

Tree Fruit News

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Pre-Thinning Observations in the Hudson Valley

Daniel J. Donahue, Eastern New York Commercial Horticulture, Cornell Cooperative Extension

Bloom Thinning Recommendations for the Hudson Valley

For 2019, my recommendation for the Hudson Valley has been and continues to be “no, not this season”. NAA 10 ppm at bloom is a mild thinner and can encourage return bloom in varieties with biennial tendencies such as Honeycrisp, Golden Delicious, and Fuji. Later applications of NAA to Fuji should be avoided due its tendency to induce the retention of pygmy fruit. However, Hudson Valley pollination weather has been poor, with only a few occasions where the bees were flying, and those events could be measured in hours. Since fruit set is uncertain at best, avoid the application of NAA at bloom this season.

The Pollen Tube Model (PTM) was developed by Dr. Keith Yoder at Virginia Tech some years ago and has found commercial acceptance in Washington State. This method of bloom thinning utilizes a computer model (found on NEWA) interfaced with a local on-farm weather station, with grower inputs for variety and average flower style length. The grower determines the target number of fruits per tree necessary for a full crop. The model is started once the target number of open blossoms is reached. The model estimates the growth extension of the pollen tube from the stigma at the top of the style, to the ovary, based on degree-hours. Once the model determines that the pollen tube has reached the ovaries of 100% of the target blossoms, successful pollination is assumed. An application of a caustic material such as ammonium thiol-sulfate (ATS) or lime-sulfur is then applied to burn off all unpollinated flowers. The model is subsequently used to time 1 or 2 additional applications such that any newly opened blossoms are burnt-off before they are successfully pollinated. In Hudson Valley trials conducted in 2018 and 2019, our variable and unpredictable weather has made timing the very precise bloom applications a real challenge. Considering that the model assumes successful pollination in the hours following the opening of the target blossoms, I don't think we can make that assumption under the bloom conditions we have experienced this season. Therefore, my recommendation has been not to implement the PTM this season.

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Two replicated PTM trials on Honeycrisp are currently underway in the Hudson Valley where the “assumption of pollination” will be severely tested. In 2018, rainy weather interfered with application timing in a Honeycrisp PTM trial in Milton, reducing the effectiveness of thinning. On the other hand, return bloom for 2019 in the PTM treatment was excellent. PTM thinning in the 2018 Valatie trial was well-timed with excellent results, equivalent to standard petal fall and 12 mm NAA/Carbaryl programs. A 2018 PTM “demo” trial in Albany County resulted in equivalent performance to a standard Maxcel/Carbaryl program in Gala. We may yet find the PTM model to be useful in the Hudson Valley in certain cases, especially where carbaryl-free thinning is desired, but our variable weather patterns and unreliable forecasting are a serious constraint on widespread adoption.

Petal Fall Thinning Recommendations for the Hudson Valley

Difficult to thin varieties such as Jonamac and Golden Delicious, small -fruited varieties such as Gala and Empire, as well as the aforementioned Honeycrisp and Fuji all benefit from a thinning program started at petal fall. Unfortunately, the potential for poor fruit set this season due to difficult pollination conditions calls for caution here as well. The exception may be southern Orange County, where orchards experienced warmer temperatures and more hours of decent pollination weather. Gala usually sets well and can be a challenge to thin, and could still be a good target for a petal fall application this year if you think they saw at least a few hours of ok pollination conditions. The afternoon of Saturday May 11th is a good example of a brief pollination window. Gala bloom came on late this season. This may have helped in Ulster County. Overall, I observed very few viable flowers on the 11th in the Milton area, most were past their prime.

Variety Thinning Recommendations for Mature Trees - 8 to 12mm fruit size

For 2019, traditional thinning at the 8-12 mm stage will be the target window. The newly revised CHO carbohydrate thinning model is well suited to thinning at this time. Unseasonably cold weather May 12-14 will slow down fruitlet sizing and delay petal fall throughout the Valley, making early assessments of fruit set challenging. For Ulster County, assuming 95% petal fall around the 15th, with fruit size around 4 mm, and forecasted temperatures reaching the high 60's, we could expect to reach 8 mm by Monday the 20th. As of May 12th, the forecast from the 18th onward looks seasonal, dry, and with temperatures in the mid-70's up to as high as 85F through Wednesday May 23rd. If we observe enough actively growing fruitlets with full seed counts by the 18th, then we will have the next 5 days to get the thinning job done this season.

