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VEGEdge

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Volume 14 | Issue 23 | October 3, 2018

Cornell Cooperative Extension
Cornell Vegetable Program

Harvesting dry beans in western NY.

Celery Anthracnose: The Leaf Curl Disease

Elizabeth Buck, CCE Cornell Vegetable Program

Did your celery kind of melt this fall? You'd not be the only one. Celery leaf curl has taken down several plantings across WNY in the past 5 years. **Since 2010 celery anthracnose (aka leaf curl) has become a major challenge in large celery production regions in Michigan and Ontario and sporadically occurs on farms in Pennsylvania, New York, and Georgia.** It attacks muck and mineral ground celery plantings and does not appear to affect celeriac or other closely related crops. **Symptoms, listed from the first noticeable to the most severe, include:**

- Small, slightly sunken, light brown elliptical lesions or cracks on the stalks
- Curling leaves (usually downward cupping) and twisting petioles
- Pale green (not yellowed) color +/- stunting
- Sunken dark brown or black lesions along stalk edges, particularly on young heart tissue
- Ruptured, greenish to light brown outer stalk lesions, frequently with gall tissue or adventitious roots on the inside
- Slimy, brown to black rot of the heart tissue that leaves intact outer leaves standing

Celery plant with anthracnose (front) and without (back). *Photo: E. Buck, CVP*

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VegEdge newsletter is exclusively for enrollees in the Cornell Vegetable Program, a Cornell Cooperative Extension regional agriculture team, serving 13 counties in Western New York.

The newsletter is a service to our enrollees and is intended for educational purposes, strengthening the relationship between our enrollees, the Cornell Vegetable Program team, and Cornell University.

We're interested in your comments. Contact us at:
CCE Cornell Vegetable Program
480 North Main Street, Canandaigua, NY 14224
Email: cce-cvp@cornell.edu

Web address: cvp.cce.cornell.edu

Contributing Writers
Elizabeth Buck
Robert Hadad
Christy Hoepting
Julie Kikkert
Judson Reid

Publishing Specialist/Distribution/Sponsors
Angela Ochterski

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The next issue of VegEdge newsletter will be produced on November 1, 2018.

continued from cover – Celery Anthracnose: The Leaf Curl Disease

Celery leaf curl, which describes the most recognizable early symptom, is the descriptive name used when this disease first showed up – before the causal pathogen was identified. We also call it celery anthracnose because we now know that an anthracnose fungus causes the issue.

The anthracnose species primarily responsible for rots in tomato and pepper do not cause celery leaf curl. **Celery anthracnose is caused by a tightly related cluster of *Colletotrichum* (pronounced cauli-tot-richum) species** formerly referred to as *Colletotrichum acutatum*. Researchers have just recently been able to use genetic identification techniques to determine that at least two species in that old grouping cause celery leaf curl. ***C. fioriniae* and *C. nymphaeae* are the major species causing celery crop losses** in Ontario, Canada. *C. nymphaeae* has also been implicated in Japanese outbreaks of celery anthracnose. Both cause disease in fruit crops; *C. fioriniae* is responsible for bitter rot of apples while *C. nymphaeae* causes strawberry anthracnose.

How celery anthracnose arrives on farm is unclear. Some recent work suggests that seeds may carry the disease, and helps explain why symptoms often start in greenhouse transplant production. Celery leaf curl is easily spread in the field by water and splashing soil. The life span of celery anthracnose in the soil isn't well understood at this point. Once on the farm, celery leaf curl fungi can infect several weeds. Common lambsquarters, redroot pigweed, yellow nutsedge, oakleaf goosefoot, and common groundsel all harbor celery anthracnose without clearly expressing symptoms themselves. This is an **important feature of celery anthracnose: the disease can infect a plant then lay quietly in an asymptomatic state (a latent or quiescent infection) until environmental conditions become favorable**.

Celery anthracnose thrives under warm, wet conditions. **Rapid growth occurs when** temperatures are **77 – 86°F**, with substantially more disease development at 86 than 77. Temperatures as cool as 60 will support fungal growth and spread, but field progression will be slow. Wet leaves also facilitate leaf curl development. **Long wetting periods of 48 – 96 hours** best promote outbreaks, though as little as 12 hours is sufficient to cause disease. It **takes 3-5 days after infection** for the small, sunken stalk lesions to appear. The curling starts just days after the initial lesions. Celery leaf curl frequently develops when it has been very hot with heavy thunderstorms followed by high humidity. Overhead irrigation and poor airflow due to weedy fields also increase leaf wetness periods and exacerbate disease.

Full disease outbreaks in celery can cause heavy losses. When environmental conditions favor disease, infection can range from 17 to 100% and cause marketable yield loss of 2 – 80%. In cooler, drier weather, infections can be as low as 1 – 10% with very little to no loss in marketability. I've seen field losses ranging from 20 to 100% on local farms. If an infection is mild and the heart tissue is unaffected, some plants with celery leaf curl can be marketed after an aggressive trimming.

So, **what to do about celery leaf curl?** For starters, **become familiar with the symptoms**. Next, keep the greenhouse free of weeds – a relevant practice for most crops because greenhouse weeds are a common source of pests and diseases. **Scout your plug trays** before transplanting into the field. **Remove suspicious seedlings and treat** the remaining ones, or consider starting over using new plug trays. Don't plant them into fields with a history of celery anthracnose. Right now there isn't enough understanding of how this disease works to say if *C. nymphaeae* will move from strawberries to celery and vice versa. Assess your comfort level for rotating those two crops, especially following strawberries that had anthracnose. To be cautious, don't move from an infected celery or strawberry planting into the other crop when doing field work. **Use drip irrigation** if there is celery leaf curl in the transplants. Using plastic or other mulch will help reduce splashing and weed pressure.

