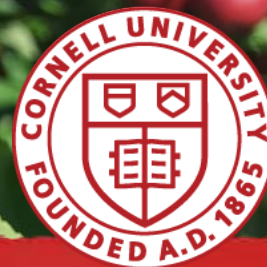


Tree Fruit News

September 2019
Volume 7, Issue 7



Updates on Harvista in New York

Mike Basedow, CCE Eastern NY Commercial Horticulture

Harvista by AgroFresh is currently being used in some orchards across Eastern NY, so I thought I would summarize some of what we currently know about this product.

How does it work?

Both Harvista and SmartFresh are formulations of 1-methylcyclopropene (1-MCP). 1-MCP acts by binding to ethylene receptor sites within the fruit. This reduced availability of binding sites slows down fruit respiration, which in turn slows fruit maturation and ripening. While SmartFresh is applied post-harvest in storage, Harvista is applied in the orchard.

How is it used?

Harvista is applied 21 to 3 days prior to the anticipated harvest date (of untreated fruit), at a rate of 48 to 242 fl oz per acre, and carries a 3 day pre-harvest interval. The exact application timing recommended is based on the starch pattern index, and many cultivars have their own recommended values for when the application should be made. Harvista must not come into contact with copper. It should go on when temps are below 95°F and when conditions will be dry for at least one hour following application.

| APPLE VARIETY | OPTIMUM AVERAGE STARCH INDEX (at application*) |
|------------------|--|
| Gala | 1.5 - 3.5 |
| McIntosh | 3.0 - 4.0 |
| Honeycrisp | 4.0 - 6.0 |
| Spartan | 1.5 - 2.5 |
| Macoun | 2.0 - 3.5 |
| Empire | 2.0 - 3.5 |
| Jonagold | 5.5 - 7.0 |
| Red Delicious | 1.5 - 3.0 |
| Golden Delicious | 3.0 - 5.0 |
| Idared | 2.5 - 4.5 |
| Rome | 2.0 - 4.0 |
| Fuji | 2.5 - 4.5 |
| SnapDragon™ | 2.5 - 3.5 |
| RubyFrost™ | 2.0 - 3.0 |
| Sweet Cheeks™ | 5.0 - 7.0 |

*Starch Index scale of 1 to 8 (Generic Starch-Iodine Index for Apples, Cornell Cooperative Extension Info Bull 221)

Application timing for Harvista is based on the average starch iodine index.

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Harvista requires special application equipment. It is applied as a liquid formulation, and is delivered through an in-line injection system from a nurse tank. This injection system can be retrofitted to an existing sprayer using an AgroFresh conversion kit.



A sprayer with an AgroFresh Harvista nurse tank installed.
Photo: Keith Culver, AgroFresh

What are the benefits at harvest?

The Harvista label suggests harvest can be delayed for up to 14 days. Along with this delay in maturity, other listed benefits may include reduced pre-harvest drop, reduced ethylene production, reduced drop in firmness, delay of starch hydrolysis and water core, and enhanced storability. In multi-pick varieties like Honeycrisp, Harvista may also allow for fewer picks, and the harvest delay allows for additional size and color development.

How does Harvista compare to ReTain?

Harvista and ReTain provide similar benefits for harvest management. The ReTain label states ReTain can be used to delay fruit maturity, improve harvest management, reduce drop, maintain firmness, improve fruit quality, enhance storage potential, and allow additional time for size and color development. The active ingredient in ReTain is aminoethoxyvinylglycine hydrochloride (AVG). While 1-MCP's mode of action is to reduce respiration by competitively binding with the ethylene receptor sites, AVG acts by blocking the synthesis of ethylene within the fruit. ReTain applications also typically begin 3-4 weeks before the anticipated harvest date, and has a 7 day PHI, allowing the final application to be made up to 1 week prior to the anticipated harvest date. ReTain can be directly added to the spray tank, but must be applied under slow drying conditions. It is best applied in the early morning hours or at night, and requires that applications be made when rain is not forecasted for 8 hours following application. The

ability to use Harvista closer to rain events, and up to three days before harvest allows for more flexibility in drop control, but it tends to be somewhat more expensive to apply compared to ReTain.

What have we seen in our recent trials?

While we still have much to learn about Harvista in New York, a number of folks on the Cornell Fruit Team have been evaluating its use. Craig Kahlke of the Lake Ontario Fruit Program has been studying Harvista, applied alone or in combination with ReTain, over two consecutive seasons on Gala, Honeycrisp, and Fuji. In his trials, he evaluated the effects the products had on firmness, brix, color, and disorder development.

