

The Produce Pages

Serving the fruit and vegetable growers of Eastern New York

Farm Feature



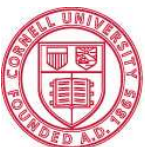
February 2017

The Customer Always Comes First at Love Apple Farm

DAN DONAHUE & SARAH ROHWER, ENYCHP

Love Apple Farm, located on route 9H in the town of Ghent, has been a part of the Columbia County, agricultural scene for more than 40 years. The original owners of Love Apple, Chris and Randae Loken, purchased the land in the 1960s and built the orchard and farm market from the ground up. In 2012 the couple decided to move to California and sold their orchard to longtime friend and *Art Omi* trustee, Francis Greenburger in 2012. A short time after the sale tragedy struck as Love Apple Farm suffered a devastating fire which resulted in the loss of the entire farm market and physical plant.

The orchards survived and the farm staff did their best to continue production and retail sales operations until the rebuilding of the farm market and cold storage commenced in 2016. A fine example of a phoenix rising from the ashes, the new farm market, café, bakery and cold storage took



Cornell University
Cooperative Extension
Eastern New York Commercial Horticulture

continued on page 3

The Produce Pages

Editor:

Maire Ullrich, Vegetables

Phone: 845-344-1234 Email: mru2@cornell.edu

Regular contributors:

Vegetables

Chuck Bornt

Phone: 518-859-6213 Email: cdb13@cornell.edu

Ethan Grundberg

Phone: 617-455-1893 Email: eg572@cornell.edu

Amy Ivy

Phone: 518-561-7450 Email: adi2@cornell.edu

Teresa Rusinek

Phone: 845-691-7117 Email: tr28@cornell.edu

Crystal Stewart

Phone: 518-775-0018 Email: cls263@cornell.edu

Fruit

Laura McDermott

Phone: 518-791-5038 Email: lmg4@cornell.edu

James O'Connell

Phone: 845-691-7117 Email: jmo98@cornell.edu

Dan Donahue

Phone: 845-691-7117 Email: djd13@cornell.edu

Anna Wallis

Phone: 518-410-6823 Email: aew232@cornell.edu

Business, Marketing and Economics

Liz Higgins

Phone: (518) 949-3722 Email: emh56@cornell.edu

Food Safety & Packaging

Erik Kocho-Schellenberg

Phone: 845-3441234 Email: jk2642@cornell.edu

The *Produce Pages* is a monthly publication of the Eastern New York Commercial Horticulture Program. For more information about the program, please visit our website at <http://enych.cce.cornell.edu/>.

Contents

General Updates

LOVE Apple Farm.....	1
Crop Insurance Selection Tool	7
SWD Update	11
FSMA Inclusion	12
Summer Internship	13
Pilgrim Pipeline	17

Vegetable Production/Marketing

Onion Insect Management	6
Garlic Mites	8
Potato <i>Dickeya</i>	10
Bt Resistance in Corn	14
LED Greenhouse Lighting	18
Log Grown Shiitake Mushrooms Program	23

Fruit Production/Marketing

Double Cropping Raspberries.....	15
Grape Pruning Workshop	20

Calendar of Events..... 20



Serving the Educational and Research Needs of the Commercial Small Fruit, Vegetable and Tree Fruit Industries in Albany, Clinton, Columbia, Dutchess, Essex, Fulton, Greene, Montgomery, Orange, Putnam, Rensselaer, Saratoga, Schoharie, Schenectady, Ulster, Warren and Washington Counties



Fire at the Love Apple Farm Market, 2012

Photo Credit: Love Apple Farm

shape and opened for business in August. Love Apple Farm is experiencing a fresh start, entering a new phase in its long history and offering old and new customers tree-ripened peaches, apples, plums and cherries from its 80-acre orchard.

Today's Love Apple Farm is operated by a dedicated and motivated team of food and agricultural industry professionals. Keith Bogdanovich, a seasoned operations professional in the food industry and a well known member of the Columbia County community serves as the facilities manager and directly supervises the farm. Amy Cutaia is the farm market manager and oversees the food service operation, the farm market, products and staff. Allison Marchese is a marketing consultant and responsible for developing and implementing effective advertising, public relations, social media, and events. The team plans to carry on the tradition of great customer service and provides its customers with

excellent local fruits, baked products, and vegetables grown on the farm and locally.

The Farm

Love Apple Farm totals eighty acres, with seventy acres under cultivation. There are sixty acres of apples and a few acres of peaches, cherries, apricots and berries. They also grow vegetables in season, including tomato, pepper, cucumber, squash, and greens. The farm currently grows twenty varieties of apples in the orchard utilizing a mix of medium and high density planting systems. The three highest volume apples on the farm are the perennial favorites Honeycrisp, Fuji and Gala, with four thousand Gala and Fuji trees planted last year. Interestingly enough, Macoun, Northern Spy, and Rhode Island Greening have been generating most interest lately from the customers. Macoun is an excellent fresh eating apple in the fall, while Spy's and Greenings store well and are great for baking. The new building houses three refrigerated storage rooms with a total capacity of 7,000 bushels, along with a loading dock and related equipment, lending flexibility at harvest time and maximizing marketing options.

Keith strives to minimize the amount of pesticides used in production, but they are not certified organic. This is understandable as profitable organic tree fruit production in the northeastern U.S. is a major, and often insurmountable challenge due to our humid climate and complex pest environment. Love Apple closely follows an integrated pest management (IPM) strategy, carefully scouting their orchards and fields for



New Love Apple facility under construction in 2016

Photo Credit: Love Apple Farm

continued on next page

pests, and only spraying if the crop is at risk and biological pest management techniques have not worked. Customers frequently ask Love Apple Farm staff whether their apples are organic. They receive fewer questions about their vegetables.

The Market, Bakery & Cafe

The newly built Love Apple Farm market, bakery & café stocks locally grown vegetables, meats, cheeses and poultry. The authentic Mexican café & a bakery features homemade pies and cider doughnuts made on site. The farm's long tradition of picking tree-ripened fruit lives on with pick-your-own being a popular family experience for Love Apple customers. Love Apple Farm is dedicated to providing local produce to the community and at the same time strives to be a destination for family fun. By offering a café they allow families to spend a full day exploring all the events, the farm, and the petting zoo, while dining at the cafe and shopping at the market. The back-to-nature experience appeals to tourists and local residents alike.



When Love Apple was planning their new building, they wanted to keep the café, which had been a popular attraction before the fire. The new café has an expanded menu, but still features quality Mexican cuisine. Management understands that it takes time to develop business and be seen as a lunch destination, especially in the off season times. In order to encourage more lunch business, they have made personal visits to local businesses, delivering menus and inviting people over for

lunch. Since making this effort they have seen more locals coming in for lunch.

The new facility has been open for 6 months, with Allison and Amy constantly working on new and exciting customer adventures. During this time, they have held a wide variety of events including a ribbon cutting ceremony, a holiday open house and fundraiser, a book signing, and a variety of tastings. In the future they are planning events to celebrate the spring equinox, a series of pancake breakfasts, as well as fun family activities for Easter, Mother's Day, and the 4th of July. In addition, they are planning an autumn equinox event which will feature customer favorites such as face painting, hayrides, and pumpkin painting. Having a full service café sets them apart from

other orchards in the area and allows customers to spend more time at the

continued on next page

Left: Inside the new Love Apple Farm Market at opening

Below: Cafe at opening

Photo Credit: Love Apple Farm



location. Love Apple is also offering the building to be rented for private parties.