Ruptured stalk lesion with gall tissue and adventitious roots (L) and dark stem lesion (R).

Light brown stalk lesions and rotten heart cause by anthracnose and/or secondary bacteria.

Leaf curling, petiole twisting, and stalk lesion.

Stalk lesion and blackening of the young heart tissue (early stage of black heart rot)

Photos: E. Buck, CVP

Scout your celery planting during a long hot period or a few days after a short one. Hold off on scouting until the foliage dries. Pay particular attention if you've had heavy rain, high humidity, or overhead irrigation. Look for curling leaves and then examine the stalks and hearts of plants more closely. Remember that aster yellows requires the presence of leaf hoppers for transmission, produces pronounced yellowing, and does not cause dark stem lesions. **Remove infected plants** to minimize field spread of celery anthracnose. Control weeds in infected fields to improve airflow and reduce the risk of carryover on weedy hosts. **Minimize overhead irrigation** if possible. Harvest fields with infections as soon as the plants are of marketable size to reduce the

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chances of developing heart lesions. Fields with celery leaf curl should be disced to incorporate infected crop residue and promote break-down. The current recommendation is to rotate away from celery for 3 to 4 years.

Some varieties show some tolerance to celery leaf curl, though no variety is resistant and all varieties screened to date will show some disease. Variety screenings were undertaken by the University of Guelph so cultivars identified as somewhat tolerant should be well adapted locally. I've also included susceptible varieties used by Michigan State for leaf curl experiments (Table 1).

Table 1. Variety selection for celery anthracnose mitigation

Least susceptible	Moderately susceptible	Highly susceptible
Merengo	Sabroso	Plato
Hadrian	TZ 6010	TZ 9779
Geronimo		Stetham
Balada		Kelvin
		Nero
		Green Bay
		Dutchess

Fungicides can help slow celery anthracnose progression and retain marketable yield. Applications should be **directed at the most susceptible young tissue in the heart of the plant**. Trials examining fungicide efficacy most often make 1 application before the disease starts, so keep in mind that field results may not be as good if sprays begin after disease is found. **Stobilurin fungicides (Group 11) best** reduce celery leaf curl progression in the field and best help maintain yield. Cabrio consistently performs well. **Stobilurin fungicides really should be applied with a protectant and be rotated with non-group 11 fungicides because of resistance concerns**. Treat any infected seedlings with a group 11 when they are set in the field. Cuprous oxide forms of copper can help in low pressure weather conditions, but do little in when environmental conditions are highly favorable. See **Table 2** for which fungicides are available to treat celery anthracnose, and early and late blight of celery.

Ongoing work at the University of Guelph is showing **good disease control success** by **using the TOMCAST forecasting model** to help time fungicide applications. Researchers are testing a **threshold** of **15 and 25 disease units**. To date they have found that both provide the highest level of control possible are more economical than calendar sprays because fewer sprays are necessary. Reducing the number of applications will make rotating fungicide groups much more achievable. Remember that protectant fungicides applied for celery early and late blight are generally effective against a broad range of diseases and may have a secondary benefit of allowing you to postpone treatment for anthracnose.

With good cultural practices and fungicide use, sporadic outbreaks can often be controlled enough to harvest a portion of an infected planting. While celery may not be a major crop in NY, celery anthracnose tends to cause major losses when it shows up. There is ongoing research into celery leaf curl in Ontario and Pennsylvania which will hopefully lead to improved future control.

Table 2. Fungicide options available in NY for common celery foliar diseases. Always check the product label for the most thorough and current application information.

Fungicide	Active Ingredient	FRAC Group	Diseases Listed	Rate & Notes	PHI (days)
Cabrio	Pyraclostrobin	11	Anthracnose, Early & Late Blight	12-16 oz /A, 64 oz/yr max ≤ 2 sequential apps	0
Pristine	Pyraclostrobin/ boscalid	11 + 7	Anthracnose, Early & Late Blight	10 -15 oz /A, 2 apps/yr	0
Merivon	Pyraclostrobin/ fluxapyroxad	11 + 7	Anthracnose, Early & Late Blight	4-11 fl oz, 3 apps/yr	1
Quilt	Azoxystrobin/ propiconazole	11 + 3	Early & Late Blight	14 fl oz /A, max of 1.5 lb azoxystrobin products/yr	14
Bravo WeatherStik	Chlorothalonil	M5	Early & Late Blight	2-3 pt/A, protectant	7
Quadris	Azoxystrobin	11	Early & Late Blight	9.0-15.5 fl oz /A, 1 spray then rotate groups	0
Flint	Trifloxystrobin	11	Early & Late Blight	2-3 oz /A	7
Tilt	Propiconazole	3	Early & Late Blight	4 fl oz /A	14
Various	Cuprous oxide	M1	Check the label of your preferred formulation		
Switch	Cyprodinil/ fludioxonil	9 + 12	Late Blight	11-14 oz/A	0

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Personal communications with Stephen Reynolds and Mary Ruth McDonald, University of Guelph and Sara May, Penn State.

Hungry Hungry Earworms

Robert Hadad, CCE Cornell Vegetable Program

We typically think of corn earworm (CEW) solely as a pest of corn, especially damaging in sweet corn. In the southern states, CEW is also called the cotton bollworm. Another name attributed to CEW is tomato fruit worm. Across NY and New England from late August through September, CEW has been found causing damage on other crops.

