

March 2020

# THE PRODUCE PAGES

Serving the fruit and  
vegetable growers of  
Eastern New York

## Feature Farm Story

### A Tale of Two Vineyards

*Dr. James Meyers, CCE ENYCHP*

It was the best of times, it was the worst of times, it was the age of warming autumns, it was the age of late spring frosts, it was the epoch of Merlot, it was the epoch of winter damage, it was the season of Light, it was the season of Darkness, it was the spring of early budbreak, it was the winter of polar vortices, we had everything before us, we had nothing before us...

With apologies to admirers of Charles Dickens and his most famous prose, growing grapes in the Hudson Valley is in many ways a similar study in contrasts. The warmest portions of the region have ripened delicate vinifera (French wine grape cultivars) to levels approaching west coast style wines, while the colder areas are unable to grow vinifera at all and rely on French-American hybrids that were bred to be

cold-tolerant.

To complicate matters, weather is often as different from year-to-year as it is from place-to-place. The 2019 season in the Hudson Valley was particularly tricky – combining a polar vortex in late January which caused substantial winter injury, an unusually warm April which led to early budbreak, and a late April frost which caused more damage. Some vinifera vines that produced plentiful ripe fruit in previous seasons produced little in 2019 and in some cases were killed.

*(Continued on page 3)*

*A Seyval Blanc planting at Clinton Vineyards in Clinton Corners, NY.  
Photo: J. Meyers*

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# The Produce Pages

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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*

(Continued from cover)



*A vineyard of mixed red varieties at Canoe Hill Estate and Winery in Millbrook, NY. Photo: J. Meyers*

Most growers in the region limit their production to a single location, which helps to reduce the number of seasonal surprises, but some operate in multiple counties and experience the full range of challenges and rewards. One such grower is Greg Esch. Greg started making small batches of hobby wine 20 years ago and has since progressed to operating vineyards in about a dozen New York counties and has grown some of the most delicate vinifera (e.g. Merlot) and the most cold-hardy cultivars (e.g. Marquette).

Looking at two vineyards currently under Greg's management, Clinton Vineyards in Clinton Corners and Canoe Hill Estate and Winery in Millbrook, provides an opportunity to delve into the range of conditions and experiences in Hudson Valley grape production. Clinton Vineyards was established in 1976 by Ben Feder who planted a single cold-tolerant white French-American hybrid cultivar: Seyval Blanc. Canoe Hill was established in 2013 by Neil Grossman who hired Greg to plant and manage several red vinifera cultivars including Merlot, Cabernet Franc, Cabernet Sauvignon, and Pinot Noir and two white vinifera cultivars: Riesling and Gewürztraminer.

Greg considers Seyval Blanc to be one of the easiest cultivars to grow in the Hudson Valley noting that 'it handles humidity well and is resistant to downy mildew, which is our principal disease threat in the region.' In contrast to Seyval Blanc, Greg considers Pinot Noir to be the 'hardest grape to grow but also the most satisfying. While susceptible to sour rot and crown gall [a trunk disease], it ripens early and can be harvested with good sugar levels.'

Seyval Blanc and Pinot Noir are also contrasted by their economic value. Greg notes that Pinot Noir grapes are in short supply in the Hudson Valley and are expensive to purchase – if they can be purchased at all. Meanwhile, Seyval Blanc prices 'have not increased in a long time despite annual increases in the cost of production.' Increasing the acreage of Hudson Valley Pinot Noir is not necessarily straight forward because 'Pinot Noir requires the best sites, which are also the most scenic along the river with high property values.' In recent years, Greg has been planting Pinot Noir at Clinton Vineyards too.

When asked about what keeps him up at night, Greg notes 'Hudson Valley cold temperatures in the winter, polar vortices, and spring frosts.' He also notes that weather forecasting is often unreliable. What is he optimistic about? 'The potential to ripen fruit to full phenological ripeness in the Hudson Valley more successfully than other New York wine regions.'

*Harvested Pinot Noir at Canoe Hill Estate and Winery. Photo: J. Meyers*



## Brussels Sprouts: Heat Stress and Other Challenges

*Jan van der Heide, Bejo Seeds*

*Consider Jan van der Heide's suggestions in preparation for planting Brussels sprouts this season. He recommends planting in the field early, in April in his region (Geneva), and front loading soil fertility to encourage sprout formation later in the season.*

*– Elisabeth Hodgdon, ENYCHP*

We are all familiar with the "Kale Craze" of the past few years. Consumers have discovered the health benefits of Kale, and this is helping draw attention to those same health benefits that can be found in other members of the Brassica family. Cauliflower, Brussels Sprouts, Chinese Cabbage, flat cabbage, and many other members of the Brassica family are enjoying increasing popularity.

While Kale is quite easy to grow, some of the other Brassicas are quite a bit trickier. Brussels Sprouts, in particular, can be challenging. Here are some tips.



*Perfection! Nice, even growth with the right fertility management gives straight stalks, even sprout development and sizing and green and healthy sprouts. Notice the shed leaves (brown and dead) on the ground (no green leaves on the stalk!) All photos: J. van der Heide*

*(Continued on page 4)*



### Brussels Sprouts like a moderate climate for steady growth.

Brussels is a city in Belgium, in Northern Europe. This area is surrounded by the warm waters of the Gulf Stream, and the summers are long, cool and wet, with very little heat stress. This allows the Brussels Sprouts to grow at a nice, even pace. Growers are able to learn how to grow this crop, and then apply the same practices every year to get the same results.

Our climate, by contrast, is a Continental Climate, with long and cold winters, a very short spring, and a hot and stressful summer. The heat stress in summer makes a nice, even pace of growth very difficult.

### Heat stress disturbs normal plant development.

During normal growth, the top bud (growing tip) on the plant produces hormones that stimulate the development of a tall stalk, while at the same time suppressing the development of side buds. These side buds eventually become the Brussels Sprouts themselves, of course. Too much heat stress can stop the plant growth, and this can lead to uneven plant growth and development.

Uneven growth leads to loss of control of plant development by the top bud (loss of “apical dominance”). This can have the following effects:

- ✓ Reduced stalk length.
- ✓ Premature development of side buds (sprouts).
- ✓ Elongation of the lower sprouts when growth resumes.

