The Produce Pages

Serving the fruit and vegetable growers of Eastern New York

February 2016

On-Farm Field Trials

BY AMY IVY

Who hasn't heard someone say they tried a new product or method last season and it worked great; or maybe it didn't work at all and was a waste of money. Trying new ways of farming is how we move forward so it's essential to keep tinkering and experimenting, but how do you know whether or not it's really working?

The key to knowing whether or not something is effective is to always use a control. Let's say you try a new product for potato bugs, but you spray your entire crop with the same product. Or you try a new kind of plastic mulch on your peppers, but you use the same mulch for your entire pepper crop. You may have had good results but you really can't say that the new treatment is the reason. The increased vigor could have been due to the weather, your irrigation, fertility, the soil prep you did before planting, the new location you grew them in this year – any number of factors, including the treatment you did,

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Cornell University
Cooperative Extension
Eastern New York Commercial Horticulture

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

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: lgm4@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 and Marketing
Jesse Strzok
Phone: 518-429-1464 Email: js3234@cornell.edu

Bob Weybright
Phone: 518-727-6238 Email: rw74@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/.

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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

could be the reason.
By using a control you can clearly see the effect of the treatment compared to the control. For a control to work, there has to be only one thing different between it and the treatment. You must use the same variety, in the same field, planted at the same time and treated the same in every way except for your treatment. Only then can you say the treatment made the difference.

Both the control and the treated blocks need to be large enough to provide an average result. You can't spray 90 out of 100 plants and be able to evaluate the difference between the two treatments. And you can't use the outside rows for one treatment and the middle rows for the other since there are other factors that influence plant grow on the edges and middles of fields (crowding, light penetration, air circulation, etc). The conditions need to be exactly the same in every way except for the one treatment in order to make a fair comparison.

To make your research even more valid, you really need to set up at least 3 replications so you can be sure there really is a difference between your treatment and your control; that it wasn't just a fluke. Two replications are not enough. I recently heard an adage that makes this concept understandable: "a person with 2 watches doesn't know the time." What this means is, if one watch says it's 2:10 and the other watch says it's 2:30, how do you know what time it really is? But if you have 3 watches, and 2 of them say it's 2:10 or pretty close to 2:10, then you can conclude it must really be 2:10. You can see that the more watches you have that indicate the same time, the more confident you'll be with that information.

Any of us on the team would be glad to help you think through and plan some of your own on-farm trials you might want to make this summer. They don't necessarily have to be complicated, but they do need to be carefully thought through in order to give you any meaningful information.

Our work as specialists needs to be more rigorous for scientific accuracy, involving several replications scattered across a field. We thank the farmers who have let us set up these trials and helped manage them so we can continue to generate credible research results for the benefit of farmers across the region and state.

Vine Crop Update 2015

CHRIS SMART & HOLLY LANGE

PLANT PATHOLOGY AND PLANT-MICROBE BIOLOGY, CORNELL UNIVERSITY, GENEVA

Cucurbit downy mildew, caused by the water-mold pathogen *Pseudoperonospora cubensis,* continues to be a serious problem for cucurbit growers in New York. While all cucurbits are susceptible, cucumbers are highly susceptible and have been extremely hard hit by downy mildew in recent years. During the 2015 season, we looked at fungicide sensitivity for conventional control products and efficacy in organically approved control products.

For the fungicide sensitivity study, we grew susceptible cucumber plants in small pots in the greenhouse. Treatments (11 fungicides + water control) were applied to plants and they were placed in the field between rows of cucumbers with cucurbit downy mildew symptoms (four reps per treatment). The potted plants were left in the field for 48 hours, then brought into the greenhouse and rated for disease severity after five days. The results can be seen in Table 1 (see page 4).

The second experiment focused on control products approved for control of cucurbit downy mildew in organic production. A total of eight treatments plus and untreated control were used in this experiment with four replicates of each treatment in a randomized complete block design. Plants (the cucurbit downy mildew susceptible cultivar Diva) were grown in a field that has been managed using practices allowed for organic production since 2008. The treatments included plant activators and products that act directly on the pathogen. The results can be seen in Table 2. It was interesting to see that Zonix was somewhat effective against downy mildew, as this product (a rhamnolipid biosurfactant) acts by disrupting the cell membrane of the zoospores (swimming spores) of downy mildew and has a very different mode of action from other products tested. While all products were better than the untreated control, all plots were heavily diseased by the final rating.

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Product	Rate	Active Ingredient	FRAC code	Mean % Disease	
water	na	na		65	a
Previcur Flex 6SL	1.2 pt/A	Propamocarb	28	58.8	a
Revus 2.08SC	8 fl oz/ A	Mandipropamid	40	55	ab
Quadris 2.08F	15.5 fl oz/A	Azoxystrobin	11	47.5	bc
Tanos 50DF	8 oz/A	Famoxadone + Cymoxanil 25%	11 27	42.5	c
Presidio 4SC	4 fl oz/A	Fluopicolide	43	12.5	d
Gavel 75DF	2lb/A	Mancozeb + Zoxamide	M3 22	10.5	de
Bravo Weatherstik	2pt/A	Chlorothalonil	M5	6.3	def
Manzate ProStik 75DG	2lb/A	Mancozeb	M3	6.3	def
Omega 500F	1.5pt/A	Fluazinam	29	2.1	ef
Curzate 60DF	5oz/A	Cymoxanil 60%	27	1.5	ef
Ranman 400SC	2.75 fl oz/A	Cyazofamid	21	0.1	f

Table 1. Results of fungicide sensitivity assay. Four fungicides had significantly more disease than the other seven, and two of the fungicides were not significantly different from plants treated with water.

Treatment	Active ingredient	Mean AUDPC (amount of disease over time)	Final rating % disease
Champ 30 WG	Copper hydroxide	319.3 b	50.0 bc
Cueva FL	Copper octanoate	232.4 b	47.5 bc
Double Nickel	*Bacillus amyloliquefaciens*	306.0 b	50.0 bc
Nordox 75 WG	Cuprous oxide	229.3 b	45.0 c
Zonix	Rhamnolipid biosurfactant	257.3 b	43.8 c
Actinovate AG	*Streptomyces lydicus*	301.3 b	57.5 b
Regalia	*Reynoutria sachalinensis* extract	257.5 b	51.3 bc
Regalia + Actinovate		236.0 b	48.8 bc
Non-treated control		483.8 a	77.5 a

Table 2. Results of product efficacy study. All treatments had statistically better disease control than the non-treated control. When looking at the final disease rating, two of the treatments (Zonix and Nordox) had better disease control than Actinovate.

In the interest of space, some minor edits were made to original document but all the information is present.

Managing Multiple Diseases Affecting Cucurbit Crops

MARGARET TUTTLE MCGRATH

PLANT PATHOLOGY AND PLANT-MICROBE BIOLOGY SECTION, SIPS, CORNELL UNIVERSITY

Every year in the northeast, cucurbit crops are potentially affected by more diseases than most other vegetable crops! Powdery mildew always occurs due to the quantity of easily wind-dispersed spores that the pathogen produces and the breadth of conditions under which it can develop (no high moisture requirement). The downy mildew pathogen also can move long distance; its occurrence in the northeast varies yearly, especially on crops other than cucumber. Occurrence of other diseases varies among farms depending on whether the pathogen is in the soil (several including Phytophthora blight), surviving in alternative host plants including weeds (e.g. white mold, viruses), present in insect vectors (e.g. bacterial wilt) or present in/on crop seed (e.g. bacterial leaf spot). Infected crop at a near-by farm can also be a source of pathogens that move short distances such as during a rainstorm (e.g. Plectosporium blight). Most diseases are more severe during a rainy than dry season because wet leaves or soil are favorable conditions for most pathogens (exceptions include powdery mildew, bacterial wilt, and virus diseases). Successful management is based on knowledge of pathogen biology, in particular sources of inoculum and conditions favoring disease development, which is used to identify appropriate cultural management practices. Knowing early symptoms facilitates early detection. It is also important to have current information on fungicides and resistant varieties. Below is information on select diseases followed by an integrated management program.

Plectosporium blight

This disease is more common when weather is rainy providing favorable conditions. Rotate, clean equipment between fields, apply chlorothalonil before rain, and incorporate infested debris right after harvest.

Powdery Mildew

An integrated program with both management tools (resistant varieties and fungicides) is recommended to maximize likelihood of effective control. The pathogen has been evolving and becoming less effectively controlled by these. Alternate among targeted, mobile fungicides in the 4 chemical groups below, and apply with protectant fungicide to manage resistance development and avoid control failure if resistance occurs, and also to comply with label use restrictions. Note that the main goal is delaying resistance development, not managing resistance. Begin very early in disease development (one older leaf out of 50 with symptoms).

Vivando (FRAC Code U8) is a new fungicide with a new mode of action. Cucurbits are on a supplemental label. It has exhibited excellent control in fungicide evaluations conducted recently. Activity is limited to powdery mildew. Do not mix with horticultural oils. It can be applied three times per year with no more than two consecutive

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applications. REI is 12 hr. PHI is 0 days. 365 day plant back restriction for non-labeled crops.

Torino (Code U6) has exhibited excellent control in fungicide evaluations conducted recently. Activity is limited to powdery mildew. It can only be applied twice to a field in a 12-mo period. Consecutive applications are not recommended. REI is 4 hr. PHI is 0 days.

Quintec (Code 13) has been consistently effective in fungicide evaluations. Activity is limited to powdery mildew. Label specifies no more than two consecutive applications plus a crop maximum of four applications, and no aerial applications. REI is 12 hr. PHI is 3 days.

DMI fungicides (Code 3) include Proline and Procure, which are considered most effective, plus Rally and Inspire Super. Resistance is quantitative. Highest label rate is recommended because the pathogen has become less sensitive to this chemistry. Efficacy has varied in fungicide evaluations. Procure applied at its highest label rate provides a higher dose of active ingredient than the other Code 3 fungicides. Five applications can be made at this rate. REI is 12 hr for these fungicides. PHI is 0 - 7 days. Powdery mildew is the only labeled cucurbit disease for these fungicides, except for Proline, which is labeled for Fusarium, and Inspire Super, which contain another active ingredient (Code 7 and 9, respectively) and are labeled for additional diseases.

Carboxamide fungicides (Code 7) could be included in the program used sparingly. Resistant pathogen strains have been detected, and are likely the reason efficacy has varied. Cross resistance was documented between Pristine and Merivon, the products registered for use on all cucurbits, but not with Luna fungicides, which therefore are the best choice, but unfortunately they are labeled for use only on watermelon so far. Carboxamides are labeled for additional diseases. REI is 12 hr. PHI is 1 day.

Resistance continues to be very common to MBC fungicides (FRAC code 1; Topsin M) and QoI fungicides (Code 11; Quadris, Cabrio and Flint); therefore these are not recommended.

There are several protectants for powdery mildew, including chlorothalonil, sulfur, copper, botanical and mineral oils, and several biopesticides.

Phytophthora Blight

This destructive disease has more been severe recently in areas where there were intensive rainfall events, which created unusually favorable conditions. A key to successfully managing this disease is managing soil moisture to avoid saturated conditions. Achieving this is difficult when rainfall amounts are large. Another key has been fungicides registered in recent years with targeted activity for pathogens in this biological group (Oomycetes). Information about these follows section on downy mildew. These are considered the reason many growers have been effectively managing Phytophthora blight. A preventive fungicide program is considered essential. Ineffective control with fungicides has been associated with poor application timing in some fields (application missed when rain began before expected) while in others favorability of environmental conditions seemed to have been too great. Development of fungicide resistance is a concern with all targeted fungicides due to single site mode of action; therefore, alternation amongst chemistry is recommended. Resistance to Ranman has been detected in the southeastern US. Protectant fungicides, such as coppers, are not sufficiently effective to be recommended alone for Phytophthora blight; however, they are useful tank-mixed with targeted fungicides to manage resistance. Presidio has a long rotational interval of 18 months for non-labeled crops, which can be a constraint on its utility. Most vegetable crops are now on the primary or supplemental labels. An important notable exception is sweet corn, which is commonly grown in rotation with pumpkins.

Biopesticides There are several products (Actinovate, Double Nickel, Regalia, RootShield, Serenade Soil, SoilGard, Bio-Tam, etc.) that can be applied to soil pre-transplant, at planting, and via drip to manage the blight pathogen, *Phytophthora capsici*, in the root and crown zone and to induce resistance (Regalia). Most of these biopesticides can also be applied to foliage.

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Typically Phytophthora blight begins to develop in low areas where water drainage is poor, but symptoms have been found first in sloped areas. This documents the need to look throughout a crop for symptoms and not focus exclusively on low areas. It is better to avoid planting low areas. While crops planted in a field lacking the pathogen (based on crop and disease history) typically will be free of Phytophthora blight, this is not absolute. The pathogen can be moved between farms via water. Two cultural practices that have proved useful are biofumigation and deep zone reduced tillage. Biofumigation can be accomplished by growing a biofumigant mustard cover crop typically in early spring, chopping into small pieces 4-6 weeks after onset of flowering, and immediately incorporating the mustard, then sealing the soil surface with a culti-packer and irrigation. At least 7 days afterwards, lightly disk then plant.

