Cornell Cooperative Extension | Cornell Vegetable Program

VEGEdge

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Managing Colorado Potato Beetles to Avoid Insecticide Resistance

Margie Lund, Cornell Cooperative Extension, Cornell Vegetable Program

Colorado potato beetles (CVP) are common potato pest in NYS, with overwintering adults laying eggs on potatoes, and subsequent larvae and adults feeding on foliage. In NYS, there are generally two generations of CPB throughout the season, and can also feed on tomatoes and eggplant, as well as weed species. Adults will emerge from last-season's potato fields and make their way to new fields, so rotating potato fields as far as possible is the first step in controlling population numbers. However, it is likely chemical control will be needed as it is difficult to rotate fields far enough from one another to see sufficient control. CPB are able to develop resistance to a large number of insecticides, so insecticide rotation is vital for long-term control of this pest. Since their availability in 1995, neonicotinoid insecticides (IRAC group 4, e.g. Platinum, Cruiser, Admire Pro, Assail) have provided excellent control of CPB, and have been used heavily as both seed and foliar treatments to control CPB. However, neonicotinoids are starting to lose their efficacy in many areas due to resistance. Therefore, a good insecticide rotation should be used, especially in areas where beetle populations are showing signs of resistance to neonicotinoids.

Colorado potato beetle larvae feeding on potato leaves.
Photo by Margie Lund, CCE Cornell Vegetable Program

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About VegEdge

VegEdge newsletter is exclusively for enrollees in the Cornell Vegetable Program, a Cornell Cooperative Extension partnership between Cornell University and CCE Associations in 14 counties.

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:
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Help us serve you better by telling us what you think. Email us at *cce-cvp@cornell.edu* or write to us at Cornell Vegetable Program, 480 North Main Street, Canandaigua, NY 14424.

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The next issue of VegEdge newsletter will be produced on July 15, 2020.

Onion canopy filling out and foliage "green to the tip". *Photo: C. Hoepting, CCE CVP*

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To create a good rotation program:

- Never rely exclusively on neonicotinoids for CPB control.
- Do not use foliar neonicotinoid products in a field that was treated with neonicotinoids at planting.
- Avoid using neonicotinoids on CPB populations late in the season just prior to adults dispersing to overwinter, and do not use for control of only leafhoppers or aphids.
- In fields that have not been rotated from potato, do not use neonicotinoids more than once every two years.

A good insecticide rotation program will help ensure that all insecticide modes of action continue to effectively control CPB populations on your farm.

Colorado potato beetle egg mass. *Photo by Margie Lund, Cornell Vegetable Program*

Colorado potato beetle (CPB) adult. *Photo by Margie Lund, Cornell Vegetable Program*

Examples of insecticide rotations for CPB control, showing options for in-furrow + foliar applications (A and B), as well as only foliar applications (C, D, and E)

Example	Year 1		Year 2	
	Early	Late	Early	Late
In-furrow (IF) + Foliar				
A.	Coragen SC*†	Radiant SC	Platinum (IF)*†	Agri-mek SC*
For use where neonicotinoid control has started to weaken or fail, rotate away from neonicotinoid use for a year.				
B.	Platinum (IF)*†	Agri-mek SC*	Coragen SC*†	Radiant SC
For use where populations are still controlled by neonicotinoids, use can continue for this year, but rotate away the following year.				
Foliar Only				
C.	Blackhawk	Beseige*†	Rimon 0.83EC*	Agri-mek SC*
For use where populations are now difficult to manage with neonicotinoids, stop using neonicotinoids for two years and use a different mode of action for each generation.				
D.	Radiant SC	Coragen SC*†	Agri-mek SC*	Actara*†
For use where neonicotinoid control has started to weaken, rotate away from neonicotinoids and do not use until the late generation in the second year.				
E.	Agri-mek SC*	Endigo ZC*†	Radiant SC	Coragen SC*†
For use when neonicotinoids are still having good control. Consider using neonicotinoids for late season control in the first year, but rotating away from use in the second year.				

*Restricted use pesticide
† Not for use in Nassau and Suffolk Counties

Garlic Anthracnose is in Western New York Again

Robert Hadad, Cornell Cooperative Extension, Cornell Vegetable Program

Colletotrichum fungal disease or garlic anthracnose has shown up in WNY again. ENY and several New England locations have also reported seeing this problem currently. High humidity and/or ain water that might have collected in the leaf whorl just prior to scape emergence seems to be a possible trigger. Spores get into that wet environment and infects the scape. Possibly damage by thrips may also open up wounds to infections. First a pale yellow streak appears then a lesion forms. When the spores start to develop on the scape, the lesion area appears orange and fuzzy. The lesions will grow and the scape will rot off. At present there is no known treatment for this problem.

Early symptoms we have noticed prior to actually seeing the lesions on the scape is that sometimes the plant leaves are twisted and the newly emerging scape is more twisted than normal.

Garlic scape with orange fuzzy spores on lesion. As you can see in the picture, the yellow infection is spreading to either side of where the orange spores are. The scape will soften and rot from here. It is unclear how the disease affects garlic bulbs in storage. Mites feeding on bulbs may cause the disease to spread down the stem into the bulb. Quick and thorough drying down of the bulbs during the curing process and dry conditions in storage could help reduce the disease problem. *Photo by Robert Hadad, Cornell Vegetable Program*

NY Sweet Corn Trap Network Report, 7/7/2020

Marion Zuefle, NYS IPM Program; from http://sweetcorn.nysipm.cornell.edu

Statewide, 33 sites reported this week with only 3 sites reporting European corn borer (ECB)-E. ECB-Z was caught at 6 sites. Fifteen sites reported corn earworm (CEW) with eleven high enough to be on a 4, 5 or 6 day spray interval (see table). Fall armyworm (FAW) moths were caught at 3 sites and Western bean cutworm (WBC) was caught again at the Williamson site this week.

WBC flight has started. Emergence is forecast to be at 25% when 1319 degree days (base 50°F) have accumulated beginning on May 1st (see table below). The degree day accumulation (May 1st, base 50°F) for sweet corn trap network sites ranges from 682-977. Peak flight in NY usually occurs during the first week of August.

