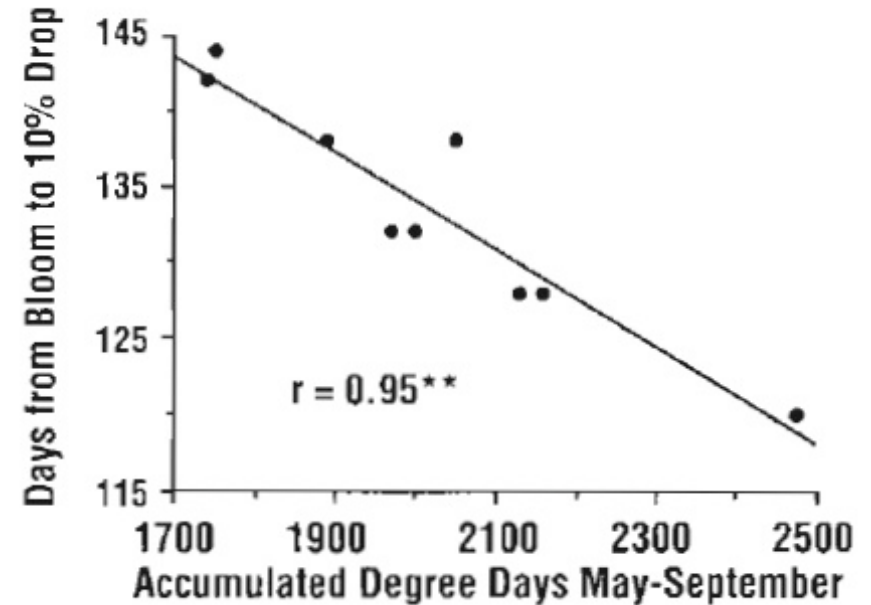
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In the Past, The Focus Has Been on Pre-harvest Drop Control

Every year we ask “How will the weather conditions this season impact harvest date, pre-harvest drop, and color development?”

- We know a warm season will advance maturity.
- We know warm temperatures in August will increase pre-harvest drop and advance maturity.
- With McIntosh, when starch rating reaches 3.5-4.5 the temperatures can be used to estimate when drop will start.



Mean daily temp.(°F)	Days from start of ethylene rise to abscission
40	25
45	18
50	13
55	9
60	7
65	5
70	4

Source: Christopher S. Walsh, 1977.

In recent years greater emphasis on other impacts of PGR's applied near harvest

- Manipulate harvest date.
- Control cracking, greasiness and internal flesh pigmentation.
- Limit the delay in red color development.
- Limit stem end flesh browning (SEFB) after storage.

Recent trends in the use of ReTain and Harvista

- **Combining ReTain with NAA:** The combination of ReTain and NAA has given better drop control than either chemical alone especially in hot years.
- **Applying Retain closer to harvest:** With Gala and Honeycrisp the negative effects of ReTain on red color development can be reduced by delaying application until 2 or even 1 week before harvest.
- **Greater use of Harvista** with sprayer kits on grower's sprayers
- **Applying ReTain at 3 weeks before harvest followed by Harvista at 1 week before Harvest.** This strategy gives the maximum delay of harvest.

Untreated Control



Retain full rate +NAA
20ppm @ 2WBH



Retain full rate @4WBH



Retain half rate + NAA
20ppm @ 4 and 2WBH



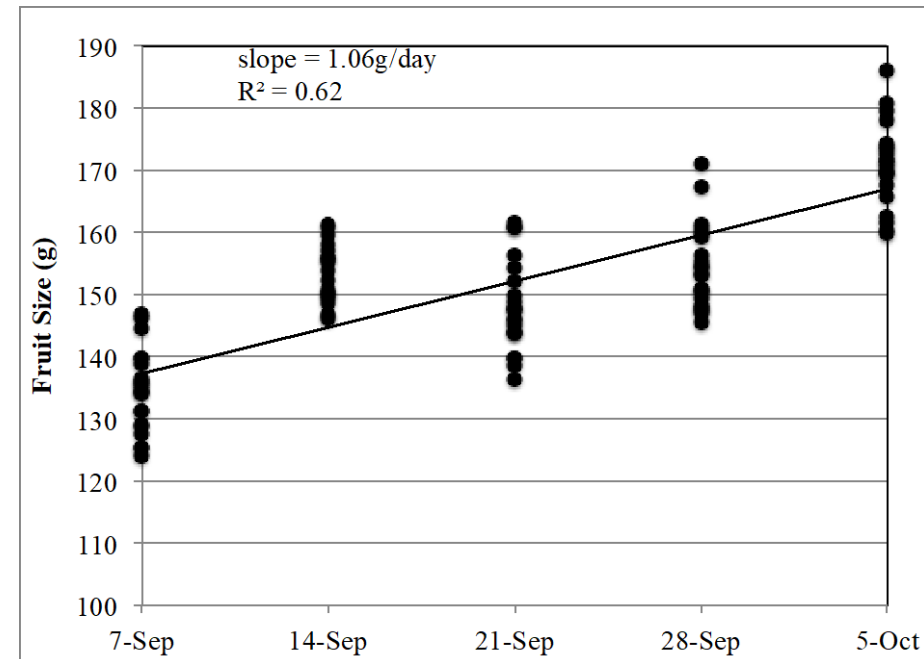
Specific recommendations for use of Retain