Downy Mildew

DM is primarily managed with fungicides. Cucumbers with a new source of resistance are becoming available. Some suppression, albeit variable, can be obtained with varieties bred to be resistant to pathogen strains present before 2004. An integrated program with fungicides applied to resistant varieties is recommend. As with powdery mildew, fungicide resistance is also a concern with the downy mildew pathogen and therefore the fungicide program recommended is also targeted, mobile fungicides applied in alternation based on FRAC Code (see list below) on a weekly schedule and tank mixed with a protectant fungicide (chlorothalonil or mancozeb) beginning very early in disease development.

An important tool for determining when fungicide application is warranted is the forecast web site for this disease at *http://cdm.ipmpipe.org* Cucurbit plants are susceptible to downy mildew from emergence; however, this disease usually does not start to develop in the northeast until later in crop development when the pathogen is dispersed by wind into the region. The forecast program monitors where the disease occurs and predicts where the pathogen likely will be successfully spread. The pathogen needs living cucurbit crops to survive, thus it cannot survive where it is cold during winter. The risk of downy mildew occurring throughout the eastern USA is forecast and posted three times a week. Forecasts enable timely fungicide applications. Label directions for some fungicides state to begin use before infection or disease development. The forecasting program helps ensure this is accomplished. Growers can subscribe to receive customizable alerts by e-mail or text message. Information is also maintained at the forecast web site of cucurbit crop types being affected by downy mildew. This is important because the pathogen exists as pathotypes that differ in

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their ability to infect the various crops. All pathotypes can infect cucumber; some also can infect melons and squashes are susceptible to others. Success of the forecast system depends on knowledge of where downy mildew is occurring; therefore prompt reporting of outbreaks by growers is critical.

Fungicides for Phytophthora Blight (PB) and/ or Downy Mildew (DM)

Presidio (FRAC Code 43). Recommended used early in the season for PB when DM not a concern. No longer effective for DM because of resistance. Apply no more than 4 times in a season with no more than 2 consecutive applications. Must be applied with another fungicide.

Ranman (21). Use organosilicone surfactant when water volumes are less than 60 gallons per acre. REI is 12 hr. PHI is 0 day. Apply no more than 6 times in a season with no more than 3 consecutive applications.

Zing! and Gavel (22). These are the only products that have a targeted fungicide and a protectant fungicide (chlorothalonil or mancozeb). Only Gavel is labeled for PB as well as DM. REI is 12 hr for Zing! and 48 hr for Gavel. PHI is 0 and 5 days, respectively. Apply no more than 8 times in a season with no more than 2 in succession. Limit total use with all products used to 1.6 lb zoxamide and 9.44 lb chlorothalonil per acre per season. The amount of chlorothalonil in an application of Zing! (1.18 lb/A) is less than the highest label rate of chlorothalonil fungicides for downy mildew (1.5 lb/A) and is below the range for other diseases including powdery mildew (1.5-2.25 lb/A). Increasing the amount of chlorothalonil applied is prudent for these diseases. To obtain an application rate of 1.5-2.25 lb/A chlorothalonil, tank mix Bravo WeatherStik at 0.43-1.43 pt/A with Zing!.

Zampro (40, 45) and Revus (40). While in the same fungicide chemical group, there is indication they may have slightly different mode of action, thus there may be benefit to using one for the first application of a product in this group in a fungicide program and then switching to the other product later in the program. REI is 12 hr. PHI is 0 day. Apply no more than 3 times (4 for Revus) in a season with no more than 2 consecutive applications (none with Revus). Revus must be applied with a spreading/penetrating type adjuvant. Zampro cannot be used in Suffolk and Nassau counties (Long Island).

Ariston, Curzate or Tanos (27). These have some curative activity (up to 2 days under cool temperatures) but limited residual activity (about 3-5 days). They can be a good choice when it was not possible to apply fungicide at the start of a high risk period when temperature is below 80 F. Apply another targeted fungicide 3-5 days later. Curzate and Tanos must be tank-mixed with a protectant; Ariston also contains chlorothalonil. REI is 12 hr. PHI is 3 days. Apply no more than 4 times in a season (6-9 for Curzate depending on rate); no consecutive applications of Tanos are permitted. Ariston and Curzate are not labeled for PB.

Phosphorous acid fungicides (33). There are numerous products (e.g. Agri-Fos, Fosphite, K-Phite, Phostrol, ProPhyt, Rampart), all effective only for PB. They are recommended used at a low label rate tank mixed with the targeted fungicides listed above for PB.

Previcur Flex (28). Activity is limited to DM. Use sparingly (less than label limit of 5 times in a season). Reduced efficacy recently is thought to be due to fungicide resistance. REI is 12 hr. PHI is 2 days.

Recommended protectant fungicides:

Chlorothalonil and mancozeb are the main protectant fungicides for DM and PB. Copper is also good for PB, but isn't as effective for DM.

No longer recommended:

Resistance to fluopicolide (active ingredient in Presidio), to mefenoxam and metalaxyl (Ridomil) and to strobilurins (e.g. Cabrio) are sufficiently common that fungicides with these \ ingredients, which use to be highly effective, are now ineffective.

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Integrated Management Program for Diseases of Cucurbit Crops

1. Sign up for alerts about downy mildew occurrence at *http://cdm.ipmpipe.org* before the season starts. Monitor this site during the season for information on outbreaks and crops affected.
2. Select resistant varieties. See *vegetablemdonline.ppath.cornell.edu/Tables/TableList.htm.*
3. Use fungicide-treated seed and/or seed that has been tested for pathogens. *FarmMore* commercial seed treatment also has an insecticide. Alternaria leaf blight, angular leaf spot, anthracnose, damping-off, Fusarium wilt, gummy stem blight/black rot, scab, Septoria leaf spot.
4. Rotate land to control diseases caused by pathogens that can survive in soil or on weeds in hedge rows, which include Alternaria leaf blight, anthracnose, angular leaf spot, bacterial leaf spot, Fusarium crown and fruit rots, Fusarium wilt, gummy stem blight/black rot, Phytophthora blight, Plectosporium blight, scab, Sclerotinia white mold, Septoria leaf spot, and viruses (which can survive in weeds).
5. Select a well-drained site to manage damping-off, Phytophthora blight, and scab.
6. Minimize leaf wetness. Select a site with good air movement and overhead irrigate when leaves will have time to dry before evening dew period to manage foliar diseases.
7. Physically separate cucurbit plantings.
8. Avoid moving infested soil into clean fields. Work last in fields where pathogens occur that survive in soil, then clean equipment before working in fields where these diseases haven't occurred (see list under rotate above). Apply pesticides to areas without soil-borne diseases first.
9. Scout for diseases regularly during the growing season. Focus on older leaves as diseases often start to develop there. Look on both leaf surfaces. It is especially important to scout once plants start to produce fruit. Check low areas for Phytophthora blight. Look for cucumber beetles.
10. Apply pesticides as needed (fungicides before rain for most diseases except powdery mildew):
    - ⇒Insecticide Admire Pro at planting or transplanting for cucumber beetles, which carry bacteria that cause bacterial wilt. Or use FarMore-treated seed. Planting Blue Hubbard or another cucurbit highly attractive to beetles around the crop to form a perimeter trap is an effective strategy that can result in insecticide only being needed on the trap plants.
    - ⇒Contans before or at planting for white mold.
    - ⇒Ridomil Gold EC (Code 4), Previcur Flex (28) or biopesticides (Actinovate, Bio-Tam, Double Nickel, Regalia, RootShield, Serenade Soil, SoilGard, etc) at planting for damping-off.
    - ⇒Biopesticides (see above) at planting for Phytophthora blight and Fusarium crown rot.
    - ⇒Proline (3) can be applied once to soil for Fusarium.
    - ⇒Protectant fungicides (chlorothalonil, mancozeb, and/or copper) before disease onset. A preventive schedule is especially important with copper for angular and bacterial leaf spots.
    - ⇒Where bacterial wilt is a concern, apply insecticide if treatment at planting is no longer killing cucumber beetles early in crop growth, especially prior to canopy closure. Labeled products are Asana, Assail, Baythroid, Brigade, Danitol, Lannate, Pounce, Sevin XLR Plus, Volium Xpress, and Admire applied through drip.
11. Apply targeted fungicides in alternation based on FRAC code when the following diseases occur starting at first symptom or when risk high, tank-mix with protectant fungicide:
    - ⇒Alternaria leaf spot. Inspire Super (3,9), Pristine (7,11), QoI fungicides (11), Reason (11), Tanos (27).
    - ⇒Anthracnose. Inspire Super (3,9), Pristine (7,11), QoI fungicides (11), Tanos (27), and Topsin M (1).
    - ⇒Downy mildew. Powdery mildew, Phytophthora. See sections above.
    - ⇒Gummy stem blight/Black rot. Inspire Super (3,9), Pristine (7,11)*, Proline (3), Switch (9,12), QoI fungicides (11)*, and Topsin M (1)*.
    - ⇒Plectosporium blight. Inspire Super (3,9), and QoI fungicides (11)*.
    - ⇒Septoria leaf spot. Inspire Super (3,9)

    * Resistance detected in the US.
12. Hasten decomposition of infested crop debris by chopping debris to break it up and then incorporating with disk, roto-till or plow. Do immediately after harvest.

Mobile Fungicides for Managing Powdery Mildew, Downy Mildew, and Phytophthora Blight in Cucurbits

Margaret Tuttle McGrath, Plant Pathology and Plant-Microbe Biology Section, Cornell University
Long Island Horticultural Research and Extension Center, 3059 Sound Avenue,
Riverhead, NY 11901; mtm3@cornell.edu; http://vegetablemdonline.ppath.cornell.edu/

Fungicide	FRAC Code	Diseases	Recommended Rate/A (labeled)	REI	PHI	Seasonal Limits	Approx.$/A/spray
Vivando [g]	U6	Powdery mildew	15 fl oz	12 h	0 d	3 sprays	$33.15
Torino [a]	U8	Powdery mildew	3.4 oz	4 h	0 d	2 sprays	$24.00
Quintec [b]	13	Powdery mildew (melon, pumpkin, w. squash, gourd)	6 fl oz (4-6)	12 h	3 d	24 fl oz	$23.60
Proline [c]	3	Powdery mildew	5.7 fl oz	12 h	7 d	2 sprays	
Procure [c]	3	Powdery mildew [c]	8 fl oz (4-8)	12 h	0 d	40 fl oz	$36.84
Merivon [c]	7	Powdery mildew	5.5 fl oz (4-5.5)	12 h	0 d	3 sprays	
Pristine [c]	7 + 11	Powdery mildew [c]	18.5 oz (12.5-18.5)	12 h	0 d	4 sprays (74 oz)	$70.85
Ranman [a,d]	21	Blight, Downy mildew	2.75 fl oz (2.1-2.75)	12 h	0 d	6 sprays	$25.24
Zampro	40 + 45	Blight, Downy mildew	14 fl oz	12 h	0 d	3 sprays	
Forum	40	Blight, Downy mildew	6 fl oz	12 h	0 d	5 sprays	$17.86
Revus [a,c]	40	Blight, Downy mildew (low efficacy DM cucumber)	8 fl oz	12 h	0 d	4 sprays (32 fl oz)	$30.31
Phostrol, etc.[f]	33	Blight, Downy mildew	2.5 – 5 pt	4 h	0 d	7 sprays	$11.44 – $22.88
Presidio [c,g]	43	Blight, Downy mildew [c]	4 fl oz (3 – 4)	12 h	2 d	4 sprays (12 fl oz)	$44.94
Tanos [e]	27 + 11	Blight, Downy mildew	8 oz	12 h	3 d	4 sprays	$25.02
Zing!	22 + M	Downy mildew	36 fl oz	12 h	0 d	8 sprays	$17.72
Curzate [e]	27	Downy mildew	3.2 oz	12 h	3 d	9 sprays	$13.26
Previcur Flex[c]	28	Downy mildew [c]	1.2 pt	12 h	2 d	6 pints	$18.32

[a] Organosilicone and/or non-ionic surfactant required (Revus) or recommended.
[b] Quintec is not labeled for use on edible-peel cucurbits. 10-14 day spray interval.
[c] Limited use recommended because resistance suspected of affecting efficacy especially when applied often.
[d] Rate range applies for downy mildew; high rate for blight. [e] Short residual; apply another fungicide within 5 days.
[f] Other phosphorous acid fungicides include ProPhyt and Fosphite. Rate and seasonal limits vary a little among products. Recommended tank mixed with other fungicides. Note that there are also phosphate fertilizers, which are not fungicides.
[g] Plant-back restriction for non-labeled crops is 365 days for Vivando and 18-month for Presidio.