FAW is beginning to increase. When scouting sweet corn for FAW look for egg masses on the leaves. Egg masses consist of 50-150 eggs and can be distinguished from ECB by the fine hairs covering the egg mass. Feeding damage is also very different from ECB. FAW will cause ragged feeding damage on leaves with large amounts of frass below the feeding site. The larva has a distinct inverted 'Y' on the front of the head. To help with identification of the different larvae, see the Sweet Corn Larval Pest Identification fact sheet. <https://hdl.handle.net/1813/57328>

Degree day accumulations in relation to percent WBC moth emergence (begin May 1, base 50°F)

Accumulated Degree Days	% Moth Emergence
1319	25%
1422	50%
1536	75%

Data from University of Nebraska

WNY Pheromone Trap Catches: July 7, 2020

Location	ECB-E	ECB-Z	ECB Hybrid	CEW	FAW	WBC	DD to Date
Batavia (Genesee)	0	0	NA	0	0	0	910
Bellona (Yates)	0	0	NA	0	0	0	917
Brockport (Monroe)	0	0	NA	4	0	0	933
Eden (Erie)	0	1	NA	4	0	0	902
Farmington (Ontario)	0	0	0	2	0	0	950
Geneva (Ontario)	0	0	0	0	1	0	926
Hamlin (Monroe)	NA	NA	NA	NA	NA	NA	866
Kennedy (Chautauqua)	NA	NA	NA	NA	NA	NA	825
Leroy (Genesee)	2	1	NA	0	0	0	905
Lyndonville (Orleans)	0	0	NA	0	0	0	834
Oswego (Oswego)	1	0	NA	0	0	0	771
Panama (Chautauqua)	NA	NA	NA	NA	NA	NA	759
Penn Yan (Yates)	0	0	0	0	0	NA	874
Portville (Cattaraugus)	0	0	NA	0	0	0	715
Ransomville (Niagara)	0	0	NA	0	0	0	910
Seneca Castle (Ontario)	0	0	0	0	2	0	902
Williamson (Wayne)	0	0	NA	2	0	3	797

ECB: European Corn Borer; CEW: Corn Earworm; FAW: Fall Armyworm; WBC: Western Bean Cutworm; NA: not available; DD: Degree Day (mod. base 50F) accumulation

Average Corn Earworm Catch			
Per Day	Per Five Days	Per Week	Days Between Sprays
<0.2	<1.0	<1.4	No spray (for CEW)
0.2-0.5	1.0-2.5	1.4-3.5	6 days
0.5-1.0	2.5-5.0	3.5-7.0	5 days
1-13	5-65	7-91	4 days
over 13	over 65	over 91	3 days

Add one day to the recommended spray interval if daily maximum temperatures are less than 80F for the previous 2-3 days.

Post-Harvest Handling Garlic Project – Call for Participants

This will be the second year for our post-harvest garlic handling project. The objective is simply to determine the best post-harvest handling practices for curing and storage. Some growers top their garlic to 1", 3" or more length before curing, while others leave the tops on. High tunnels, barns and other buildings are used for curing/storage, while other growers leave their garlic outside on wagons. Garlic can be stored in bins, on bread wracks, or hung in bundles. Fans and dehumidifiers may or may not be used. There seems to be 101 different ways of handling garlic post-harvest.

For this project, we grow a crop of garlic and give each grower who participates in the project 5 samples of 10 bulbs (= 50 bulbs total), each within mesh onions bags, to cure and store along with their garlic (Fig. 1). Attached to one of the sample bags is a temperature/relative humidity sensor. If the grower does not top the plants, then they are cured with the tops on within the mesh bags. If the grower normally tops the garlic, then he would top them and put back into mesh bags, etc. In early October, we collect all of the samples and evaluate them for shrink and various other quality factors. We are hoping that we will be able to determine which practices lead to the best quality of garlic (least shrink, hardest, whitest, best skin retention, least disease, no mites, etc.).

If you are interested in participating in this project, please contact Christy Hoepting at cah59@cornell.edu; 585-721-6953. Our garlic will be ready soon.

Figure 1. Post-harvest garlic project: Garlic samples in mesh bags (in red) being cured along with grower's garlic. In this case, topped to 3" necks, single layer in bread trays in green house with fan. *Photo: Christy Hoepting, CVP*

Judging When Garlic is Ready to Harvest

Crystal Stewart-Courtens, CCE Eastern NY Commercial Horticulture Program

Everyone knows the balancing act that is garlic harvesting—too early and the cloves are small and don't store well, too late and the head pops, making it unmarketable and more susceptible to diseases. So, as we near harvest, how should a grower decide if the garlic is ready? The best answer is to pull a few plants, cut through the head sideways (so you cut through all the cloves), and see how well developed the cloves are (Fig. 1). You can use the leaves as a guide to decide when to do this (lowest third or half of the leaves yellowing and dying is a good mark to start with), but looking at the cloves is the best way to know if the garlic is ready. Cloves should fill the wrappers—if they seem a little loose, the garlic has a little ways to grow. A little of the very outer wrapper may have started to decay at this point. That is okay—it's a normal part of the maturation process. The key is to harvest before the bulbs pop, which can happen relatively quickly, especially if we have another wet year. If you don't think you will be able to get out and harvest for a period of time, it's better to harvest bulbs a little too early than a little too late.

