ReTain Recommendations – Apples

ReTain label limits and best practices:

- Up to 2 pouches per acre (see suggested programs below)
- Single or split applications
- Timing of first application no greater than 28 days before harvest; other apps as close as 7 days before harvest.
- Use Organosilicone surfactant at 0.05 - 0.1% v/v (6.5 – 13 fl oz / 100 gallons)
- Recommended water volume: 100 GPA or amount needed for complete coverage
- Apply under slow drying conditions and cool fruit temperatures (early AM, late PM)
- 7 day PHI

General Effects of ReTain:

- Ethylene production reduced
- Starch to sugar conversion slowed
- Fruit softening slowed
- Fruit drop reduced/delayed
- Watercore reduced/delayed
- Cracking reduced/delayed
- Internal bleeding reduced/delayed
- Greasiness reduced/delayed
- Delays background color shift (e.g., Gala)
- Delays red color development in some varieties

Practical Impacts:

- Harvest management:
  - Promotes orderly harvest of large acreage of single varieties by treating portions of the crop with different rates/timings of ReTain, 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
  - ReTain can help eliminate the “crunch periods” for more orderly harvest.
- Maintenance of fruit quality (firmness, watercore, greasiness, etc.)
- Protection of yield through drop control
- Increased fruit size due to harvest delay (→ increased yield)
- Improved fruit color due to harvest delay (→ improved packout)
- Preconditions fruit to optimize response to postharvest 1-MCP (SmartFresh, FYSIUM) by keeping ethylene levels in check, resulting in more uniform response across all fruit

Tank Mixes with ReTain and NAA (PoMaxa or Fruitone):
Tank mixes of ReTain and NAA have been demonstrated to enhance fruit drop control in drop prone varieties and in seasons where fruit drop is particularly problematic. NAA is Auxin, and it helps to strengthen the abscission layer where the apple stem joins the spur. A negative effect of spraying NAA on trees prior to harvest is that it increases ethylene in the fruit. If not harvested in a timely manner, the spike in ethylene can hasten ripening. ReTain stops the production of ethylene caused by NAA. The NAA thereby strengthens the abscission layer without the negative side effects. Therefore, maintenance of fruit quality and extended fruit drop can be obtained from this tank mix. At least one-half rate of ReTain needs to be applied to overcome the effect of NAA on ethylene production.

Varietal Recommendations:

Gala:

- Typical program for harvest management, maturity delay, drop control, cracking reduction
    - Option #1 - One half to 1 pouch per acre at 21 days before harvest; higher rates result in longer delays in maturity and may have a more pronounced effect on color development
    - Option #2 – One half pouch per acre 21 days before harvest followed by ½ pouch per acre 7 day before harvest. This program provides the full benefit of ReTain on fruit quality while minimizing effects on color development.
    - Single applications of half rates typically provide no more than 1 week in harvest management extension
    - Control of stem end cracking with ReTain is dose dependent. To maximize reduction in stem end cracking use one full pouch of ReTain
    - Organosilicone surfactant at 0.05% v/v (6.5 fl oz / 100 gal)

- Program to start harvest “on time” without delaying first pick. This approach enhances storage quality of fruit from the first pick and maintains quality of remaining fruit on the tree for 2nd and 3rd picks. Quality retention for Gala is defined in terms of reduced stem end cracking, delayed onset of greasiness and maintenance of fruit firmness of later harvested fruit.
    - 1 pouch at 7 to 10 days before harvest
    - Organosilicone surfactant at 0.05% v/v (6.5 fl oz / 100 gal)
    - The full rate of ReTain (1 pouch) applied at this time will not cause a delay in color development since red fruit color will be significantly advanced at the time of application
    - Half rates one week prior to first pick are not advised unless ½ rate was applied 1 – 2 weeks prior to the 7 day before harvest application.