For Honeycrisp, Craig found few differences in drop control in 2017 between his treatments, and there was little recorded drop in 2018 overall. He found ReTain plus Harvista increased the fruit quality of later picks, but suggests ReTain alone, applied at different rates and timings, provided a nearly equal benefit. Less color **delay** can be achieved by delaying the application of ReTain.

In Gala, there were few differences in firmness between the various treatments of Harvista and/or ReTain. Again, less color can be achieved with ReTain if applications are made closer to harvest, rather than at the full 3-4 weeks ahead of anticipated harvest. As in his Honeycrisp trials, ReTain alone applied at different rates and timings gave similar fruit quality benefits to Harvista. For more details on Craig's study, you can view the presentation he gave on it at the 2019 In-Depth PGR School (https://rvpadmin.cce.cornell.edu/uploads/doc_802.pdf).

In these trials, the rate of Harvista was 60g per acre, at the low end of the labeled rate recommendations. While the Gala Harvista timing was consistent with AgroFresh's recommendation, the Honeycrisp timing may have been too early. It is possible additional benefits would have been seen at the higher recommended rate of 150g per acre, and at the recommended application timing.

Craig also noted that disorder development in his studies was heavily impacted by the weather in each season. Due to the number of variables associated with Harvista application, we cannot make specific rate or timing recommendations, and recommend you work closely with AgroFresh consultants to determine your rate and timing.

What are some of the effects of Harvista when fruit are stored?

Dr. Chris Watkins has been looking at Harvista as well, and his recent work found Harvista helped maintain firmness and reduce skin wrinkling. Harvista also decreased the risk of soft scald and senescent breakdown development, but it may aggravate bitter pit and leather blotch. In Gala, Harvista alone provided a slight benefit on maintaining flesh firmness and acidity, decreased the incidence of stem end flesh browning and

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core browning, and delayed greasiness. It should be noted here that these trials have only been performed for one year, so your mileage may vary. For more information on Chris's trials, you can view his presentation from the PGR meeting here: https://rvpadmin.cce.cornell.edu/uploads/doc_805.pdf

Summary

Overall, there is still work to be done to fully evaluate Harvista in New York conditions. However, we currently feel confident that Harvista provides:

- Pre-harvest fruit drop control.

- Safe delay of harvest for additional color and fruit size development.
- Maintenance of fruit firmness before and/or after harvest (storage benefits are short term).
- Slowed starch conversion.
- Greater consistency in maturity for improved storage performance.
- Fewer pick dates required for multiple-pick varieties.
- Reduced soft scald in Honeycrisp and reduced stem end flesh browning in Gala.

Developments in Robotic Apple Harvesting

Mike Basedow, CCE Eastern NY Commercial Horticulture

Last Friday I had the opportunity to speak over the phone with Dr. Manoj Karkee, a professor of Biological Systems Engineering at Washington State University's Prosser Irrigated Agriculture Research and Extension Center.

Dr. Karkee has spent much of his career working in agricultural engineering, and over the last few years has focused some of his work on orchard automation and mechanization, including work on robotic apple pruners and harvesters. We spoke mostly about the future of robotic harvesting, and below are some of the key takeaways from our conversation.

- There are two companies that are currently close to commercializing a robotic harvester. FF Robotics is an Israeli company working in Washington, and Abundant Robotics is based in California.
- Both companies have robotic harvesters being tested in commercial orchards this harvest season.
- The FF Robotics system uses mechanical arms to pick fruit, while the Abundant Robotics system uses a vacuum system.
- Dr. Karkee anticipates that units might be commercially available within the next two to three years, with wider adoption potentially coming in the next five to ten years.
- Pricing for the units is difficult to predict, but he estimates a harvester will likely cost at least \$300K. The economics for these units still need to be worked out, but the goal would be to make them competitive with hiring human labor. In addition to the initial investment in the machinery, maintenance costs of these high-tech units will also need to be a consideration.
- In the meantime, how can we best set up our orchards for mechanical harvest? We should focus on developing orchards with narrow canopies, so a higher percentage of the fruit is near the outside of the canopy. Fruit in the interior of thick canopies is difficult for the machine to image and reach, making it more likely to be left on the tree. Narrow tall spindles and fruiting walls are going to be best adapted for these harvesters.