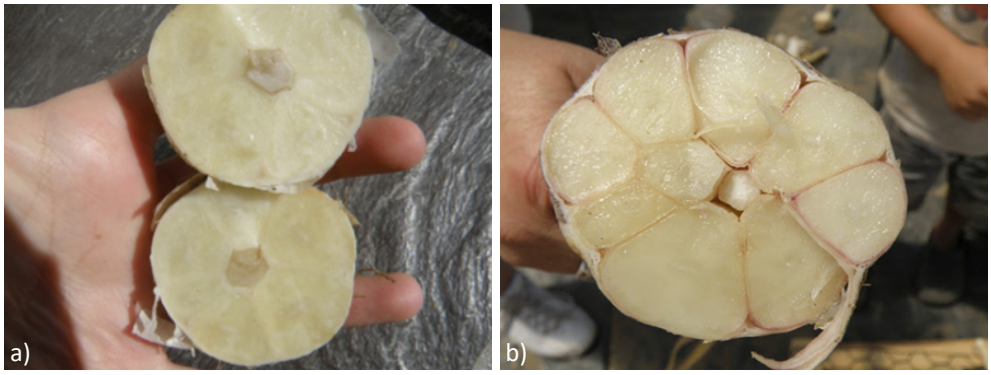

Figure 1. To judge the maturity of garlic, cut the bulb across the cloves; you want the bulb to be very firm in its skins and you want to see a small gap around the scape. The clove on the left (a) is not quite ready, whereas the one on the right (b) is. *Photos by Crystal Stewart-Courtens, CCE ENY Commercial Horticulture Program*

CROP INSIGHTS

BEETS

Fresh market beets continue to be harvested and I've seen some real beauties out there! Early processing beets are sizing up. Many later plantings have suffered from poor emergence because of dry soils. Irrigation, weed control, and scouting for leaf diseases are the priorities this week. The forecast for Cercospora leaf spot (CLS) is moderate for most of our region heading into the weekend. The CLS decision support system (DSS) relies upon the measurement of temperature and relative humidity at the standard height of 1.5 m by on-site weather stations linked to NEWA. This information is used to calculate daily infection values (DIVs) which are accumulated from the total hours with relative humidity of at least 85% and average temperature in a 24 h period (starting at 12 noon). DIVs are accumulated over the day of interest and the previous day to represent the daily infection risk (DIR). Research trials over the past several years have informed the timing and frequency of either TIlt or Miravis Prime fungicide when the CLS DSS is used. Unfortunately, fields with overhead irrigation do not fit this model and would be considered higher risk. We are testing the CLS DSS in a few commercial fields this year. If you would like a copy of the DSS manual and/or to be included in twice weekly emails with the forecast from weather stations in our region, please contact Julie. - JK

CARROTS

Fields are a mixed with success this year depending on planting date and soil moisture. Some early fields had snow on them initially and now we are into extreme heat and dry soils. Other fields just never emerged well. However, as is typical there are also good fields out there. Continue scouting for diseases and aster leafhoppers which can transmit Aster Yellows Disease. - JK

CUCURBITS

Downy mildew is present in at least Niagara and Erie Counties. This can be an aggressive disease on cucumbers, protect your crops and be sure to scout at least once a week to make an early detection! Gray spores can be seen on the underside of the yellow checkers during humid conditions – you may need a hand lens. Powdery mildew is breaking out as expected during zucchini and summer squash harvest. Seeing several cases of virus in cucurbit fields. Virus is often vectored by aphids or thrips. Unfortunately, also seeing aphid populations beginning to build. Some spidermite activity in melons. - EB

Mid-to late stage downy mildew infection puts yellow, rectangular checkers on the green cucumber leaves. Early stage infections will be a few yellow or slightly rusty checkers defined by vein borders. *Photo: E. Buck, CVP*

DRY BEANS

Potato leaf hoppers continue to be a problem in some dry bean fields this week, and nymph stages are now present on plants. In high numbers, PLH can lead to leaf mottling and curling, and eventually leaf death. Treatment should be considered if PLH are found at the following thresholds: 0.5 PLH/ plant at unifoliate stage, or 1 PLH/ trifoliate leaflet at later plant stages.

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Aphids have been spotted in dry beans this week. While aphids can spread viruses in dry beans, they are often not present in high enough numbers to be of major concern. Although, if aphid levels are particularly high in your fields, management options are available. Japanese beetles have also been feeding on dry bean leaves this week, leaving visible feeding damage on some plants. However, management is rarely needed to control Japanese beetles, as dry beans are able to tolerate a large amount of damage from the pest. – ML

LETTUCE AND GREENS

Lettuce – Tarnish plant bugs are moving into what's left of the lettuce plantings. Coming in off of weeds found along field edges, tarnish plant bugs are a generalist feeder bothering a wide assortment of crops including bush beans (which is happening now) and later on tomato causing disfiguring of fruit. Baythroid XL, Sevin XLR Plus, Hero, and Warrior II. As always, read labels for specific instructions. Pay particular attention to harvest intervals. Exclusion with fine mesh insect netting will also help to reduce this pest.

Tarnish plant bugs are small damaging insects that feed on a wide variety of plants. *Photo:UVM IPM*

ONIONS

Not much new to report this week. It is hot and dry! The onions are thirsty and growers have been irrigating when/where feasible. Hopefully, forecasted rain for this weekend will come into fruition. Majority of direct seeded onions are in the 6-7 leaf and early bulb-swell stage. We have seen up to a 2-week ride with momentum of Movento in transplanted fields that got their Movento applications 3-4 weeks ago. Direct seeded fields range from getting their first to just having had their second application of Movento. With few exceptions of influx sites, onion thrips are being held below spray threshold of 1.0 thrips per leaf with Movento. Growers are encouraged to wait until spray threshold is met before applying their next insecticide spray, as this reduces insecticide use and ensures that we do not run out of insecticide options should it be a long and heavy thrips season - in these hot as blazes temperatures, it sure feels like it could be. Typically, a period of 1-2 weeks passes after Movento before spray threshold is met again, which we affectionately call "the ride with the momentum of Movento". See article for all the insecticide options following Movento on page 8.