Varieties to Thin with Maxcel (or *Excellis* at equivalent rates) + Sevin (or carbaryl)

- Gala - 64 oz Maxcel /100 gallons TRV dilute = 128oz Maxcel per acre for a fully grown tree + 1pt Sevin/100 gal TRV dilute = 2pt Sevin per acre for a fully grown tree

- Empire - 48 oz Maxcel /100 gallons TRV dilute + 1pt Sevin/100 gal TRV dilute
- Jonamac - 48 oz Maxcel /100 gallons TRV dilute + 1pt Sevin/100 gal TRV dilute
- Macoun - 48 oz Maxcel /100 gallons TRV dilute + 1pt Sevin/100 gal TRV dilute
- Fuji - 48 oz Maxcel /100 gallons TRV dilute + 1pt Sevin/100 gal TRV dilute
- Red Delicious - 36 oz Maxcel /100 gallons TRV dilute + 1pt Sevin/100 gal TRV dilute
- Bartlett Pears- 96 oz Maxcel /100 gallons TRV dilute
- Bosc Pears- 48 oz Maxcel /100 gallons TRV dilute

Varieties to Thin with NAA

- McIntosh - 2oz Fruitone L/100 gal TRV dilute + 1pt Sevin/100 gal TRV dilute
- Honeycrisp - 3oz Fruitone L/100 gal TRV dilute + 1pt Sevin/100 gal TRV dilute
- Cortland - 2oz Fruitone L/100 gal TRV dilute
- Golden Delicious - 4oz Fruitone L/100 gal TRV dilute + 1pt Sevin/100 gal TRV dilute
- Rome - 2oz Fruitone L/100 gal TRV dilute + 1pt Sevin/100 gal TRV dilute
- Jonagold - 3oz Fruitone L/100 gal TRV dilute + 1pt Sevin/100 gal TRV dilute
- Gingergold - 1oz Fruitone L/100 gal TRV dilute + 1pt Sevin/100 gal TRV dilute
- Idared - 2.5oz Fruitone L/100 gal TRV dilute + 1pt Sevin/100 gal TRV dilute
- Pink Lady - 1 or 2 oz Fruitone L/100 gal TRV dilute + 1pt Sevin/100 gal TRV dilute
- Northern Spy: 2oz Fruitone L/100 gal TRV dilute + 1pt Sevin/100 gal TRV dilute

Chemical thinning program for Young Trees:

- For newly planted trees where you desire to totally eliminate the crop try a heavy rate of Maxcel (64 ounces) + Sevin (2pts) + Oil (1pt) /100 gallon TRV dilute when fruit size is 8-10mm.
- For 2nd year trees where we want a small crop use only hand thinning and the Cornell young tree thinning guide to adjust crop load.

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- For 3rd year trees use Sevin alone + follow-up hand-thinning.
- For 4th year trees use 1/2 of our suggested full rate of NAA + Sevin or Maxcel+Sevin.
- For 5th year trees use 75% of a full rate of NAA + Sevin or Maxcel+Sevin.
- For 6th year trees use a full rate of NAA+Sevin or Maxcel+Sevin.

Acknowledgements: Dr. Terence Robinson, Dr. Poliana Francescatto, and Win Cowgill contributed to the compilation of the specific Maxcel, NAA, and Sevin thinning recommendations. Please follow the label for all rates and timings. ■

Thinning Without Carbaryl

Michael Basedow, Eastern New York Commercial Horticulture, Cornell Cooperative Extension

While carbaryl is commonly used in combination with NAA or 6-BA to effectively thin fruit, growing public concern of its potential impact on bees remaining in the orchard following bloom has led to the product's registration being removed in Europe. Some US retailers are also prohibiting the use of carbaryl on the produce they market, requiring growers to utilize alternative thinning strategies if they plan to continue marketing fruit through these retailers. Thankfully, other options with similar thinning efficacies are available, and have been trialed with good results in New York. In this article I will discuss some of the results from studies performed by Dr. Poliana Francescatto in New York in 2018, along with some other general recommendations when thinning without carbaryl.