State of the Art Farm Marketing

Love Apple has designed their marketing strategy by talking to customers and using email to conduct market research. They're interested in knowing how far away their customers are traveling and why they chose Love Apple. Staff will design further marketing based on the answers they receive and the data collected. Current outreach methods include keeping in touch with customers via direct email, but they are cautious to not send emails too frequently. Love Apple uses radio advertising, but very little print as they believe it is not as cost effective. The print advertising they do is mostly in tourism focused publications. Because of their prime location on a busy road, new signage is used to encourage new customers to stop in. Other promotional methods implemented include membership in the local chamber of commerce, partnering with vendors, and website cross promotion.

Allison and Amy believe that their most effective promotional strategies revolve around a strong social media presence, both free and paid. All effective advertising and marketing efforts require significant expenditures of staff time and money, but an effective social media program requires an especially intense management time commitment. When asked how many staff hours per week are devoted to maintaining a mindfully prepared social media presence, after a little discussion the answer came back, ten! The total commitment of staff time to all marketing and promotional activities is equivalent to 50% of a full-time position. While apples grow on trees, customers very definitely do not. Keith, Amy, Allison and the owners of Love Apple clearly understand that reality, and are making the marketing commitment necessary to achieve farm business success.

When asked, the Love Apple team was candid on what they could have done differently. At the time of their grand opening, the realization quickly set in that they were understaffed. The crowd of customers during those first crucial weeks was larger than anticipated and employees were unable

to give every customer the time and attention they deserved. Love Apple strives to implement a customer service driven philosophy, and they quickly addressed the situation by hiring more staff. They have an information desk at the center of the market devoted to improving customer experience where they provide maps and answer questions. When asked about how Cornell Cooperative Extension has helped their farm business succeed, Keith responded that he appreciated the ENYCHP E-Alerts, newsletters, and looked forward to winter fruit school every year. Farm visits by ENYCHP tree fruit and berry specialists were also helpful. Amy and Allison were interested in learning more about farm business and marketing educational opportunities offered by Cooperative Extension, and how they could host educational events in the future.

Great tasting locally-grown produce, superior customer service, and an exciting farm environment are the makings of a memorable farm experience for all at Love Apple Farm!



Love Apple Farm Playground & Petting Zoo

Photo Credit: Love Apple Farm

Why Wait?

When to Begin Your Onion Thrips Management Program

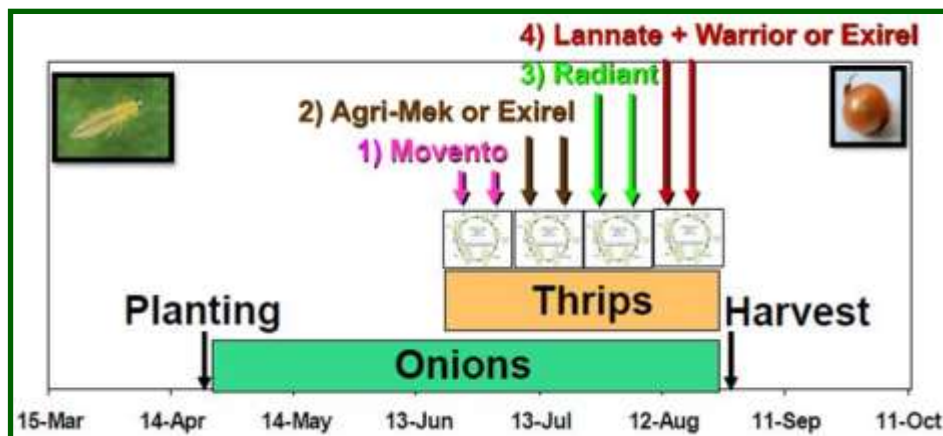
ETHAN GRUNDBERG, ENYCHP

Brian Nault, Professor of Entomology at Cornell, has spent much of the past decade developing the best management practices for onion thrips control for New York onion growers. Here is a summary of his recommendations for how to determine when to start your onion thrips management program and which chemistries he finds most effective.

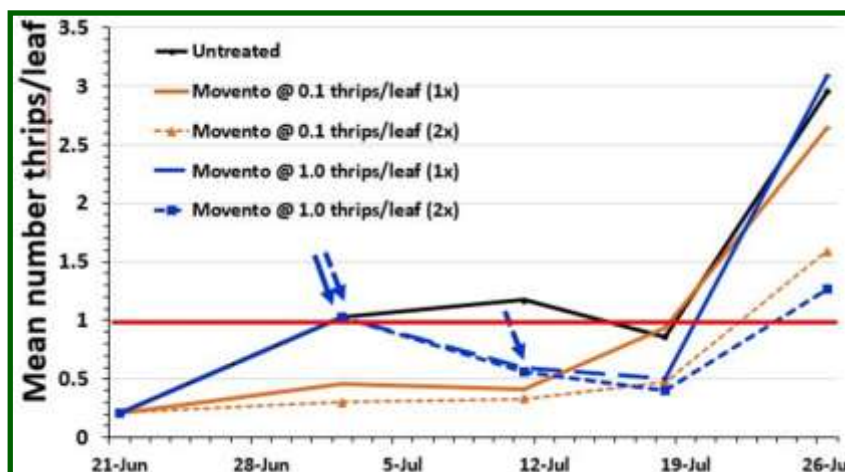
1. Scout your fields at least once a week for thrips beginning in early June
2. Wait until you reach an average of one thrip per leaf in your scouting
3. Once you have reached the action threshold of one thrip per leaf for the first time in the growing season, apply Movento® (*spirotetramat*, Group 67) with a non-ionic surfactant, like Dyne-Amic®. Avoid tank-mixing Movento® with Bravo® (*chlorothalonil*) products, as they reduce the efficacy of the insecticide.
4. Keep scouting!
5. When you reach the action threshold of one thrip per leaf again, repeat the application of Movento® with a surfactant.
6. Keep scouting!
7. When you reach the action threshold of one thrip per leaf again, DO NOT SPRAY MOVENTO® AGAIN! In order to reduce the potential for the development of resistance in the thrips population to any given chemical, it is important to try to limit the use of any thrips management product to two sprays per year. Dr. Nault recommends following Movento® with Agri-Mek® (*abamectin*, Group 0). Just as with Movento®, you must use a surfactant

for best results and avoid tank-mixing with Bravo®.

