Our Experience with Precision Thinning of Gala, Fuji, and Honeycrisp Apples in 2014

Subtitle: "I Wish There Were an App for That!"

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In 2014 and in collaboration with Dr. Terence Robinson at Cornell University, four "precision thinning" protocols were set up in two locations (MA- University of Massachusetts Cold Spring Orchard and NJ- Rutgers University Snyder Research Farm) on three apple varieties: 'Buckeye' Gala (MA and NJ); 'Brak' Fuji (MA); and Honeycrisp (NJ).

Briefly, the precision thinning protocol is as follows:

1. Select 5 trees per orchard block/ variety.
2. Count the number of blossom clusters per tree (x5 = potential crop).
3. Assign target crop load based on trunk cross-sectional area, tree size, and experience.
4. Mark 15 spurs on 5 trees.
5. Begin measurement of fruits after petal fall.
6. Measure fruits 3-4 days after each thinning application and again 4-5 days later.
7. If fruit grow more than 50% in the 4-5 day period, they are predicted to persist.

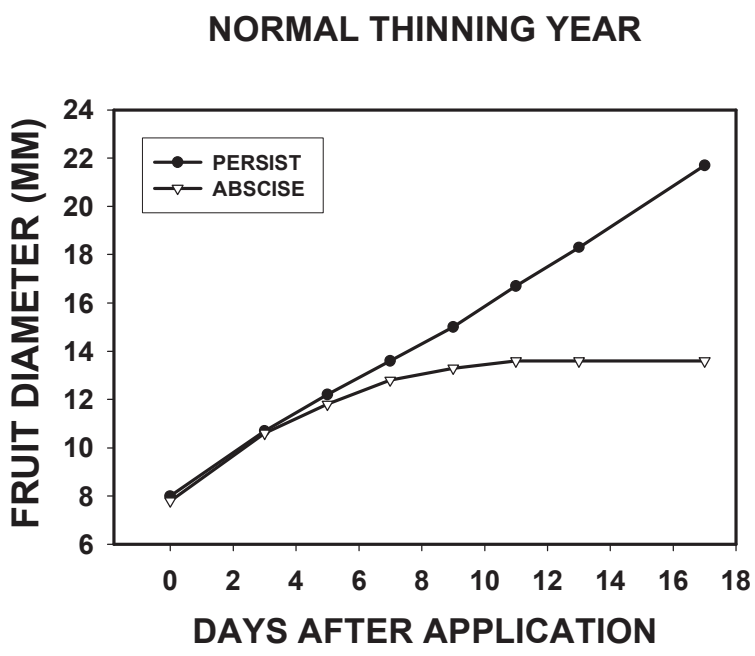

Figure 1. About 7 or 8 days after a thinning application, those fruit that will not persist until harvest, stop growing. Measuring diameter 3 days after applying a thinner and then again 4-5 days later allow us to assess the percent of the crop which will persist and the percent which will drop. Then the decision can be made as to whether or not an additional thinner should be applied. This figure is from *Fruit Notes* Volume 70 Number 2 (Greene et al., 2005). Dr. Greene's extensive work on this topic has resulted in the precision thinning model.

Figure 2. A fruiting spur tagged at petal fall.

Figure 3. Me asuring fruit diameter with electronic calipers.

Figure 4. A precision thinned tree at harvest time.

8. Based on the bloom count (potential crop) and the percent of fruit that have grown more than 50%, estimate the final crop.
9. If this number substantially exceeds the target fruit number, then apply more thinner.
10. Repeat measurements as above, and continue thinning applications until the target is reached. The approach of multiple thinner applications is called nibble thinning (Phil Schwallier).

Calculations can be simplified with the precision thinning spreadsheet developed by Phil Schwallier, Michigan State University. The spreadsheet and more details regarding precision thinning are available at http://apples.msu.edu/horticulture.

At the UMass Cold Spring Orchard, a petal fall application of NAA plus carbaryl was made. After the second measurement, based on the predicted number of

fruit setting, which was more than the target, a thinning application of 6-BA plus carbaryl was made at 10-13 mm to both Gala and Honeycrisp. This resulted in some over-thinning, because for both varieties, the number fruit harvested per tree was less than the target (24% less for Gala, 28% less for Honeycrisp).

At the Rutgers Snyder Farm, bloom (NAA, Gala and Honeycrisp) and petal fall (NAA and carbaryl on Honeycrisp, 6-BA and carbaryl on Gala) chemical thinning sprays were applied. Fruit diameter was measured 3 days after the petal fall application, and again 4 days later. Because of predicted set, no additional thinning was performed for either Gala or Honeycrisp. Additional measurements were made over the next 2 weeks, but only a small amount of hand thinning was done. The final set was somewhat more than the target (28% greater for Honeycrisp and 17% greater for Gala), but experience suggests that the final crop load was the perfect number of fruit for these trees. In New Jersey, Gala averaged 180 blossom clusters per tree or an estimated 900 fruit per tree. Honeycrisp averaged 261 clusters per tree or an estimated 1305 fruit per tree. Both varieties should have been pruned more heavily before bloom to reduce crop potential by removing fruiting wood.

Although the precision thinning protocol is a valuable tool in the precision orchard management toolbox, it relies on properly assessing initial flowering and target crop load (which is somewhat subjective), and it takes considerable time to set up, take subsequent measurements, enter data, and assess the outcome. In addition, it should be performed for every block and variety.

Jon says that more effort and study needs to be placed on modifying the process to make it easier and quicker to perform precision thinning and crop load management of apple so it can be more widely adopted by growers. Hence, "I wish there were an app for that!"

Win says the precision thinning tool is extremely useful as is, and more growers should "just do it!"

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