As is the case with many aspects of fruit production, keep in mind there are many unique variables associated with chemical thinners. As you plan your thinning program each year, be sure to review the product labels, and tailor your programs based on your experience, your block's cropping and thinning history, and keep a very close eye on your local weather patterns before and after thinning to get the best possible results. As a reminder, trees greatly respond to thinners under high temperatures (generally above 65F) and cloudy conditions. Temperatures in 2018 were around 70-80F from petal fall to about 15mm, therefore thinning efficacy will likely vary in a cooler year, much like this one.

Here are two of the thinning programs trialed in 2018 for Honeycrisp:

- 10ppm NAA at bloom, followed by 50ppm 6-BA+7.5ppm NAA at petal fall and 10-12mm.
- 50ppm NAD+.125% Regulaid at bloom and petal fall, followed by 50ppm 6-BA+50ppm NAD at 10-12mm.
- *All rates were calculated according to the block's Tree-Row -Volume, which in this case was 120 gallons.*

In these thinning programs, thinning began with NAA or NAD+Regulaid at bloom. These materials usually provide a very mild thinning response. They will slowly work down the croplod, and will help increase flower initiation to maximize return bloom the following year. These were followed with an application of 6-BA+NAA at petal fall and at 10-12mm, or NAD+Regulaid at petal fall and NAD+6-BA at 10-12mm. In both programs, NAA and NAD were tank mixed with 6-BA for better efficacy.

Some of the 2018 thinning programs for NY-1 and NY-2 included:

- 10ppm NAA at bloom, followed by 100ppm 6-BA+7.5ppm NAA at petal fall and 10-12mm.
- 10ppm NAA at bloom, followed by 100ppm 6-BA+50ppm NAD at petal fall and 10-12mm.
- *Rates were calculated according to Tree-Row-Volume, which in*

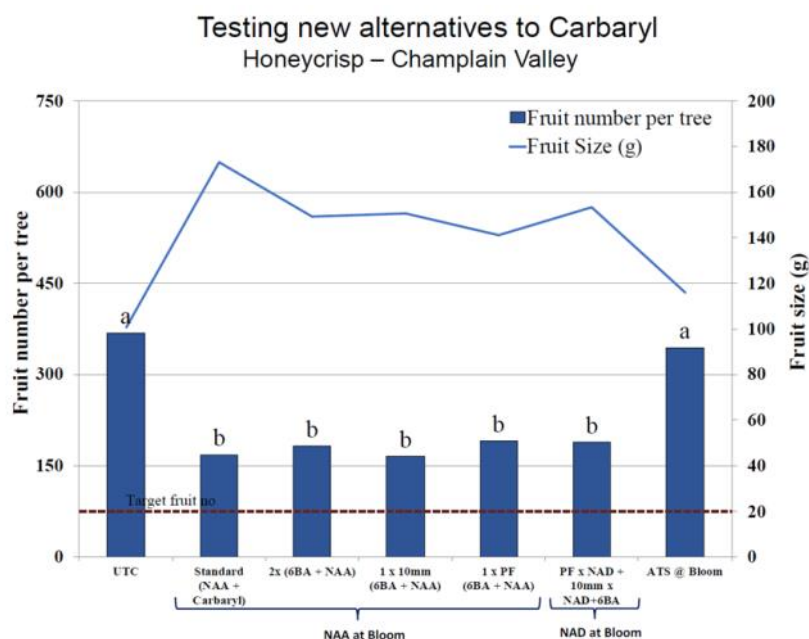


Figure 1: In a 2018 Honeycrisp trial in Peru, NY, NAA at bloom followed by applications of 6-BA+NAA were as effective at reducing croplod as the standard NAA+carbaryl treatment. NAD at bloom followed by NAD+Regulaid at PF and NAD+6-BA at 10-12mm also effectively reduced croplod. In another treatment, ATS was used at 2.5% and 2% during bloom.

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this case was 130 gallons.