Tank-mix each of these fungicides with a protectant, with the exception of Zing! (or Gavel), which are formulated with chlorothalonil or mancozeb. Need to tank-mix is specified in use directions on many labels.

Sulfur is a very effective, inexpensive product for powdery mildew, no efficacy for other diseases.
Oils (several botanical and mineral oils available) are also a good choice for powdery mildew only.
Chlorothalonil and copper have broad-spectrum activity. Copper also effective for bacterial diseases.
Mancozeb is recommended when only downy mildew is occurring.

Apply fungicides for a particular disease in alternation to manage resistance (in the use directions on many labels; typically 1 or 2 consecutive spray maximum) and to ensure effective control if resistance develops.

QoI* and Ridomil fungicides are not recommended due to resistance. (*Amistar, Cabrio, Quadris, Flint).

TUBER SOFT ROT

Potato Blackleg and Dickeya: Updates and Recommendations for Long Island Growers

SANDRA MENASHA, VEGETABLE/ POTATO SPECIALIST,

CORNELL COOPERATIVE EXTENSION SUFFOLK COUNTY

What is Blackleg and Where did it Come From?

Blackleg is a bacterial pathogen that causes soft rot decay and can be found wherever potatoes are grown. While blackleg has been present for years in North America as the bacterial pathogen *Pectobacterium sp*. (formerly *Erwinia sp*.), there now seems to be a new strain of the pathogen present known as *Dickeya sp* which displays similar characteristics but it is much more aggressive and has higher optimum temperatures for disease development. Although little is known about Dickeya in the US, it has been present in the UK for years and Scotland has been at the forefront of working on management and control of the disease, so the industry has experts they can look to for guidance as we move forward in determining best management practices in the US.

AERIAL STEM ROT

STEM ROT

WILTED AREA

Symptoms:

- **poor emergence/stands**
- **stunting and wilting of plants**
- **a stem rot (blackleg) characterized by inky black, mushy areas on the stem**
- **tuber soft rot decay.**

Disease Spread:

The bacteria is carried in on tubers and can easily be spread during any seed cutting, handling or planting operation. Rot is favored by cool (50 F), wet soils at planting followed by high temps after emergence (<68 F). With increasing temperatures the disease becomes more evident. Spread can also occur from tuber to tuber as the seed piece decays

continued on next page

or the bacteria moves through the stolons to daughter tubers.

2015 LI Situation:

The first symptoms were observed soon after emergence as stunted/wilted plants but the majority of the issue was noticed around flowering where growers were reporting significant drop-outs in fields; anywhere from 5-35%. The varieties most affected were Reba, Norwis, Superior, and Norlands. At the same time, other states in the region were also reporting significant losses in fields; NJ, PA, DE, MD, NC, and to a lesser extent upstate NY, MA and other areas across the US. I collected infected plant tissue from several infected fields and shipped them overnight to a lab in Maine for testing. Results confirmed the presence of Dickeya in almost all the samples collected. While most of the seed did come from Maine, it has been detected in other seed production areas across the US.

Why it's a Big Issue Now:

- Dealing with a more virulent, aggressive strain
- The pathogen has likely been increasing in some seed lots causing more noticeable outbreaks
- Warmer growing seasons – pathogen development is favored by warm temperatures
- Disease was not properly identified previously – mistaken for traditional blackleg so levels were allowed to build
- Seed certification programs really only evaluate for virus

What is Being Done:

Multiple Agencies are involved and they will be working very hard to learn as much as possible about Dickeya over the next few years. Research and control efforts are being handled at a national level with the National Potato Council (NPC) involved. The NPC is putting together working groups made up of growers, seed certification officials, APHIS, state managers and researchers to develop a uniformed management plan for Dickeya. However, the research necessary to develop such a plan could take up to 2 years to fully implement. The Maine Potato Board, MFX, and University of Maine have been very proactive and involved in solving the problem in Maine, developing short and long term management plans for the control of blackleg while the national management and control plan is being developed and implemented. Clearly seed certification programs need to change to include and address any blackleg present during field inspections and during the winter Florida test. But, any changes to State Seed Certification Programs require action by the State's Legislature which takes time and well thought out proposed rule changes.

Control Practices and Recommendations for Growers:

1 is Sanitation!

- Sanitize all harvesting and handling equipment including harvesters, windrowers, truck bodies, bin pilers, seed cutting equipment, graders, etc.
- Sanitize between seed lots, especially during the cutting process
- Rotate out of potatoes at least 1 year – Dickeya does not survive well in soil but can survive on plant tissue (volunteers)
- Treat cut seed with fungicides immediately after cutting
- Avoid any condensation on surfaces of cut seed pieces
- Monitor irrigation and nitrogen to avoid excess crop growth
- Ask for the North American Health Certificate (NAHC) with each seed lot and talk to your seed supplier about blackleg

Harvest and Storage Considerations:

- Harvest tubers from infected fields last and move them out first – avoid storing potatoes where blackleg was present (if possible)
- Promote wound healing through proper curing
- Do not harvest potatoes from low areas – bacterial populations are likely very high
- Selectively store from "healthiest" portions of field
- Store tubers from more suspect areas in front
- Store potatoes as cold as possible - Dickeya does not survive cold temps well
- Provide good air flow - Pathogen becomes more infectious under low oxygen conditions

Continued on next page

- Avoid condensation and wet tuber surfaces
- Post-harvest sprays can do more damage
- Do not wash tubers going into storage!

Other Varieties to Consider:

The high incidence of blackleg in the variety Reba in 2015 has many growers shying away from planting it in 2016. So what other options are there for round white varieties? Below are a few varieties that have done well on LI in my trials and I recommend growers should consider growing as a substitute.

NY140: This is a late season, dual purpose (chip and tablestock) variety with resistance to races Ro1 and Ro2 of the golden nematode. Tubers are round to oblong with relatively smooth, bright cream to buff colored skin. High yields and a large tuber size. Since 2005, yields on LI have been anywhere from 3-53% above that of Reba. Good appearance and few pickouts. Scab susceptible.

NY 141: Early to mid-season tablestock variety with Resistance to race Ro1 of the golden nematode. Attractive tubers are round to oblong with cream to buff, relatively smooth skin. Good yields and good tuber size. From 2005 – 2007 yields on LI were similar or slightly below that of Reba. Since 2008, yields on LI have been greater than Reba anywhere from 2-43% greater. Good appearance and good resistance to common scab. Low levels of knobs.

NY151: Late season tablestock variety with resistance to race Ro1 of the golden nematode. Tubers are big and round with bright, smooth, cream skin. Very attractive; scored 8 out of 9 for appearance. Yields on LI have average 20% greater than Reba over 4 years of trials. Low levels of brown center have been observed. Moderate resistance to common scab. Limited seed available.

Waneta: Late season chipstock and tablestock variety with resistance to race Ro1 of the golden nematode. Tubers of this variety are round with slightly netted, buff colored skin. Good yields with good tuber size distribution. Long Island yields averaged similar to Reba over 6 years of trials. Vines have a slow start but end up nice. Good overall appearance. Moderate resistance to common scab. Hollow heart potential in large tubers at 5-10%.

Sebec: A dual purpose potato (chip or table) with mid-season maturity. Tubers were uniform, round to oblong with cream to buff, slightly netted skin. Good yield and size profile in Long Island trials. Good appearance. Low external defects and potential for low levels of hollow heart. Moderately susceptible to scab.

Pesticide Updates

SUBMITTED BY
CHUCK BORNT, ENYCHP

The following are recent registration decisions by the New York State Department of Environmental Conservation (NYSDEC):

- Registration of **Acuron Herbicide** (EPA Reg. No. 100-1466) which contains the active ingredient bicyclopyrone. This is the first product registered in New York State containing this active ingredient. (Acuron also contains atrazine, s-metolachlor, and mesotrione.) Acuron is registered for use on corn for control of annual grass and broadleaf weeds. Note that this is a restricted-use pesticide in New York State and use in Nassau and Suffolk Counties is prohibited.
- Registration of **Orvego Fungicide** (EPA Reg. No. 7969-301) **and Zampro Fungicide** (EPA Reg. No. 7969-302) both of which contain active ingredient ametoctradin. These are the first two products registered in New York State containing this active ingredient. (Both products also contain dimethomorph.) Orvego is registered for various fungal diseases on field-grown and containerized ornamental nursery plants. Zampro is registered for various fungal diseases in brassica leafy vegetables, bulb vegetables, cucurbit vegetables, fruiting vegetables, grapes, hops, leafy vegetables, and potato. Both products are restricted-use pesticides in New York State and are not for use in Nassau and Suffolk Counties.

Extending Local Strawberry Production Using Day Neutral Cultivars and Low Tunnel Technology

MARVIN PRITTS, SCHOOL OF INTEGRATED PLANT SCIENCE, CORNELL & LAURA MCDERMOTT, CCE ENY COMMERCIAL HORTICULTURE PROGRAM

Opportunities to produce strawberries for five months of the year now exist with the merging of new day neutral cultivars, particularly Albion, with low tunnel technology using plastics that exclude much of the ultraviolet and infrared radiation. Studies were conducted 1) with various day neutral cultivars, 2) with various plastic covers, 3) with varying planting dates, and 4) with grower-cooperators. After four years of research, the following procedure is recommended for growing and producing day neutral strawberries.

Establish raised beds (18 inches or wider) in late fall or early spring so they can be planted as soon as possible in spring. Each bed should have a trickle irrigation line attached to a fertilizer injection system. Cover each bed with white plastic, and plant Albion in a staggered double row, with plants 9 – 12 inches apart in each row. Use a tool that will insert roots into the bed while disturbing the plastic as little as possible.

Fertilize the planting with 2 lbs of actual nitrogen per planted acre per week for the first few weeks after planting. Remove the flowers for the first three weeks, or until vigorous new leaves appear from the crown. Plant grass seed between the rows, or lay a landscape fabric or straw mulch to prevent mud from splashing on the berries.

Install tunnels when plants begin to throw new flower trusses. Cover the tunnels with 4 to 6 mil plastic, preferably with a type that excludes ultraviolet light and reduces infrared radiation. Dubois Agrinova (http://www.duboisag.com/) sells kits with plastic that has predrilled holes for ventilation when the plastic is lowered. The cost for the tunnel kits is $450 per 100 foot of row. This cost is recovered in the first year.

At least one side of the plastic should remain up under normal weather conditions to allow for pollination and to prevent heat build-up. Infrared-inhibiting plastic does provide some shade which is beneficial for the plants, so allow them to be shaded by the plastic if possible. Lower the sides when the weather is cold or stormy. A benefit of the plastic is the near elimination of Botrytis gray mold from water exclusion and inhibition of spore germination from the reduction of UV light.

Once plants begin to set fruit, increase the nitrogen to 5 lbs/acre per week. Failure to provide weekly applications of nitrogen was a major reason why our grower-cooperators had lower yields than expected.

Harvest the fruit at least twice a week. Peak yields will occur in late August, with production occurring through October. Fruit quality from Albion has been excellent. Fortunately, spotted winged drosophila damage has been minimal provided that fruit is harvested regularly and not left rotting

Day Neutral strawberry variety 'Albion' growing under low tunnels in October 2014 at Cornell University Orchards field trial.

Photo by L. McDermott

continued on next page

in the field.

Once the temperature falls below 40F, lower the tunnels. If the temperature falls below 30F in mid-October, cover the entire field with row cover for the night. This will extend the harvest season should the weather warm again.

Once harvest is over, lower or remove the plastic and cover the beds with straw. Albion does not overwinter well in cold weather. Remove the straw in late March/early April and allow these plants to fruit again. The tunnel can be used to protect from late spring frost.

Over the course of the first year with an April planting date, we harvested 20,000 lb/acre, which is as much as a good June-bearing cultivar will produce in one season. Average berry size of Albion was 15 grams, which is the size of a medium king fruit on a June-bearer. Flavor is excellent. Production peaked in early September with two quarts (four pints) of berries per 10 feet of row, but in October plants consistently produced about a quart of berries every 10 feet of row until a hard frost.

In spring of the second year, a large flush of fruit is produced about the same time as that of early June-bearers. Tunnels can be used to accelerate flowering if desired. Spring yields can be almost as much as the previous year's yield. We have not found it to be economical to hold over these plants into a second summer and fall. Rather, we grow them for about 15 months and then remove them.

We found that, while attractive, growers may not be able to "fit" such a crop into their farm operation since day neutrals require constant attention. Plastic has to be raised and lowered, plants have to be fertilized weekly, and once harvest begins, it lasts for months. However, the rewards can be great. Growers have reported gross sales of $50,000 per acre from Albion in New York State. Given that the cost of materials for an acre is about $44,000, sales can pay for the materials in the first year. In the second year, costs include plants, fertilizer, labor and harvest. Conservatively, this can be $20,000, but with sales approaching $50,000, the margins are quite good.