Working with the FF Robotics harvester. Photo: Dr. Manoj Karkee

I am hoping within the next few years we can set up a demonstration of these harvesters here in Eastern NY.

For more information on these harvesters, you can visit the company websites at ffrobotics.com and www.abundantrobotics.com.

Rapid Detection of Fireblight in Orchards: Assessment of Available Technologies

Elizabeth Higgins, CCE Eastern NY Commercial Horticulture

Research is currently underway at Cornell to develop and assess rapid detection technologies for fireblight in orchards. Currently the standard practice in NY for growers who want to confirm the presence of fireblight in their orchards is to send a sample of the diseased plant material to a lab to culture the bacteria to determine if the strain that causes fireblight is present. This takes about a week, and with shipping costs and lab fees, can cost as much as \$80 per test. There are also several points of potential error in the process, particularly in selecting a bad sample to send and damage in shipping. If an error is made, this will make the results unreliable, even though the lab process is highly reliable. Another concern is the amount of time from sample to result, as growers, who are concerned that fireblight is present, prefer to treat the site as if it is fireblight, rather than wait for a lab test.

Dr. Awais Kahn at Cornell AgriTech in Geneva and his assistant Della Cobb-Smith are working to develop a field-based lab that can provide accurate results using a portable device, the Bio Ranger. They are also assessing currently available commercial test kits. These technologies would allow for testing to take place at (or closer to) the potential infection site and provide results in 30 minutes or less. The Bio Ranger has an up-front cost of about \$4000 for equipment, but the per-test costs are relatively low. The commercial test kits range from \$4-\$10 per test.

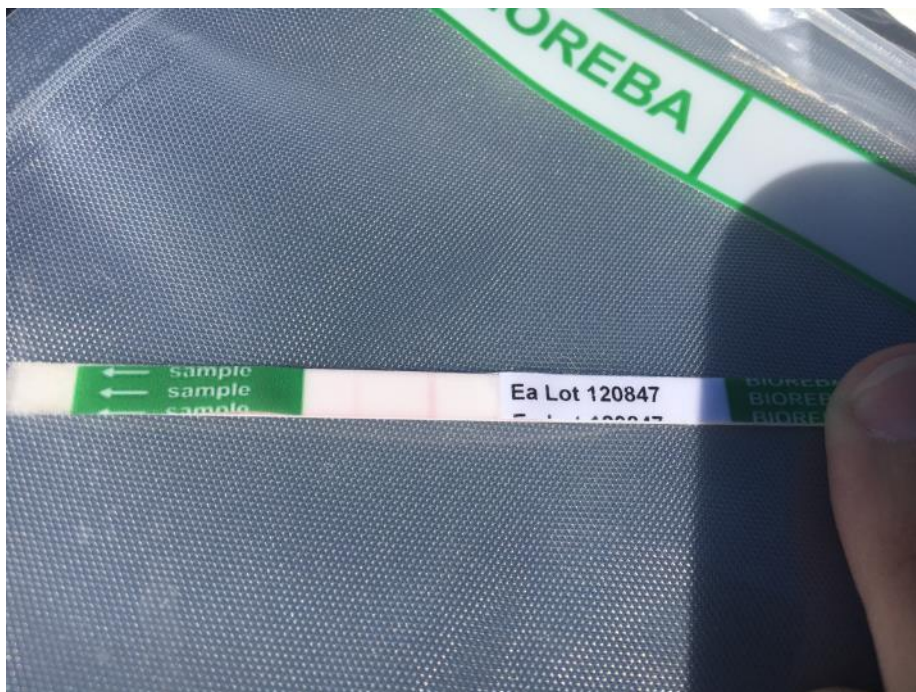
The tests are not perfect. The commercial test strips may miss very low levels of bacteria and may also show positive results for bacteria strains that are closely related to fireblight bacteria, but that don't cause fireblight. In both of these cases, however, visual symptoms of fireblight would probably not be present. The BioRanger's results, while accurate, are not as simple as the test strips to read and the testing process requires more training. None of the tests can distinguish live bacteria from the DNA of the bacteria.

We would like to have a better understanding of how these technologies could have a role in orchard management. Fireblight is a costly disease and can spread rapidly through an orchard under the right conditions, but over-treatment can reduce apple orchard productivity and, as labor costs increase, add significantly to costs of production. I will be sending out a short survey to growers in October for this project. Your input will help us focus the development of the technologies in ways that are beneficial to the industry. If you have feedback on the test kits (or would like to try one) contact me at

emh56@cornell.edu.