- Program to minimize color delay on color sensitive strains e.g. Royal or Tenroy strains
    - One half to 1 pouch per acre 7 – 14 days before first harvest
    - Time of application should be based on color development. Apply 10 – 14 days out in good coloring years and 7 – 10 days out in poor coloring years.
    - Control of stem end cracking with ReTain is dose dependent. To maximize reduction in stem end cracking use one full pouch of ReTain
    - In blocks or strains that have a history of stem end cracking, apply at least 14 days prior to first pick
    - PoMaxa/Fruitone (4 oz/A) may be included if drop control is desired

Honeycrisp:

- Typical program for drop control and harvest management (delay first pick date)
    - One half to 1 pouch per acre at 21 days before harvest; higher rates result in longer delays in maturity and color development e.g. up to 2 - 3 weeks
    - Organosilicone surfactant at 0.05 – 0.1% v/v (6.5 - 13 fl oz / 100 gal)

- Program to start harvest "on time" without delaying first pick date. This approach enhances storage quality of fruit from the first pick and maintains quality of remaining fruit on the tree for 2nd and 3rd picks. Quality retention for Honeycrisp is defined in terms of delayed onset of over ripening – off flavor development, fruit softening and skin greasiness
    - Apply ½ to 1 pouch 7 to 10 days before harvest – full rates will provide maximum quality retention of 2nd pick fruit
    - Organosilicone surfactant at 0.05 – 0.1% v/v (6.5 - 13 fl oz / 100 gal)
    - The full rate of ReTain (1 pouch) applied at this time typically will not cause a delay in color development since red color should be significantly advanced at the time of application. If color development is not advanced, apply 7 days before harvest and use ½ rate.
    - Half rates applied one week prior to first pick typically provide only short-term maintenance of fruit quality of 2nd pick fruit. e.g. up to 7 days after 1st pick.

- Program for extended harvest window – up to 4 weeks. This approach may be useful in situations where spreading out harvest over a long period is desired or in pick your own operations to extend availability of a variety
    - Split application of half to 1 pouch at 21 days before harvest plus half to 1 pouch at 7 days before normal harvest
    - Higher rates will result in longer delays in maturity (up to 4 weeks)
    - PoMaxa/Fruitone (4 oz/A) may be included in the second ReTain application for additional drop control
    -
- Program to minimize color delay on color sensitive strains or in years when natural color development is slow to progress
    - One half to 1 pouch per acre 7 – 14 days before first harvest
    - Higher rates (1 – 2/3 pouch) will result in maximum quality retention and drop control
    - Applications closer to harvest (7 days) will result in minimal to no delay in first pick date but will maintain quality of later picked fruit. If delayed harvest is desired, make applications at least 2 weeks prior to the anticipated first pick date
    - PoMaxa/Fruitone (4 oz/A) may be included for additional drop control. A minimum of ½ rate of ReTain is needed when tank mixed with NAA to overcome fruit softening caused by NAA

McIntosh: including Mac types such as Macoun and Aceymac

- Typical program for harvest management, maturity delay, drop control
    - One pouch per acre at 14 - 21 days before harvest;
    - Organosilicone surfactant at 0.1% v/v (13.5 fl oz / 100 gal)

- Program to minimize color delay on color sensitive strains e.g. Rogers Mac
    - One half pouch 2 weeks prior to harvest (short term delay and drop control)
    - For longer drop control and harvest management use one half pouch 3 – 4 weeks prior to harvest followed by one half pouch 1 – 2 weeks prior to harvest

    - PoMaxa/Fruitone (4 oz/A) may be included in the second ReTain application for additional drop control
    -
- Program for extended harvest window – up to 4 weeks. This approach may be useful in situations where spreading out harvest over a long period is desired or in pick your own operations to extend availability of a variety
    - Split application of 1 pouch applied 21 days before harvest plus 1 pouch applied 7 days before normal harvest
    - PoMaxa/Fruitone (4 oz/A) may be included in the second ReTain application for additional drop control. A minimum of ½ rate of ReTain is needed when tank mixed with NAA to overcome fruit softening caused by NAA

Red Delicious:

- Typical program for harvest management, drop control, reduction in watercore
    - 1 pouch at 21 - 28 days before harvest
    - Organosilicone at 0.05 to 0.1%; use lower rate under hot conditions (>85F)
- Enhanced drop control programs:
    - 1 pouch applied 14 days before harvest combined with NAA (10 ppm) plus organosilicone surfactant
    - Split application: 1 pouch at 21-28 days before harvest plus half to 1 pouch at 7-14 days before harvest.
    - PoMaxa/Fruitone (4 oz/A) may be included in the second ReTain application for additional drop control