We believe that this technology will transform strawberry production in the Northeast over the coming decade.

California Tests Show Low Pesticide Levels on Produce

SUBMITTED BY

JUSTIN O'DEA, CCE ULSTER

Tests on produce collected by the California Department of Pesticide Regulation indicate the vast majority of fruits and vegetables available for sale in California meet stringent federal pesticide safety standards. During its 2014 survey, DPR found 96.4 percent of tested California-grown produce had little or no pesticide residues.

The findings are included in DPR's newly released 2014 Pesticide Residues in Fresh Produce report.

"This report further confirms that California's vigorous pesticide regulatory program creates a reliable marketplace where consumers can have faith in their fresh fruits and vegetables," said Brian Leahy, DPR director. "The pesticide rules and oversight we have in this state are effective at protecting the produce that we enjoy eating."

The report is based on year-round collection of about 3,500 different samples of produce, including those labelled as 'organic', conducted by DPR scientists at grocery stores, farmers markets, food distribution centers, and other outlets throughout California.

The produce is tested using state of the art equipment for 300 types of pesticides operated by the California Department of Food and Agriculture (CDFA). The U.S. Environmental Protection Agency sets standards allowing each piece of fruit and/or vegetable to contain trace amounts of pesticide. The highest residue level that is allowed on that commodity is called a "tolerance." It is a violation if a residue exceeds the tolerance for the specific fruit/vegetable, or if no tolerance has been established.

Highlights from the 2014 Pesticide Residues in Fresh Produce include:

- 43 percent of all produce samples (California grown and non-California grown) had pesticide residue levels that were legal i.e. at or below EPA tolerances.

•Of those, 40.74 percent had no detectable residues at all, while 52.69 percent had residues detected within the legal level.
•07 percent of the samples had pesticide residues in excess of the established tolerance level.
•An additional 5.5 percent of the samples had illegal traces of pesticides that were not approved for that commodity.

Produce that most frequently tested positive for illegal pesticide residues in 2014 included Ginger from China; cactus pads, cactus pears, limes, papaya, summer squash, tomatillos, chili peppers and tomatoes from Mexico; and spinach and kale from the United States.

If DPR finds produce with illegal residues, it quickly works to remove it from the chain of distribution (to prevent it from reaching consumers) and also attempts to trace it to its source. The tainted lots are quarantined.
Businesses that violate California pesticide residue laws face loss of their product and also fines. In December 2014, DPR imposed a $21,000 fine against a California produce importer with a history of recurring pesticide residue violations, mostly on produce imported from Mexico. See press release on Repeat Pesticide Offenders.
DPR continues to find a small but significant number of cases of illegal residues on fresh produce from Mexico and other countries. To help address this, in 2014 DPR enforcement staff gave presentations about the DPR Pesticide Residue Monitoring Program to about 160 Mexican fruit and vegetable growers at workshops in Mexicali and Ensenada.
The 2014 pesticide residue monitoring data is posted here:

http://www.cdpr.ca.gov/docs/enforce/residue/rsmonmnu.htm

Source : California Department of Pesticide Regulation. Printed in Vegetable Grower News, *October 2015*

Visit the ENYCHP Website

http://enych.cce.cornell.edu/

Cornell Announces Robin Bellinder Graduate Student Fund

On November 13, 2015, we received the sad news that our friend and colleague, Robin Bellinder, professor of Horticulture at Cornell University for 31 years and an international expert in weed control in vegetable crops, died unexpectedly. She was 70 years old. Robin died of a pulmonary embolism after a brief hospitalization and stay in a physical rehabilitation clinic for an unrelated spinal injury.

At Cornell, Robin's research program focused on weed management for vegetable crops. One of few women in her field at that time, she became a national and international leader. She published research results widely in peer reviewed publications, as well as publications that advised growers about her work's practical applications. She served as president of the Northeastern Weed Science Society and, in 2005, was named the recipient of Cornell's College of Agriculture and Life Sciences award for outstanding accomplishments in applied research. She will be remembered as a weed scientist who ardently and tirelessly supported New York vegetable growers. Robin had a deep concern for people, whether farmers in South Asia, for whom she championed the introduction of more efficient weed control practices, or hungry families in New York's southern tier. She initiated Cornell's efforts to provide fresh fruits and vegetables from the Homer C. Thompson Research Farm to the Food Bank of the Southern Tier. She realized that rather than composting the farm's edible produce, they could feed hungry area families. Since 2004, as a result of her initiative, Cornell has donated almost 2 million pounds of produce.

Robin will be remembered as an intense, thoughtful, loyal, generous, creative and loving person who tenaciously advocated for the things she believed were important. Mentoring students and seeing them become leaders around the world provided Robin with great satisfaction. At the urging of her colleagues, Cornell is proud to announce the establishment of the **Robin Bellinder Graduate**

continued on next page

Student Fund. The fund will be established *"to provide financial support for graduate students working on vegetables crops, with a preference given to projects with a weed science emphasis. The fund will be distributed at the discretion of the chair of the horticulture section, and may be used to supplement travel or research expenses for the successful candidates".*

Those interested in supporting the fund should make their checks payable to "Cornell University" with "Bellinder Fund, Horticulture" in the memo line. We will be happy to share any notes or messages with Robin's family. Checks can be sent to:

Chair, Horticulture Section, Cornell University
134 Plant Science Building, Ithaca, NY 14853 USA

Thank you for your support of the Robin Bellinder Graduate Student Fund.

Got a Pesticide You're Not Sure is Still Registered in New York?

CHUCK BORNT, CCE ENYCHP

It seems that pretty often we are asked by growers whether a container of pesticide they found in the shop is still allowed or labeled to be used in NYS by the Department of Conservation. Lots of times we can find out pretty easy, but sometimes we need a little extra help, especially for some materials that might be let's just say "older"! I also thought that now might be good time to look in your pesticide storages to see what might be in there that you have questions about and instead of waiting to the heat of season, ask now or do some searching on your own.

What to do: The first thing is, hopefully the container has a label still attached so we at least know what it is. Second, the Cornell University Pesticide Management and Education Program has a great online database called the Product, Ingredient, and Manufacturer System or PIMS: http://pims.psur.cornell.edu/index.php Here you can find information on currently registered products, archived products(expired registrations), pest and site code searches, and a download application for local use(special local labels) and this information is provided by the New York State Department of Environmental Conservation. It is a great place to find out if your product can still be used or find a NYS specific labels or labels for new products such as the two mentioned in this month's Produce Pages (Acuron Herbicide and Orvego/Zampro fungicide). I know many of you may use CDMS (Crop Data Management Systems) website to look up labels and for the most part that is fine. However, unless you spend the time to look through the whole list of materials that are returned for your search, you might miss the specific label for NYS and this is important because what you look at might be the Federal Label which may differ from the specific NYS label.

You can search the database using the following criteria: EPA registration number, Product/label name, active ingredient, Company/distributor/payer, Special Registrations (these include Special Local Need Products (SLNs), Experimental Use Products (EUPs), 2(ee) Recommendations, NYS Emergency Exemptions (FIFRA Section 18s) or Pending New Active Ingredients (NAI) and Major Change in Labeling (MCL)) or a Custom search using any combination of previous information (see figure 1).

The one that I seem to use most commonly is the Product/label name search criteria (see figure 2). Remember that if you have an old container of something to select the "All" selection in the dropdown menu under "Registrations". If you don't, only the current labels will appear and even though you might see some labels for your product they may not be the exact one that you have or you may not see any results because the product no longer has a valid registration in NY and can't be used. If you have the label and can read the EPA Registration Number, it might make better sense to use this search option but remember to do the same and select "All" under the "Registrations" menu.

I know this might sound tricky but it really isn't and the best part is you have several extension educators that can assist you with these kinds of searches if you need help. Now that you have an idea of how to search for labels, what happens when you find the material you are searching for no longer has a valid label in NYS? Don't use! I think the easiest might be to walk you through and example. Let's say I found an old bag of Atrazine 80 W Herbicide and I have no idea if I can use it or not, regardless of whether or not the product itself is even still good, I don't know if it still has a label in NYS. So, I go to the PIMS website and I search via the "Product/Label name and I am sure to select "all" under registrations. The easiest might be to walk you through an example:

continued on next page

Cornell University Cooperative Extension

SEARCH: Go

PMEP Cornell Pages People more options

PMEP

Product, Ingredient, and Manufacturer System

New York State Department of Environmental Conservation

Last update: 01/05/2015

The NYS Pesticide Product, Ingredient and Manufacturer System (PIMS) databases are designed to aid the user in searching for pesticide product information as supplied to the Pesticide Management Education Program (PMEP) by the New York State Pesticide Product Registration Section within the New York State Department of Environmental Conservation (NYSDEC).

On This Page

- NYS PIMS Products Database
- NYS PIRS — Public (Site and Pest Searches)
- Download NYS PIMS Data
- Background Information

Figure 1: This is the home menu of the PIMS site showing you the different search options.

NYS PIMS Products Database

The PIMS Products Database contains information for pesticide products **currently** or **previously** registered in New York State with NYSDEC. (See also Special/Pending Registrations below for additional products.) Select a report:

EPA Registration Number
Find products by their EPA Registration Number.

Product/Label Name
Find products by their label name, trade name, brand name, or a portion thereof. There are often many different names and name variations for the same product.

Active Ingredient
There are two searches on this page. The first returns active ingredient codes based on (partial) ingredient name or ingredient synonyms for a given code. The second returns products containing an active ingredient specified by code number, and optionally restricted by product *use* or *type*.

Company / Distributor / Payor
Searching by Company Number (the first component of the EPA Registration Number) provides a list of those products that are registered or were previously registered with the EPA and New York State and manufactured by a particular company. Searching by Distributor Number (the third component, if present, of the EPA Registration Number) provides a list of those products distributed by a company. Searching by Payor Number provides a list of all products for which a company has paid the NYS registration fee.

Custom Search
Search the product database using a variety of criteria.

Special Registrations
"Special Registrations" include:

- Special Local Need Products (SLNs) Definition[+]
- Experimental Use Products (EUPs) Definition[+]
- 2(ee) Recommendations
- NYS Emergency Exemptions (FIFRA Section 18s)
- Pending New Active Ingredients (NAI) and Major Change in Labeling (MCL)

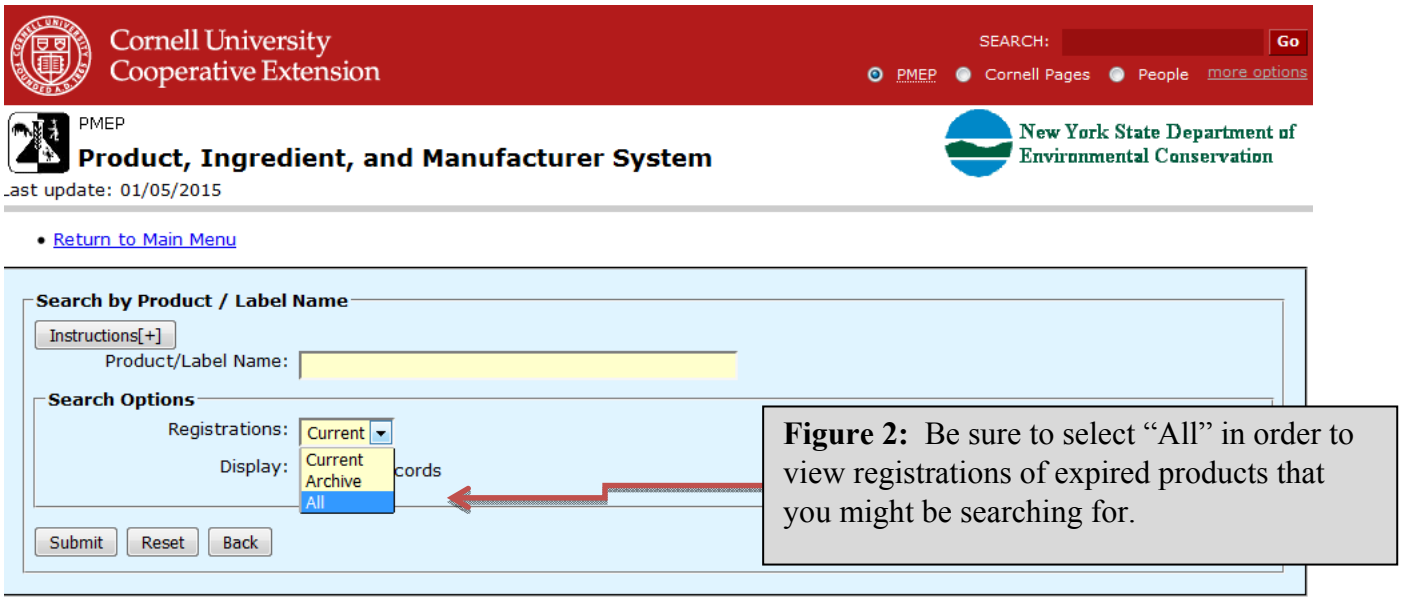

Figure 2: Be sure to select "All" in order to view registrations of expired products that you might be searching for.