Currently, diseased material is sent to the lab for identification, but new field-based tests are under development. Photo: Mike Basedow



A commercial Erwinia test strip, showing the test and a very faint positive line, confirming the presence of Erwinia in the sample. Photo: Mike Basedow

Entomopathogenic Nematodes are Effective at Killing Plum Curculio Larvae in the Soil

Jaime C. Piñero, Stockbridge School of Agriculture, University of Massachusetts; Tracy C. Leskey, USDA ARS Appalachian Fruit Research Laboratory; David Shapiro-Ilan, USDA ARS Fruit and Tree Nut Research Laboratory

This article first appeared in Fruit Notes, Volume 84, Winter 2019.

The original can be accessed at the following link:

<http://umassfruitnotes.com/v84n1/a3.pdf>

Current recommendations to control plum curculio (PC) rely on insecticide applications targeting adults. Due to various environmental and regulatory concerns, there is a need to develop alternative and more sustainable management strategies for this pest. Entomopathogenic nematodes (EPNs) have been identified as being promising biological control agents of key insect pests. EPNs are very small, soft bodied, non-segmented roundworms that are parasites of insects. The nematodes are obligate parasites of insects in nature. EPNs occur naturally in soil environments. They locate their prey in response to carbon dioxide, vibration, and other chemical cues.

When an EPN is used against a pest insect, it is critical to match the right nematode species against the target pest. About a dozen nematode species are produced commercially as biological control agents of economically important insect pests including the larvae of several weevil species. Results from previous research conducted by USDA ARS scientists indicate that, relative to the untreated check, the EPN species *Steinernema riobrave* caused 85.0% and 97.3% control in 2011 and 2012, respectively, in Belchertown, Massachusetts, and 100% control in West Virginia on both years. Another nematode species, *Steinernema feltiae*, caused 0% and 84.6% control in 2011 and 2012, respectively, in Belchertown, and 78.2% and 69.7% control in West Virginia. These results are highly encouraging because this is the first time that biological control of PC shows high potential for controlling immature stages of PC. Here, we



Pyramidal emergence trap used for the quantification of PC adult emergence after the application of either, the EPN *Steinernema riobrave*, or water (control).

Trap dimensions: 1.1 x 1.1 yards at the base.

present results of on-farm research that aimed at demonstrating the level to which EPN *Steinernema riobrave* applied to the soil underneath the canopies of perimeter-row apple trees is effective at killing PC larvae.

Materials & Methods

Study sites and experimental cages. This study was conducted in seven orchard blocks located in Massachusetts (five blocks) and New

Hampshire (two blocks). Within each block, individual perimeter-row trees and their understory were used. Two pyramidal emergence traps (1.1 x 1.1 yards at the base) made of PVC and steel screen were placed underneath the canopy of each tree. Within each tree, the assignment of cages for treatment (EPN application, see below) or control (water only) was done at random. A plastic conical device that topped each cage permitted the capture of adult PCs that, upon adult emergence from the immature stages, walked upward on the interior surface of the capturing device. Thirty-two cages (16 were assigned to EPNs, 16 served as controls) were deployed in all across all seven blocks. Each orchard block received 4-8 cages.

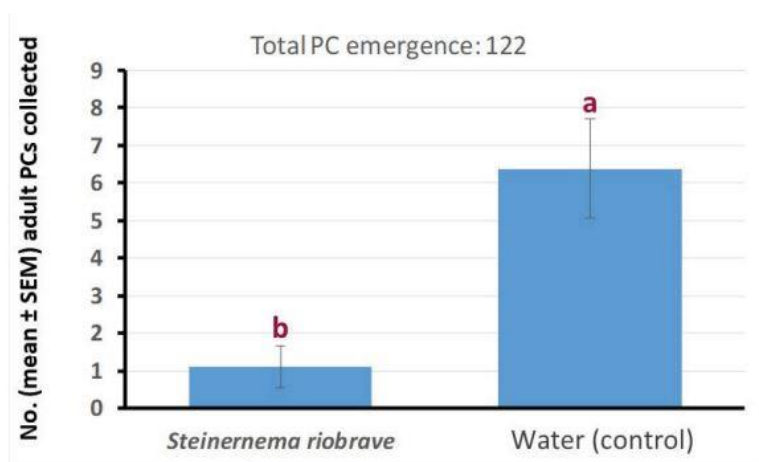


Figure 1: Number \pm standard error of the mean [=SEM], a measure of how precise the estimate is) of adult plum curculios (PCs) that were recovered from emergence cages following application of either, the EPN *Steinernema riobrave*, or water (control). Different letters above bars denote statistically significant differences between treatments at odds of 19:1.