Generally, there has been no movement in development of Botrytis leaf blight (BLB) and Stemphylium leaf blight (SLB). Many fields have been relying on mancozeb (initiated at first detection of BLB) and Bravo for management of BLB and SLB, although some growers have included SLB/BLB fungicide applications instead of Bravo with one of their Movento apps. Most commonly used so far include Inspire Super 20 fl oz (high rate, FRAC 3b + 9b) and Scala 9 fl oz (FRAC 9a) + Rovral 1 pt (FRAC 2), with the latter in Elba where this combination is still thought to have functional utility. Optimum conditions for BLB include 59 – 65°F plus 12 hours leaf wetness, with infection greatly reduced above 81°F. However, SLB is favored by much warmer conditions with 77°F plus 10 hours of leaf wetness being the optimum, but it can remain active up to 93°F. During the current dry conditions, the leaf wetness requirement could be achieved on a humid night when the dew point is high resulting in heavy due, with irrigation, and when the crop canopy is thick resulting a lesser degree of aeration, especially during windless conditions. Crops that are bulbing or suffering from heat stress and thus have tipburn and outer leaf dieback setting in, are also at greater risk for SLB to set in on this necrotic tissue. Alternatively, smaller onions that are green to the tip that have good aeration in the canopy theoretically would be at lesser risk for SLB. Not surprisingly, in this heat as the crop begins to bulb, bacterial disease has begun to show up. - CH

PEAS

In peas, daytime temperatures exceeding 78°F at flowering and pod fill will significantly decrease yields. In addition, high temperatures near harvest will mature the peas quickly resulting in a shortened harvest window. Pea aphids are building up in some fields and populations can increase rapidly during hot weather. Peas near alfalfa fields that are being cut may be particularly vulnerable. During vegetative growth of peas, aphid infestations usually do not cause economic damage. Aphid feeding on flowers and pods can reduce the number of seeds produced, particularly if aphid numbers are very high. In addition, lady bugs are attracted to aphids and can become a contaminant at harvest. Scout fields at flowering, early pod-set, and especially during early pod filling. Monitor pea aphid populations using a sweep net. After checking with several other states, we have determined an average threshold: if you find 25 to 35 aphids per sweep and the peas are more than ten days from harvest, insecticide treatment is recommended. In past years, Asana and Mustang Max have been used in processing pea fields. However, there are numerous products labeled. Make sure to consult the preharvest interval when selecting a product to use. - JK

PEPPERS

Peppers are at high risk for Blossom End Rot (BER) given the current hot, dry conditions. This localized calcium deficiency occurs when moisture is limited and crop growth rates and transpiration are high. On peppers BER occurs on the lower side wall of the fruit (compared to the bottom on tomatoes). Regular, constant moisture is the best prevention. In young crops with heavy fruit loads, BER in pepper can be very hard to prevent when temperatures go into the 90s and there is wind. Removing any fruit that shows BER can reduce further losses, as even damaged fruit will continue to mature, adding to additional calcium competition within the plant. Weedy fields add to the water stress, and BER in the crop. See tomato section for more information. - JR

POTATOES

Tarnished plant bugs have been found in potatoes this week in low numbers. Tarnished plant bug feeding can result in wilted leaflets or necrotic areas along leaf midveins. A threshold of 15 adults or 25 nymphs per 50 plants should be used in management decisions. Numbers are usually low enough that chemical management isn't needed, though with the dry weather there may be higher numbers than normal.

With the hot and dry weather this week, blight units (BU) and late blight risk are relatively low across the region. A BU of 30+ indicates the need to spray for late blight. Stations that have exceeded the 30 BU threshold for the forecast period are Ceres, Fulton, Versailles, and Wellsville. Fungicide Units are below threshold at all stations except Wellsville. The chart assumes use of a susceptible potato variety, and an application of chlorothalonil. Because weather conditions can vary depending on topography and altitude, the recent disease information and disease forecasts will be most accurate very close to the weather station used. For locations that are not close to a weather sta-

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tion, forecast information should only be used as a general indication of how favorable weather has been for late blight. Forecast BUs are subject to changes as the weather forecast changes, so check forecasting tools regularly to see if disease forecasts have changed. Information for other weather stations can be found at http://newa.cornell.edu/index.php?page=potato-diseases. On a national level, no new late blight confirmations have been reported, and has still only been confirmed in FL and AL. No late blight has yet to be reported in NYS. - ML and JG

New Late Blight Risk Chart, 7/07/20

Location	Blight Units[1] 6/24-7/07	Blight Units[2] 7/08-7/10	Location	Blight Units[1] 6/24-7/07	Blight Units[2] 7/08-7/10
Albion	0	3	Hammondsport	5	7
Arkport	15	12	Knowlesville	10	1
Baldwinsville	0	6	Lyndonville	17	11
Bergen	0	3	Medina	22	1
Buffalo	6	1	Niagara Falls	0	1
Burt	10	3	Penn Yan	21	2
Ceres	44	18	Rochester	21	2
Elba	10	2	Sodus	NA	NA
Fairville	10	3	Versailles	29	3
Farmington	11	1	Wellsville	31	18
Fulton	28	3	Williamson	6	3
Geneva	5	1			

[1] Past week Simcast Blight Units (BU)
[2] Three-day predicted Simcast Blight Units (BU)

SNAP BEANS

Pressure from potato leaf hoppers remains high across the state. Cruiser insecticide seed treatments generally protect the crop through the time of flowering, but it is still a good idea to scout fields. The presence of nymphs indicates that the population is reproducing on beans and a foliar treatment may be warranted. Check the 2020 Cornell Vegetable Guidelines for thresholds and treatment options. Japanese beetles are out and may feed on beans, however, they generally don't require treatment unless populations are very high. Mexican bean beetles and spider mites are other insects to be scouting for currently. Dry soil conditions do not favor emergence of plantings that would still be going in at this time for late harvest. For fields that are in flower, the high temperatures will likely inhibit pollination, potentially causing reduced or split sets, a problem for one-pass harvest used in processing beans. From S. Reiners, Cornell: Daytime temperatures over 86 F or night temperatures over 80 F at flowering can result in poor set. Moisture stress can also lead to problems in beans. Although the critical time for optimum soil moisture is at the time of flowering and set, dry conditions when the crop has two trifoliate leaves can decrease later vegetative growth and affect flower initiation. This may result in lowered yields and uneven crop maturity. - JK

SWEET CORN

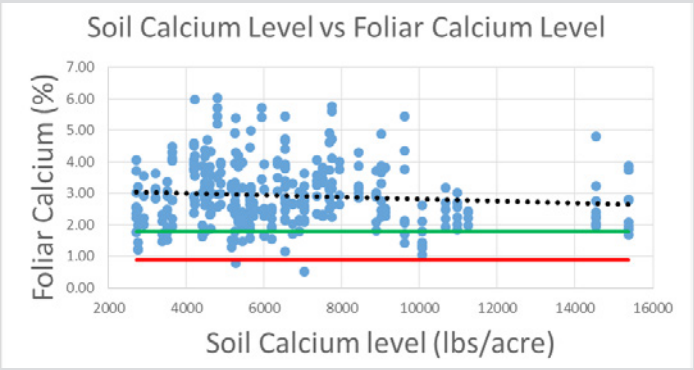
In sweet corn, Japanese beetles will feed on the tassels but worst, they will feed on newly emerging ear silks. In some plantings, there are swarms of them. With too much silk eaten, less pollen will be able to pollinate an ear resulting in fewer kernels. This reduces marketability. Several compounds have action against the beetles including Assail 30 SG, Baythroid XL, Sevin XLR Plus, and Warrior II. As always, read labels for specific instructions. Pay particular attention to harvest intervals.