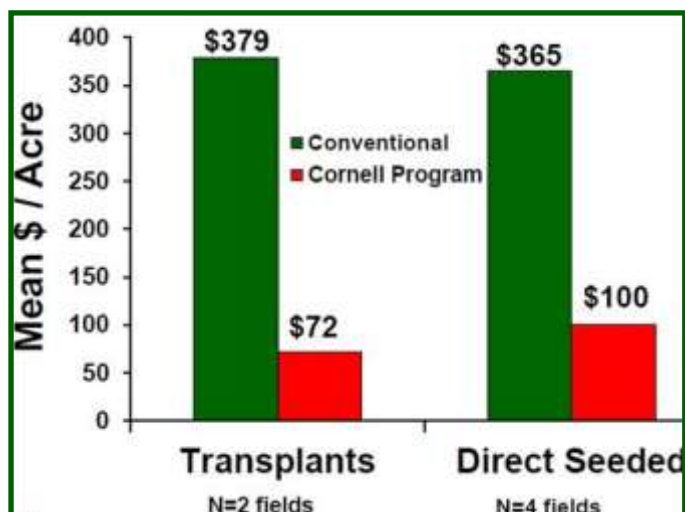
8. Repeat the process. Scout, wait until you reach the action threshold of one thrip per leaf, do not apply any chemistry more than twice, use a compatible surfactant, and follow this sequence of products: Movento®, Agri-Mek®, Radiant® (*spinetoram*, Group 9, do not mix with Bravo®), Exirel® (*cyantraniliprole*, Group 6²) or Lannate® plus Warrior® II (*methomyl*, Group 1A plus *lambda-cyhalothrin*, Group 7A).



You might ask yourself, “wouldn’t this program be even MORE effective if I blasted those thrips with Movento® at a threshold of 0.1 thrip per leaf early in the season and really nip the problem in the bud?” Dr. Nault thought you might have that question, so he conducted research in 2016 on the impact of moving the timing of the first application of Movento® to the 0.1 threshold instead of his recommended 1 thrip per leaf standard. He found that an extra early application of Movento® did not



continued on next page



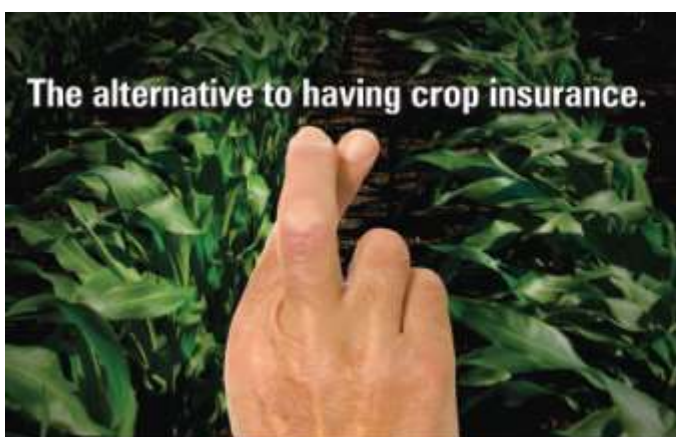
prevent a rebound in the thrips population and only was effective at increasing the number of pesticide applications required in a growing season to maintain levels at or below the one thrip per leaf threshold.

I can almost hear some of you saying, "I don't have time for all of that scouting... why can't I just rotate chemistries after every two sprays and stick to a weekly calendar spray for thrips management?" Dr. Nault anticipated that question, too. The simple answer is that all of that scouting will likely save

you time not having to make unnecessary insecticide applications and, in addition, will save you money on your chemical bill. Christy Hoepting, the onion specialist with the Cornell Vegetable Program, and Dr. Nault compared the average cost of a weekly spray program to the IPM program outlined above. In 2014, the cost savings per acre by using the one thrip per leaf threshold was over \$300 for transplants and \$265 for direct seeded onions. Do you have 5 acres in transplants and 45 acres in direct seeded onions? How would you like to save \$12,460 on your pesticide bill AND make up to six fewer applications in a year?

Obviously, these recommendations are more complicated than back in the 1990s when you could get away with spraying Warrior® four or five times a season and achieve excellent thrips management. However, the new reality of insecticide resistance in thrips populations demands a more sophisticated approach. You can ask Dr. Nault all about these recommendations and more at Orange County Onion School on February 28th at the CCE office in Middletown. Go to <http://enych.cce.cornell.edu/event.php?id=661> for more information and to register online.

Graphs/photos courtesy of Brian Nault.



The alternative to having crop insurance.

Farming is an inherently risky business.

If you suffer losses this year, will you be able to plant next year?

Crop insurance can help protect you and your family from substantial crop losses. Corn for grain or silage can be covered, as well as other crops. In 2016*, New York State policy holders received:

- an average of **\$198 in payments per acre** for their losses
- nearly **\$11 million total in drought-related payments**

*As of Dec. 20, 2016. Totals will likely continue to increase as claims are processed.

NEW CROP INSURANCE WEB TOOLS

- ⇒ Quickly and easily explore crop insurance options for your farm!
- ⇒ Use your own yield and revenue data to get instant premium estimates.
- ⇒ Get an idea of what you will pay before you speak with an agent.

Single-Crop Insurance Calculator

Provides estimates for traditional crop insurance coverage

Ag-Analytics.org/AmAg

Provides estimates for plans that cover diversified farms



Eriophyid Mites: Micro-Scourge of Garlic

CRYSTAL STEWART, ENYCHP

We've been getting a lot of calls from growers remarking that their garlic just isn't holding up the way it should this winter. Cloves are drying out and discoloring much earlier than would be expected. Dr. Frank Hay at the Geneva Experiment station popped some of this suspect garlic under a microscope and found some very unwelcomed visitors: Eriophyid mites. These mites are small. I mean really small. Hugely small! Invisible to the naked eye, and unrecognizable under a hand lens. Only at 32x magnification do we start to see them clearly, but honestly you might not want to. I will show you anyway. See Below.

Yikes! This was not what I was expecting to see on the surface of those desiccated cloves. Yet as I started digging with the help of our dedicated entomologists, it became clear that this is an issue we as an industry have been dealing with for a while. We may not have been seeing the mites, but we have been seeing their symptoms, and writing them off

as poorly cured garlic in storage and as environmental stress/viruses in the field.

Examination of the symptoms:

Garlic can degrade in storage for a variety of reasons. Poor post-harvest handling, sub-optimal storage conditions (too warm, too wet, etc), and high disease pressure can all play roles in garlic storing poorly. To determine which of these issues affects your garlic, peel 10-15 cloves and examine them closely. One way to differentiate mite damage from other issues, particularly if you are having issues shortly after garlic enters storage, is to look for a dull surface to cloves as opposed to a shiny surface. The mites rasp at the surface of the clove, and are themselves dusty looking on the surface. From here, find the highest magnification hand lens you can to look at the surface, and look for what look like very, very small thrips. Or you can send samples to the diagnostic clinic to have the presence or absence of mites verified.

In the field, mite damage can be seen early in the growing season as stunted, twisted growth with streaking (Lange and Mann, 1960). Notably, the plants tend to out-grow this damage. The first few leaves may emerge stunted and twisted, but later growth may appear fine.

continued on next page



Peeled suspicious cloves. Image: Frank Hay



10 X magnification



32 X magnification



400 X magnification

Images: Frank Hay

Control Measures:

There are two methods of control of Eriophyid mites which show promise. The first, which comes from Oregon State (Jepson and Putnam, 2008), is to soak seed stock for 24 hours immediately prior to planting in a 2% soap and 2% mineral oil water bath. I'd recommend this as a control if you detect an issue prior to planting, but after drying the garlic.