Experimental approach. Prior to the placement of the emergence cages, 75 apple fruitlets that were suspected to have PC larvae were placed on the ground, underneath tree canopies. The fruit was spread out to cover about 50% of the area under the emergence cages. All fruitlets were collected from unsprayed trees in Belchertown, Massachusetts. EPNs were obtained from BASF Corporation. EPN application rate was 4 million of infective juvenile nematodes per square meter (1.1 yards) and were applied in 3.78 L of water. For each tree, one cage received EPNs and the other cage received water (3.78 L) alone. Afterwards, the cages were buried and flagged with treatment information and application date (July 16-20, 2018). Starting on 15 August 2018, the number of adult PCs collected in the capturing device were recorded and removed on a weekly basis. Other than the amount of water that was applied during treatment application, no additional irrigation took place. Treatment effects were assessed by comparing the number of adult PCs emerging from cages subject to EPN application versus control cages.

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Results

Overall, 122 adult PCs were recovered from the 32 emergence cages (103 weevils from control cages, and 19 weevils from EPN-treated cages), a result that indicates that only a low number of fruit that was placed inside the cages (2,475 fruits) was actually infested with PC. On average, 1.1 adult PCs were recovered from EPN-treated cages while 6.4 adult PCs were recovered from control cages (Figure 1). Thus, the application of EPNs led to a 5.5-fold decrease in the number of adult PCs emerging relative to the untreated check.

Conclusions

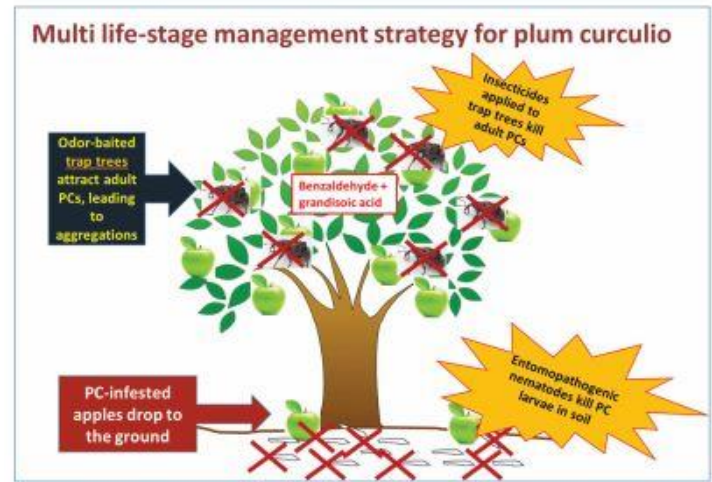
Our results indicate that the EPN *Steinernema riobrave* is effective at killing PC larvae in the soil. The overall goal of this research is to use EPNs as a biologically-based component of an IPM program that targets multiple stages of PC. This approach makes use of attractive lures to pull adult PCs to selected perimeter-row trees. The canopies of odor-baited trees are then sprayed with adult-killing insecticides while the other trees in the block do not receive insecticides to control PC (see preceding Fruit Notes article). By only spraying odor-baited trees the total number of trees that receive insecticide treatment can be reduced by more than 90%. As a result of adult PC aggregations, there is also aggregation of fruit injury by PC in odor-baited trees. As shown here and also from previous research, EPNs can then be applied to the soil of those trees to kill PC larvae, which will also be concentrated in those areas compared to any other trees in the orchard.

Acknowledgments

We thank Steven Wood, Tom and Ben Clark, Keith Arsenault, Steve Lamphear, Kenneth Nicewicz, and Mark Madden for allowing us to work on their orchards, and to Shawn McIntire (UMass Cold Spring Orchard) for support. We also thank Natalie DiDomenico and Nicole Foley for technical assistance. BASF graciously donated *Steinernema riobrave* for this investigation. The UMass Stockbridge School of Agriculture provided funding for this research.

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“Farm Focused” Sexual Harassment Prevention Training

Richard Stup, Cornell University

A team of Cornell Cooperative Extension educators recently adapted New York State’s model sexual harassment prevention training materials to be more relevant to the farm workplace. NY State DOL reviewed these materials to be sure they meet the content requirements and now they are ready for release. You will find both a presentation that teaches about sexual harassment and set of case studies that illustrate it in more detail. The presentation and case studies are available in English and Spanish and in PowerPoint or video format. You can use the PowerPoints as visual aids if you choose to do the presentation and review the case studies yourself. Or, you can show the video recordings of the presentation and case studies to train your farm employees.