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Let's say I found an old bag of something on the bottom shelf, way in the back of my pesticide storage. I pulled it out and could still read the label which said, "Atrazine 80W Herbicide". I have no idea if I can use it or not so I goto the PIMS website and do a search. On the homepage, I choose "Product/Label Name" (see Figure 1). On the next menu, I make sure that I've selected the "All" under the "Registrations" dropdown menu(see Figure 2). Then I type in "Atrazine 80W Herbicide" and hit "Submit". The search returns 5 possible products (Figure 3) that could be mine so you might have to do a little more research and look for either a manufacturer name on the bag or a EPA registration number.

New York State Pesticide Products

- Return to Main Menu
- Return to Search Page

Printing[+]

Print Selected | Reset Selection | Select All | Click a column label to sort by that column | Records per page: 25 | First | Prev | Records 1 – 5 of 5 | Next | Last

	Product Name	EPA Registration Number	Company	Distributor	Restriction	LI Use	Labels
☐	ACETO'S ATRAZINE 80W HERBICIDE	2749-150	ACETO AGRICULTURAL CHEMICALS CORP. (2749)			Yes	NYS EPA *
☐	ATRAZINE 80W HERBICIDE	201-397	(201)			Yes	NYS EPA *
☐	ATRAZINE 80W HERBICIDE	201-410	(201)			Yes	NYS EPA *
☐	ATRAZINE 80W HERBICIDE	352-491	E.I. DU PONT DE NEMOURS AND COMPANY (352)			Yes	NYS EPA *
☐	CLEAN CROP ATRAZINE 80W HERBICIDE	2749-150-34704	ACETO AGRICULTURAL CHEMICALS CORP. (2749)	LOVELAND PRODUCTS, INC. (34704)		Yes	NYS EPA *

Print Selected | Reset Selection | Select All | First | Prev | Records 1 – 5 of 5 | Next | Last

Figure 3: My search returns 5 products that match my product so I need to determine which one is the correct one.

Luckily, I can still read the bag and I know that my product is a DuPont product with an EPA number of 201-410. I select the correct row to take me to that specific product and I find out that this product is no longer registered for use or sale in NYS (Figure 4).

Figure 4: You can see that this product is no longer registered for use of sale in NYS so it must be disposed of properly.

ATRAZINE 80W HERBICIDE

This product is no longer registered for use or sale in New York State.

Label Information

State Label Information: NYS Labels/Documents **Federal Label Information:** EPA Primary Labels *

Product Information

Product Name:	ATRAZINE 80W HERBICIDE	**EPA Registration Number:**	201-410
Use:	Agricultural	**Type:**	Herbicide
Status:	Not Registered ‡	**Toxicity Statement:**	NONE
Signal Word:	Caution	**Precautionary Statement:**	Oral, Dermal & Inhalation
Flammable:	N	**Formulation:**	Wettable Powders
Restricted:	NONE	**Suspension Date:**	Not Available
Nassau/Suffolk Use Allowed:	Yes	**Initial Registration Date:**	05/23/1986

Ingredient Information

AI Code	Prefix	Active Ingredient Name	Percent of AI
80803		ATRAZINE	80

Contact Information

Manufacturer	Distributor	Payor
		E.I. DU PONT DE NEMOURS AND COMPANY P.O. BOX 30, 1090 ELKTON RD. NEWARK DE 19711-0030

Notes:

¦ **Not for use in Nassau and Suffolk Counties:** pesticide labels that indicate "Not for use on Long Island, N.Y." mean that use is prohibited in Nassau and Suffolk Counties only.

† Products with status of "**Registered-discontinued**" *are* considered registered in New York State. The registrant is no longer producing and shipping these products into New York State and intends to remove them from registration on the expiration date listed. It is illegal to sell, offer for sale, distribute, or use any unregistered product in New York State.

‡ This product has an **expired registration**. It is illegal to sell, offer for sale, distribute, or use any pesticide product in New York State unless the product has been properly registered with the New York State Department of Environmental Conservation.

* Links to pesticide labels at this EPA site may not include restrictions specific to New York State use.

E **Federally restricted by EPA:** Federally restricted pesticide per EPA.

continued on next page

Now what do I do? Well, I suppose I could put it back under the shelf and hope NYS DEC never comes to do an inspection and suffer the consequences (fines, lose my applicators permit etc.) if they find it or I could find out when the next hazard waste collection day is in my respective region. These collection events happen throughout the state and are put together by a program called CleanSweepNY. Cleansweep is a DEC program that works with producers to properly dispose of unwanted pesticides.

I would really encourage you to take advantage of these collection days when they are close by so check their website once in a while or many times if a collection is taking place in any of the counties that the ENYCHP work in, we will send out special announcements about them so you can take advantage of these programs. You may also want to check with your local municipalities as many of them may have similar hazard waste collection days they do for homeowners.

The good news is as I was scanning some other emails, I happened to catch this:

CLEAN SWEEP NY

The CleanSweep NY program is coming to Hudson Valley region in April or May 2016

CleanSweep NY will accept old, unwanted pesticides from agriculture and non-agriculture establishments (not homeowners) for proper disposal free of charge. They will also accept other chemicals for a nominal charge.

Their plan is to have at least 2 collection sites, 1 in Plattsburgh and 1 in Hudson Falls. Registration is required, but there's no enforcement potential.

CleanSweep NY may be reached at:

1-877-793-3769

CleanSweep NY

Financial Benchmarking

JESSE STRZOK

Financial benchmarking for our region is a topic of strong interest in the region. These tools are useful, requiring a large amount of detailed financial information needs to be collected over time to have a solid view of the landscape for each commodity. The diversity of our program, geography, regions, resources, growers and crops create a significant challenge resulting in the need to look to alternative resources to compare their numbers to such as benchmarks already provided by Farm Credit, the USDA, etc. until the required resources are available to put benchmarks in place for the region.

Having surveyed different publications, Iowa State University's Ag Decision Maker website pops up as a good resource, providing an intuitive and well written article for selected alternative agricultural financial benchmarks (written by Craig Chase and published November 2012). This appears to be a good place to start by using these numbers as a starting point to be extrapolated to fit much of the production in our region. Key areas to watch for variances likely needing input from an individuals farm to update your revenues and costs (paying special attention to fuel, sprays, etc.). Using the information from 2012 to 2015, this article could prove to be very beneficial. This article can be found on our website -

http://enych.cce.cornell.edu/submission.php?id=333&crumb=business|business

Additionally, the following webinar may be of interest.

On February 11th – March 3rd, the Farmers Market Federation of NY is offering a FREE Brown Bag Lunch Webinar Series: Farmers Market Benchmarks. For more information contact Farmers Market Federation of NY office at 315-400-1447 or visit the webinar website

http://www.nyfarmersmarket.com/farmers-market-benchmarks/

For more information contact Jesse Strzok at 518.429.1464 or

js3234@cornell.edu

The Mystery of Apples In China

DESMOND O'ROURKE *

Dr. O'Rourke is President of Belrose, Inc., is a world apple market analyst, and Emeritus Professor in the School of Economic Sciences, Washington State University. Dr. O'rourke is the publisher of "World Apple Report", a publication read by apple industry professionals around the world. What follows is the text of his presentation at the 2016 Empire State Fruit & Vegetable Producer's Expo, Syracuse, NY, January 19, 2016, in Session I "Apples of the World: Varieties & Preferences", moderated by Dan Donahue, ENYCHP.

Introduction

When Dan Donahue first suggested the title of my talk today, "The Mystery of Apples in China", I had some reservations. However, as I reviewed the evidence, China did present many mysteries, but also most outside observers have consistently gotten China wrong in the past. That makes me very cautious about any forecasts we might make, or expectations we might have, about China in the near future. Dan was also correct on a second point. When he originally asked me to speak, he apologized in advance for inviting me to Syracuse in January. Considering yesterday's snowstorm, I understand why!

I have been a student of China for a long time. One of the first analysis I encountered was by a French China expert about 1980. He argued that if China succeeded in liberalizing its economy, Communist Party control would collpase. Thirty-five years later, he is still wrong. The Chinese economy has opened up dramatically, but the Communist Party is still firmly in control.

In the late 1970s, Chairman Deng Xiaoping began to replace central planning with the household responsibility system. Most analysts expected that China would struggle like other developing countries in modernizing its industrial economy. However, China has since become an industrial powerhouse. It had one trump card that most other developing countries did not have, a first world appendage, Hong Kong. The Chinese in Hong Kong provided immediate entrepreneurial guidance, and instant access to the world's top financial, industrial and marketing systems.

Reforming a Peasant Economy

Again, most analysts expected that many millions of Chinese peasants on tiny holdings would have difficulty in adapting to the gradual extension of the personal responsibility system to China's agriculture. However, the peasants used their new-found freedom to dramatically increase their incomes by moving as rapidly as they could from production of low-priced grains to higher-priced fruits and vegetables.

The apple industry was a poster child for that successful transition. In 1980, China produced about 3 million metric tons of apples, much less than the United States. By 1990, that production was consistently topping 4 million metric tons. Based on data that was becoming available, I forecast that China's production could reach 14 million metric tons by the year 2000. Was I ever wrong? It hit that level by 1995, topped 20 million by the year 2000, and USDA,FAS forecasts production of 43 million in 2015-16, over 8 times U.S. production. One major contribution to China's success was the introduction of the relatively new Fuji apple from Japan. The Fuji flourished in the Chinese climatic conditions, and held up well in China's then primitive storage.

I was also wrong in forecasting Chinese per capita apple consumption. It averaged about 3 kilograms in 1980. I expected that it would eventually peak at the same level as in the high-income Chinese Taiwan, namely 6 to 7 kilograms. In fact, it passed that level in 1993, and is now estimated to be over 26 kilograms, four times that of Taiwan.

China's Surprising Export Prowess

Another surprise from China was its exporting prowess. Prior to 1990, Chinese fresh apple exports went almost entirely to other centrally planned countries like Russia, North Korea and Mongolia. Quality was poor and prices very low. However, beginning in the mid-1990s, good quality Chinese Fuji apples began to penetrate many markets at very low prices. They rose from less than 200,000 metric tons in the late 1990s to over 1.2 million in 2009. They rapidly grabbed market

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share from the United States in Southeast Asia. By the year 2000, Chinese fresh apple exports were growing rapidly in Europe, and in 2002, they entered Canada.

The story was a little different with concentrated apple juice. In the 1990s, China built a large, modern apple juice processing industry from scratch. Exports of AJC to the U.S. went from zero in 1994 to over 200,000 metric tons in 1998. That led the U.S. apple industry to bring an anti-dumping suit against Chinese AJC that cost a lot of money, but did little to save the U.S. AJC industry. Indeed, the Chinese onslaught severely damaged AJC production in other countries like Australia, New Zealand and South Africa.

There was widespread fear that China would swamp the world market with cheap fresh apples and AJC. However, analysts were wrong once again. About 2005, events took another surprising turn. China allowed the value of the yuan to rise, domestic demand began attract product away from the export market, and export volume of both fresh apples and AJC peaked as export prices began a rapid rise.

China's Economic Growth Will Falter

Foreign analysts have continued to be surprised by the persistence of rapid rates of growth in China since President Deng's reforms. As Xiaodong Zhu noted in his article "Understanding China's Growth: Past, Present, and Future," in the Journal of Economic Perspectives, Vol 26, No 4, Fall 2012, pp 103 -124, "The pace and scale of China's economic transformation have no historical precedent." China's per capita GDP grew by over 8 percent per year between 1978 and 2012. China went from one of the poorest countries in the world in 1978 to per capita GDP of one-fifth the United States in 2012. It leapfrogged Japan into second place in total real GDP. Zhu noted the contribution to Chinese economic growth of the dramatic outflow of surplus labor from the rural, agricultural sector into the rapidly growing urban, industrial sector.

China's economic growth survived the Tiananmen Square protests in 1989, the Asian financial crisis after 1977 and the Great Recession of 2008. China's growth seemed unstoppable. After 2008, while stimulus measures in the developed world ran into all sorts of bureaucratic and procedural delays, China was able to forge ahead without waiting for such niceties. As Europe and North America stagnated, more and more exporting countries in Africa, Latin America and Australasia sought to tie their economies to China's insatiable demand for raw materials, commodities, machinery and equipment. It now looks as if they too got China wrong?

China's Economic Growth Fuels Import Boom

In the last decade, China's demand for consumer goods took off. Fruit imports grew tenfold in 10 years. There was renewed growth in its total imports of fresh apples, including both direct imports, and those through Hong Kong. Imports continued to move through Hong Kong to avoid the approximate extra charges of 23 percent for import duties and valued added taxes. Both direct imports, and imports through Hong Kong, more than doubled between 2007 and 2011. However, since then, they have tumbled back to levels last seen in the year 2000.