Bush, pole, and dry bean plants can also be hit very hard by Japanese beetle and tarnished plant bug (Lygus bug) feeding. The feeding starts off with tiny holes and a browning between and around holes. Very quickly, however, beetles can skeletonize leaves which impacts productivity of the plants. Some feeding damage can also occur on young bean pods. - RH

TOMATOES

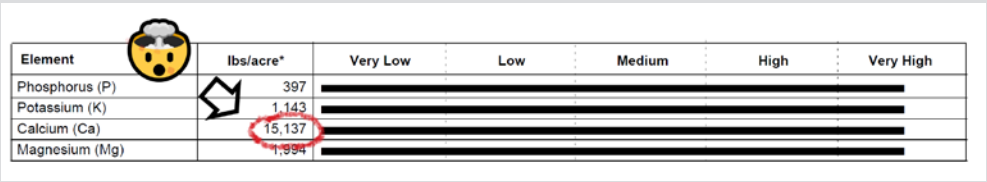
See comments in the pepper section on Blossom End Rot (BER). A couple of common questions on preventing BER involve calcium and timing of irrigation. CVP research has shown that increased levels of calcium in the soil are not correlated with increased calcium levels in the plant. For most farms this means there is no need to apply additional calcium as a foliar spray or through fertigation. Additional applications could make things worse! For example, injecting calcium nitrate would raise the root zone pH and push additional vegetative growth, both of which could lead to further BER.

The sunken bottom, discolored bottom of this fruit is indicative of Blossom End Rot. *Photo: J. Reid*



CVP research on over 40 farms has shown that increased levels of soil calcium do not increase foliar levels. Each blue dot represents a soil sample, with the green and red lines representing sufficiency range of foliar calcium. The dotted line shows the overall trend of decreasing foliar calcium as soil levels increase, with most samples having excess foliar calcium, even at low soil levels.

With this data in mind, we can focus on water management. The question of when and how much will vary on each farm, based on soil type, crop stage and weather conditions. However, we know that constant moisture availability is the best strategy to prevent BER, so daily (shorter) irrigation is preferable to sporadic deep watering. Keep an eye on the forecast. - JR



Mind blowing levels of calcium are not a guarantee against Blossom End Rot; they may make it worse! *Image: J. Reid*

Insecticide Programs to Consider for Onion Thrips Control in Onion in 2020

Brian Nault, Dept. of Entomology, Cornell Agri-Tech, and Christy Hoepting, CCE Cornell Vegetable Program

Onion thrips already have colonized onion fields in New York and the first insecticide sprays of the season have been made. Movento® is typically used first, but what should be next? The following guidelines (Table 1 and Fig. 1) provide several different insecticide sequence options to consider for the remaining 2020 season. And remember to always use a surfactant with your insecticide sprays to improve the level of thrips control. Also, do not co-apply insecticides that need to move into the plant including Movento®, Agri-Mek®, Minecto Pro®, Radiant® or Exirel® with chorothalonil (= Bravo) as it reduces the efficacy of the insecticides.

START WITH MOVENTO®

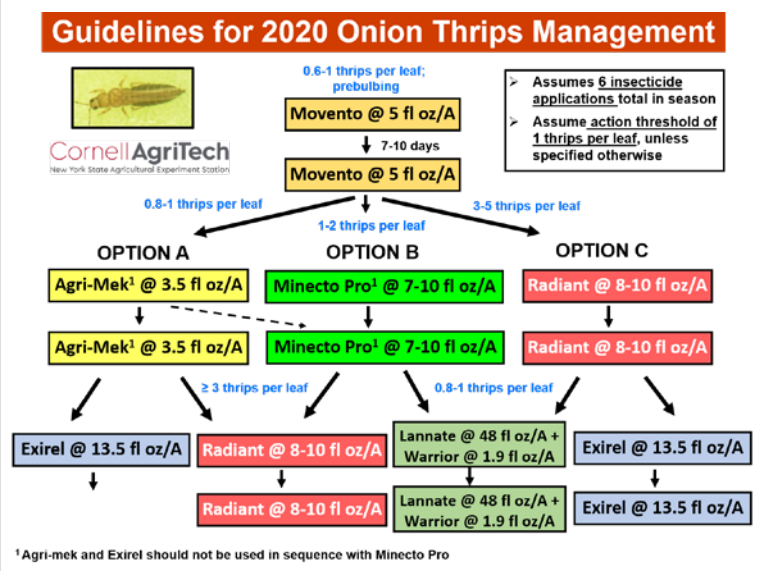
We suggest beginning onion thrips management with two sequential applications of Movento® (spirotetramat) at 5 fl oz per acre. **Movento® is one of the best products to use early in the season for controlling thrips because it kills larvae and may cause females to lay fewer eggs.** Movento is systemic even when applied to foliage, so it moves to new foliage tight in the neck to kill thrips that might not be touched by other products. In many cases, two weeks of thrips control occurs after the second weekly application of Movento®. Because Movento® is not nearly as effective on larger onion plants that are bulbing (e.g., 1-2 inch bulbs), make sure that Movento® is applied before onions are bulbing or when the thrips population reaches at least 0.5 thrips per leaf. After Movento® applications are made, follow either 'Option A', 'Option B' or 'Option C' for the remained of the season (Fig. 1).