A second control measure is heating the garlic to between 113° and 119° F briefly during the drying process. At 113° mite eggs are killed within an hour (Courtin et al, 2000). This process should be done with great attention to prevent bulbs reaching the temperature of 120°, at which point waxy breakdown occurs. Bringing garlic to this temperature while monitoring the crop, then dropping back to between 100° and 110° for the remainder of drying should yield good control and maintain crop quality. Check for mites before putting the garlic into storage, to determine storage protocol.

If mites are detected in garlic which is being kept for consumption rather than planting, the best method to stop population increase is to store the garlic cold. Maximum population growth occurs at 77° and 80-95% RH (note, this temperature would be considered fine for most other storage considerations, so if you have a mite issue, storage as usual will not work). As the temperature drops from here, reproduction slows, stopping at 43°. Hence, a moderate infestation could be held static by storing garlic at 43° or lower. If you store cool to cold, remember that the garlic is being vernalized, and will sprout if brought to warmer temperatures. Keep it cold until its being sold or distributed.

Additional best practices can help to reduce mite pressure over time. Mites may reside in the soil, so make sure to practice crop rotation (as a general rule a 3 year rotation is good; 4 is better). Periods of field saturation can greatly reduce mite numbers, so the wet fall and winters we have been having could actually play in our favor. This pest will be receiving additional attention over the coming years, with more control recommendations being evaluated, including rotations and chemical controls (organic and conven-

tional), as well as biocontrols. When considering chemical controls, remember this is a mite, not an insect, and that acaricides, not insecticides, will be most effective. That said, at this point there do not appear to be any acaricides labeled for eriophyid mite control in garlic in New York that this time.

What is an eriophyid mite, anyway?

It turns out that if you are confused by mites, you aren't alone. Some garlic growers have heard of wheat curl mite in the past (*A. tosichella*) and now we are adding in dry bulb mite (*A. tulipae*) as another worry.

The two have been confused by entomologists for years, and the differences are still being teased out (Skoraka et al, 2013). Notably, there is still work needed to understand which mites will feed on garlic and other alliums, and to what extent.

One key difference to be aware of, however, is that eriophyid mites are different from bulb mites. Bulb mites feed primarily on damaged or decaying tissue, while eriophyid mites will feed on healthy tissue. Bulb mites are slightly larger, pearly cream colored, and bulbous.



References:

- Courtin, O., Fauvel, G. and Leclant, F. Temperature and relative humidity effects on egg and nymphal development of *Aceria tulipae* on garlic leaves. *Ann. Of Appl. Biology*, 137: 207-211. 2000
- Jepson, S. and Putnam, M. Eriophyid mites on stored garlic. *OSU Extension Bulletin*. 2008
- Lange, W.H. and Mann, L.K. Fumigation controls microscopic mite attacking garlic. *California Agriculture*. December, 1960.

Best Management Practices for Soft Rot Associated with *Dickeya* in Potato Production Fields in the Northeast

Potato seed tubers harboring *Dickeya dianthicola* are the only confirmed source of this pathogen. It does not appear to be able to survive in soil (including in crop debris) from one growing season to the next. Consequently, rotating with a non-susceptible crop is not a necessary component of the management program. Best management practices listed below are encouraged to minimize potential losses from *Dickeya*.

Note: While *Dickeya* is an emerging pathogen and of greatest concern, bacteria in the genus *Pectobacterium* continue to be responsible for soft rot disease in eastern and midwestern states and are the most common soft rot pathogen in some areas.

- Select certified seed with negligible potential to be contaminated with *Dickeya*. This is best determined by talking with the seed producer about past occurrence on the farm and what is being done to manage it. There are seed producers who have never had *Dickeya* develop from their seed, and some who did not have *Dickeya* develop from their seed in 645⁰ after they disposed of seedlots found to be contaminated in 2015 plus implemented a good management program.
- Select seed from farms where the pathogen has not been detected and seed marketed in previous years was not associated with *Dickeya* developing where the seed was planted. But note statement above; seed producers can eliminate *Dickeya* from their operation, thus it is important to talk with seed producers before purchase.
- Select seed from farms where zero tolerance is being implemented.
- Check Certificates before purchase to determine if the seed was increased in previous years on a farm where *Dickeya* has been detected and so is at risk for being contaminated.

- Select seed with zero blackleg levels reported on the North American Seed Potato Health Certificates or the Winter Grow Out Test results for presence of *Dickeya* in ANY seed lot from ANY source. Seed lots with field readings of blackleg present should have reports that suspect plant samples were taken for testing and found to be *Dickeya* free. Check Certificates before purchase and require a copy be provided for your records.
- Select seed that tested negative for *Dickeya*. Note that not detecting a pathogen in a sample of seed does not mean the pathogen is not present in the seedlot.
- Ask for 'references' to contact: potato growers who purchased their seed in 2016.
- Avoid seed lots that tested positive for *Dickeya* in previous years.
- Avoid seed if its Certificate is unavailable. All certified seed has a Certificate.
- Avoid seed from fields where symptoms of *Dickeya* were observed, even if affected plants were rogued out.
- Request from supplier (directly from seed producer or broker) PCR testing for *Dickeya dianthicola* using an independent laboratory.
- It is recommended that each truckload brought



Tubers infected with *Dickeya* will be completely macerated and have a tapioca-like appearance. They may not have a rancid smell as they do when they are infected with *Pectobacterium*.

Photo Credit: by S. Johnso

Source: University of Delaware Cooperative Extension

continued on next page

to a farm operation be sampled and re-tested for *Dickeya* once delivered. All results should be reported to your State Department of Agriculture or Potato Growers Association.

- All equipment during seed piece cutting should be disinfested on a regular basis (at least daily), and also between lot numbers.
- While it is recommended to rotate where potatoes are grown to manage most pathogens that can survive in unharvested tubers, this practice is not considered important for *Dickeya* because this pathogen does not readily spread in fields (thus a few tubers with *Dickeya* will not result in significant disease outbreak as can occur with late blight) and infected tubers are likely to rot while in soil.
- Inspect fields for symptoms regularly, starting when skips and affected plants are readily visible. Examine the crop for unevenness (erratic growth) and plants that are unthrifty. *Dickeya* can be present in a plant affecting growth but not causing its typical blackleg symptom.
- Growers are encouraged to submit suspect samples for testing promptly to their local extension office in order to confirm *Dickeya* is the cause and to contribute to knowledge about *Dickeya* occurrence, and also to share their observations of *Dickeya* with the seed producer.
- Avoid excess irrigation that results in standing water as *Dickeya* can move in this water. Note that surface irrigation water is not considered to be a possible source of *Dickeya*.
- Do not apply copper or other fungicide for *Dickeya*. They are ineffective being unable to reach the pathogen, which is inside stems.
- All growers are requested to share information about *Dickeya* occurrence and absence in their production fields. This information is needed to improve understanding about this disease. Include variety, lot number (North American Seed Certificate), field location, and testing results.
- *Dickeya* has not been observed to continue developing in storage, which is as expected considering high temperatures are favorable, thus there are no management steps to implement after harvest for table-stock potatoes. However, it is prudent to make sure storages and pile temper-

atures remain cool, also reduce condensation and encourage airflow and exchange.

Prepared by Meg McGrath and Andy Wyenandt with assistance from Steve Johnson, Keith Perry, Kate Everts, Beth Gugino, and Nate Kleczewski.