Partly, this reflects China's enduring protectionist instincts. As fresh fruit imports have grown, temporary barriers to selected products began to rise under various pretexts. Imports of numerous products were suspended, including Washington apples, California oranges, New Zealand apples, U.S. soybeans, and many other products. While foreign suppliers fought these actions, many lost one to two years of access to the Chinese market. Selective products, such as pears, sweet cherries and kiwifruit saw imports continue to rise.

There was also a mysterious outbreak of food safety problems among foreign food retailers and restaurant chains in China. Huge multinationals, like Walmart, Yum Brands and McDonalds, received much negative publicity for endangering Chinese consumers. It appeared like a deliberate effort to damage the reputation of foreign food firms in China.

Apple Dispute Resolved

The suspension of imports of U.S. Red Delicious and Golden Delicious apples had an additional, barely hidden, agenda, of pressuring the United States to allow entry of Chinese fresh apples into the U.S. market. That figured prominently in negotiations about restoring access to China for U.S. apples. Eventually, China got what it wanted, while the U.S. got something it had been seeking for two

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decades, namely, access for all U.S. apple varieties to the Chinese market. This means that the Washington Apple Commission can finally openly promote varieties other than Red Delicious and Golden Delicious in the Chinese market. It also means that the U.S. Apple Export Council can promote other apple varieties from the central and eastern states.

Exports of Washington State apples to China were up over 230 percent in September-December 2015 compared to the same period in 2014. However, so far most of the sales appear to have been of Gala, Red Delicious and Golden Delicious. It will take some time to educate Chinese buyers on the benefits of other varieties. Exports of Washington State apples to China could approach 2 million boxes in 2015-15, making it the fifth largest export market. There is much optimism about the potential for further rapid growth in China's imports of fresh apples, fresh pears and fresh sweet cherries. Is that optimism based on solid grounds?

China's Future Economic and Political Trajectory

Today, there is unusual uncertainty about China's future economic and political trajectory. Even the Chinese leadership admits that the past breakneck rate of growth cannot be sustained. The latest five-year plan expects the growth rate to fall below 7 percent annually. Many outside observers believe that may be too optimistic. China continues to waste valuable resources in supporting its giant state-owned enterprises. Many other industries, and China's housing sector, have huge unused capacity. The Chinese labor force appears to be have peaked and the apparently endless supply of cheap labor has been exhausted. Many foot-loose industries are already moving to cheaper countries like Vietnam and Bangladesh. A series of monetary stimuli have failed to prevent the slowdown.

The new president, Xi Jinping, has gradually amassed control of all of the major engines of power in China. He has supported a more aggressive Chinese posture in external diplomatic and corruption campaign that has already ensnared top party, military and business leaders. He has been openly hostile to "western" values, and is seeking to establish a "new" Chinese way. Deng Xiaoping framed a pact between the Chinese people and the Communist Party thirty years ago. Individuals and businesses would be free to enhance their income and wealth as long as they left politics to the ruling Communist Party. However, if the economy slows too fast, that unwritten pact between the Party and the Chinese masses could break down. Does this mean that the forecast of the French China expert will finally come true? Or will President Xi and his team be able to maintain control if times get tough? The mystery continues.

Implications for Future Imports of Fresh Apples

There are two ways to investigate the potential for imports of fresh apples to China, one using best guesses about the future economic and political trajectory, and the second putting those best guesses into a formal, objective model. Three years ago, I conducted such objective analyses for fresh apples, fresh pears, fresh sweet cherries and fresh kiwifruit for the years from 1998 to 2011. I recently updated those analyses by adding data for the years 2012 to 2014. The main explanatory variables I used for each year were deflated import prices and deflated GDP per capita. The results are very interesting. In the case of pears, sweet cherries and kiwifruit, the models still indicate strong gains in

Table 1. Alternative Forecasts of Chinese Imports, 2020 compared to 2010 (metric tons)

Import Type	Variety	2010 Actual	1998-2011 base 2020 Forecast	1998-2014 base 2020 Forecast
China Direct	Apples	77,175	207,179	81,313
	Pears	527	527	5,388
	Sweet cherries	23,760	85,846	97,773
	Kiwifruit	43,112	139,918	88,277
Direct + Hong Kong	Apples	126,578	291,092	123,116
	Pears	527	527	13,776

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imports by China by 2020. However, in the case of fresh apples, the most recent model, that includes the years 2012 to 2014, shows little change in imports compared to 2010. Intervention by the Chinese authorities has had a serious dampening effect on Chinese import demand for fresh apples. Had that not occurred, we would still be expecting China's fresh apple imports to double by 2020.

The models also allow us to estimate how much a slowdown in the Chinese economy would affect import demand. Our original forecast assumed that real GDP per capita would increase by 7.5 percent per year between 2010 and 2020. If that annual rate of increase was to fall to 6 percent, which appears likely, it would lower imports of apples by about 10,000 mt, pears by about 1,000 mt, sweet cherries 14,000 mt and kiwifruit 15,000 mt. As one might expect, imports of higher-priced fruit are more likely to be responsive to bigger increases in per capita incomes
than would lower-priced items like apples and pears.

One other factor that could affect Chinese trade in fresh fruits is changes in exchange rates. As China's exports have slowed, China has begun to allow the value of the yuan to rise against the U.S. dollar. However, China has lagged behind some major competitors in allowing the value of its currency to fall. For example, since July 2014, the New Zealand dollar has fallen against the U.S. dollar by 35.7 percent, the Chilean peso by 21.7 percent, and the euro by 21.2 percent. So, the Chinese monetary authorities may be tempted to allow the yuan to fall further in value to offset some of the gains made by New Zealand, Chile and the euro zone.

Implications for Chinese Exports

It is also possible that Chinese exports of fresh apples and apple juice concentrate may again reverse direction. If Chinese consumer demand slows, Chinese apple production continues to rise, and the value of the yuan continues to fall, these could contribute to a new surge in Chinese exports. Between July and October 2015, Chinese exports of fresh apples were up about 13 percent in both volume and value. Chinese exports of apple juice concentrate were up almost 29 percent in volume, but only 8 percent in value as average prices fell by 16 percent. These trends need careful watching.

Conclusions

The Chinese consumer market is large, and growing. In the long-term, it should offer excellent opportunities for increased exports of U.S. fresh fruits. Many varieties of fresh apples could benefit from the liberalization of U.S. apple trade with China.

However, there may be further hiccups ahead for the Chinese economic and political system. Both of these could lead to further protectionist measures. We once again need to heed the warning of ERS's Dr Fred Gale that import demand in China cannot be extrapolated from past trends. He advises agricultural exporters to be prepared for multiple future scenarios that could generate widely different import demands. As the data I have presented here shows, this warning is very appropriate for exporters of fresh apples and othe temperate fruits.

References:

Gale, Fred. 2015. "China's Growing Participation in Agricultural Markets: Conflicting Signals." *Choices magazine, Quarter 2. Available online at Choices magazine.*

Upcoming Berry Workshops

Thursday, February 18th Hudson Valley Fruit School – Two full days of Tree Fruit information followed by a third day of Berry and Grape information PLUS NEWA (Network for Environment and Weather Applications) workshops. Visit our website for agenda information and to register: https://enych.cce.cornell.edu/.

Tuesday, February 23rd Berry Processing Workshop – CCE Columbia County and Micosta Enterprises, Hudson, NY. Keep checking our website for information to come:
https://enych.cce.cornell.edu/

Thursday, March 24th Cornell Berry Production Workshop - CCE Saratoga County, 50 West High Street, Ballston Spa, NY 12020 – agenda and registration details forthcoming.

"How Low Can You Go?"

Low Temperature Reponses in Grapevines

SHANNA MOORE, CORNELL UNIV.
HANS WALTER-PETERSON , CCE &
JASON LONDO, USDA-ARS

Adapted from VitisGen Voice newsletter, Spring 2015 by Chrislyn Particka.

The grapevine genus (*Vitis*) has evolved over a wide range of environmental conditions, from warm and humid conditions in the subtropics to dry, desert-like climates, to extreme cold in the northern US and Canada. Because of its superior fruit quality, commercial production has been historically dominated by a single grape species, Vitis vinifera, which evolved, and is traditionally grown in, milder Mediterranean climates. When V. vinifera is planted in regions with significantly different climatic conditions, such as very cold temperatures in the winter or highly variable temperatures in the early spring, these vines can be severely damaged or killed.

Interest by potential growers and consumer demand for locally-produced grapes and wine has led to an expansion of grape cultivation into non-traditional growing areas in less favorable climates. One of the most important decisions for growers in these areas is selecting varieties that will withstand severe winters, mature during short growing seasons, and still produce a good crop. Winter injury can result in significant losses in the grape harvest, and consequently impact wine production and sales; for example, a single cold event in the Finger Lakes region of New York during the winter of 2004 caused over $63 million in lost revenue (Martinson and White, 2004).

At A Glance

- One of the biggest challenges faced by growers in colder climates is selecting varieties that will withstand severe winters, yet still produce a good quantity and quality of fruit and mature during short growing seasons.
- ·Some grape varieties can survive low temperature events like extreme cold winter temperatures and early spring frosts due to multiple, complex, physiological adjustments (acclimation) in response to decreasing day length and the onset of low temperatures.
- ·VitisGen scientists are working to develop a better understanding of the genetic mechanisms involved in acclimation, dormancy, and freezing tolerance, with the goal of giving breeders better information to help them develop new varieties that can thrive under climatic conditions that previously made grape growing a major challenge.

Further, this expansion into non-traditional grape growing regions has resulted in the need for broader information regarding the genetic and physiological mechanisms that impact survival and productivity, including an understanding of how some grape species can survive extreme low temperatures or break bud later in the spring. Depending on cultivar, dormant V. vinifera buds and canes can be damaged at temperatures just below 0°F, while species that evolved in colder climates, like V. labrusca and V. riparia, can tolerate much colder temperatures with no significant damage. However, the fruit quality of these more hardy species is generally not valued as highly by consumers as that from V. vinifera cultivars. Thus, a greater understanding of the mechanisms underlying low temperature tolerance could allow for the development of new cultivars as well as improve cultural practices for existing varieties. Survival at low temperatures is dependent upon multiple, complex physiological adjustments (acclimation) to events such as decreasing day length and the onset of low temperatures. Exposure to short days and colder temperatures initiates protective biochemical measures within the vines to minimize cellular damage and initiate dormancy. Acclimation and dormancy, while closely interrelated, are distinct phenomena. Grape bud dormancy is an adaptive strategy for survival that has multiple stages, including paradormancy, endodormancy, and ecodormancy. Each of these stages is crucial for bud and vine survival, but in this article we will focus primarily on endodormancy and ecodormancy. In fall, the vine begins to prepare for winter conditions by ceasing vegetative growth and developing periderm (the outer layers of woody stems/roots) along the one year old shoots. The dormant buds that are left behind on the vines are in a state of

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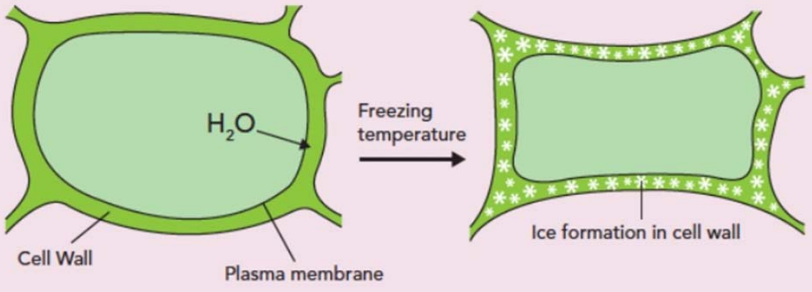
endodormancy. Endodormancy is a biological state that prevents new growth from occurring in buds while early winter temperatures fluctuate. As the season progresses, extended periods of extreme temperatures promote increased freezing tolerance, protecting the vines from environmental extremes-in this case, mid-winter low temperatures. Like many other fruit crops, grapes require a certain number of "chilling hours" during the dormant season in order to conclude endodormancy and properly break bud and grow the following spring. Chilling hours start accumulating in endordormant vines when temperatures occur between 0 and 7°C. Chilling hours may accumulate quickly (mild winter with lots of days above freezing) or slowly (cold winter with lots of days below freezing). Different grape species and cultivars have varying chilling requirements (from 500–2000 hours) that must be met before bud break can successfully occur. This adaptation helps to ensure that new bud growth does not happen during short temperature fluctuations (midwinter warming) that can occur throughout the winter. If a particular winter is mild and the chilling requirement of a vine is met early, the vine will quickly emerge from dormancy in response to warm weather, leaving the new growth vulnerable to spring frosts. Although some cultivars can produce a crop on secondary buds if primary shoots are killed, the yield will be lower. Conversely, if chilling requirements are not met by spring, bud break will be erratic, desynchronized, and extended in the spring.