### Heat stress causes physiological problems: Summer Frost.

Brussels Sprouts are like any other plant. The leaves evaporate water to create suction to bring up nutrients with water through the roots, but evaporation is also needed to cool the plant during hot weather. When the weather is hot the leaves will draw most of the water from the vascular system at the expense of water flow to the sprouts, and the young developing sprouts will not get many nutrients. This can lead to calcium deficiencies in the sprouts (Summer Frost). This is very similar to calcium deficiencies that lead to tip burn in cabbage, lettuce and other leafy crops and blossom end rot in tomatoes and peppers. The weak tissues are invaded by *Alternaria*, and sometimes by bacteria that cause soft rot. As with tomatoes, be sure to provide irrigation when the weather gets hot and dry. You will get better sprouts later in the year.

### Uneven growth produces uneven sprouts.

Anything that stops the plant from growing (too much water, too dry, too hot, etc.) will disturb the

normal growth of the plant. The sprouts at the bottom of the plant (the ones that were formed first) are eager to “grow out”, just like the suckers on a tomato or cucumber plant. The only thing that keeps them from growing out is the dominance of the top bud. If dominance from the top is weak (because of uneven growth) the bottom sprouts will start to develop and will try to grow out.

The lower sprouts will elongate and stretch. The stretching tears the outer leaves from the stem, and these leaves will wilt and die.

*Alternaria* can move in quickly, turning



*SUMMER FROST in Brussels Sprouts is caused by Calcium deficiency (lack of water during hot weather). The symptoms are similar to tip burn and internal black in cabbage. The same issue causes blossom-end rot in tomato.*



*This sprout from the bottom of the stalk is “stretching” and has pulled the outside leaf off the stalk. This wrapper leaf is dying and could soon be invaded by *Alternaria* (left). Uneven growth results in the bottom sprouts to grow into sideshoots. Notice the little sprouts at the bottom of this sideshoot (right).*



*“Funky” Brussels Sprouts, caused by the same issues as SUMMER FROST. (top view, side view) Tipburned tissues are invaded by *Alternaria*. Avoid heat stress and irrigate, when possible.*



*“Funky” sprout—one, two, three, and four layers down.*

these weak and dying leaves black.

### Effects of Planting Time.

Planting early (April) will allow the plants to take advantage of relatively good growing conditions in spring and early summer and make a lot of length before the heat stress challenges of July and August. Planting late (July) will put the plants pretty much into the thick of the heat stress at the beginning of their development, and the plants will stay short until the weather cools down by late August. These late plantings will have a lot of catching up to do before cold weather sets in.

Early plantings will produce earlier sprouts, which will need to be picked early. Early plantings will challenge the holding ability of the sprouts, and sprout quality will decline with extended field holding.

Late plantings will not have problems with field holding, but stems tend to be shorter, and sprout development is not complete. Because the sprouts are not (over)mature yet the quality of the sprouts is quite good.

Clearly, we are searching for a happy medium that strikes the right balance of yield and quality. You will have to experiment with planting time and with different varieties. The early-maturing varieties will run into severe quality challenges when planted early, while the late maturing varieties will benefit from early planting. Early varieties could give you nice sprouts when planted late (July) – they can develop quickly when the weather cools down in spring without running the risk of getting over-mature, while late planting of late-maturing varieties will produce only a small crop of sprouts.

### Front-load Fertility.

The Brussels Sprout plants need to make tall stalks quickly at the beginning of the season, so they will need plenty of fertility to support this rapid growth. Once the plant reaches its maximum length (at about 2/3 of the season) the fertility in the soil should be just about used up to force the plants to re-distribute its nutrients from the leaves into the sprouts. The leaves will turn yellow, starting at the bottom, wilt and fall off

while the sprouts increase in size, until the whole stalk is “naked” and stacked with healthy and green sprouts.

Too much fertility late in the season will keep leaves green, and the leaves will not shed. The sprouts will not fill evenly, leaving the top sprouts under-developed, and harvest will be complicated by too many leaves.

General fertility recommendations are 200 – 250 pound of N/acre, 200 – 300 # K/acre, and 60 – 100 # P/acre. Earlier maturing varieties will need a little less, and longer maturing varieties will need a bit more. Consider the fertility of your fields, and the previous crops. Soybeans add quite a bit of N, and field corn can leave a lot of fertility in the field for the next crop.

The development of a crop of Brussels Sprouts is more easily managed on a field of moderate fertility: you can always add a little N to help the crop along, but you cannot take away too much fertility. Some varieties will need a small amount of N at the end of the season to prevent the sprouts from yellowing/aging while on the stalk, while others are very effective feeders that need no extra help with late-season fertility. Ask your seedsman for tips on how to fertilize individual varieties.

### Brussels Sprouts are not easy. Give yourself time to learn.

It takes a few crop cycles to learn how to grow Brussels Sprouts. Don't be discouraged when your first trial does not work out too well. You need to figure out the fertility program for your ground, figure out the best planting time for different varieties, figure out if you should only grow with irrigation or not, figure out the best plant spacing for different varieties, etc. Don't be surprised if it takes you 7 – 8 years to figure it out. Maybe growing kale is not such a bad idea, after all!



*Mid-October harvest. Planted in May (left), the lower sprouts are quite mature and there is good development of sprouts along most of the stem. At this stage, the weight of the plant can cause the plants to lodge a bit. In some varieties, the lower sprouts might be over-mature and get “funky”, but MARTE has good field-holding ability. Notice the yellow leaves at the base of the plant – this is a good sign. Planted in June (middle). Good quality sprouts, no “funkiness”, nice even development. Planted in July (right). This plant is still very green, and not much sprout development in the top half of the stalk.*



## Grow Beets, Not Weeds!

*Julie Kikkert, Cornell Cooperative Extension, Cornell Vegetable Program; with information from the late Dr. Robin Bellinder, Cornell University*

The market for table beets has increased in New York State due to interest in health benefits and locally grown foods. Additionally, new beet products and varieties have sustained the table beet renaissance. Weeds are a huge management issue in beets, because they can directly reduce yields through shading and competition, and increase the risk for plant pathogens by reducing air movement in a field and potentially harboring pathogens. Furthermore, weeds interfere with mechanical harvest as they can wrap around and jam up the equipment. As a last resort, the tops of tall weeds are mowed-off just above the beet canopy prior to harvest. However, weeds allowed to pollinate in the field, generally continue down the path of seed production, creating large weed seed banks in the soil. For instance a single lambsquarters or pigweed plant can produce over 70,000 seeds, perpetuating the problem for years to come. Hand-weeding costs can be in excess of \$100/acre depending on the density of weeds in a field.