These thinning treatments for NY-1 and NY-2 were similar to those used in Honeycrisp; however the rate of 6-BA was increased as these two varieties are considered very difficult to thin, like Gala. Thinning again began with NAA at bloom. This was followed with 6-BA+NAA or 6-BA+NAD at petal fall and 10-12mm. The addition of the 100ppm 6-BA beginning at petal fall contributed to better fruit sizing (Figures 2 and 3). It should be noted that best thinning results with 6-BA are seen when there are at least 3-5 days above 70 degrees following application, which was the case in these 2018 Geneva trials. Thinning with NAA is likely to be less variable if cooler temperatures are observed during these thinning windows.

Some other general strategies and comments to consider when thinning without carbaryl:

- ✓ **Take advantage of multiple spray windows:** Like in the previous examples, you can slowly work down your cropload using a “nibbling” strategy by starting at bloom or petal fall. You can then use the carbohydrate model and/or fruit growth rate model to fine tune your subsequent sprays at 10-12mm as needed. These models have been newly updated in 2019, and are available online at NEWA.cornell.edu and Malusim.org. Starting early can be difficult in cool years like 2019, where pollination conditions may have been poor.
- ✓ **Mix BA and NAA:** As in the above examples, 7.5ppm NAA can be used to replace the pint of carbaryl per 100 gallons TRV dilute when mixed with 6-BA. Avoid using this combination on Delicious or Fuji after petal fall where pygmy fruits can occur. No signs of pygmy fruit were encountered in NY1 and NY2 during these trials, however in cooler conditions during thinning, the pygmy condition may occasionally show.
- ✓ **In easy to thin honeycrisp blocks, the use of NAA at 5ppm is recommended:** It is best not to exceed 10ppm, as higher rates can negatively affect fruit size.
- ✓ **If you plan to use NAD as a thinner by itself:** mixing with Regulaid at 0.125% is recommended for better efficacy.
- ✓ **The 2019 return bloom still needs to be evaluated from these studies.**
- ✓ **Start small when trying a new thinning program:** try a new

Testing new alternatives to Carbaryl for NY1

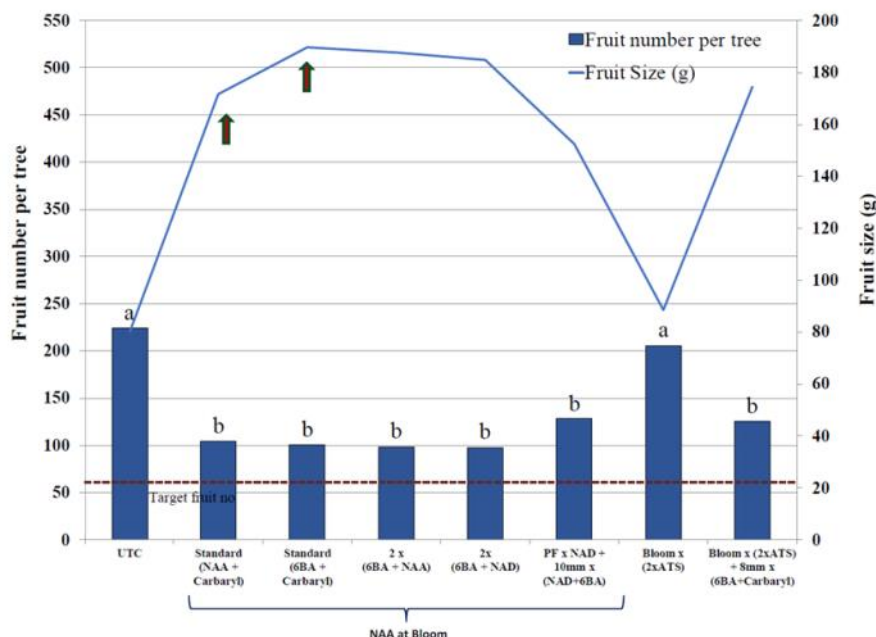


Figure 2. In a 2018 NY-1 trial at Geneva, applications of NAA at bloom followed by applications of 6-BA+ NAA or 6-BA+NAD produced a similar thinning response to the standard 6-BA+carbaryl or NAA+carbaryl treatments. Note that fruit size was greatly increased when 6-BA was included in a regular thinning strategy with carbaryl when applications began at petal fall.