NOTE: In March 2020, a new product **Senstar™ Insecticide** became labeled on onion for thrips control in New York. Senstar™ Insecticide includes a combination of spirotetramat (the active ingredient on Movento) and pyriproxyfen (generally used to control whiteflies). While onions are never infested with whiteflies, this product may be as effective against onion thrips as Movento. Research planned in Nault's program should have that answer in August.

WHAT'S AFTER MOVENTO®? USE AN ACTION THRESHOLD TO HELP GUIDE YOUR DECISION

We recommend using an action threshold when following these insecticide sequence options. An **action threshold of one thrips per leaf** has been very effective for timing insecticide applications for controlling onion thrips infestations. In many research trials conducted in commercial onion fields in New York from 2015-2019, action threshold-based insecticide programs offered the same level of thrips control as a weekly insecticide program, and reduced onion thrips population by 83% compared to untreated. While these insecticide programs offered similar levels of control, action threshold-based insecticide programs used 2-5 fewer insecticide applications as compared to a weekly insecticide program.

Figure 1.



Outline of Onion Thrips Management Flow Chart

Title: Guidelines for 2020 Onion Thrips Management

Top of chart begins: 0.6-1 thrips per leaf, use Movento 5 fl oz/A followed by a second application 7-10 days later.

1. If, thrips 0.8-1 thrips/leaf, then, Option A: Agri-Mek SC 3.5 fl oz/A
   - a. If, 1 thrips/leaf, then Agri-Mek SC 3.5 fl oz/A
     - i. If, 1 thrips/leaf, then Exirel 13.5 fl oz followed by a second application of Excirel 13.5 fl oz/A when 1 thrips/leaf
     - ii. If, ≥ 3 thrips/leaf, then Radiant 8-10 fl oz/A followed by a second application of Radiant 8-10 fl oz/A when 1 thrips/leaf
   - b. If, 1-2 thrips/leaf, then Option B: Minecto Pro 7-10 fl oz/A followed by a second application of Minecto Pro 7-10 fl oz/A when 1 thrips/leaf
     - i. If, ≥ 3 thrips/leaf, then Radiant 8-10 fl oz/A followed by a second application of Radiant 8-10 fl oz/A when 1 thrips/leaf
     - ii. If, 0.8-1 thrips/leaf, then Lannate 48 fl oz/A + Warrior 1.9 fl oz/A followed by a second application at 1 thrips/leaf
   - c. If 3-5 thrips/leaf, then Option C: Radiant 8-10 fl oz/A followed by a second application of Radiant 8-10 fl oz/A when 1 thrips/leaf
     - i. If 0.8-1 thrips/leaf, then Lannate 48 fl oz/A + Warrior 1.9 fl oz/A followed by a second application at 1 thrips/leaf
     - ii. If 1 thrips/leaf, then Exirel 13.5 fl oz/A followed by a second application of Exirel 13.5 fl oz/A at 1 thrips/leaf

The chart assumes 6 insecticide applications total in the season.

Agri-Mek and Exirel should not be used in sequence with Minecto Pro.

OPTION A – AGRI-MEK FOR LOWER ONION THRIPS PRESSURE

'Option A' is an affordable option that is highly effective for controlling low to moderate populations of onion thrips (around 0.8 to 1 per leaf).

continued on next page

continued from page 8

The main reason for its affordability is that it includes Agri-Mek® SC or similar abamectin-based product. In 'Option A', we suggest making two sequential applications of Agri-mek® SC at 3.5 fl. oz per acre after applying Movento® (Fig. 1). If Agri-mek® SC has underperformed on your farm in recent years, **we recommend tank mixing Warrior® II with Zeon technology with Agri-mek® SC**. After two applications of Agri-mek® SC with or without Warrior II with Zeon technology, either Radiant® SC or Exirel® should be applied depending on the onion thrips pressure. Exirel® at 13.5 fl oz per acre is recommended when onion thrips densities are 1-2 thrips per leaf. In insecticide efficacy trials conducted from 2016-2019, two sequential applications of Exirel® controlled onion thrips densities of 4 thrips per leaf, but was not successful at higher densities. Thus, we still recommend Radiant® at 8-10 fl oz per acre when onion thrips densities are greater than 2 per leaf. If additional insecticide applications are needed, a tank mix of Lannate LV (48 fl oz per acre) and Warrior® II with Zeon technology (1.9 fl oz per acre) can be co-applied to prolong thrips control until harvest.

OPTION B – MINECTO PRO FOR MODERATE ONION THRIPS PRESSURE

'Option B' is best suited for fields that face moderate onion thrips pressure early in the season (1-2 thrips per leaf). This option features, Minecto® Pro, a pre-mix of Agri-mek® SC (abamectin) and Exirel® (cyantraniliprole). The cost of Minecto® Pro may be higher than other insecticide options (i.e. Agri-mek® SC), but Minecto Pro® can offer superior control of thrips. In a 2016 insecticide evaluation trial under moderate thrips pressure, Minecto® Pro performed equivalently to Radiant® SC at 10 fl oz per acre (spinetoram) and reduced thrips by 80% when compared to the untreated control. Consider applying Minecto® Pro at 7-10 fl oz per acre if thrips populations rebound moderately after Movento® applications have been made (Fig. 1). **Minecto® Pro** should be applied early to mid-season because it **has a 30-day pre-harvest interval, just like Agri-Mek® SC**. Because Minecto Pro contains abamectin and cyantraniliprole, caution should be taken to ensure that no more than 2 applications of an abamectin-based and cyantraniliprole-based product are made during the season (see below, 'No more than two applications of abamectin per season'). Following the 'Option B' track, use either two applications of Radiant® SC or a tank mix of Lannate® LV (methomyl) and Warrior® II with Zeon technology (lambda-cyhalothrin), depending on the onion thrips pressure. If densities remain high (above 2 thrips per leaf) after applications of Minecto® Pro, Radiant® SC should be applied at 8-10 fl oz per acre. If densities are lower (1-2 thrips per leaf), consider applying a tank mix of Lannate® LV and Warrior® II with Zeon technology (48 fl oz per acre and 1.9 fl oz per acre, respectively).