*Figure 1: As table beet seedlings emerge, so do weed seedlings such as purslane, velvetleaf, and lambsquarters seen in this photo. Often weed seedlings grow much faster than the beets.*

*Photo: J. Kikkert, CCE CVP*

### **A weed management plan for table beets in New York should include:**

- A whole farm plan where weed issues are managed in rotational crops and with weed suppressing cover crops in the years prior to planting beets.
- Stale seedbeds when appropriate
- Appropriate cultivation techniques, which may include tine-weeders, field cultivators, finger weeders, and other implements. Dr. Bryan Brown, NYS IPM Program <https://nysipm.cornell.edu/> is a good resource for cultivation equipment in table beets and conducted trials in 2018 and 2019 with stacking different implements on a toolbar to assess both weed control and crop damage.
- Pre-plant incorporated and/or Pre-emergence herbicides. Note the potential for crop injury with these products under certain environmental conditions.
- Post-emergence herbicides. There are no good stand-alone products, so combinations of SpinAid, Nortron, UpBeet and Stinger should be applied when beets and weeds are small depending on weed species present. Select Max or Poast herbicide can be applied for post-emergence grass control.

Further information on the available herbicides for 2020 is available in the text and table that follow. Make sure to read the labels for full details.

### **DUAL MAGNUM (Group 15)<sup>2</sup>**

Dual Magnum is one of the most widely used pre-emergence herbicides in vegetable crops. It predominantly controls annual grasses but also some key broadleaf weeds as well, e.g. redroot pigweed, hairy galinsoga, and eastern black nightshade. Yellow nutsedge is also significantly suppressed. Under cold, rainy conditions beets can be stunted as they emerge and occasionally stands are reduced. Do not use on coarse textured soils with less than 1.5% organic matter or on soils with greater than 10% organic matter. Please refer to the product label as well as the New York State Supplemental Labelling SLN NY-110004 (available at <http://www.dec.ny.gov/>

### **RO-NEET Herbicide (Group 8)<sup>2</sup>**

Ro-Neet is a pre-emergent herbicide that is typically used pre-plant in beets in NY. The label also says that it can be applied at planting or immediately post-planting. It must be incorporated immediately to prevent loss of the herbicide. The new label states that crops should be planted or seeded immediately after application, except for fall application; whereas the old label recommended delayed planting. We do not have recent experience in Cornell trials with planting date of beets relative to Ro-Neet application. The previous recommendation for delayed planting may have to do with concern over crop injury. A colleague in Texas reports that he has not seen any crop injury in his trials. Furthermore, he says that weed control is generally very poor after about 3 weeks. Thus, waiting to plant may reduce the efficacy of the herbicide by as much as 30%. If you have used Ro-Neet in the past, you should proceed cautiously before changing the timing of your planting relative to herbicide application. Use 2.0 – 2.67 qt/acre for table beets. The lower rate should be used on sandy soils, in hot weather, or on dry soils. Annual broadleaf weeds will only be controlled if the application is made when conditions are favorable for germination. It will not control established or germinated weeds present at the time of application. Do not use on muck soils.

### **NORTRON SC (Group 8)<sup>2</sup>**

While Nortron SC has a regular NYS label now, it is to be used in conjunction with New York State Supplemental labelling SLN NY-10014 (available at <http://www.dec.ny.gov/nyspad/>). This herbicide has both pre-emergence and post-emergence activity largely on annual broadleaf weeds, with some activity on foxtails and large crabgrass (see Table 1). Pre-emergence applications do not require incorporation as long as sufficient rainfall is predicted, and can have residual activity of 5 to 6 weeks. Cornell research tested 1.0 and 2.0 quart rates and generally injury was low and rapidly outgrown at the higher rate. Injury observed included some loss of stand, stunting, and occasional downward cupping of early leaves. Weed scientists in Oregon and Michigan have reported more significant injury with the 2.0 quart rate and frequently attribute this injury to soils having high amounts of sand. The label for New York lists 60 fl. oz (2.1 quart) for the pre-emergence rate. Do not use on muck soils.

Post-emergence applications are intended to be applied together with Spin-Aid, UpBeet, and Stinger. These 2 and 3 product mixtures are called 'micro-rate' applications. They are intended to be applied when the weeds are very tiny, cotyledon to 2 true leaves and are to be applied when the beets have 2, 4, and 6 leaves, roughly every 7 to 10 days. The rates for use in New York are 5.25 to 10.5 fl. oz depending on the size of the beets at the time of application. Also, specific to New York's 24C is the restriction to making no more than 2 applications per acre per

season. Thus, Nortron could be applied pre-emergence and followed by one post-emergence application later or it could be applied twice to emerged weeds with the other post-emergence herbicides. Adjuvants are not used in mixtures that include Spin-Aid as this product is an emulsifiable concentrate. If applied with UpBeet or Stinger, then adjuvants are recommended. See labels for specific details. The label does not list a PHI for this product.

### **UPBEET Herbicide (Group 2)<sup>2</sup>**

UpBeet has only post-emergence activity and provides excellent control of several broadleaf weeds. This herbicide will be of interest to growers who have had problems with velvetleaf. Other weeds controlled include wild mustards, wild radish, and smartweeds. Like post-emergence Nortron, control of multiple weeds increases when UpBeet is applied together with the other post-emergence herbicides at the 2, 4, and 6 leaf stages. It is applied at 0.5 oz/A when weeds are tiny, cotyledon to 2 true leaves, and also requires adjuvants when applied with Nortron and/or Stinger but not with Spin-Aid. The PHI for this product is 30 days.