The host range for CEW is actually quite large according to the literature. It feeds on a number of crops including field and popcorn, tomato, cotton, green beans, clover, vetch, lettuce, peppers, soybeans, and sorghum. We have witnessed CEW also eating winter squash, pumpkins, and flowers.

CEW is seen here damaging a hubbard squash. The photo is from UMASS Extension educator, Katie Campbell in a post to Northeast vegetable educators last week. The photo was taken on a farm in western MA where the pest was found feeding on 25 different vegetables, flowers, and fruit.

Various colorations and body patterns of CEW. *Photo: Purdue Dept. Entomology, extension.entm.purdue.edu*

This season here in the WNY fresh market vegetable scene, CEW has been found feeding on tomato, peppers, immature pie pumpkins, bush beans, various cut flower varieties, and sorghum. Marion Zuefle, NYS IPM specialist noted this has been a very bad year for CEW. Perhaps it is weather related from the dry conditions early on pushing this pest to find more or better food sources, perhaps a later flush of larvae hatching, or maybe even a shift in feeding habits. This is one pest we may need to keep a closer scouting eye on for next season.

Time to Sow Cover Crops in High Tunnels!

Judson Reid, CCE Cornell Vegetable Program

CVP research on over 40 NYS farms has documented that many high tunnels have less than 4% soil organic matter and 94% of soils contained excessive phosphorus levels. The intensive nature of cropping without precipitation or rotation can drive soils out of balance in a hurry. Recently the team was awarded Federal Capacity Funds to examine the potential of cover crops to improve soil health in high tunnels. The objective of this project is to research and document best management practices on winter cover crops and other BMPs in tunnels where tomatoes are grown. By researching and documenting the nitrogen contribution of winter crops, we hope to help farmers decrease excess nutrients (particularly P, Ca, Mg and pH) while increasing soil health and the profitability of crops such as tomatoes. This fall the CVP is sowing cover crops at a cooperating farm, and now is a good time for all tunnel farmers to consider the value of the crop still in the ground vs. the potential of a cover crop such as winter grains. Stayed tuned for updates!

Buckwheat cover crop in a Seneca County high tunnel. *Photo: J. Reid, CVP*

Northeast Regional Potato Report

USDA, NASS, 9/17/18

New York

Fall potato final production for 2017 is 4 million cwt, up 14 percent from the 2016 crop, according to Blair Smith, State Statistician of USDA's National Agricultural Statistics Service, New York Field Office. Harvested area, at 14,400 acres, is down 3 percent from 2016. The average yield of 280 cwt per acre is up 40 cwt from the previous year. The value of all potatoes sold in 2017, at $47.3 million, increased 17 percent from the previous year. The average price, at $12.60 per cwt, is unchanged from 2016. The quantity of potatoes sold from the 2017 crop totaled 3.7 million cwt, up 17 percent from 2016. Sales accounted for 92.8 percent of 2017 production, up 3 percent from the previous year. Shrinkage and loss is estimated at 236 thousand cwt for 2017, down 16 percent from 2016. Potatoes used for livestock feed on farms where grown, home use, and seed on their own farms totaled 56 thousand cwt, down 22 percent from 2016.

For the complete "Potatoes, 2017 Summary" report, go to: https://usda.mannlib.cornell.edu/MannUsda/viewDocumentInfo.do?documentID=1123

EverGol Prime – New Seed Treatment for Onion Smut Available Now

Christy Hoepting, CCE Cornell Vegetable Program

I am "jumping for joy" now that EverGol Prime is labeled for control of onion smut in onion (Fig. 1). It has been over a half century since a new fungicide has been registered for this use. I have been evaluating fungicides for control of onion smut since I was a summer student at the Muck Crops Research Station in the Holland Marsh in Ontario, Canada in 1996. My Master's research (1999-2001) was also on onion smut, and as an Extension Educator with Cornell (2001-present), I have conducted almost 20 field research trials and evaluated at least a dozen active ingredients against onion smut (mostly in collaboration with Cornell Seed Scientist, Dr, Alan Taylor). Out of all this, **the active ingredient in EverGol Prime, penflufen has been the most effective fungicide we have ever tested**. I have waited for this moment for 22 years and I am thrilled!

Figure 1. Christy Hoepting is "jumping for joy" at the news she recently shared with onion growers at Oswego onion twilight meeting that a new seed treatment EverGol Prime is now labeled for control of onion smut. It has been over a half century since a new fungicide has been labeled for onion smut and Christy has been waiting for 22 years for this to happen since she first started working on onion smut in 1996.
Photo: Jeremy Veverka, CCE

Onion smut is a chronic problem in muck onion production

Onion smut is a serious soil borne disease of direct seeded onions grown in muck soils in New York. Smut results in seedling mortality. When smut-infested seedlings survive, they often do not reach maturity, and if they do, bulbs are undersized and unmarketable due to ugly black pustules of smut spores within the scales (Fig. 2). Onion seedlings are only susceptible to smut infection from approximately the third day after seedling germination until the flag leaf is fully mature, which is about 12-15 days (this is why transplants are immune to smut). The longer it takes a seedling to emerge, the greater the risk for smut infection. Therefore, **fungicides applied at planting are critical for effective control of onion smut.**

Need something better than Pro Gro and mancozeb

Since the beginning of fungicide use in onions in the 1960s and 1970s, multi-site mode of action dithiocarbamate fungicides (FRAC M3) mancozeb, thiram and carboxiin have been used to control onion smut as in-furrow drenches and seed treatments. Many formulations of mancozeb are used as an in-furrow (IF) drench in combination with Pro Gro (a.i carboxiin + thiram) seed treatment. Control of onion smut with Pro Gro + mancozeb IF has averaged only 59% (range: 22-89%) in 11 field trials conducted in Elba from 2002 to 2014. Comparatively, Pro Gro alone generally did not provide adequate control (average 38%; range: 0-76%, 15 trials). **Every year, loss of stand due to onion smut occurs in every field of direct seeded onions grown in muck soil.** Because the spores persist in the soil for 20 years or more, some fields are chronic "hot spots" for smut.