OPTION C – RADIANT FOR HIGH ONION THRIPS PRESSURE

'Option C' is most appropriate for fields that face high onion thrips pressure early in the season (3 or more thrips per leaf). This option cuts to the chase and requires use of the Radiant® SC hammer to get a potentially runaway thrips infestation back under control. The cost of Radiant® SC may be higher than other insecticide options (i.e. Agri-mek® SC and Minecto Pro®), but based on studies in 2017-2019 it is the only product labelled on onion than will control a thrips population that exceeds 3-5 thrips per leaf. Following the 'Option B' track, use either two applications of a tank mix of Lannate® LV (methomyl) and Warrior® II with Zeon technology (lambda-cyhalothrin) or Exirel® (cyantraniliprole), depending on the onion thrips pressure. If densities bounce back after the second Radiant® SC application (above 2 thrips per leaf), use Exirel® at 13.5 fl oz per acre. If densities are lower (0.8-1 thrips per leaf), consider applying a tank mix of Lannate® LV and Warrior® II with Zeon technology (48 fl oz per acre and 1.9 fl oz per acre, respectively).

OTHER VARIATIONS

These insecticide application guidelines provide examples with commonly used products, but other options to control thrips also exist. For example, if following 'Option A' and onion thrips densities increase after one application of Agri-mek® SC, consider moving to the 'Option B' track and make an application of Minecto® Pro to decrease onion thrips densities (Fig. 1, dotted line).

NO MORE THAN TWO APPLICATIONS OF ABAMECTIN AND CYANTRANILIPROLE PER SEASON

Whether you follow 'Option A' or 'Option B' or end up jumping tracks, no more than two (sequential) applications of Agri-Mek® SC or Exirel® either alone or as part of Minecto® Pro, may be made per season. For example, if Agri-Mek® SC is followed by Minecto® Pro, neither a second application of Minecto® Pro nor a second application of Agri-Mek® should be used Instead, choose from either i) Exirel®, ii) Radiant®SC, or iii) Lannate® + Warrior® II with Zeon technology.

Table 1. 2020 Conventional Insecticide Roster for Onion Thrips Management in Onion.

Trade Name	Recommended Rate/A (Maximum No. Apps/crop/season)	Active Ingredient	IRAC[1] Group	Relative Performance	Spray Threshold (No. thrips per leaf)
Movento	**5 fl oz** (Max: 2)	spirotetramat	**23**	**BEST!**	0.6 – 1 Or, Pre-bulbing[2]
Agri-Mek SC **Agri-Mek EC** (and generics)	**3.5 fl oz** **14 fl oz** (Max: 2)	abamectin	**6**	MEDIOCRE	0.8 - 1
Minecto Pro	**7.5 – 10 fl oz** (Max: 2)	abamectin + cyantraniliprole	**6** **28**	GOOD	1 - 2
Exirel	**13.5 fl oz** (Max: 2)	cyantraniliprole	**28**	GOOD	1
Radiant SC	**8-10 fl oz** (Max: 30 fl oz: 2-3)	spinetoram	**5**	**BEST!**	3 - 5[3]
Warrior II w/ Zeon Technology (other pyrethroids)	**2 fl oz**	lambda-cyhalothrin	**3A**	**POOR!**	0.6 - 1
Lannate LV	**3 pt**	methomyl	**1A**	**POOR!**	0.8 - 1

[1] **IRAC:** Insecticide Resistance Action Committee – Mode of Action.
[2] Movento does not work very well when onion plant is bulbing. To ensure opportunity to use this effective product is not lost, make first application at threshold or crop stage, whichever comes first.
[3] Radiant may be applied at 1.0 thrips per leaf, but is capable of reducing thrips popuations > 3 per leaf.

Spotted Wing Drosophila and Small-Scale Berry Growers

Esther Kibbe, Cornell Cooperative Extension, Harvest NY

Spotted Wing Drosophila (SWD) is an invasive fruit fly pest that showed up in New York less than 10 years ago. Since then it has spread to all fruit growing regions and become a major pest of small fruit crops, including berries, cherries and grapes. The adults look very similar to native Drosophila species (common fruit flies), except that the males have a black spot on each wing, and the females have a serrated ovipositor that allows them to lay eggs in ripening fruit. This is where this pest becomes so difficult to manage – the females lay eggs inside developing berries, and the larvae feed and grow inside the fruit, then hatch out and continue the cycle, which can take as little as 14 days, when conditions are optimal. Infested fruit becomes soft and leaky, and customers are understandably unhappy if they find larvae ("worms") in their berries.

It is not well understood yet how SWD overwinter in NY, but some number do and populations increase through the spring, feeding on other hosts until the berry/fruit crops are ripe. New York has a trapping network set up across the state to understand when and where this pest first appears. This network has already trapped SWD adults in almost every county in the state since late June. Raspberry and blueberry crops are at severe risk of infestation. For a marketable crop, growers, even with small plantings, need to take steps to manage this pest.

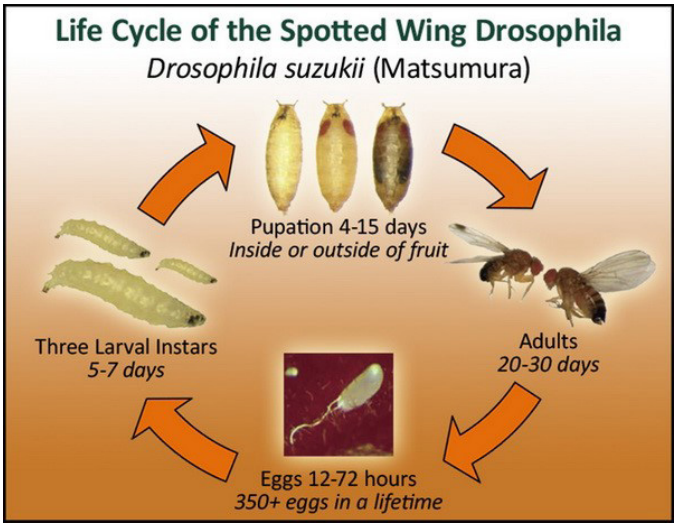
AGGRESSIVE SWD MANAGEMENT ENTAILS 5 KEY TACTICS