Testing new alternatives to Carbaryl for NY2

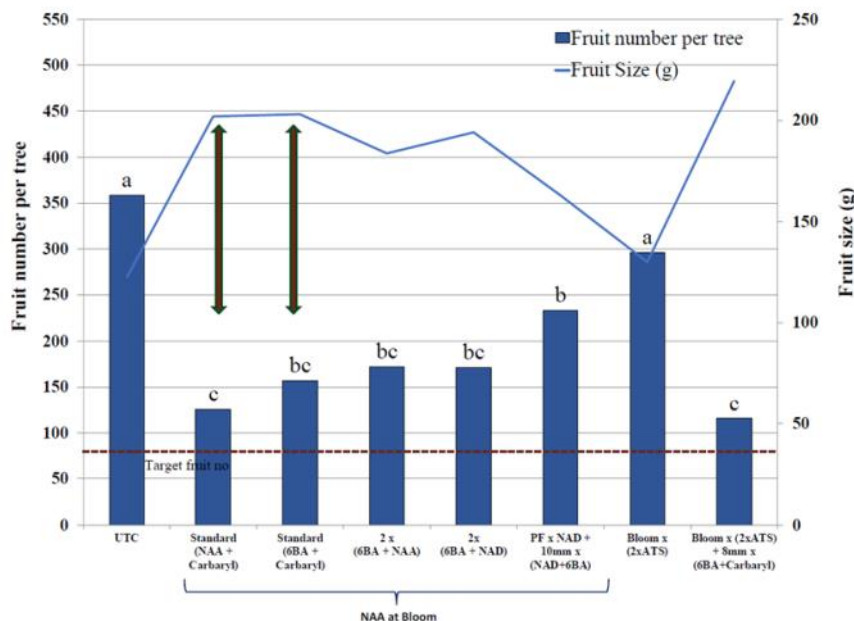


Figure 3. In a 2018 NY-2 trial at Geneva, NAA at bloom followed by applications of 6-BA+NAA or 6-BA+NAD produced a similar thinning response to the standard 6-BA+carbaryl or NAA+carbaryl treatments. Again, note the increased fruit size when 6-BA was used in a regular thinning strategy with carbaryl starting at petal fall.

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program on a small block of trees and see how your results are compared to your standard program.

For more information, review the 2019 Cornell Pest Management Guidelines for Commercial Tree Fruit Production, pages 173-174 and the Winter 2016 Fruit Quarterly article “Mechanical Blossom Thinning Followed by 6-BA Shows Promise as an Alternative to Thinning Without Carbaryl”. Thank you to Dr. Poliana Francescato for performing these trials and for her contributions to this article. ■

Nitrogen: A Key Element for Fruit Production

Dr. Lailiang Cheng and Mario Miranda Sazo, Cornell University

Nitrogen is an essential element necessary to form the large group of chemicals known as amino acids and proteins. Large amounts are necessary for the formation and enlargement of new cells and tissues. The use of N promotes growth. The rapid response of trees to all forms of N make the use of N fertilizer a useful tool to regulate shoot growth and the development of heavy crops of large fruit. The difficulty arises in the use of nitrogen to promote fruiting without stimulating excessive and competing vegetative growth.

Growers should target N supply based on the two phases of plant growth: (1) the first phase is **cell division**, a time when amino acids and protein are needed for all the new cells, (2) the second phase is **cell expansion**, a time when high concentrations of carbohydrates (sugars) rather than protein are required. With these carbohydrates, the cell is able to pull in water and expand.

For blocks where you expect a normal crop load this year:

1) **Nitrogen management:** The highest demand for nitrogen is from **petal fall to the end of shoot growth**. During this period, both rapid shoot growth and fruit cell division require substantial amounts of nitrogen. The total annual requirement by high density Gala trees is about 50 lbs. actual nitrogen per acre, 70% of which occurs from bloom to the end of shoot growth. Foliar N application at petal fall and early cover sprays is a good way to supply nitrogen to the young fruitlets and spur leaves. Dr. Cheng recommends using foliar urea application at petal fall, first cover, and second cover at a rate of 5 lb. urea per 100 gallons on blocks that had marginal N status last year. Urea can be easily tank-mixed with most fungicides and insecticides, but cannot be mixed with oil. We recommend dilute sprays, but if you have to make concentrate sprays, do not concentrate over 3X.