Source: Cornell.edu

Research Updates on SWD

Two very informative webinars discussing the most recent research into Spotted Wing Drosophila management have been recorded. The recordings can be found at the following links:

Making the Most of Your Insecticide Toolbox to Manage SWD:

https://www.youtube.com/watch?v=nV4Yb6_DiHw&feature=youtu.be

and

Management of Spotted Wing Drosophila using Organic Strategies:

<http://articles.extension.org/pages/74034/management-of-spotted-wingdrosophila-using-organicstrategies>

The Low-Down on the Food Safety Modernization Act (FSMA)

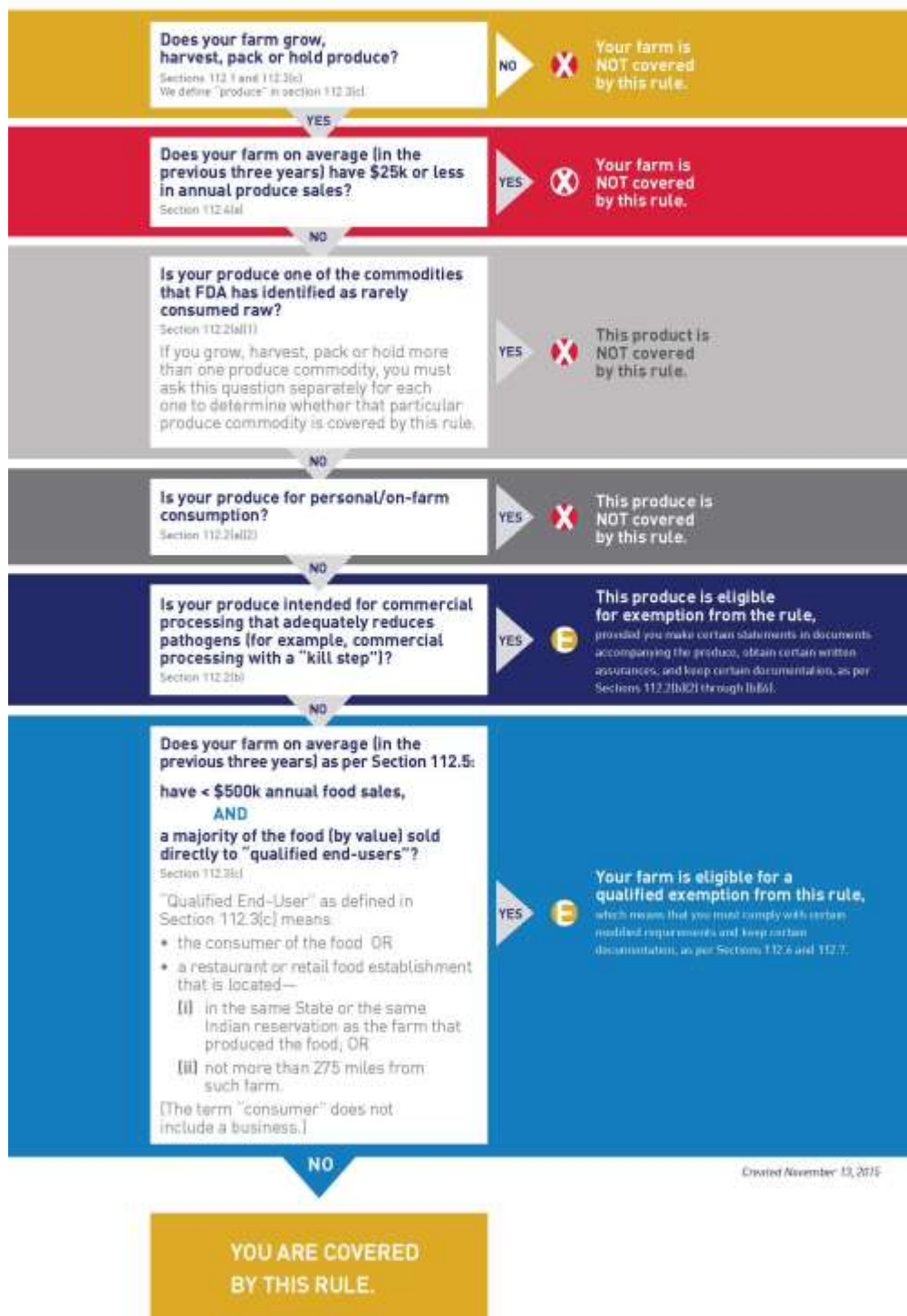
ERIK SCHELLENBERG,
ENYCHP

Some produce farmers will have to comply with the Produce Rule, part of FSMA. The first thing to know about it is that even non-exempt farms don't have to comply immediately. The soonest that any farm needs to be in compliance with the Produce Rule is January 2018. That date is for farms that gross over \$500,000 or otherwise do not qualify for a conditional exemption. Non-exempt farms making between \$250,000 and \$500,000 have an additional year (January 2019), and non-exempt farms making between \$25,000 and \$250,000 must comply by January 2020. All income brackets will have an additional two years to comply with certain requirements pertaining to the use of agricultural water. Also, small operations grossing less than \$25,000 in produce sales are not covered by the rule. That means you don't even need to file for exemption.

Is my farm exempt or not?

To qualify for exemption, your farm business operation must have a three year running average gross revenue of less than \$500,000 in all food sales. This includes produce, meat, eggs, animal feed, market sales. If you're scratching your head wondering why the produce rule income brackets include sales from food other than produce, you are not alone. Anyway, you must average less than

The Preventive Controls for Human Food rule clarified the definition of a farm to cover two types of farm operations, primary production farms and secondary activities farms. The same definition is used in the Produce Safety rule (section 112.3(c)). Below are basic criteria that determine whether an operation that meets the definition of "farm" is subject to the produce rule.



\$500,000 in gross sales of food over three years, AND you must sell the majority of the food to qualified end users. That means either direct consumers of the food, or retail locations within 275 miles of the primary address of the farm. Meet those two criteria, and you

continued on next page

can file for exemption from the Produce Rule. You still have to comply with modified requirements, which mainly include displaying your farm name on farm stands, retail locations, and certain types of packaging.

If you need clarification on this or any other issue related to FSMA, GAPs, or food safety in the production of fresh fruit, berries, or vegetables, please contact me, your food safety specialist, Erik Schellenberg at 845-344-1234. Also check our upcoming events to sign up for the closest FSMA certificate training so you can get the ball rolling on complying with the rule.

New PSA FSMA Training Date in the Capital Region!



ENYCHP will be hosting a training on April 4th and 5th, 2017. The first day is mandatory to receive FSMA certification. The second is an optional workshop for those growers who would like assistance in developing a food safety plan.

Please note: Pre-Registration is Mandatory for both days!

Time: 8:30am-4:30pm both days
Location: Albany Ramada Plaza Hotel
 3 Watervliet Avenue Ext.
 Albany, NY 12206

Cost: Day One- \$100 per person (includes manuals, certification and lunch) or \$25 per person that wishes to sit in but NOT be certified.
Day Two- \$35 per person

Please Register online at <https://enych.cce.cornell.edu/events.php> or call Abby Henderson at 518-746-2553



SUMMER 2017 PAID STUDENT INTERNSHIPS For Addressing the Needs of Farmworkers in NYS

Would you like to be paid to work with the Cornell Farmworker Program while conducting research and educational outreach to address the needs of farmworkers in New York State?