1. **Excellent sanitation will reduce SWD populations.** Ripe fruit should be harvested frequently and completely to prevent the buildup of ripe and over-ripe fruit. Unmarketable fruit should be removed from the field and either frozen, "baked" in clear plastic bags placed in the sun, or disposed of in bags off-site. This will kill larvae, remove them from your crop, and prevent them from emerging as adults.
2. **Canopy and water management will make the environment less favorable.** Prune to maintain an open canopy, increase sunlight and reduce humidity. This will make plantings less attractive to SWD and will improve spray coverage. Repair leaking drip lines and avoid overhead irrigation when possible. Allow the ground and mulch surface to dry before irrigating.
3. **Insecticide sprays will kill SWD adults and thereby reduce egg laying.** Insecticide treatments should begin when either regional monitoring alerts about the first SWD trap catch or when highly susceptible fruit crops begin to ripen. Treatments should be applied at least every seven days and repeated in the event of rain. Choose the most effective insecticides with pre harvest intervals that work for your picking schedule.

   Rotate insecticides according to their modes of action.

   Quick reference guides:
   - SWD insecticides for berries <http://www.hort.cornell.edu/fruit/pdfs/swd/berry-insecticides.pdf>
   - SWD insecticides for stone fruits and grapes <www.hort.cornell.edu/fruit/pdfs/swd/treefruit-grape-insecticides.pdf>
   - SWD insecticides for treating dropped fruit <www.hort.cornell.edu/fruit/pdfs/swd/drop-cull-insecticides.pdf>

   Check the Cornell Guidelines <cropandpestguides.cce.cornell.edu> for the latest list of approved pesticides. Special needs labels are being sought for NY berries. Always read and follow the pesticide label instructions.



4. **Regular fruit sampling.** At least 100 fruit per block per harvest should be observed for infestation. Talk to your local CCE agent about a monitoring program. Fruit can be inspected for evidence of larval feeding. Small holes in berries where the eggs were laid may leak juice when the berry is gently squeezed; this is especially diagnostic on blueberry. Infested red raspberry fruit may leave a red juice stain on the berry receptacle when the fruit is picked. Fruit with small indents or bruises where the berry surface appears to have flattened or deflated may be damaged.

   A salt flotation method, immersing fruit in a solution of 1 Tbsp. (14.8 cc) table salt per 1 cup (236.6 ml) water, may cause larvae to float to surface. At least 100 fruit per block per harvest should be observed for infestation. Suggested methods were adapted for NY growers in Guidelines for Checking Fruit for SWD Larvae in the Field
5. **Cool berries immediately.** Chilling berries immediately after harvest to 32° – 33°F will slow or stop the development of larvae and eggs in the fruit. U-Pick customers should be encouraged to refrigerate fruit immediately to maintain fruit quality at home.

ADDITIONAL THOUGHTS FOR SMALL SCALE GROWERS

1. If berries are not a major crop on your farm, consider timing: SWD populations increase rapidly during June/July, increasing risk of infestation through the summer. Summer (floricane) raspberries fare better than fall (primocane) berries. Early blueberry varieties have lower infestation than late ones.
2. Netting small plantings can provide good control without insecticides – there is a lot of research in progress on the best structures and design for this, but it is a promising approach.
3. Spraying for SWD is required if you don't want this pest to destroy your berries – even if you have to use a backpack sprayer on a single row of plants. There are products that can be applied without a pesticide applicator license, as well as organic spray options.

Learn more about SWD. Check out the information on Cornell Fruit Resources Spotted Wing Drosophila, http://fruit.cornell.edu/spotted-wing/.

Credit: Life cycle image and management recommendations from the Cornell IPM Spotted Wing Drosophila blog and website.

Weather Charts

John Gibbons, CCE Cornell Vegetable Program

WEEKLY WEATHER SUMMARY: 6/30/20 - 7/6/2020

	Rainfall (inch)		Temperature (°F)	
Location**	Week	Month July	Max	Min
Albion	0.00	0.00	95	60
Arkport	0.00	0.00	88	57
Bergen	0.00	0.00	91	58
Brocton	0.00	0.00	86	60
Buffalo*	0.00	0.00	94	63
Burt	0.00	0.00	92	57
Ceres	0.00	0.00	91	57
Elba	0.00	0.00	90	59
Fairville	0.00	0.00	90	56
Farmington	0.02	0.02	92	57
Fulton*	0.00	0.00	92	57
Geneva	0.01	0.01	91	61
Hammondsport	0.00	0.00	89	58
Hanover	0.00	0.00	89	57
Lodi	0.01	0.01	91	62
Niagara Falls*	0.00	0.00	91	61
Penn Yan*	0.00	0.00	92	62
Rochester*	0.15	0.15	92	60
Sodus	0.00	0.00	89	56
South Bristol	0.00	0.00	89	61
Varick	0.00	0.00	92	62
Versailles	0.00	0.00	88	57
Williamson	0.00	0.00	88	57

ACCUMULATED GROWING DEGREE DAYS (AGDD) BASE 50°F: APRIL 1 - JULY 6, 2020

Location**	2020	2019	2018
Albion	974	858	1105
Arkport	829	797	1181
Bergen	944	827	1042
Brocton	954	857	NA
Buffalo*	973	841	1171
Burt	891	746	977
Ceres	807	856	994
Elba	916	796	1062
Fairville	919	777	1001
Farmington	953	805	1037
Fulton*	945	766	1019
Geneva	982	854	1075
Hammondsport	929	818	1030
Hanover	958	852	1105
Lodi	993	888	1113
Niagara Falls*	951	797	1251
Penn Yan*	1010	902	1132
Rochester*	978	930	1193
Sodus	NA	759	991
South Bristol	938	813	1046
Varick	1036	919	1129
Versailles	932	848	1091
Williamson	892	739	964

*Airport stations
** For other locations: http://newa.cornell.edu

Cornell Cooperative Extension
Cornell Vegetable Program

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VEGEdge

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VegEdge is the highly regarded 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 University and Cornell Cooperative Extension. VegEdge is produced every few weeks, with frequency increasing leading up to and during the growing season.

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