2) **Potassium management:** If your tree **K level** was marginal in last year's leaf analysis and you expect a normal or a heavy crop this year, you need to apply a higher than average amount of potassium this year if you have not done so. This is because fruit harvest removes significant amounts of potassium from your orchard. For example, if you had a fruit yield of 1500 bushels per acre last year, 80 lbs of potassium (equivalent to 100 lbs of potash (K₂O)) was removed from your orchard in the harvested fruit. You need to replace at least the same amount to sustain your orchard productivity. Fertigation is a great way to deliver potassium. If you use fertigation, target the period from petal fall to a couple weeks before harvest.

For blocks where you expect a light crop load due to possible low return bloom, frost damage or poor fruit set this year:

1) **Reduce nitrogen application or even don't apply any nitrogen at all** to mitigate vigorous shoot growth as a result of a low crop load.

2) **Reduce or even eliminate potassium application** because much less potassium is required for supporting a light crop.

3) **Adequate fruit Ca and its balance with potassium is critical for minimizing bitter pit development for Honeycrisp and other bitter pit-susceptible varieties.** Dr. Cheng's work in 2015 clearly showed that Honeycrisp fruit had a much lower level (only about 50%) of Ca than Gala in the flesh, but a significantly higher concentration of potassium in the peel, which makes Honeycrisp more susceptible to bitter pit development. Under low crop load conditions, fruit gets bigger, diluting the fruit Ca concentration. Even for fruit of the same size, fruit on light cropping trees have lower Ca levels. This is closely related to higher K concentrations. So, controlling potassium supply under low crop load conditions is critical for mitigating bitter pit. Of course, increasing Ca supply is equally important. Ca accumulation occurs during the entire fruit growth period from petal fall to fruit harvest. In addition to having proper soil pH and maintaining “calm” trees, a foliar Ca spray program is essential for bitter pit susceptible cultivars such as Honeycrisp. We have been recommending 3 to 4 cover sprays of 1 to 2 lbs of calcium chloride (78% CaCl₂) or its equivalent per 100 gallons (dilute basis) at 14-day intervals, beginning 7 to 10 days after petal fall, followed by 2 additional sprays of 3 to 4 lbs of calcium chloride per 100 gallons at four and two weeks prior to harvest. It is important to keep in mind that complete coverage of fruit is essential and more frequent spray is more important than exact timing of spray. Calcium

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chloride cannot be mixed with oil.

Too much nitrogen can be counterproductive if looking for increased Gala fruit size: Applying more than 80 pounds per acre of N is luxury and does not contribute to increased fruit size; instead it will decrease quality (Figure 1). In addition, there are several disadvantages of using too much N: (1) increased shoot growth can result in an increase in fire blight susceptibility. Gala trees are already sensitive enough without help from extra N. And high N applied early would only increase shoot growth, and (2) Gala fruit quality can be reduced through “Stem End Cracking” and “Ring Bowl Cracking”. These disorders may also be related to high N and vegetative growth.



22

66

131

262 lbs N/A



Figure 1. An oversupply of nitrogen in Gala leads to delayed fruit quality and storability.

Nitrogen for all cultivars:

- ◆ **Years 1 and 2:** Provide high nitrogen supply. 60-120 lb N/Acre. @ 1/4lb. Ca nitrate per tree after the soil settles carefully applied in a doughnut shaped band around each tree.
- ◆ **Year 3:** N should be lowered. 30-80 lb N/Acre. When tree starts to produce fruit and has grown enough, N must be reduced to improve fruit color. Ideally, by the end of the third year trees should get to the top of the wire.
- ◆ **Year 4, 5, and beyond:** N supply should be strictly controlled. 20-50 lb N/Acre. This is to avoid bitter pit in susceptible cultivars such as Honeycrisp, and to improve yield and fruit quality. ■

PESTICIDE CERTIFICATION EXAM SUMMER TRAININGS

July 2, July 9, July 16, July 23

1:30pm—4:30pm

**CCE Clinton County
6064 Route 22, Suite 5
Plattsburgh, NY 12901**

ENYCHP Enrolled Members: \$50

Non-Enrolled: \$60

To register for these trainings, visit:

<http://bit.ly/PesticideExamIntensive>

CCE ENYCHP Horticulture Specialists Mike Basedow and Elisabeth Hodgdon will be offering four afternoons of training to review key concepts and study tips in preparation for the exam.