Figure 2. Dark pustules of onion smut spores inside leaves of onion seedling (left) and inside scales of immature bulb (right). Onion smut results in seedling mortality and unmarketable bulbs. It is a chronic problem in direct seeded onions grown in muck soils.
Photos: C. Hoepting, CVP

Penflufen is the best we've ever tested

Since 2002, I have trialed at least a dozen different active ingredients for activity against onion smut and the active ingredient in EverGol Prime, penflufen has been the best performing fungicide we have ever seen. Penflufen averaged 91% control (range: 84-98%) in three field trials conducted in Elba (Hoepting, 2012, 2013). In Canadian studies conducted in the Holland Marsh by the University of Guelph, penflufen was also a top performer and provided 79 to 83% control of onion smut (McDonald and Vander Kooi, 2012).

Testing penflufen in the real world (Fig. 3)

In these previous studies, penflufen was tested only with film coated seed and as a single active ingredient in New York, and in combination only with Sepresto (for onion maggot protection) in Canada. In 2017, the New York Onion Research and Development Program (**ORDP) funded a project to test specifically the performance penflufen formulated as EverGol Prime using commercial seed pelleting in combination with seed treatment and in-furrow packages with which it would typically be co-applied.** For this study, all seed treatments were commercially pelleted by Nunhems. EverGol Prime was applied in combination with Thiram and Sepresto for control of damping off and onion maggot, respectively in a "Bayer program". In a "Syngenta program", EverGol Prime was applied in combination with Farmore FI500 for control of both damping off and onion maggot. Treatments for each Bayer and Syngenta programs included EverGol Prime with and without mancozeb in-furrow. Pro Gro seed treatment + mancozeb IF was include as the industry standard, as well as an untreated control with no

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smut protection. Two small plot trials were conducted in commercial fields of yellow onion (c.v. Arioso) in Elba muck. Spring conditions were generally wet with over 8 inch of rainfall between planting and 2-3 leaf stage. Trial 2 was under standing water for a week prior to onion emergence.

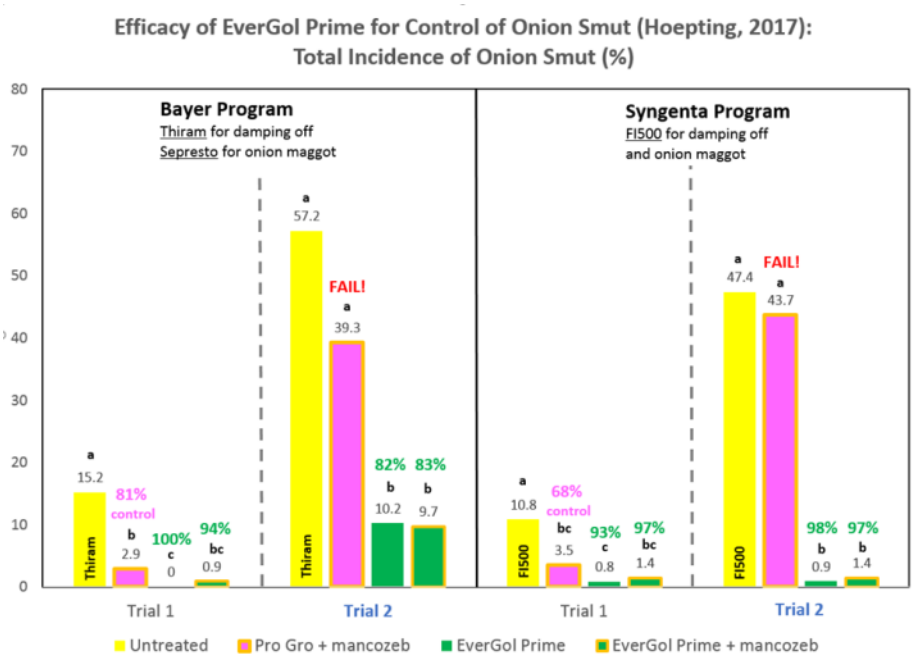

Figure 3. Efficacy of EverGol Prime seed treatment with and without mancozeb in-furrow (IF) compared to Pro Gro seed treatment + mancozeb IF for control of onion smut in direct seeded onion (c.v. Arioso) grown in muck soil in Elba. In the Bayer program, Thiram 42S 6 fl oz/100 lb seed and Sepresto 75WS 0.32 g/1000 seeds was included in each treatment for control of damping off and onion maggot, respectively. In the Syngenta program, Farmore FI500 was included in each treatment for control of both damping off and onion maggot. FI500 included Dynasty 0.38 fl oz/ 100 lb seed, Maxim 4FS 0.16 fl oz/ 100 lb seed, Apron XL 0.32 fl oz/ 100 lb seed, Cruiser 0.20 mg/seed and Regard 0.2 mg/seed. EverGol Prime was applied at 16 fl oz/ 100 lb seed. Mancozeb was applied as Dithane DF 3 lb/A in ~ 25 gpa by gravity into the furrow after seed placement. Trial 2 was under standing water for a week after planting and prior to onion emergence. Bars followed by the same letter in the same program per trial are not significantly different, Fisher's Protected LSD test, $p<0.05$. Percentages above the bars indicate the level of control relative to the untreated control.