Internship research topics may include:

- Conducting research to assess farmworker needs
- Providing on-farm workshops including: English as a Second Language, Chemical Safety, and Emergency Planning
- Surveying farmworker services and their usage
- Examining farmworker perspectives on labor issues
- Canvassing immigration concerns and developing relevant extension materials

Interns may be hosted by a range of local organizations.



TO APPLY for an INTERNSHIP:

- Set up a meeting with Mary Jo Dudley, Director of the Cornell Farmworker Program (farmworkers@cornell.edu), to discuss internship opportunities and your areas of interest. Please include possible meeting dates and times upon initial request.
- Following first meeting, submit your resume (including name, local and home address, telephone number, and email address) with a cover letter outlining:
 - ⇒ Area of interest (both topic and geographic interest)
 - ⇒ Skills and strengths you will bring to the internship program
 - ⇒ Proposed learning goals
- Provide three letters of recommendation using the CFP recommendation form.
- Submit a hard copy of your official transcript.

Submit CFP internship application materials by March 3, 2017 to:

Mary Jo Dudley, Director, Cornell Farmworker Program
 Department of Development Sociology
 275 Warren Hall, Cornell University, Ithaca, NY 14853 (607) 254-5194
 Application instructions at: www.farmworkers.cornell.edu
 Email: farmworkers@cornell.edu to request an interview

Corn Earworm Developing Resistance to Bt Toxins in Sweet Corn

JOSEPH INGERSON-MAHAR &

KRISTIAN HOLMSTROM,

DEPARTMENT OF ENTOMOLOGY,

RUTGERS AG. EXPERIMENT STATION

New research from the University of Maryland indicates that corn earworm, also known as tomato fruitworm, has developed resistance to the Cry1 Bt toxins present in some sweet corn hybrids. Based upon Galen Dively's twenty-one years of research comparing non-Bt sweet corn varieties with Bt varieties in plot studies, the proportion of damaged ears in Bt varieties has dramatically increased over that time.

Syngenta sweet corn hybrids with Attribute® technology expressing Cry1 Ab toxins in 1996 showed less than 10% ear damage. Those hybrids with Attribute® in 2016 averaged 84% ear damage. Similarly, the amount of damaged area per ear had tripled.

Seminis produced sweet corn hybrids with Performance Series™ containing Cry1 A.105 and Cry2 ab for worm control. When some of these hybrids were first evaluated in 2010 they provided 100% control of fall armyworm and 95% control of corn earworm. In 2016, six plantings at research farm sites of these hybrids averaged 67% damaged ears. Syngenta also developed Attribute II® hybrids, incorporating the Cry1 Ab toxin with a new vegetative insecticidal toxin, Vip3A, which was released commercially in 2013. In thirteen field trials, Attribute II® hybrids had no live larvae (worms) in the ears and no ear damage was found, indicating 100% control of the larvae of corn earworm, fall armyworm, and European corn borer.

What does this mean for our sweet corn farmers? Effective, almost 100% control of European corn borer can be achieved with any of the Bt sweet corn hybrids. Bt hybrids that express only the Cry1 Ab toxin will not control corn earworm and fall armyworm sufficiently so that silking sprays will be needed to maximize marketable yields. Those hybrids expressing Cry1 A.105 and



Corn earworm caterpillar feeding on sweet corn tassel

Cry2 ab will probably require some silking sprays, as well. The hybrids expressing the Cry1 Ab toxin and Vip3 A toxins may currently provide nearly 100% control of corn earworm and fall armyworm and silking sprays may not be necessary. However, farmers have to look at the seed cost of these different hybrids and what the yield potentials are. If a particular variety has the Bt traits that you want but is expensive and doesn't yield well, then you should look at other varieties. If fall armyworm is not a concern for you, and you are willing to use silking sprays for corn earworm, then a variety expressing only the Cry1 Ab toxin may economically work for you.

Lastly, the trend over the past twenty years has been a gradual decline in corn earworm populations. This has likely been the result of the planting of Bt hybrids in field corn and cotton. Even though the moths are becoming resistant to the Bt toxins, it does weaken the moths so that they are less fit, that is, fewer eggs are laid, fewer eggs hatch, and fewer larvae survive to adulthood. But these moths have greater impact on the sweet corn crop because they are increasing in their Bt resistance, so that fewer moths may cause greater damage on Bt hybrids. Source: Plant and Pest Advisory: Vegetable Crops, Rutgers Cooperative Extension, January 18, 2017:

Link: <http://plant-pest-advisory.rutgers.edu/corn-earworm-developing-resistance-to-bt-toxins-in-sweet-corn/>

Double Cropping Raspberries - *making the most of a challenging situation*

LAURA MCDERMOTT,
ENYCHP



Spotted Wing Drosophila (SWD) with its demonstrated preference for raspberry and blackberry fruit and its amazing population growth in late summer has made fall raspberry production very difficult for NYS growers. Fall raspberries, which are called primocane fruiters because they bear fruit on the primo (first year) canes, were enormously popular because they eliminated the need for selective pruning. The labor savings on these raspberries was substantial and much of the U-Pick farms elected to move to a late summer raspberry model.

But those days are over. If a farm is going to control SWD, they need to either commit to a weekly spray program once the fruit begins to color or they need to make changes in their cultural management of the fall raspberry crop. Reducing foliage to improve air flow and spray penetration is critical to eliminating SWD.

There are several ways that a farmer can address these challenges and they center around variety selection and pruning.

- Control density of traditional fall bearing raspberries
- Consider shifting raspberry production to an earlier time frame – either all floricanes (summer production on 2nd year canes).
- Consider double cropping with varieties that bear on both primocanes and floricanes. These varieties are referred to as 'Commercial ever-bearers'.
- Trellis raspberries.
- Control weeds.

In order to grow the traditional fall bearing primocane varieties you must reduce the cane pop-

ulation. The first step towards that goal is to reduce the width of the row. The row at harvest time should not exceed 2' in width at the base. You can attain that by removing all canes outside of a 12-18" strip in the spring. Before canes reach 24" in height, remove all exterior canes and all canes except the biggest, most robust 4-6 canes per square foot. This pruning can go quite quickly as none of the canes are large so pruning isn't that onerous. Early pruning may force even more canes as the spring progresses, so you may need to send workers back through the planting in a few weeks to get rid of late emerging canes especially on the edge of the row.

If your existing planting is made up of varieties that are more than 12 years old, consider complete renovation with some newer plants. If you haven't grown summer bearers in a while, now might be a good time to try again. There has been improvement in the fruit and the pressure from SWD is markedly less.