We developed a comprehensive farm sexual harassment prevention resource page (<https://agworkforce.cals.cornell.edu/regulations/sexual-harassment-prevention/>) on the Cornell Agricultural Workforce Development website. The site contains a step-by-step guide to help a farm business meet New York’s requirements for employer sexual harassment prevention policies and training. Find the new resources under Step 5.

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A few reminders as you prepare for the training:

1. Treat it seriously. You could have someone in your workforce experiencing harassment right now.
2. Customize your policy for your farm and put it in place before you do the training.
3. Customize the "Sexual Harassment Prevention Poster/Notice" and distribute copies to your employees at the training.
4. Be sure that you include an interactive portion such as a question and answer session, or brief feedback survey with your employees. You can pause the videos to create opportunities for interactive questions and discussion.
5. Document your training activities.
6. All New York employers are required to complete the training each year with all employees. The due date for this first time is October 9, 2019!

By Richard Stup, Cornell University. Permission granted to repost, quote, and reprint with author attribution. The post "Farm Focused" Sexual Harassment Prevention Training appeared first on Cornell Agricultural Workforce Development at <http://aqworkforce.cals.cornell.edu/>

A Comprehensive Acreage & Variety Survey for Commercial Apple Growers in NY

Craig Kahlke, CCE Lake Ontario Fruit Program and Mike Basedow, CCE Eastern NY Commercial Horticulture

With the large plantings of new high density apple acreage in recent years, and the high percentage of those being managed varieties, it is paramount to have a handle on current and future acreage and variety makeup. This is critical information to have when trying to market the apple crop, and will assist in future planning for storages and other infrastructure.

Your data from your individual operation will remain anonymous. Aggregated data will be published. One survey per farm—please communicate with others in your operation to submit only once- this survey is being distributed in multiple outlets.

Records to have on hand to complete the survey quickly:

- ✓ Total current acreage, and by variety
- ✓ % bearing total, % non-bearing total
- ✓ % destined for fresh, processing, slice, and cider markets
- ✓ Approximate total acreage planting in next 3 years- total, and by variety
- ✓ For planting in next 3 years, approximate rootstock percentages- total
- ✓ Approximate acreage removing in next 3 years- total, and by variety
- ✓ Approximate total acreage currently under drip irrigation
- ✓ For planting in next 3 years, approximate that will be planted with drip irrigation

If you have all records on hand, it should take you less than 15 minutes to complete.

If your records or future plans are not as detailed or clear, please give your "Best Guess". We are striving for full industry participation to enable all of us to make the most informed decisions!

PLEASE BE AWARE - There is no "Back Button" anywhere in the survey, and all your answers will count once you hit the SUBMIT button on the last page (questions on drip irrigation systems). Once you open the link and start the survey, you will have 1 week to complete it.

This survey is funded in part by the Apple Research and Development Program

NOTE - If you're in a region in Eastern NY, at the end of this survey you'll be redirected to another - The Eastern New York tree fruit specialists would like to collect additional information on the extent of planting and performance of club and managed varieties in their local conditions. This should take no more than five minutes.

Questions? Contact Craig Kahlke at 585-735-5448, or cjk37@cornell.edu

LINK to THE SURVEY: https://cornell.qualtrics.com/jfe/form/SV_ba6M0RB8boWJoDb

Upcoming Events

How to be Retail Ready

October 8, 2019

From licenses needed, certifications available, and labeling requirements, this session will go through all that is needed to be successful and ready for retail. The group will not only learn what is out there, but will hear how successful area businesses navigate the sea of regulations and opportunities, and what works best for them.

Learn more: <http://washington.cce.cornell.edu/producer-resources/how-to-be-retail-ready>

October Last Monday Grant Webinar for Fruit and Vegetable Growers

October 28, 2019

4:00pm

Are you curious about what grants are available to help your farm business? Tune in to this final webinar of the year to discuss grants relevant to fruit and vegetable farmers

Register here: <http://bit.ly/329Pmv6>

2020 ENYCHP Winter Conference

February 26-26, 2020

SAVE THE DATE! The third annual Winter Conference will be held once again at the Desmond Hotel & Conference Center in Albany. More details to come!



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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