Industry standard failed in saturated soil conditions. Total season long incidence of onion smut was low in Trial 1 reaching only 15% (Bayer program) and 11% (Syngenta) in the untreated. In Trial 2, it was much higher at 57% (Bayer) and 47% (Syngenta) in the untreated (Fig. 3 – yellow bars). Under low pressure in Trial 1, the standard treatment, Pro Gro + mancozeb IF significantly reduced onion smut by 81% (Bayer) and 68% (Syngenta) to less than 4%. However, **Pro Gro + mancozeb completely failed to control onion smut where pressure was high** in Trial 2 (Fig. 3 – pink bars). Either, Pro Gro and mancozeb are subject to leaching or otherwise deactivated during saturated soil conditions, or, this treatment is overwhelmed when smut pressure is high.

EverGol Prime consistently excellent. Under low pressure, EverGol Prime provided 93% (Syngenta) and 100% (Bayer) control of onion smut, easily reducing levels to less than 1% in Trial 1. Amazingly, **under high disease pressure and saturated soil conditions in Trial 2, EverGol Prime significantly controlled onion smut by 82% (Bayer) and 98% (Syngenta) and reduced it to only 10% (Bayer) or less than 1% (Syngenta)** (Fig. 3 – green bars). Clearly, **EverGol Prime performed excellently when applied along with standard seed treatments on commercially pelleted seed.**

No mancozeb needed with EverGol Prime. In these studies, addition of mancozeb in-furrow to EverGol Prime seed treatment did not result in statistically significant or even numerically better control of onion smut than EverGol Prime seed treatment alone (Fig. 3 – compare green bars to green bars with yellow border). **Therefore, opportunity exists to "plant dry" with no in-furrow drench application of mancozeb necessary to achieve optimum control of onion smut with EverGol Prime.** Growers who require chlorpyrifos (e.g. Lorsban) in-furrow drench for onion maggot control will not be able to "plant dry" with EverGol Prime. Watch for an article in a future issue of VegEdge regarding need for mancozeb and Ridomil in-furrow for control of damping off in light of using Farmore FI500 and EverGol Prime.

Order EverGol Prime for 2019 onion crop

EverGol Prime is registered in most states including Idaho and California, where majority of onion seed treatment occurs, as well as in New York. It is a Bayer product and is available for purchase by any seed or seed treatment company. It may only be applied with commercial seed treating equipment. Any variety of onion may be treated with EverGol Prime. It may be applied with any other seed treatment, such as Farmore FI500 for example. Experiment with EverGol Prime in 2019 onion crop on as much acreage as you feel comfortable trialing a new technology.

Penflufen has a different mode of action than any other fungicide labeled for onion smut control. It is a SDHI and belongs to the exact same sub-class of FRAC 7 as the FRAC 7 fungicide in Merivon (a.i. fluxapyroxad). Penflufen/EverGol Prime is a product of Interregional Research Project No. 4 (IR-4) program, which is a USDA funding stream that supports registration of pesticides for minor use crops (a fungicide for control of onion smut in muck grown onions certainly fits this category!) with original request made by Alan Taylor, Cornell University. The federal Section 3 label of EverGol Prime was approved by EPA in November 2016 and state labels including New York were approved in December 2017. Since FRAC 7 fungicides have a much higher risk for fungicide resistance than FRAC M3 (mancozeb, thiram, carboxiin), we are fortunate to have another fungicide belonging to FRAC 3 in the pipeline for registration for onion smut in onion.

Onion Growers Should Make 2019 a Trigard Seed Treatment Year for Onion Maggot Control

Christy Hoepting, CCE Cornell Vegetable Program

The 2018 growing season marked the seventh consecutive season that most onion growers used FarMore FI500 seed treatment for control of onion maggot in direct seeded onions grown in muck soils. Although onion maggot damage in the form of stand loss and unmarketable bulbs (Fig. 1) was highly variable across the region, it resulted in greater than 30% stand loss alone in some fields.

Figure 1. Onion maggot larvae (left) feed on the bulb of an onion seedling, which disrupts its vascular system and causes the seedling to wilt and die (middle). Once plants start ot bulb, onion maggot feeding does not kill the plant, but its feeding damage on the bulbs deems them unmarketable (right). *Photos: C. Hoepting, CVP*

In the last two years, Brian Nault's small-plot field trials were located at such high-infestation sites, where total stand loss from onion maggot was 86-87% (Fig. 2 yellow bars). Under such high pressure in 2018, although FarMore FI500 seed treatment significantly reduced onion maggot damage compared to the untreated, stand loss still exceeded 50%, which is completely unacceptable (Fig. 2 right chart – blue & pink striped bar). In this trial, Sepresto also failed to provide significant control of onion maggot (Fig. 2 – right chart orange bar). This is not surprising as Sepresto has performed poorly in Cornell field trials for years and is not recommended. **Interestingly, it was Trigard that stood out as the best treatment in the 2018 trial and performed nearly as well as FarMore FI500 in 2017.** Trigard provided twice as much control of onion maggot as FarMore FI500 in 2018 and reduced stand loss to 30% (Fig. 2 right chart – green bar).

Although 30% stand loss is still not acceptable, these trial results highlight the renewed activity of Trigard against onion maggot. Historically, onion maggot can develop resistance to an insecticide within 4-5 years of continuous exposure. Trigard is a triazine belonging to IRAC (Insecticide Resistance Action Committee) group 17, while FarMore FI500 is made up of a neonicotinoid (IRAC 4) and a spinosyn (IRAC 5), and Lorsban (chlorpyrifos), which is often used in-furrow with a seed treatment, is an organophosphate (IRAC 1). Prior to the registration of FarMore FI500 in 2012, control of onion maggot with Trigard had been slipping in both research trials and in grower fields. Onion maggot resistance to Trigard was never proved, but it certainly was suspected.