### **SPIN-AID Herbicide (Group 5)<sup>2</sup>**

Spin-Aid is a key component of the 'micro-rate' application program mentioned above. The labeled rate ranges from 1.5 to 3 pints/A depending on the number of beet leaves present. Spin-Aid is one product that is more likely to cause slight injury, leaf chlorosis or tip burn after application, but most of the time, recovery occurs within a week or two. However, Spin-Aid can be very "hot" under higher rates as I have burned 2-leaf beets with 1.5 pints/A. Please use this product cautiously if you are not familiar with it. Weeds are most successfully controlled when they are tiny, cotyledon to 2 true leaves. Spin-Aid is one of the only beet herbicides with significant activity against common lambsquarters. Some of the other well controlled weeds include: common chickweed, c. purslane, c. ragweed and annual sowthistle. This herbicide does not require the use of adjuvants. The PHI for beets is 60 days.

### **STINGER (Group 4)<sup>2</sup>**

Stinger has a fairly narrow spectrum of weed species controlled and should only be used if those species are problematic in a given field (based on scouting). Stinger has primarily post-emergence weed control activity but does remain in the soil for an extended period of time and due to this has specific crop rotation restrictions. It is important to review these on the product label. Stinger is noted for excellent control of common ragweed, galinsoga, nightshade species, wild buckwheat, prickly lettuce and annual sowthistle. It also does a good job of suppressing Canada thistle and dandelion. Stinger may be applied twice per season, to beets having 2 to 8 leaves at rates of 0.25 to 0.5 pint/A with a total of 0.5 pint being applied. The product label states that adjuvants are not required for applications of Stinger;

*(Continued on page 8)*

(Continued from page 7)

however, they are sometimes used when mixed with Nortron and UpBeet. The PHI for Stinger is 30 days.

### SELECT MAX (Group 1)<sup>2</sup>

A post-emergence herbicide with activity against many annual grass species. The use rate is 12 to 16 fl. oz, with no more than 0.5 lb a.i./A per season. NIS at 0.25% (v/v) is recommended. Do not cultivate within 7 days before or after application. The PHI for Select Max is 30 days.

### POAST Herbicide (Group 1)<sup>2</sup>

A post-emergence herbicide with activity against many annual grass species. Apply to actively growing grasses according to the

maximum grass sizes on the label. Do not exceed 2.5 pt per application or 5.0 pt/acre per season. Always add 2.0 pt/a crop oil concentrate. Do not cultivate within 5 days before or 7 days after treatment. The PHI for Poast is 60 days.

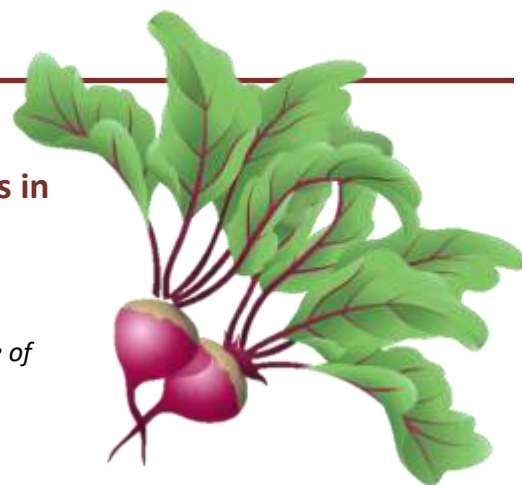
<sup>1</sup>Some of the information in this article originated from the late Dr. Robin Bellinder, Cornell University.

<sup>2</sup>Weed Science Society of America (WSSA) Mode of Action.

## Relative Effectiveness of Herbicides Available for use in Table Beets in New York for 2020

Compiled by Julie Kikkert, CCE Cornell Vegetable Program with information from the late Robin Bellinder, Cornell University

For general comparison only. Effectiveness may vary with method of application, rate, use of an adjuvant, size of weed, soil type, and weather. See the 2020 Cornell Guidelines for Vegetable Production for more details. Always read and follow label directions.



Key to Compare Effectiveness: G = Good; F = Fair; P = Poor to None

Key to Compare Effectiveness  G = Good F = Fair P = Poor to None	Rate/A	PHI	BROADLEAF ANNUALS												ANNUAL GRASS				PERENNIALS				
			Lambsquarters	Purslane	Common Ragweed	Pigweed	Smartweed	Galinsoga	Mustard	Nightshade	Chickweed	Shepherds Purse	Velvetleaf	Wild buckwheat	Barnyardgrass	Crabgrass	Fall Panicum	Foxtail sp.	Quackgrass	Yellow Nutsedge	Canadian Thistle	Dandelion	
Pre-Plant Incorporated																							
Ro-Neet (cycloate)	2.0-2.67qt		F-G	F	P	G	P	F	P	F-G	F	G	F	F	G	G	F	G	F	F-G	P	P	
Pre-Emergence																							
Dual Magnum (s-metolachlor)	0.67pt		P	F	P	G	P	G	P	G <sup>b</sup>	P	P	P	F	G	G	G	G	P	G	P	P	
Nortron (ethofumesate)	60 fl oz		F	F	P	F	G	P	G	G	G	P	P	G	P	P	P	F	P	F	P	P	
Post-Emergence																							
Nortron (ethofumesate)	5.25-10.5 oz		F	P	P	F	G	P	G	G	F	P	P	F	P	P	P	F	P	P	P	P	
UpBeet (triflurosulfuron-methyl)	0.5 oz	30 d	P	P	F	F	F-G	F	G	F	F	F	G	F	P	P	P	P	P	P	P	P	
Spin-Aid (phenmedipham)	1.5-3.0 pt	60 d	G	G	G	P	P	P	P	P	G	G	P	P	P	P	P	P	P	P	P	P	
Stinger (clopyralid)	0.25-0.5 pt	30 d	P	P	G	P	G	G	P	G	P	P	P	G	P	P	P	P	P	P	F	F	
Select Max (clethodim)	9-16 fl oz	30 d	P	P	P	P	P	P	P	P	P	P	P	P	G	G	G	G	F	P	P	P	
Poast (sethoxydim)	0.5-2.5 pt	60 d	P	P	P	P	P	P	P	P	P	P	P	P	G	F	G	G	F	P	P	P	

<sup>b</sup>Eastern black nightshade only



## Cold Injury, Wood-Decay Fungi, and Black Rot

Michael Basedow, CCE ENYCHP

With the recent sub-zero temperatures and the 10 to 20 inches of snowfall expected across the Champlain Valley over the next few days, I feel it is about the right time of year to discuss cold injury, and the various maladies associated with it.