Once the chilling requirement is satisfied, the plant enters a different state of dormancy, ecodormancy. In this state, the buds are held dormant due to temperatures that are too low to allow growth. In late winter and spring, vines become responsive to increases in temperature, and will break dormancy and begin to grow.

There are some techniques growers can use to reduce the chance that their vineyards will suffer low temperature damage in winter and spring. They can choose cultivars adapted to local conditions, select sites well-adapted for grape production, use cultural practices such as canopy and crop load management, bury portions of vines during winter, or apply certain fertilizers or other products prior to or during dormancy that may increase tolerance to cold temperatures.

Because these techniques are not always successful and can be costly, the ability to identify markers linked to genes that improve low temperature survival and delayed bud break could have a significant impact on further expanding grape production in less-favorable climates. Grapevines' responses and acclimation to low temperature events is a complex process that is influenced both by the environment (where and how they are grown) and by their genetic makeup. VitisGen scientists are developing a better understanding of the genetic mechanisms involved in acclimation, dormancy, and freezing tolerance, with the goal of giving breeders information that will help them develop new varieties which will survive and thrive in an increasingly wider range of climatic conditions. This work will allow scientists to more objectively evaluate a vine's cold hardiness or resistance to early bud break independent of environment, and develop new varieties that can thrive under climatic circumstances that previous made grape growing a major challenge, or even impossible.

How do grapevines protect their tissues from freezing in the winter?



Credit: Levitt, J. 1980. Responses of Plants to Environmental Stresses: Chilling, Freezing, and High-Temperature Stresses, Vol. 1 New York: Academic Press.

To avoid being damaged by temperatures below freezing, buds use the process of 'supercooling' that reduces the amount of water in the cell, increases concentration of solutes and reduces freezing temperatures.

Water inside a cell is like water in a ziplock bag, which is in turn inside a shoebox. Inside the cell (the ziplock bag) are all of the important structures like the nucleus and the chloroplasts. When temperatures go below freezing, the cells push water from inside the cell into the cell wall structure (shoebox) and extracellular space where it can freeze safely, away from those important organelles. With a lower concentration of water inside the cell, the remaining water will freeze at temperatures lower than 0°C, and thus allowing those cells within the bud tissues to survive below freezing temperatures.

Reference:
Martinson, T. and G. White. 2004. Estimate of Crop and Wine Losses Due to Winter Injury in the Finger Lakes. http://www.fruit.cornell.edu/grape/pdfs/Cost of Winter Injury Finger Lakes 2004.pdf

What's this Wacky Weather doing to the Grapevines?

HANS WALTER PETERSON,
CCE FINGER LAKES GRAPE PROGRAM

In addition to the article below, Jason Londo discussed bud dormancy and cold hardiness of grape vines in a recent webinar by the Northern Grapes Project. You can view that webinar here: https://www.youtube.com/watch?v=jIPRBxOcWsU&feature=youtu.be

It's a question that I have been getting a lot lately, not surprisingly. The warmer than normal temperatures that we've had since the end of harvest have raised some concerns about what impact they are having on the vines this winter, especially the hardiness of the dormant buds.

As far as hardiness goes, the buds are actually in good shape. The most recent samples were collected at the Experiment Station in Geneva one week ago on December 14 (we will start collecting samples from other areas in the Finger Lakes and New York in January). The LT50 values for all four varieties are about where they would be if we were experiencing a more "normal" winter, except for Concord which may be a little less hardy than it has been at this time over the past couple of years. Even so, these data indicate that bud hardiness is still good, and has not been significantly impacted because of the warm weather.

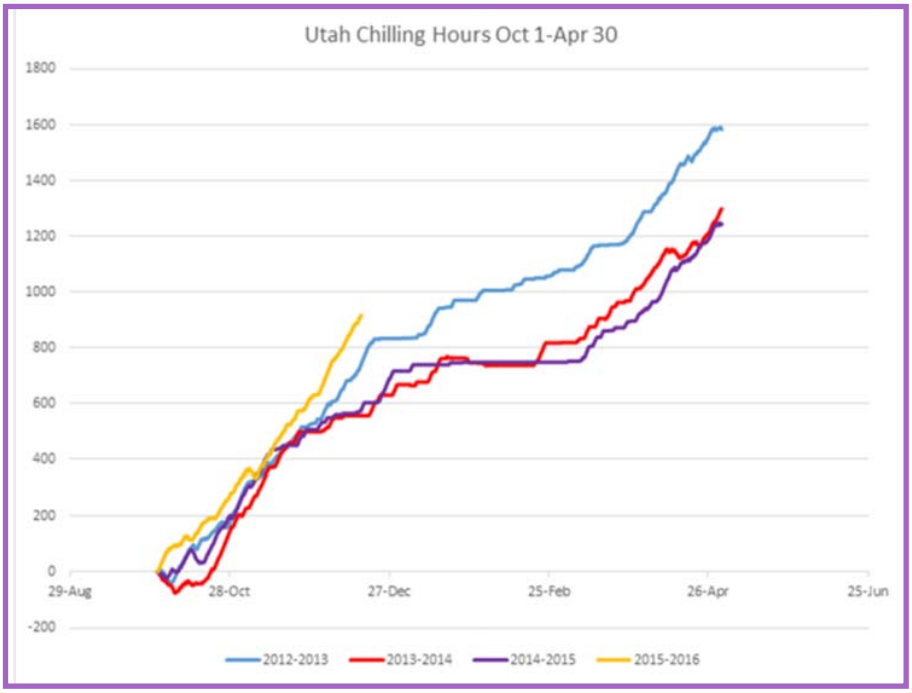
That's not to say, however, that the weather is not impacting the vines at all. The warmer weather has meant that the vines are accumulating more chilling hours than they normally would at this time of year. Chilling hours are how the grapevine tracks the length of the winter, and has a major impact on how the vines respond to warming temperatures during the winter and early spring leading up to budbreak. If a vine's chilling requirement is met during the winter, then budburst tends to be much more synchronized than if the chilling requirement is not met.

Chilling hours are accumulated when temperatures are generally between 32 - 54°F. When temperatures are outside of this range, the plant basically doesn't count them. The warmer than normal temperatures this winter means that we have spent more time in that 32 – 54 degree temperature range than we normally do, and therefore are accumulating more chilling hours up to this point than we have in the past several years.

Jason Londo, who spoke about this subject at last year's B.E.V. NY conference, provided us with the following graph showing the accumulation of chilling hours so far this winter compared the past three:

The yellow line is the chilling accumulation so far this winter, and you can see that we are well ahead of where we were the past two winters, and even ahead of the 2012-13 winter, when we also had a warmer than normal winter. At this point, most of our important commercial varieties have already met their chilling requirements for the year. According to Jason, Concord is very close and will probably meet its requirement this week, while Cabernet Sauvignon requires a higher amount of chilling, but will likely meet that target within the next week or two. OK, so the vines are meeting their chilling requirements earlier – so what? Once the vines have met their chilling requirement for the season (each variety has somewhat different requirements depending on its genetic background), they are primed to break bud under the right conditions. In other words, the vines are at a higher risk of breaking bud in response to an early warming event, which increases the risk of frost damage.

Variety	LT50 Value (° F) on Dec. 14
Concord	-11.3
Noiret	-10.7
Cabernet Franc	-9.5
Riesling	-10.1



Chilling hours accumulation in the 2015-16 compared to the past 3 years. Based on temperatures from Geneva, NY.

Source: Jason Londo, USDA-ARS, Geneva, NY

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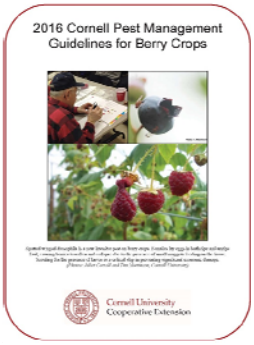
A follow-up question might then be "How warm does it need to get, and for how long, for the buds to break?" Unfortunately, we don't know the answer to that, except that it will take less time at warmer temperatures for the buds to come out of dormancy under these conditions than it normally would. Varieties that need fewer chilling hours before budbreak, such as riparia-based varieties like Marquette, Frontenac and Baco noir, will still respond to warmth more quickly than those that require higher amounts of chilling, much as they do in a normal season.

Let me emphasize that we are not predicting that we will have an early budbreak, but based on what we know right now, there is an increased risk that we could have an earlier start to the season if we get a spell of warm weather in March or early April. If temperatures don't warm up quickly this spring, we may still have budbreak that is closer to its normal timing. As always, Mother Nature gets the last word in farming.

With all that in mind, are we recommending that growers alter their pruning practice in response to this information? The answer, as usual, is "it depends." In the case of varieties that have an early budbreak, or areas that are more prone to frost damage, leaving some extra buds could help to balance out any frost damage that might come. Double-pruning is another option to consider, where much of the bulk pruning is done during the winter, and a follow-up pass is done to finish pruning after the major threat of frost has passed. Growers who consider trying one of these will need to keep in mind that both practices may require an additional pass through the vineyard, either to finish the pruning or to thin excess shoots if we don't end up getting significant frost damage.



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[1] These Guidelines are biennial publications, so they will not be updated in 2016.

[2] This guideline was updated in 2014; it will not be updated in 2016.

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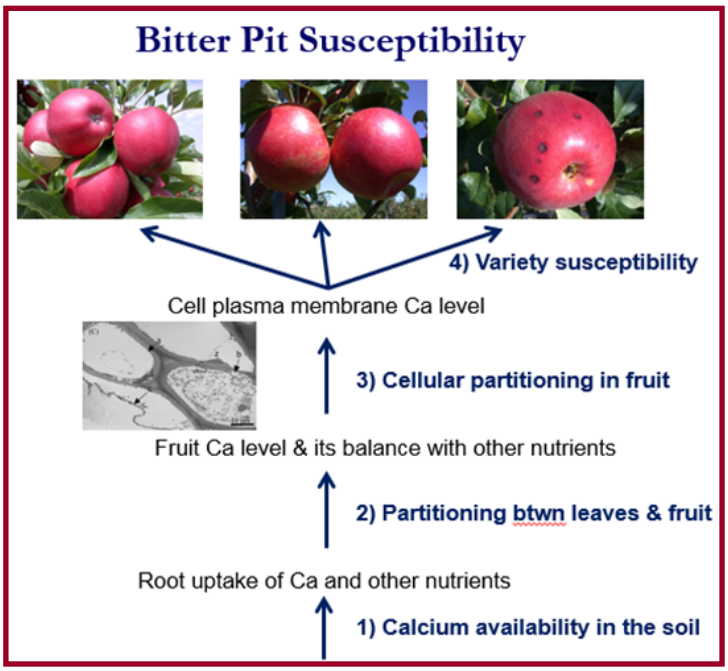
Ca and N Management in Honeycrisp

ANNA WALLIS

At the Empire State Producer's Expo Jan. 19-21, Dr. Lailiang Cheng presented information on calcium and nitrogen management for Honeycrisp. This information can be used to evaluate current Ca and N management practices.

Calcium deficiency in fruit is associated with many physiological disorders, most notably bitter pit. However, High susceptibility of Honeycrisp to bitter pit is still not completely understood. In research conducted by Dave Rosenberger et al, the amount of Ca in the fruit only explained about 35 to 50% of the bitter pit variation. Other factors at play include tree vigor, crop load, Ca availability in the soil, presence of other nutrients, environmental conditions, and apple variety. The diagram at the right shows the places in the transport of Ca through the plant where there are opportunities for Ca deficiency to occur.



Calcium availability in the soil is obviously affected by soil pH, soil moisture, and other nutrients present. Ca is taken up by the roots with water, so only soluble forms are available to the plant. Both drought conditions and over-saturated soil conditions can prevent adequate Ca uptake, increasing risk of bitter pit; Honeycrisp is especially sensitive to soil moisture. Ca is a cation (positively charged particle), so other cations in the soil (K, Mg, P) will compete with Ca uptake. Maintaining a balance of nutrients as well as ensuring adequate root growth will maximize Ca uptake.

Partitioning between leaves and fruit. In the plant, Ca is delivered to the leaves and the fruit via the xylem. Reducing tree vigor will direct more of the xylem sap (and Ca) to the fruit. Therefore, proper pruning, nitrogen management, and Apogee applications can reduce bitter pit incidence. Crop load also has an impact on bitter pit incidence. In light-cropped trees, high fruit K level decreases fruit Ca level and large fruit size dilutes the Ca in the fruit, leading to higher risk of bitter pit.