If your farm market relies on consistent raspberry production throughout the year and into the fall, consider double cropping. This system will require more attention and more investment in trellis infrastructure, but should result in more high quality fruit out of the planting and more consistency.

continued on next page

To double crop raspberries, choose varieties that consistently produce good crops on both primocanes and floricanes. These include:

- **Prelude** – A red raspberry that is one of the earliest floricanes producers also produces a reliable fall crop, especially in Zone 5 or warmer. The berries tend to be soft and canes can be winter damaged in cold zones.
- **Caroline** – A red raspberry that does really well in most of eastern NY. It is a primocane variety that can be pruned to bear in the summer, but if planted on light soils and not irrigated well the berries can be crumbly – usually just in high heat summers. It's flavorful and high yielding.
- **Joan J** – This variety will provide the best pay-back for trellising and thinning canes. The plant is tall so the top cane should be at least 60", some growers are suggesting as high as 72". If your location is cold, overwintering could be a problem.
- **Himbo Top** – This variety is being recommended by nurseries but I don't have a lot of first-hand experience. It's notably *Phytophthora* tolerant and quite winter hardy. It may need significantly less nitrogen than most raspberry varieties. It could be a good choice for organic growers or those that have slightly heavy soils.
- **Anne** - The best choice for double cropping if you want a yellow raspberry.

you to retention as the wire stretches. Nursery clips hold canes in place.



To get the most out of the double cropping system, don't plan on harvesting a crop the first year. The largest floricanes should be kept (4-6/foot) and then when they are 4' in height they should be clipped to the trellis wire. This will help prevent winter injury due to wind.

In mid-May the following year, newly emerging canes (primocanes) should be thinned to 6-8 per foot. When the summer harvest has finished, the canes that just finished fruiting are removed and the new primocanes are then clipped onto the wire where the other canes were. Remove leaves on lower third of cane to improve air flow, spray penetration and discourage SWD.

In late November, well after the fall harvest is complete, the primocanes are cut back to 4-5' and lateral branches are trimmed to 8-12". All short primocanes that have emerged late in the season are removed.

Production estimates on this system are encouraging but still not reliable. I like the fact that the farmer is committing to manage this planting more aggressively with an expectation of high yield. In order for us to make money on raspberry plantings in the northeast, more attention needs to be paid – and this cropping strategy provides a recipe for success.

Many thanks to Nate Nourse for the photos and the information provided from a presentation at the recent Empire State Producers EXPO. For more information on raspberry pruning and production systems of brambles visit: <http://www.fruit.cornell.edu/berry/production/brambleproduction.html>. For information on double cropping raspberries, visit Nourse Farms <https://www.noursefarms.com/>.

A T-trellis should be built and the overall goal is to have 4-6 floricanes canes per foot of row with no more than 8 primocanes emerging during the season. The T on the trellis is 12-24" wide. Mono-filament trellis wire works very well as it never rusts and is very strong. Self locking devices on the wire allow



The Pilgrim Pipeline — Is Your Farm Affected?

ELIZABETH HIGGINS, ENYCHP

You may be hearing more about the Pilgrim Pipeline project soon. The pipeline, if constructed, would carry crude oil south from Albany, NY and refined petroleum products (gasoline, diesel, heating oil, and kerosene) north from Linden, NJ. It is a large project and would definitely have an impact on some farms in our region. We therefore wanted to help make farmers in our region aware of information about this project.

According to the developer, Pilgrim Pipeline Holdings, LLC almost 80 percent of the mainlines in New York would be installed within the New York State Thruway (NYS Thruway) right-of-way (ROW); 7.5 percent would be co-located with other roads, utilities or railroads ROWs; and the remaining 13.5 percent would be on newly acquired ROW. However, five additional single pipe product lateral pipelines would be constructed in New York to intermediate delivery points (existing terminals), and four pump stations and 10 meter stations would also be constructed.

The draft Environmental Impact Statement, prepared by the developer, states that they estimate that the mainline of the pipeline would cross 1.35 miles of active agricultural land, not including agricultural land that is in the Thruway right of way (ROW), as follows:

- Albany County - .07 miles
- Rensselaer County - .67 miles
- Greene County - .35 miles
- Ulster County - .19 miles
- Orange County - .07 miles

Outside of the Thruway ROW, the mainline would pass through a total of approximately 5.82 miles of prime farmland; and 7.63 miles of farmland of statewide importance. One possible concern is these estimates exclude the land acquired for the laterals and other infrastructure, which definitely include some agricultural lands including orchard land in Ulster/Orange. They also exclude



Figure 1—Pilgrim Pipeline Route

the impact on all land that is inside the Thruway ROW.

If your farm is near I-87, especially if you farm in or adjacent to the Thruway ROW, or, based on the overall map, near a proposed lateral, you should review the more detailed plans for the project to see what is proposed. A link to the project plans are available at <http://pilgrimpipeline.com/detailed-applications/>. The sheets are organized from Albany – South. The first sheet is in Albany and the last sheet in Orange County is Sheet 195. If your farm is affected, the environmental review/permitting phase of the project is your opportunity to make your concerns known and to make sure that the impact on your land and your business is accounted for in the negotiations by the State with the developer.

The DEC Pilgrim Pipeline Website describing the process for reviewing the pipeline permit is - <http://www.dec.ny.gov/permits/105174.html>. Matthew Broward is the NYS Ag and Markets staff person who is following the project for the agency. If you have questions about the responsibility of pipeline project developers on agricultural lands he would be the person to talk to. His e-mail is Matthew.Brower@agriculture.ny.gov

Greenhouse Supplemental Lighting: Is it time to switch to LEDs?

NEIL MATTSON, CORNELL

Light is the driving force for photosynthesis and thus for plant growth and yield. During winter and early-spring conditions, sunlight can be limiting in the greenhouse, leading some growers to add supplemental light. Three main categories of lights are typically used for supplemental lighting.

- **Fluorescent** lights are often used for germination shelves because they can be placed close to plants without overheating them. They are usually not used for supplemental lighting in the greenhouse as their fixture causes excessive shading). Lifespan to 80% light output is about 10,000 hours.
- **High intensity discharge (HID)** lamps are most often used for greenhouse supplemental light because of their high light output and relatively little shading – there are two main types: high pressure sodium (HPS) which look yellow/orange and metal halide (MH) which look blue-

ish. Lifespan is about 20,000 hours.

- **Light emitting diode (LED)** lamps are becoming more affordable and higher output. For plants they are often red and blue to target spectra where photosynthesis is slightly more efficient. They produce heat but out of the back of the fixture (not with the light) therefore they can be placed close to the plant (similar to fluorescent). Lifespan is 25,000-50,000 but this is very temperature dependent (lower lifespan at warmer temperatures).

Two primary factors are used to compare costs of different lamps – the initial cost of the lamp (capital cost) and the operating (electrical) cost. The operating cost can be compared in terms of wall plug efficacy - light output per kW of total electricity consumed (including electricity for the power supply, ballast, and cooling). Other factors that should be considered are lifespan, installation, and maintenance costs. Regarding lifespan, LED fixtures might last longer, but once they burn out the entire fixture must be discarded. Whereas for HID lights, the bulb can be replaced.