Cold injury is complex, to say the least. It occurs when living cells within the xylem, phloem, or cambium are killed; this results when ice forms within or around the cells, subsequently rupturing them. It can occur in the vegetative and floral buds, in the shoots, and in the roots. It can occur in the fall during the acclimation period, in mid-winter, or during the spring as trees are de-acclimating. As trees are

exposed to progressively lower temperatures in the fall, they acclimate, or increase their ability to withstand the cold. Acclimation begins at the growing tips of the trees, so we commonly observe cold injury on the trunk, from the lower limbs to just above the soil line, following a winter when there was an early cold snap in the late fall or early winter (Palmer, Prive, and Tustin, 2003).

Symptoms that we can easily observe include: darkening of the killed xylem when we cut into the injured tissues, stem dieback, winter kill of dormant buds, and browning of the cambium and bark tissues along the trunk (Palmer, Prive, and Tustin, 2003; Rosenberger, 2017). Southwest injury is a unique form of cold injury, where sunlight reflected from snow cover causes cyclic warming and cooling on the southwest side of the tree, leading to bark splitting in the trunk and lower branch crotches (Kesner and Hansen, 1976). Cold injury can reduce yields, and can kill the tree if enough vascular tissue is damaged. Stress from the cold injury can also reduce the tree's subsequent ability to fight off subsequent fungal infections, including infections from wood decay fungi and black rot (Quamme et al., 1982).

Wood decay fungi inhabit and slowly decay the xylem of trees. These fungi may already be present in the trees' xylem at planting (Havenga et al., 2019), or can gain entry into trees through pruning and other wounds through the bark (Celetti, 2015). These fungi are quite weak, causing relatively minimal damage in healthy trees. If trees are stressed from previous cold injury, wood decay fungi may eventually progress through the wood towards the bark, creating visible cankers on the trunk. These cankers may eventually encompass the vascular tissues to the point of tree collapse. This can be a slow process, and collapse may not happen until a few seasons later (Rosenberger, 2007).

Trees compromised by cold injury and/or wood decay fungi may be further weakened by *Botryosphaeria obtusa*, the causal species of black rot in apple. Similar to wood decay fungi, black rot is relatively slow to spread in wood of healthy trees. However, stressed trees can become infected by black rot through splits in the wood, through surface decay caused by wood decay fungi, or through other wounds on the tree (Rosenberger, 2007; Celetti, 2015). Once the black rot fungi gain access to the bark, the disease can spread through the tree, especially when other wood decay fungi are already present in the older xylem. Early infections appear as slightly sunken, reddish-brown to dark purple areas on the trunks or limbs. As damage progresses, cankers will grow and the bark may crack and peel, exposing black, dead wood underneath. If the black rot canker spreads enough, it can girdle the limb or trunk, leading to tree collapse above the canker (Celetti, 2015).

The main takeaway here is that cold injured trees may suffer reduced yields, and have the potential to collapse over time. This collapse can be directly caused by the cold injury itself if enough tissues are injured, or through subsequent death of the tissues from

*(Continued on page 10)*



*Cold injury damage occurring on the lower trunks above the graft union.*

*Photos: Tianna Dupont, WSU Extension*

infection by wood decay or black rot fungi.

So, what can we do to mitigate the risk of winter injury and these subsequent infections?

- ✓ First and foremost, avoid planting in cold pockets, and choose varieties well-adapted to our growing region.
- ✓ Reduce water stress as much as possible; provide adequate irrigation in droughty years, and avoid planting on poorly drained sites.
- ✓ Perform regular leaf nutrient testing, and be careful not to over-apply nitrogen, as excess growth will delay the cold acclimation process in the fall.
- ✓ Avoid pruning trees too early, as pruning temporarily deacclimates the wood surrounding the cuts, increasing the risk of cold injury.
- ✓ Trunks can be painted with white latex paint to reduce trunk cracking from southwest injury.
- ✓ Reduce woodpiles around the orchard, as they can be an inoculum source for wood decay fungi.
- ✓ For black rot control, remove mummified fruit, prune out infected shoots, and remove cankers when possible. These tissues should be removed from the orchard, burned, or finely chopped with a flail mower.
- ✓ Black rot often colonizes shoots killed by fire blight, so fire blight should be well controlled.
- ✓ Summer disease management practices will reduce the buildup of black rot inoculum. Captan, Topsin M, and strobilurins are effective for managing black rot fruit infections.



Left: Early stages of black rot on apple limb and trunk, showing sunken dark red/purple cankers. Photo: Michael Celetti, OMAFRA. Right: An older black rot canker on Red Delicious, showing rough, peeling bark and dead wood beneath. Photo: Dr. Srdjan Acimovic, Cornell University HVRL.

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# From Soil to Substrate—Considering a New Way of Growing Strawberries

Laura McDermott, CCE ENYCHP



Participants examining a wide variety of available substrates. Photo: L. McDermott

On February 11-13, 2020, the New York Berry Growers Association hosted a strawberry substrate workshop taught by Dennis Wilson of Delphy (<https://delphy.nl/en/>). Delphy is a worldwide horticulture consulting and educational firm that offers training in the production of horticultural crops grown under protected culture. The workshop featured hours of lecture followed up with hands-on opportunities to practice techniques and see the substrates and fertilizers being discussed. Attendees were also able to view the greenhouse lighting and CO2 work being done in Dr. Neal Mattson's lab at Cornell.

Many growers might ask – 'Why would I want to convert from soil to substrate?' This is a reasonable question, and given our historically strong retail markets it may render the rest of this article moot. Before considering substrate culture, a grower should have reliable markets in place – possibly a mix of retail and wholesale. Our reliance on retail has come at a cost to our wholesale opportunities, but local produce is valued by consumers regardless of the market channel. An example was given by the instructor, that in 1995, only 50% of berries in grocery stores were grown in the United Kingdom, now 95% of berries (during production season) are grown on local farms. This was due to a concerted effort by UK farmers to invest in cutting edge production technology and prove to wholesalers that their product was equal or better than their competitors – and that locally grown strawberries were appealing to consumers.