Cellular partitioning in fruit. Inside the fruit, Ca is divided again, between peel and flesh tissue. In addition, it decreases in concentration from the stem to the distal end of the fruit due to decreasing functional xylem vessels. This is why bitter pit symptoms are present closer to the calyx end. Again, Ca is not the only nutrient involved: it continues to compete with other nutrients, most importantly P and K (cations). Dr. Cheng's recent work showed that, compared with fruit without bitter pit, Honeycrisp fruit with bitter pit have higher levels of K and P in both the flesh and peel, leading to higher K/Ca and P/Ca ratios.. Peel analysis is being evaluated as a predictor for bitter pit.

Variety susceptibility. Nutrient levels vary based on apple variety. For example, Dr. Cheng's recent work showed that much less Ca is partitioned to fruit in Honeycrisp than in Gala, making Honeycrisp more susceptible to bitter pit. In addition to lower fruit Ca level, Honeycrisp fruit has much higher K/Ca ratio.

Recommendations for BP management in HC:

- Adjust soil pH to ensure adequate Ca supply in soil
- Promote and maintain root growth and Ca uptake (B, Zn, water availability)
- Control tree vigor to mitigate competition with fruit for Ca.
- Avoid low cropload situation
- Strictly control K (as well as N, Mg and P) to balance fruit Ca with K (and other nutrients)

Calcium Spray Program

Using Ca sprays can be effective for increasing Ca concentration in fruit. Calcium Chloride ($CaCl_2$) consistently is the best performing material compared to other formulations[1,2]. Do NOT apply CaCl-$_2$ when temperatures are above 80°F as this can burn leaves.

The following program provides program provides 3.4-4.5 lbs of actual Ca per acre:

4 sprays of 1.5 to 2 lbs of $CaCl_2$ (78%) or its equivalent per 100 gallons (dilute basis) at 10 to

continued on next page

14 day intervals beginning 7 to 10 days after petal fall.

OR

2 sprays of 3 to 4 lbs per 100 gallons at 2 week intervals starting from mid-season.

Nitrogen

Nitrogen management plays an important role in ensuring good tree growth and achieving high yield and fruit quality. Timing and Rate of N applications are critical. Here are some recommendations[5]:

Timing is important. Trees have high N requirement early in the season to support canopy development and early shoot growth. The later N is applied in the season, the higher the amount of N in the fruit. Late applications can also stimulate vegetative growth, which would lead to the partitioning of more xylem sap and Ca to shoots and away from fruits. In certain situations, where soil fertility is low, spring-summer N applications may be appropriate. In most situations, only very early spring applications should be used.

Rate is site specific. But as a rule of thumb, every 10% increase in fertilizer results in 0.1% in leaf N. Increased N does improve fruit size and yield, but only to a point. Fertilizing above 30lbs/acre will not have any additional benefit.

The optimal leaf N for Honeycrisp is 2.0 to 2.2%.

Nitrogen Recommendations for young Honeycrisp trees

- In the 1st and 2nd leaf, provide high N supply (60 to 120 lb N/acre) to promote tree growth
- In the 3rd leaf when trees start to produce fruit, N supply should be lowered to 30 to 80 lb N/acre. By the end of 3rd leaf trees reach the desired height (11 feet).
- From the 5th leaf, N supply is strictly controlled (20 to 50 lb N/acre) to improve yield and quality.

References:

[1]Biggs, A. and Peck, G. (2015). Managing Bitter Pit in 'Honeycrisp' Apples Grown in the Mid-Atlantic United States with Foliar-applied Calcium Chloride and Some Alternatives. *HortTechnology, 25*(3), 385-391.

[2]Rosenberger, D.A. et.al. (2004). Controlling Bitter Pit in 'Honeycrisp' Apples. *HortTechnology, 14*(3), 342-349.

[3]Rosenberger, D.A. et.al. (2003). Managing Bitter Pit in Honeycrisp. *New York Fruit Quarterly, 11*(3), 17-21. http://www.nyshs.org/pdf/fq/2003-Volume-11/Vol-11-No-3/Managing-Bitter-Pit-in-Honeycrisp.pdf

[4]Freitas, S. and Mitcham, E.J. (2012). Factors Involved in Fruit Calcium Deficiency Disorders. *Horticultural Reviews, 40, 107-146.*

[5]Cheng, L. (2010). When and how much nitrogen should be applied in apple Orchards. New York Fruit Quarterly 18(4), 25-28.

Northeastern NY Commercial Tree Fruit School

February 15, 2016

Fort William Henry Hotel and Conference Center

48 Canada Street, Lake George, NY 12845

Registration and More information

http://enych.cce.cornell.edu/event.php?id=460

Agenda

7:30 Registration & coffee, Sign morning DEC Recertification Rosters
8:30 Welcome and Announcements
8:40 Review of the 2015 Insect Pest Management Season in ENY
9:10 Apple Disease Concerns and Management Updates from the 2015 Season
9:40 PGR Strategies for Improving Production Practices – 2015 Review
10:10 Precision Management: How and Why We Should Irrigate
10:40 AM-Morning Break and Trade Show
11:00 NEWA, How to Get the Most Out of It
11:30 DEC Updates
12:00 Lunch and Visit Trade Show
1:00 Washington State Apple Industry: A Travelog
1:20 Factors to Consider When Assessing a Variety's Potential
1:50 The Potential for Cider Apple Production in the Northeast
2:20 PM-Break
2:40 Food Safety & FSMA, What You Need to Know
3:10 Crop Insurance Considerations
3:30 Update on Pesticides and Pollinators in New York State
4:00 New York Apple Association Update

Northern NY Vegetable School

Tuesday, March 15 9:00-3:00

Ausable Valley Grange, Keeseville NY
For info contact Amy Ivy
adi2@cornell.edu

Calendar of Events

February 9-11, 2016. ***NJ Agricultural Convention and Trade Show,*** Atlantic City, NJ.
http://www.njveggies.org/convention

February 15, 2016. ***Northeast NY Tree Fruit School.*** Lake George, NY. See p. 30 for more

February 16-17, 2016. Hudson Valley Fruit School – Tree Fruit Sessions. See back page

February 18, 2016.
Hudson Valley Fruit School – Berry and Grape session.

February 24, 2016. ***ENYCHP Capital District Vegetable Grower's School,*** Albany, NY.
https://enych.cce.cornell.edu/events.php

February 25, 2016. ***ENYCHP Hudson Valley Vegetable Grower's School,*** Kingston, NY.
https://enych.cce.cornell.edu/events.php

March 2-4, 2016. ***North American Raspberry and Blackberry Conference,*** Colonial Williamsburg in Williamsburg, VA.
http://www.raspberryblackberry.com/

March 8, 2016. ***Onion School,*** CCE Orange County, 18 Seward Ave. Middletown, NY.

March 17, 2016. ***Northeastern NY & VT Winter Grape School,*** Holiday Inn, Lake George, NY
http://enych.cce.cornell.edu/event.php?id=486

Commercial Vegetable Growers' Schools

Wednesday, February 24, 2016, 8:00 am to 4:00 pm
Best Western Albany Airport Inn
200 Wolf Road, Albany, NY 12205

TOPICS

- Imidacloprid Use in Vegetable Crop Production: Best management practices and alternatives
- Resistance Management: Things to think about
- What do Worker Protection Standard changes mean for your farm? *County/CCE ENYCHP*
- Food Safety Modernization Act: What it means for you?
- Cover Crop Nitrogen Budgets
- Fertility Research in High Tunnels Update: What trends are we finding?
- Crop Insurance Update
- 2015 Pumpkin Variety Trial Results
- 2015 Root Crop Variety Trial Results
- Emerging Brassica Insect Pests and some old favorites
- My experience using Brassicas for biofumigation
- Edamame: Is it right for you?
- Sweet corn herbicide updates
- Controlling birds in sweet corn: Western NY research update

Thursday, February 25, 2016, 8:00 am to 4:00pm
Best Western Plus, Kingston
503 Washington Ave. Kingston, New York 12401

TOPICS

- Food Safety Modernization Act: What it means for you?
- Imidacloprid Use in Vegetable Crop Production: Best management practices and alternatives
- What do Worker Protection Standard changes mean for your farm?
- Resistance Management: Things to think about
- RMA - Crop Insurance Update
- Emerging Brassica Insect Pests and some old favorites
- Cover Crop Nitrogen Budgets
- Fertility Research in High Tunnels Update: What trends are we finding?
- My experience using Brassicas for biofumigation -
- 2015 Pumpkin Variety Trial Results
- 2015 Root Crop Variety Trial Results
- Edamame: Is it right for you?
- Sweet corn herbicide updates
- Controlling birds in sweet corn: Western NY research update

Capital District Pesticide Applicator's Recertification Day

Protecting Pollinators

Tuesday , March 22, 2016

Registration 7:30—8:30 am

The Century House ,
997 New Loudon Rd. (Rte. 9)
Latham, NY 12110

General Morning Session

(3 core credits applied for)

Afternoon Sessions

Please choose **one** of the three afternoon sessions

SESSION I: ORNAMENTALS & TURF
(3 credits requested for categories 2, 3A, 3B, 4, 24, 25)

SESSION II: AGRICULTURE PLANT
(3 credits requested for Categories 1A, 10, 21, 22, 23)

SESSION III: STRUCTURAL & RODENT
(3 credits requested for Categories 7a & 8 applied)

To register, have questions, or need special accommodations: Please call Tove at 518-765-3518 to **pay by credit card,**

To Register Online:
https://reg.cce.cornell.edu/pesticiderecert_201

2016 Hudson Valley Commercial Fruit Growers' School

February 16-18, 2016

Best Western *Plus* Hotel (Garden Plaza Hotel)

503 Washington Avenue, Kingston, NY 12401

Attend all three days and receive a total of 8 NYS DEC recertification credits! *Participants must be on-time and in-attendance to receive DEC Credits*

Pre-Register online at the CCE ENYCHP website, look for the detailed agenda and pre-registration links in the "Upcoming Events" section of our homepage

Special thanks to our Platinum Sponsor: NYSDAM in partnership with the USDA Risk Management Agency. *(Maire, we should include the appropriate USDA logo here, Chuck was working on acquiring it)*

Agenda - Tuesday, February 16, 2016 – Tree Fruit Session 1

8:00 – 9:00 AM Registration & Coffee. Sign morning DEC recertification rosters.
9:00 Welcome and Announcements
9:05 Apple Disease Concerns and Management Updates from the 2015 Season
9:50 Hard Cider has a Bright Future in the HV
10:20 Networking Break
10:45 FSMA and the Produce Rule:What you need to know
11:10 NYS Horticultural Society Public Affairs Update
11:25 New York Apple Association Update
11:40 Update & Annual Meeting for the Hudson Valley Research Laboratory, Inc.
12:05 Announcements and stamp morning DEC certificates
12:10 Lunch and networking
1:15 Sign afternoon DEC recertification rosters
1:30 Call to Order and Announcements
1:35 Black Stem Borer – A New Nemesis Emerges
2:10 Crop Insurance: One Grower's Unit Strategies and the New Supplemental Coverage
2:50 Networking Break
3:05 Native Entomopathogenic Nematodes for Biological Control of Plum Curculio
3:35 Updates from our Industry Sponsors
3:55 Final announcements and stamp PM DEC certificates.
4:00 – 7:00 PM Trade Show

A total of 1.75 NYS DEC Pesticide Recertification Credits will be granted for Day 1

Agenda - Wednesday, February 17, 2016 – Tree Fruit Session 2

8:00 Registration & coffee. Sign morning DEC recertification rosters.
9:00 Welcome and Announcements
9:05 What is the Future for McIntosh in Eastern New York?
9:35 Review of the 2015 Pest Management Season in ENY
10:15 Break
10:30 Update on Pesticides and Pollinators in New York State
11:00 Precision Orchard Management: How and Why We Should Irrigate
11:30Results From Our 2015 Plant Growth Regulator Trials at Geneva
12:00 Announcements and stamp morning DEC certificates
12:05 Lunch and networking
1:15 Sign afternoon DEC recertification rosters
1:30 Call to Order and Announcements
1:35 Using Plant Growth Regulators to Induce Lateral Branching
2:05 Pome and Stone Fruit Viruses – The Continuing Threat
2:35 Tree Fruit Horticultural Research at the Hudson Valley Lab
2:55 Break
3:10 The Washington State Apple Industry: A Travelog
3:40 Economics of GAP Certification
4:00 Update on Plum Pox Virus in the Hudson Valley

A total of 3.5 NYS DEC Pesticide Recertification Credits will be granted for Day 2

Agenda - Thursday, February 18, 2016 – Tree Fruit Session 3

1:00 NEWA "Hands-On" Workshop: How to Use Computer Models for Effective IPM & Precision Orchard Management Implementation. *Attendance is limited to 30, pre-registration is required, bring your own laptop.*

A total of 2.75 NYS DEC Pesticide Recertification Credits will be granted for Day 3

THURSDAY, FEBRUARY 18TH WILL ALSO HOST THE BERRY (MORNING) & GRAPE (AFTERNOON) SESSIONS. FOR MORE ON THEM SEE:

https://enych.cce.cornell.edu/events.php

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