- **Gala**

- We recommend the application of only $\frac{1}{2}$ pouch/acre of Retain to reduce the delay in color development.
- Apply 3 weeks before expected first harvest to get the benefits of reduced stem end flesh browning after storage.
- A second application of $\frac{1}{2}$ pouch /acre of Retain at 1 week before expected normal first harvest will permit Gala fruit to remain on the tree an additional 21 days.
- By delaying harvest date, fruit size will increase by 1% each day harvest is delayed.

Over the course of 21-day delay, fruit size will increase by 1 box size.

- Retain can reduce to 2 or even 1 picking in some cases.
- Retain also reduces fruit stem end cracking and greasiness in the second and third picks.



Specific recommendations for use of Retain

- **Honeycrisp**
 - can have significant pre-harvest drop in some years.
 - We recommend a very low rate of 1/3 pouch per acre of Retain applied 2 weeks before expected harvest in blocks which have had a drop problem in the past.
 - ReTain (or Harvista) on Honeycrisp can increase the incidence of bitter pit during storage if the nutrient ratio of K/Ca is high. The decision on whether to use ReTain or Harvista on Honeycrisp should be made only after an assessment of the risk of bitter pit development by using the peel sap nutrient ratio method.

Specific recommendations for use of Retain

- **McIntosh**

- We recommend a combined application of ReTain (1 pouch) + NAA (10ppm) in a normal year and in a hot year a second application of the same tank mix.
- Apply tank mix 3 weeks before expected first harvest and in a hot years apply 2 applications at 3 weeks and 1 week before harvest.

Specific recommendations for use of Retain

- **For late September and October varieties**
 - the negative effect of Retain on fruit color development is much less than in early September varieties, thus we suggest the use of the full pouch/acre of Retain to provide a consistent reduction of fruit drop and greasiness.
 - For late September and October varieties which are harvested under cooler conditions, application timing should be 3 weeks before normal harvest date (10-15 of September).
 - Treating **Empire, Delicious and Jonagold** provides some flexibility in harvest date since those three varieties need to be harvested at about the same time.
 - **Cortland and Jonagold** both suffer from greasiness problems as the fruit mature and Retain applied 3 weeks before normal harvest can be a very effective control strategy.
 - **Idared and Rome** both suffer from internal flesh pigmentation (bleeding), which can result in rejection of the fruit at the processing plant. Our research indicates this problem can be controlled effectively with $\frac{1}{2}$ pouch/acre of Retain applied in mid September.
 - **Remember:** use an organosilicone surfactant



Specific recommendations for use of Harvista

- **Harvista**

- **Remember:** Harvista can be applied later than Retain (about 1 week before anticipated harvest but before significant drop occurs).
- It has a much more rapid action in the plant and can prevent fruit drop even when applied close to harvest.
- It has a long-lasting effect and will keep fruit on the tree more than 4+ weeks which is longer than Retain.
- MCP (the active ingredient in Harvista) is a gas and must be applied with specialized equipment to get consistent results.

Points to remember:

1. Pre-harvest drop is increased by low leaf Mg and high K and B.
2. Excessive summer pruning increases pre-harvest drop.
3. High levels of mites, leafminers or other insects increase fruit drop.
4. Drought increases fruit drop.
5. Hot years advance ripening into warmer periods of the year resulting in rapid onset of pre-harvest drop.
6. The combination of Retain and NAA can control drop better than either chemical alone.
7. The earlier Retain is applied the greater the negative effect it has on fruit color but waiting too long will result in some ethylene production and some fruit drop before Retain suppresses ethylene production.
8. Half rates of Retain have less of a negative effect of color but wear off sooner.
9. Half rates of Retain + NAA can give good drop control for 7-10 days with little negative effect on color



Questions?