Prior to the registration of FarMore FI500, the spinosyn component in this seed treatment package (= a.i. spinosad/ tradename Regard) averaged 88% control of onion maggot in 15 on-farm small-plot field research trials (Nault *et. al.* 2004-2009). In the 2017 trial, Regard resulted in 48% control of onion maggot under high pressure, which was significantly worse than FarMore FI500, which suggested that the neonicotinoid component of FarMore FI500 may be assisting in maggot control (~15%) (Fig. 2 left chart blue and striped bars). In 2018, Regard was no different than FarMore FI500, both of which resulted in even less onion maggot control than the year before (34%) under identical high pressure. **These results beg the question about whether onion maggot populations are developing resistance to FarMore FI500?** Alternatively, is there some other factor compromising its efficacy? We do not have enough information to answer this question at this time.

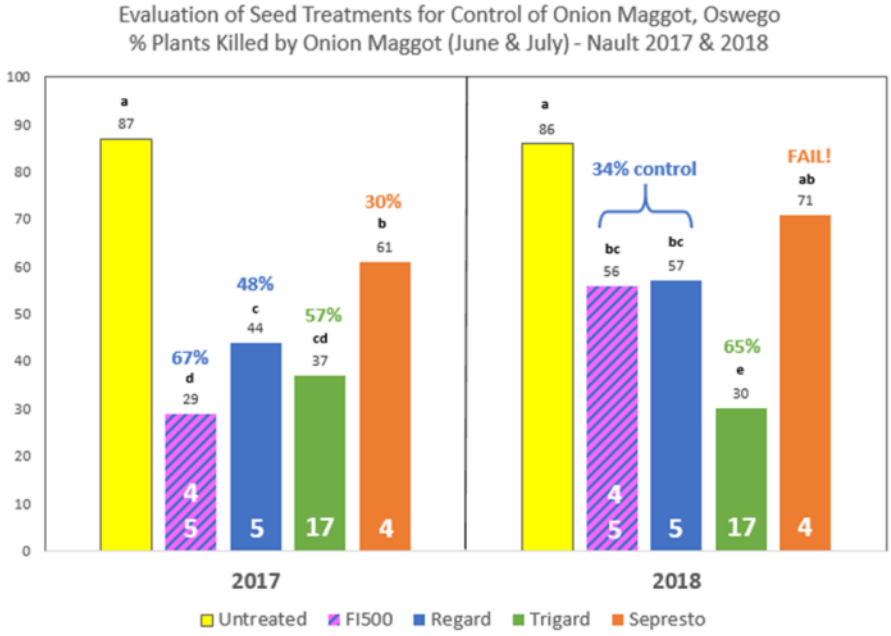

Figure 2. Evaluation of seed treatments for control of onion maggot in commercial onion fields in Oswego County in 2017 and 2018 (Nault). All treatments included FarMore F300 seed treatment package (= Dynasty + Maxim + Apron) for control of damping off, and Pro Gro seed treatment and Dithane F45 Rainshield in-furrow treatment for control of onion smut. Bars in the same trial year followed by the same letter are not significantly different, Tukey's Studentized Range (HSD) Test; n= 5. Percentages above the bars indicate the level of control relative to the untreated control. White numbers at base of each bar indicate the IRAC group.

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continued – Onion Growers Should Make 2019 a Trigard Seed Treatment Year for Onion Maggot Control

Conclusively, these field trial results are a good reminder that we should be mindful of insecticide resistance management for onion maggot, whether your field is exposed to high maggot pressure or not. Trigard is a Syngenta product and it is still labeled and available as a seed treatment. As more growers ask for Trigard on a greater number of varieties and volume (=acres planted), the easier it may be for seed companies to fulfill such "special" orders. Recent trial results indicated that Trigard is as good as FarMore FI500, if not better in some cases (Fig. 2). Ideally, for best insecticide management practices, one should annually alternate FarMore FI500 with Trigard to ensure useful longevity of both products. In Nault's trials, there was rarely a case where Lorsban + Trigard significantly improved maggot control, but most of the time there was a slight reduction in maggot damage compared with Trigard alone. Nault's studies have shown variable efficacy of Lorsban across locations, most likely due to differences in resistance among maggot populations. For example, where the population has some level of resistance, adding it to the seed treatment does not improve control. **We are not aware of any new insecticides in the pipeline that could be used for managing onion maggot at this time, so preserving FarMore FI500 and Trigard are critical!**

USDA Conducts On-Farm Labor Survey

NASS, Northeast Regional Field Office, 9/17/18

The U.S. Department of Agriculture's National Agricultural Statistics Service (NASS) is gearing up to conduct the Agricultural Labor Survey, which is conducted twice each year. The survey will collect information about hired labor from more than 1,600 Northeastern farmers and ranchers.

"Labor is obviously critical to farming operations and data about the use of hired workers helps administer farm labor programs," said King Whetstone, Director of the NASS Northeastern Regional Field Office. "The data that farm operators and employers provide through NASS's Agricultural Labor Survey helps leaders, associations, and farmers themselves make decisions based on accurate information."