There are many reasons why growers might consider growing strawberries in soilless substrates. The primary reason is the loss of soil sterility. Strawberries

are notoriously susceptible to soil diseases. In regions where land is at a premium, crop rotations are difficult or impossible to put in place. Poor crop rotations result in exceptional disease pressure on strawberry producers in California, Florida and other places in the world. Substrate culture removes this risk.

The second problem is the difficulty of finding Ag labor, especially for harvest. Substrate production allows growers to elevate the crop. Harvesting from plants that are waist high has been shown to increase harvest productivity by 25-50%. Table tops or raised beds are easy to implement in protected culture (under glass or plastic) and many growers have been experimenting growing berries under high or low tunnels for years. Substrate production also allows for relatively easy changes in varieties or even types of plants depending on the market.

Control of the crop remains the primary reason for making the switch from soil to substrate. Planting in substrate gives greater predictability over plant establishment and performance. You can control all aspects of irrigation and nutrition which leads to significant improvements in fruit size and quality. Yield on farms that grew in soil increased over four times when the same UK grower implemented substrate production. Again – numbers need to be crunched for our markets to insure commercial viability, but from a production standpoint it's intriguing.

The workshop consisted of three full days of very detailed information along with a review of some of the science to help explain the protocol outlined. In my work with a few growers that have tried substrate production – even the most basic questions are difficult to answer. Below are a few tips on substrate and container selection. If you have additional questions, please give me a call.

## Substrate

Ideal strawberry production requires either peat based mixes or coir. Most growers are familiar with peat mixes and from a chemical standpoint they are easier to work with than coir. However the physical makeup of peat can be a challenge – it needs to have coarse enough particles to drain. The peat substrate should have an air filled porosity (AFP) of 14-18% which will mean that most particles in the mix are medium to coarse. The other challenge with peat is that peat extraction has come under environmental scrutiny in many parts of the world. That scrutiny has resulted in coir becoming a peat alternative.

(Continued on page 12)



Workshop attendees practice measuring moisture and pH of substrate. Photo: L. McDermott



Botanicoir bag. Photo: L. McDermott



Trough container with truss support. Photo: L. McDermott

Coir substrate is actually coconut compost made from the husk of harvested coconuts. The physical attributes of this media make it preferable to peat for strawberry production, but growers should know that low cost coir will need to be rinsed of salt, and then re-rinsed, and triple rinsed – and then even after that it will still be chemically inappropriate. It's imperative that growers purchase high quality, pre-rinsed coir substrate in order to avoid problems. Strawberry coir substrate – often marketed as coco-peat although it has no peat – will have an 85:15 ratio of pith: fiber. The pith is the dust left from the coco fiber extraction process. The fiber is what actually resembles shredded coconut husks.

Perlite is frequently added to both peat and coir mixes to improve drainage. Perlite is an expanded volcanic material and thus is stable and does not decompose. It has little or no cation exchange capacity (CEC) and helps manage the electrical conductivity (EC) in substrates. Adding perlite to substrates with a higher than desired % of fine material will help improve drainage, but the better solution might be to start with the appropriately graded substrate.

### Production Containers

Growers can use individual pots, troughs or pre-filled substrate 'bags'. When using any of these containers it's very important to make sure that the containers are supported adequately. Often in the early stages the bags or containers are placed on the ground. There are lots of advantages – support being one of them, but ground level production negates the advantage to growing at an elevated level so that picking is easier.

Containers should have excellent drainage, and be completely clean if they are being re-used. The color of the container may depend on where the grower is located along with the types of strawberries being grown. Containers should have some type of truss support to prevent crimping.

A recommendation by the instructor is that containers will do a better job if they are tall and slender rather than short and wide – in recognition of the strawberry root system and the way that water flows through media. The irrigation system needs to be robust. Both spaghetti systems and drip tape are used depending on the container.

Pre-filled substrate bags are the most popular in Europe and were recommended for new growers, but they are difficult to deal with when discarding and they are 25-40% more expensive than containers filled with media. They can be used multiple times which will help with overall cost. There is also a labor savings as they come pre-filled with planting and drainage holes already in place.

Substrate production goes hand in hand with protected culture, so investments in the overall system needs to include some type of covering, be it high tunnel, rain cover, greenhouse etc. These systems eliminate many of the challenges with growing outside, but require attention to all details to be profitable.



# Managing Allium Leafminer: What We've Learned in Three Years of Research

Ethan Grundberg and Teresa Rusinek, CCE ENYCHP

With support from the New York State Department of Agriculture and Markets, a USDA NIFA Crop Protection and Pest Management Grant, and now a Northeast SARE Partnership Grant, CCE ENYCHP vegetable specialists Ethan Grundberg and Teresa Rusinek have been working with Cornell entomologist Dr. Brian Nault since 2016 to study how best to manage the invasive Allium leafminer (ALM). The major findings from the research in the past three years have been:

- ✓ Leeks are most susceptible to damage from ALM, followed by scallions.
- ✓ The potential for damage is higher in the fall than in the spring across all allium crops.
- ✓ Several conventional insecticides already labeled for use on bulb crops in New York are effective at reducing damage from ALM, including Exirel (cyantraniliprole, IRAC Group 28, 2(ee) label required and available on the <https://www.dec.ny.gov/nyspad/products?3> website) at 13.5 fl oz/acre, Radiant (spinetoram, IRAC Group 5) at 8 fl oz/acre, and Warrior II with Zeon Technology (lambda-Cyhalothrin, IRAC Group 3A) at 1.6 fl oz/acre.
- ✓ Of the OMRI-certified insecticides studied, only Entrust (spinosad, IRAC Group 5) at 6 fl oz/acre has shown any efficacy at reducing damage from ALM.
- ✓ Two carefully timed applications either 2 and 4 weeks or 3 and 4 weeks after the beginning of the adult ALM flight of Entrust at 6 fl oz per acre mixed with M-Pede (potassium salts of fatty acids) at 1.5% v/v concentration provided the largest reduction in ALM damage of any 2-spray sequence during the 6- to 7-week long flight.
- ✓ Adding the adjuvant Nu-Film P to Entrust significantly DECREASED the efficacy of the insecticide at managing ALM when compared to combining M-Pede with Entrust.
- ✓ Planting alliums on metalized reflective plastic mulch consistently reduced ALM damage from 22% to 36% compared to alliums planted on either black or white plastic.
- ✓ Combining the use of metalized reflective plastic mulch with two carefully timed applications of Entrust mixed with M-Pede can be an effective strategy for managing ALM for organic growers.