The pesticide exam will be offered by a DEC representative in Plattsburgh on July 30th at the MHAB conference space, located at 14 Dormitory Drive in Plattsburgh, NY. Attendees wishing to sit for the exam will need to enroll for the exam separately. Attendees should also plan to spend some time outside of class reviewing their manuals and completing review questions.

For more information, contact Mike Basedow at mrb254@cornell.edu or Elisabeth Hodgdon at eh528@cornell.edu.

Upcoming Events

Southern Hudson Valley Petal Fall/Thinning Meeting

May 15, 2019 - 9:00am-11:30am

DuBois Farms, 209 Perkinsville Rd, Highland, NY

Dr. Terence Robinson will join Dan Donahue, Dr. Srdjan Acimovic, Peter Jentsch, Win Cowgill, and Liz Higgins to discuss the current season's fruit set, thinning recommendations, pest management issues, and crop outlook. duboisfarms.com

Northern Hudson Valley Petal Fall/Thinning Meeting

May 15, 2019 - 2:30pm-4:30pm

Columbia-Greene CCE, 479 NY-66, Hudson, NY

Dr. Terence Robinson will join Dan Donahue, Dr. Srdjan Acimovic, Peter Jentsch, Win Cowgill, and Liz Higgins to discuss the current season's fruit set, thinning recommendations, pest management issues, and crop outlook. ccecolumbiagreene.org

Capital Region Petal Fall/Thinning Meeting

May 16, 2019 - 2:00pm-4:00pm

Devoe's Rainbow Orchard, 1569 US 9, Halfmoon, NY

Dr. Terence Robinson will join Mike Basedow, Dr. Srdjan Acimovic, Peter Jentsch, and Liz Higgins to discuss the current season's fruit set, thinning recommendations, pest management issues, and crop outlook. devoesorchards.com

Last Monday Grant Webinar for Fruit and Vegetable Growers

May 27, 2019 - 12:00pm-1:00pm

Webinar

Monthly webinar to disseminate information on available grants relevant to fruit and vegetable farmers in Eastern New York. To register, visit: <https://enych.cce.cornell.edu/events.php>

FSMA/PSA Grower Food Safety Training Course

July 15, 2019 - 8:00am-5:30pm

CCE Warren County, 377 Schroom River Rd, Warrensburg, NY

A grower training course developed by the Produce Safety Alliance (PSA) that meets the regulatory requirements of the Food Safety Modernization Act (FSMA) Produce Safety Rule. At least one person per farm producing more than \$25,000 worth of fruits and vegetables must attend this course once. Participants will receive a certificate of course completion by the Association of Food and Drug Officials. To register, visit: bit.ly/JulyFSMA

Summer 2019, 20-minute Ag Manager Lunchtime Webinar Series

Focused Business Topics for Busy Managers

12:30pm—1:00pm on alternating Tuesdays, June through August

June 4—Understanding the Time Value of Money

June 18—Making Capital Investment Decisions

July 2—Understanding Financial Statements 1 (Balance Sheets)

July 16—Understanding Financial Statements 2 (Income Statement)

July 30—Understanding Financial Statements 3 (Budgets and Analysis)

August 13—Ag Tax Topics - the Schedule F

August 27—Ag Tax Topics - Sales Tax and Property Tax Issues for Ag in NYS

To register, visit: bit.ly/AgManagerWebSeries

The Eastern New York Commercial Horticulture Program is a Cornell Cooperative Extension partnership between Cornell University and the CCE Associations in these seventeen counties: Albany, Clinton, Columbia, Dutchess, Essex, Fulton, Greene, Orange, Montgomery, Putnam, Rensselaer, Saratoga, Schenectady, Schoharie, Ulster, Warren & Washington.

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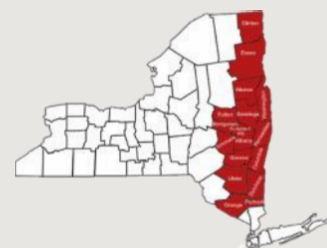
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