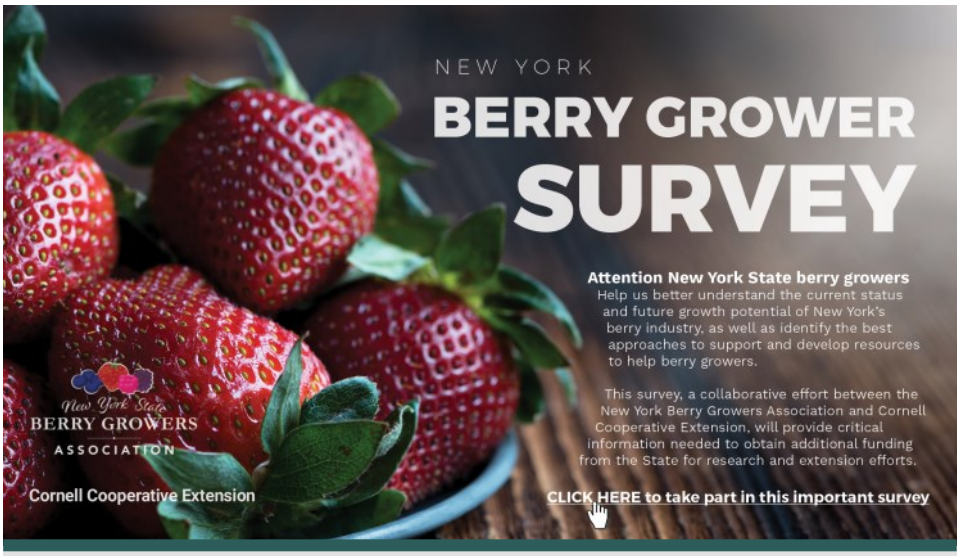
USDA and the U.S. Department of Labor use statistics gathered in the Agricultural Labor Survey to establish minimum wage rates for agricultural workers, administer farm labor recruitment and placement service programs, and assist legislators in determining labor policies.

The survey asks participants to answer a variety of questions about hired farm labor on their operations, including total number of hired farm workers, the average hours worked, and wage rates paid for the weeks of July 8-14 and October 7-13. For their convenience, survey participants have the option to respond online.

"With two specific reference weeks, we are able to publish quarterly data and capture seasonal variation," said Whetstone. "This approach reduces the number of times we ask farm businesses to respond to surveys while ensuring that accurate and timely data are available for anyone conducting research or analyses."

Photo from R. J. Anderson, CCE

NASS will compile, analyze, and publish survey results in the November 15 *Farm Labor* report. All previous *Farm Labor* publications are available online at http://bit.ly/FarmLabor. For more information on NASS surveys and reports, call the NASS Northeastern Regional Field Office, 1-800-498-1518.



The survey consists of 8 questions and should take less than 5 minutes to complete.

Visit https://www.surveymonkey.com/r/YP22Y6K or contact Angela Ochterski at 585-394-3977 x426 for print copy of the survey to be mailed to you. Thank you!

Harvesting Sweet and Irish Potatoes for Storage

Chuck Bornt, CCE Eastern NY Commercial Horticulture Program; from Vegetable News, 9/19/18

I know that over the last couple of weeks sweet potato harvest has begun, but I suspect the bulk of sweet and Irish potato harvest will be getting into full swing now. I thought for a change, instead of having separate articles, I would put the two very different potatoes side by side in table format so you can see the major differences between the two. Remember, sweet potatoes and Irish potatoes have almost nothing in common in regards to storing but some similarities in how they can be handled!

	Sweet Potatoes	Irish Potatoes
Temperature	Do not let the roots get exposed to cold temperatures (less than 50°F), especially soil temperatures. Sweet potato vines can be hit with a light frost, but when roots are exposed to prolonged colder temperatures, they can form an internal white ring of tissue which really decreases the quality of the root. The roots will not store as long or taste as good.	Irish potatoes should not be harvested if the pulp temperature of the tubers is less than 40°F. Pulp temperatures below that can increase bruising and internal issues like black spot. I find using a soil thermometer or even a meat thermometer that goes low enough works well to determine pulp temperatures.
Vines	One of the biggest questions I get is how do you deal with the vines? There are several ways, but all of them involve some extra labor. I know some growers that send a crew in before harvesting and hand cut the outside rows of vines and roll them off into the roadway. Then as they harvest those rows, the vines from the next rows can be cut and rolled off where the previous row was. The more efficient way, in my opinion, is to try and cut or shred the vines with a flail mower – however, you need to be very careful of the roots that may be sticking up above the soil line. I've seen old forage choppers used very nicely for this task. Cutting vines ahead of time **does not** make skins "set" or more resistant to skinning or bruising!	One of the key components to ensuring the highest quality potatoes is proper vine killing. Minimally vine killing should occur 2 -3 weeks before harvest to ensure the tubers set their skin, making the tubers more resistant to skinning and bruising. Vine killing can be done many different ways including flail mowing, flaming and chemical desiccants.
Diseases	The one nice thing about sweet potatoes is that they are not affected by many of the same diseases that Irish potatoes are so fungicides are usually not needed.	Maintain fungicide applications as long as there is green tissue left exposed including those stumps of vines from flail mowing. These tissues are still susceptible to diseases such as Late Blight.
Bruising	Make sure that tubers are not falling from heights greater than 6 inches (this includes digging and handling). This will also help reduce the potential for bruising and black spot (a result of bruising).	
Curing	You need to cure them after harvest for several reasons. First, curing allows any cuts, abrasions or bruises to heal which allows for better storability of roots. Second, curing is when the roots develop their flavors and starches are converted into sugars which give sweet potatoes their sweetness. Ideal curing conditions are a temperature of 85°F with 90% humidity for 5-7 days. At this time of year empty greenhouses can be an excellent place to cure sweet potatoes, but there are a couple of things that need to be done. First, floors of the greenhouse should be watered several times a day in order to keep the humidity levels at 90%. Second, make sure fans are set for 85°F and the heater is turned on and set to keep the greenhouse as close to 85°F night.	**Do not put harvested potatoes directly into a cold storage.** Potatoes should go in a dark area and allowed to cool down gradually and heal or cure up a bit. The best temperatures for this to happen is 60-65°F for about 5 – 20 days at a high humidity with good air circulation. Cooling them down rapidly could result in condensation developing and that is not what we want as that can increase rot organisms that might already be there. I know this might be contrary to what most of us think, but carrying a little bit of moist soil into the bins or whatever you are harvesting into is not a terrible thing – and I don't mean tons of soil, but enough that it provides some of the humidity needed to help properly cure your potatoes.
Storage	Once your sweet potatoes are cured, store as close to 55-60°F as possible, but no lower, and maintain a high humidity. If done properly, sweet potatoes should easily store into February and even into April if conditions are right.	After this healing period they can be moved into storage and cooled slowly to 40°F maintaining a high relative humidity of about 90 – 95%. This should help reduce the shrinking that happens in storage.
Washing	Do not wash potatoes before putting them into storage, but rather wash what you need as you need them. **Do not put warm potatoes into wash water that is 10 degrees colder as this will increase bacterial breakdown.** For that matter, you should follow this rule for all produce that is washed!	
Wet Areas	Don't dig and plan on storing tubers from wet areas of a field. If possible keep them separate and plan to market those immediately to reduce the chance of brining disease into the storage.	
Culling	Cull hard! Do not put any potatoes that do not look healthy into your storage, and when it doubt, don't put it in!	