*An adult allium leafminer fly with distinctive yellow head alongside the diagnostic line of circular pale green oviposition scars near the tip of a scallion leaf. Photo: E. Grundberg*

If you'd like more details on how to manage ALM on your farm, please reach out to Ethan at [eg572@cornell.edu](mailto:eg572@cornell.edu) or Teresa at [tr28@cornell.edu](mailto:tr28@cornell.edu). We'll also upload a more comprehensive report of the research findings summarized above and post it to the leek and onion pages at <https://enych.cce.cornell.edu>.

## Cornell University Survey on Food Safety and Conservation Practices Used by Produce Growers



If you grow fruits or vegetables in the Eastern US, please out the survey at: [bit.ly/2t6EQsO](https://bit.ly/2t6EQsO)

You will be asked about your operation's farm management practices and costs. The survey will focus on food safety, wildlife management, conservation, and agricultural water use. The person most directly in charge of managing food safety should take the survey, which takes 20-30 minutes. All responses will be kept strictly confidential.

*The first 300 respondents to complete the survey are eligible to receive a \$15 gift card.*

# What are Some of the Issues Facing Farmers Markets?

*Robert Hadad, CCE Cornell Vegetable Program; from VegEdge 2/3/20*

The long-awaited consumer survey, “Assessing the Barriers to Increasing Customer Participation and Farm Sales at Farmers Markets: Implications for Marketing Strategy: by Todd Schmit, Roberta Severson, and Ekubo Sawaura all from the Dyson School of Applied Economics and Management, Cornell University, has been posted. The survey was answered by 2856 people from 4 states (NY, VT, MA, and MD) with NY having 925 respondents.

## Survey Goal

The bigger goals of the survey were to offer insight to why attendance and sales are dropping from farmers markets. The hope was that the data would provide information for creating actions that would improve retention for current shoppers and pull in new shoppers. The survey report can be found at the Famers Market Federation of NY <http://www.nyfarmersmarket.com/> and also check out their upcoming webinar series.

## Highlights of the Survey

Here are some of the highlights and insights from the survey. The authors asked a series of questions based on the experiences of people shopping at farmers markets (FM) comparing 2017 to 2016. The answers given provided analysis based on the categories given by the respondents. The first group (B1) was made up of people whose purchases at FM in 2016 to 2017 increased or stayed the same. The second (B2) group were people whose purchases decreased during that time period. Those who didn't shop at FM were B3.

## Demographics

B1 - 30% of shoppers between ages 25-44. 30% between 44-59 and 38% over 60. The 18-24 age group shopped the least at around 2%. B2 and B3 shoppers more evenly distributed over the age ranges. Household size of 2 people made up 49% of shoppers while a household of 3 and 4 were about 16% and 12% respectively. Families with children under 5 made up only 8% of shoppers while families with children over 5 were at 15%.

Whites made up about 90% of shoppers. Females were 83% of shoppers.

Income groups: 18.6% of respondents making \$25-49,999. Nearly 36% were \$50-\$99,999. 37% over \$100,000. Fulltime or self-employed people made up 51%

## Data on Spending Habits

B1 and B2 groups, the percent of food dollars spent at grocery stores were between 47-54%.

For FM, B1 spent 18.7% and B2 9%. Coops and CSAs were around 10% and 4.4% respectively.

“Local food” was highly ranked (88%) as important reason to shop at FM followed by supporting local farmers and purchasing fresh produce.

## Negative Perceptions of FM

Respondents listed an assortment of reasons on why they don't attend FM more often and why they don't spend more at FM when there:

- Feel pressured to purchase if they visit each grower
- Intimidated to talk with growers – growers don't seem welcoming
- Prices are perceived as being too high
- Having enough cash at the market (need for ability to use credit card)
- Limited selection by variety
- Limited number of growers
- Poor signage a) price b) what product is c) how to use product
- Want to see farmer not workers at booth/stall
- Convenience (as compared to stores)
- Too much of a flea market atmosphere
- FM seem elitist



- Due to price, healthy food a luxury
- Too much emphasis on social gathering, ready to eat foods, entertainment rather than easier shopping
- Inconvenient times of market open for working people
- Not open year round
- Poor parking
- Limited or non-existent public transportation

## Discussion

The authors, in my opinion, didn't offer strong action points to deal with the initial survey goals. From reading the whole report, here are several action points that could be helpful for farmers market managers. Looking at the list of negatives above, responding to these would be a good place to start. Farmers need to know how to set prices and communicate with their customers more. Merchandizing is another area that sellers need to learn more about.

Knowing the demographics of the area surrounding the FM should be investigated. Looking at available transportation routes and the time of FM operation is also critical. EBT, SNAP and credit card sales offer customers more convenience.

The report didn't really look at the differences between a more suburban/urban FM and rural FM. The rural FM are seemingly having a more difficult time than the metro areas. The needs of these FM must be investigated. FM in the same metro area or in the same rural county should be working together to achieve improvement through collaboration rather than competition for the same growers or from lower pricing.

Management of FM is another area where this position simply just can't be a job of oversight. Understanding the financial situation of how farmers and vendors are succeeding (or failing) must be incorporated. If farmers aren't doing well at a market, the reasons might be market issues that the management can address. Too often, decisions about bringing in new vendors/farmers are not made with the financial interests of the current growers in mind. One example of this is making the market look fuller with more farmers. There is a balance between having enough farmers and having too much competition.