Empire:

- Typical program for harvest management, firmness retention and aiding storage quality
    - 1 pouch at 14 - 28 days before harvest, 21 days before harvest is ideal
    - Organosilicone at 0.05 to 0.1%;
- Program for maximum quality retention for long term storage
    - 1 pouch applied at 3 weeks before harvest plus ReTain ½-1 pouch applied at 1 week before harvest
    - Organosilicone at 0.05 to 0.1%

Fuji

- Typical program for harvest management, watercore reduction and aiding storage quality
    - ½ - 1 pouch applied 14 days before harvest
    - Use ½ rate for poorly coloring or later maturing Fuji strains
    - Use a minimum of ½ pouch for watercore reduction
    - On good coloring strains or if fruit color development is adequate at the time of application, applying ReTain 2 weeks prior to harvest will not cause a delay in the start of harvest
    - Organosilicone at 0.05 to 0.1%

- Split application program for early ripening strains (such as September Wonder and Rising Sun Fuji) for extended harvest management and watercore reduction
    - Apply ½ pouch per acre at both 3 and 1 week(s) before harvest
    - Organosilicone at 0.05 to 0.1%

ReTain Recommendations – Peaches

General Effects

- Inhibits/decreases ethylene production
- Can delay maturity and extend the harvest window
- Maintains higher fruit firmness
- Increased fruit size by delaying harvest
- Reduces fruit drop

Practical Benefits

- Reduced number of picks due to effect on fruit firmness
- Season extension – delay harvest to fill gaps in the marketing window or extend the sales season of late season varieties
- Flexibility - keep fruit on the tree longer rather than pick and place in cold storage
- Larger fruit - maintaining firmness allows fruit to hang on the tree longer and gain size
- Firmer fruit will store better and are less likely to get over ripe

Application guidelines:

- ReTain – one pouch per acre
- Include ProGibb LV Plus for enhanced performance. ProGibb is gibberellic acid and it has been demonstrated to delay senescence (aging) and the breakdown of cell walls.
- Tank mix both products in the same application
- Application rate: 333 g/A ReTain (one pouch)
  10 fl oz/A ProGibb LV Plus
- Spray volume: 100 gal/A
- Organosilicone surfactants MUST be used
- Application: 10 -14 days before start of normal harvest (first pick)
- PHI: 7 days
- In order to maximize uptake, apply during slow drying conditions (late evening or early morning)

ReTain Recommendations – Pears

The two most common pear varieties that *ReTain* is used on are Bartlett and Bosc (Pacific Northwest), but good results have been obtained on Red Clapps, Starkrimson, and Comice.

General Effects:

- Delayed maturity – on average about 7 days
- Reduced pre-harvest fruit drop
- Increased fruit size
- Better fruit firmness
- Enhanced storage potential

Application guidelines:

- Application rate is 1 pouch per acre

- Best timing on Bartlett, Clapps, Starkrimson, and Comice is about 7 – 10 days before normal harvest of untreated fruit.

- If stop-drop on Bartlett is the primary goal, then an earlier timing works better – more like 14 - 20 days before normal harvest.

- For Bosc, the best timing is 14 – 16 days before normal harvest.

- Apply in a sufficient volume of water to ensure thorough coverage without run-off. In most cases, a spray volume of 100 GPA is fine; however if trees are very large and/or have a lot of dense watersprout / sucker growth in the tree centers, you may get a better response by increasing application volume to 150 or 200 GPA.

- Buffer spray tank pH to neutral to slightly acidic.

- Do not apply to trees under stress.

- Apply in slow drying conditions.

- Apply when fruit surface and internal temperatures are at their lowest point e.g. early morning and evening applications

- Always use a surfactant with *ReTain*. An organosilicone surfactant or Lightweight summer oil at ½% v/v may be used.

- Unusually cool weather in the 30 days prior to harvest can advance pear maturity and require an earlier application timing.