Fixture	Power (Watts)	Light Output (μmol/s)	Wall-plug Efficacy (mol/kWh)	Cost (\$ / fixture)
PAR Source 1000W DE HPS	1077	1712	5.72	\$407
Gavita Pro 600W SE HPS	700	1092	5.62	\$294
Heliospectra LX602□G LED (100% on R/W/B)	649	772	4.27	\$1,849
Illumitex PowerHarvest W 10 Series LED	510	872	6.16	\$1,299
Lighting Technologies 100W LED	101	109	3.90	N/A
LumiGrow Pro 650™ LED (100% on R/W/B)	566	764	4.86	\$1,369
Philips GreenPower LED Toplighting DR/B – Med. B	216	516	8.60	\$500
Valoya Model R150 NS1 LED	133	192	5.18	\$976

*Cost is retail price for single unit as found online July, 2016. Costs can change dramatically over time and according to supplier and bulk purchasing.

continued on next page

Through a project funded by the New York State Energy Research & Development Authority (NYSERDA) and in collaboration with A.J. Both at Rutgers University we were recently able to measure light output and power consumption of several different lamps. From these measurements, we could calculate wall-plug efficacy. In the table below the first two lamps are high pressure sodium (HPS) and the subsequent rows are LED lamps.

In the below example we use a fairly extreme case of year-round production of hydroponic lettuce grown in a 1-acre greenhouse in central NY. We assume we wish to light the lettuce crop to $17 \text{ mol} \cdot \text{m}^{-2} \cdot \text{d}^{-1}$. To achieve these daily light levels we have calculated we need a target instantaneous light level of $200 \text{ } \mu\text{mol} \cdot \text{m}^{-2} \cdot \text{s}^{-1}$ and that fixtures are on for 2,585 hours per year. Finally, we assume electricity costs of \$0.105/kWh.

Fixtures needed and electricity cost example

Based on light output and efficacy one can estimate the number fixtures needed to reach a target instantaneous light level in the greenhouse (in terms of $\mu\text{mol}/\text{m}^2/\text{s}$ of photosynthetically active radiation). Then, if you know the number of hours to light per year, you can calculate annual electricity costs. We have a free online calculator to help walk you through these calculations http://www.cornellcea.com/resourcesPublications/CornellPublications/LampsCalculator_V1.0.xlsx (you can find this on the right-hand sidebar at www.cornellcea.com)

The tables show that two of the LED lamps we evaluated are better than HPS lamps in terms of wall-plug efficacy. There were also several LED lamps with worse wall-plug efficacy than HPS. This suggests that LED lamps should not all be considered energy efficient but should be examined on a case-by-case basis. Even for the LEDs with the greatest wall-plug efficacy, it appears that it would take several years of electricity savings to recoup the initial high investment. Over time, LED fixtures will become more economically viable as capital costs decrease and efficacy further increases.

Fixture	Fixtures to light 1 acre	Cost of fixtures	kWh electricity (1 yr.)	Electricity cost (1 yr.)
PAR Source 1000W DE HPS	473	\$192,511	1,320,965	\$138,701
Gavita Pro 600W SE HPS	742	\$218,148	1,345,067	\$141,232
Heliospectra LX602 □ G LED (100% on R/W/B)	1,049	\$1,939,601	1,769,370	\$185,784
Illuminex PowerHarvest W 10 Series LED	929	\$1,206,771	1,226,889	\$128,823
LumiGrow Pro 650™ LED (100% on R/W/B)	1,060	\$1,451,140	1,554,593	\$163,232
Philips GreenPower LED Toplighting DR/B – Med. B	1,569	\$ 784,500	878,270	\$92,218
Valoya Model R150 NS1 LED	4,216	\$4,114,816	1,457,893	\$153,079

Note: these calculations do not account for lifespan, installation, or maintenance costs.

Calendar of Events

February 21, 2017. *Grape Pruning Workshop.* See feature to the right.

February 22, 2017. *Effective Orchard Spraying.* Hudson Valley Lab, 3357 US Rt. 9W, Highland, NY 12528. Contact Dan Donahue djd13@cornell.edu.

February 23, 2017. *Effective Vineyard Spraying.* Hudson Valley Lab, 3357 US Rt. 9W, Highland, NY 12528. 8:30-3:15, \$15. Contact Jim O'Connell/jmo98@cornell.edu/845-943-9814

February 28 (Portland NY) & March 7 (Riverhead, NY) . *Growing Berries Under Cover—NYS Berry Growers Association Workshop.* For workshop details and agendas visit: <https://enych.cce.cornell.edu/events.php>

February 28, 2017. *Orange County Onion School.* 8:45AM-4:00PM, Middletown, NY. Enrollees: \$50 before Feb 10, \$65 after Feb 10. Non-enrollees \$80 before Feb 10, \$95 after Feb 10. Contact Ethan eg572@cornell.edu

March 1, 2017. *Pesticide Recertification Program* 997 Loudon Rd. Latham, NY. 8:00-4:00. 3 core credits & 3 credits in MANY categories. \$85 1/2 day, \$100 full day. 518-765-3500. Contact Tove tff24@cornell.edu or Lily lbc75@cornell.edu.

March 9, 2017. *Eastern NY Garlic School.* CCE Voorheesville, NY. 9:30-3:00. \$20 enrolled, \$25 non-enrolled. Contact Crystal at cls263@cornell.edu.

March 14, 2017. *Northern Vegetable School.* Whallonsburg Grange, 1610 NYS Rt. 22, Essex, NY 12936. 8:45-3:00. Contact Amy at adi2@cornell.edu

March 28, 2017. *Effective Orchard Spraying and NEWA Training.* Miner Institute, Ridge Rd. Chazy, NY 12921. Contact Anna Wallis aew232@cornell.edu

April 4th & 5th, 2017. *PSA FSMA Training: Capital Region.* Albany Ramada Plaza, Watervliet Ave. Extension, Albany NY 12206. 8:30-4:30, \$100 day one (includes certification and manuals,), \$35 day two (optional farm food safety plan workshop). Registration is mandatory! Contact Abby Henderson 518-746-2553 or ENYCHP website to register

See the Website to register for many of these programs

<http://enych.cce.cornell.edu/events.php>

Grape Pruning Workshop

It's February, there is some snow on the ground, and the days have started to get longer. Let's take advantage of those longer days and prune some grapes.

Join Jim O'Connell of CCE Ulster and ENY, on **February 21, 2017 from 10:00 am to 1:00 pm** at Red Maple Vineyard in West Park, NY for a free pruning workshop on hybrid grapes.

Red Maple Vineyard (<http://www.redmaplevineyard.com/>) is, "A boutique farm and vineyard located amidst the gorgeous Hudson Valley." They grow several different types of Northern Hybrids, which are trained on a vertical shoot position (VSP) system. Jim O'Connell will demonstrate cane renewal pruning on a VSP system.

Red Maple Vineyard is located at 103 Burroughs Drive, West Park, NY 12493.

The event is free, please pre-register by February 17, 2017 with Jim by phone 845-943-9814 or email jmo98@cornell.edu. Also, please dress for the weather and bring your own pruners.



The Label is the Law. Cornell Cooperative Extension and the staff assume no liability for the effectiveness of results of any chemicals for pesticide use. No endorsement of any product is made or implied. Every effort has been made to provide correct, complete, and current pesticide recommendations. Nevertheless, changes in pesticide regulations occur constantly and human errors are still possible. These recommendations are not substitutes for pesticide labeling. Please read the label before applying any pesticide. Where trade names are used, no discrimination is intended and no endorsement is implied by Cornell Cooperative Extension.

Diversity and Inclusion are a part of Cornell University's heritage. We are a recognized employer and educator valuing AA/EEO, Protected Veterans, and Individuals with Disabilities.