Advisory committees made up of vendors/farmers, the input from all the growers, the management staff, and a few customers could help achieve a strong working group where decisions can be made based on real needs and benefits rather than perceived notions. The results of the decisions must impact farmers in a positive profitable way.

One of the biggest issues that may be facing FM is price. This is where management and the farmers can provide the message of the many benefits of the FM. Price of locally grown reflects the true cost of food production. Consumers need to understand this. The financial impacts of the farmers making a living wage has a strong positive effect on the local economy.

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## Stokes Seeds Acquires Siegers Seed Company

*Stokes Seeds, Inc.*

Stokes Seeds® has announced the acquisition of the Siegers Seed Company business of Holland, MI, effective December 19, 2019. Stokes Seeds has retained the employees of Siegers Seed Company and is continuing operations from the Michigan, Georgia and Florida locations with the newly combined organizations doing business under the Stokes Seeds brand. The ongoing 2019-2020 sales season will be a transition year with primary focus on customer service. Siegers Seed Company customers can expect the same level of service, provided by the same staff, from the same facilities. The acquisition combines two organizations that have each operated for over 100 years in the vegetable seed industry. Stokes Seeds will now serve commercial growers from five US locations in Buffalo, NY, Vineland, NJ, Holland, MI, Moultrie, GA and LaBelle, FL. Stokes Seeds expanded US market area now includes the Northeast, Mid-Atlantic, Midwest, Mid-South and Southeast. Eighteen territory managers will serve growers with the best seed prescriptions to meet their production and profit goals. "We're pleased to make this acquisition, expand our US market coverage to include the Southeast, and combine the best attributes of each business to place Stokes Seeds in an excellent position to continue our growth and better serve growers in the regions we serve," stated Wayne Gale, Stokes Seeds President. Stokes Seeds is a leading distributor of commercial vegetable seed in the United States and Canada, with operations in Ontario, Canada and the five locations in the US. With twenty-five experienced territory managers, exciting new varieties from world-class vendors and exceptional customer service, Stokes Seeds continues to be the seed supplier of choice for growers across North America. For more information, contact Stokes Seeds at 800.263.7233 or [www.StokeSeeds.com](http://www.StokeSeeds.com).

# Upcoming Events

## Diversifying Production on Small Farms—A Webinar Series about Opportunities

Feb 20, Feb 27, Mar 5, Mar 12, and Mar 19, 2020

Whether you are an existing or aspiring farmer, join us for a five-part webinar series where experts provide overviews of diverse enterprises that might work for your business. For more information and to register, visit: [bit.ly/DiversifyingProductionSeries](https://bit.ly/DiversifyingProductionSeries)

## Hands-On Pruning Demonstration with Dr. Terence Robinson—Capital Region

February 27, 2020—Indian Ladder Farms, Altamont, NY

Join us for a morning of hands-on pruning demonstrations with Dr. Terence Robinson. Terence will emphasize pruning the tall spindle training system, and will also review pruning strategies for other training systems commonly grown in the Capital Region. To register, visit: [bit.ly/PruningDemoFeb27](https://bit.ly/PruningDemoFeb27)

## Effective Management of Farm Employees: Eastern NY Session

March 2-3, 2020—CCE Dutchess County, Millbrook, NY

The course covers: Moving From Individual Performer to Supervisor; Onboarding New Employees and Performance Management including effective communication, developing training and assessment programs that get your employees off to a good start and providing timely and supportive feedback to get the best out of your staff. For more information, visit: <https://enych.cce.cornell.edu/event.php?id=1361>

## 2020 Orange County Onion School

March 6, 2020—Pine Island Fire Department, Pine Island, NY

Join experts from Cornell Cooperative Extension, Cornell University, and the University of Georgia for a day full of updates on best practices for muck onion production in New York. Researchers will share the results from trials studying herbicide efficacy, pink root management in transplanted onions, Stemphylium leaf blight fungicide programs, timing of copper applications for reducing bacterial bulb rots, adjuvant selection and use, and more! For more information and to register, visit: [bit.ly/OnionSchool2020](https://bit.ly/OnionSchool2020)

## Agricultural Respirator Fit Testing Clinic

March 11-12, 2020—CCE Ulster County, Kingston, NY

Appointments are 1-hour long and are scheduled on a first-come, first-served basis, only during the date range below. Groups of 8 workers can be seen at a time. Medical evaluations, fit tests, and trainings are available in both English and Spanish. Anyone who handles or applies pesticides or other materials which require them to wear a respirator should attend. To schedule an appointment, contact the NYCAMH office toll-free at 800-343-7527, Monday-Friday, 8:00 AM-4:30 PM or through email at [fit.test@bassett.org](mailto:fit.test@bassett.org).

## Hands-On Pruning Demonstration with Dr. Terence Robinson—Champlain Valley

March 13, 2020—Forrence Orchards, Peru, NY

Join us for a morning of hands-on pruning discussion and demonstration with Dr. Terence Robinson. Terence will walk us through the key steps of pruning the tall spindle orchard, and will also review pruning techniques for other orchard systems commonly grown across the Champlain Valley. We will also demonstrate pruning with a self-propelled platform. To register, visit: [bit.ly/PruningDemoMar13](https://bit.ly/PruningDemoMar13)

## Produce Safety Alliance Grower Training Course

March 18, 2020—CCE Oneida County, Oriskany, NY

A grower training course developed by the Produce Safety Alliance (PSA) that meets the regulatory requirements of the Food Safety Modernization Act (FSMA) Produce Safety Rule. At least one person per farm producing more than \$25,000 worth of fruits and vegetables must attend this course once. Participants will receive a certificate of course completion by the Association of Food and Drug Officials. More information: [cceoneida.com/events/2020/03/18/psa-grower-training](https://cceoneida.com/events/2020/03/18/psa-grower-training)

## 2020 NYS Organics Summit: Food as a Resource—Expanding Opportunities

April 7-8, 2020—Albany Capital Center, Albany, NY

This yearly event is an opportunity to connect with over 150 NYS materials management professionals to share success stories and discuss creative solutions to barriers that restrict the sustainable management of organic materials, with a specific focus on wasted food and food scraps. For more information and registration, please visit <https://www.nysar3.org/page/nys-organics-summit-100.html>.



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