view all Cornell Vegetable Program upcoming events at CVP.CCE.CORNELL.EDU

The BioControls[SM] USA East Conference & Expo

October 11-12, 2018
Rochester Riverside Hotel, Rochester, NY

The Biocontrols[SM] USA East Conference & Expo is coming to Rochester October 11-12! Market research indicates a growing interest in the benefits of biocontrols among growers, making now the time to optimize your pest management program. This conference is an opportunity for northeastern growers, suppliers, retailers, and manufacturers to gather and learn the latest strategies and tips from the experts succeeding with biocontrol today. **Exclusive field tour and workshops** are available to give you a first-hand look at how growers are extracting the most from both organic and conventional programs. Visit https://www.biocontrolsconference.com/usa-east/

Processing Snap Bean Advisory Meeting

December 4, 2018 | 10:00 AM - 1:00 PM
CCE Ontario County, 480 N Main St, Canandaigua, NY 14424

All are invited to discuss processing snap bean production in New York. Hear reports of 2018 snap bean projects funded by the association. Special report on the application of remote sensing for white mold management by RIT researchers. Hear ideas and concerns from fellow growers and industry members. Your input is needed to set future research priorities. This meeting is free and includes a complimentary lunch. Contact Julie Kikkert at 585-313-8160 for more information.

Processing Sweet Corn, Pea, Lima Bean, Beet & Carrot Advisory Meeting

December 12, 2018 | 9:30 AM - 3:00 PM
First United Methodist Church, 8221 Lewiston Rd (Rte 63), Batavia, NY 14020

A roundtable meeting will be held for each crop. Hear ideas and concerns from fellow growers and industry members. Reports of the 2018 funded projects will be given. Your input is needed to set future research priorities. This meeting is free and includes a complimentary lunch. Contact Julie Kikkert at 585-313-8160 for more information.

Cornell Cooperative Extension
Cornell Vegetable Program

480 North Main Street
Canandaigua, NY 14424

VEGEdge

YOUR TRUSTED SOURCE FOR RESEARCH-BASED KNOWLEDGE

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VegEdge is the award-winning newsletter produced by the Cornell Vegetable Program. It provides readers with information on upcoming meetings, pesticide updates, pest management strategies, cultural practices, marketing ideas and research results from Cornell and Cornell Cooperative Extension. VegEdge is produced every few weeks, with frequency increasing leading up to and during the growing season.

VEGETABLE SPECIALISTS

Elizabeth Buck | 585-406-3419 cell | emb273@cornell.edu
fresh market vegetables, weed management, and soil health

Robert Hadad | 585-739-4065 cell | rgh26@cornell.edu
food safety & quality, organic, business & marketing, and fresh market vegetables

Christy Hoepting | 585-721-6953 cell | 585-798-4265 x38 office | cah59@cornell.edu
onions, cabbage, potatoes and pesticide management

Julie Kikkert | 585-313-8160 cell | 585-394-3977 x404 office | jrk2@cornell.edu
processing crops (sweet corn, snap beans, lima beans, peas, beets, carrots) and dry beans

Judson Reid | 585-313-8912 cell | 315-536-5123 office | jer11@cornell.edu
greenhouse production, small farming operations, and fresh market vegetables

PRECISION AG SPECIALIST

Ali Nafchi | 585-313-6197 cell | anafchi@cornell.edu

PROGRAM ASSISTANTS

Amy Celentano | ac2642@cornell.edu

John Gibbons | 716-474-5238 cell | jpg10@cornell.edu

Angela Ochterski | 585-394-3977 x426 | aep63@cornell.edu

Caitlin Vore | cv275@cornell.edu

ADMINISTRATION

Peter Landre | ptl2@cornell.edu

Steve Reiners | sr43@cornell.edu

Cornell Cooperative Extension
Cornell Vegetable Program

For more information about our program, email cce-cvp@cornell.edu or visit us at CVP.CCE.CORNELL.EDU