Cornell University Cooperative Extension

Eastern NY Commercial Horticulture Program

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Vegetable News

Time for Leaf Hoppers

Chuck Bornt, ENYCHP

Figure 1: Potato Leafhopper adult.
Source: Purdue University

Late last week we started to find Potato Leafhoppers in potatoes, and I'm not surprised as this usually coincides with first cutting of hay, especially alfalfa fields. So, it's time to start scouting your potatoes (and beans) as the threshold (especially susceptible varieties) is very low and if left unchecked can cause some serious damage. Potato leafhoppers survive on over 200 species of plants and migrate from the south. Once they are in the region, they often move into potatoes and other plants such as beans from alfalfa and hay fields that have been cut. Keep in mind that there are 3–4 generations of leafhopper each season here so continued vigilance and scouting is key!

Key characteristics: Adult is wedge-shaped, iridescent green in color, and 1/8 inch long (Figure 1). The body is widest at the head. Eggs are laid singly on the underside of leaves. Both adults and nymphs are very active, running forward, backward, or sideways. Sometimes the easiest way to find the nymphs is to brush the plants and wait to see what flies up. As the leafhoppers fly up, follow where they land and flip the leaf over and lots of times you'll find them. The symptoms produced by feeding have been termed "hopperburn." Leafhopper damage is caused when the insect continually probes the leaf tissue, injecting a toxin via their saliva into the plant cells and then sucking the contents back out. The continual probing and saliva injection eventually causes blockages in the vascular tissues of the leaf. Most commonly, hopper burn will be found first on the leaf tips and margins; leaf tips will commonly turn maroon in color followed by wilting then yellowing and usually turn brown and dried up , and die (Figure 2). In beans, the leaf becomes distorted in shape. The entire process takes four to five days.

Scouting/thresholds: Examine tractor radiator and air intake screens for adult leafhoppers during cultivation and hilling operations or check for the presence of adults by using a sweep net or by placing yellow sticky traps near the field edges. Nymphs are best sampled by visual examination of the undersides of leaves on the lower half of the plant. **Threshold: treat when more than one adult is found per sweep or more than 15 nymphs are found on 50 leaves.** (Source: CU IPM Guidelines for Vegetables)

Insecticide options: Many of the plantings that I have

Figure 2: Leaf hopper injury: maroon colored leaf margins and tips followed by yellowing and complete dieback of the leaf.

In this issue of Vegetable News:

been in the last week or so are flowering so be very careful when choosing your insecticide and the timing in which you apply them. There are a number of insecticides for leafhopper control including Warrior II (lambda-cyhalothrin) at 0.96—1.6 ounces per acre or Ambush/Pounce (permethrin, see labels for rates) or a related material Asana XL (esfenvalerate) at 5.8-9.6 fluid ounces. However, having some residual control will also be useful so those options include Assail (acetamiprid) at 1.5—4.0 ozs per acre, Voliam Express (5-8 fluid ounces) or Dimethoate 400 (dimethoate) at 1 pint per acre.

Organic options include Pyganic EC 1.4 or Pyganic EC 5.0 (see label for rates) or products that contain azadirachtin (Aza-Direct, AzaGuard, Ecozin Plus etc., see label for rates and directions) as well as several biologicals that are labeled such as Grandevo. The key is going to be timing and repeated applications! Three applications of azadirachtin at 7—10 day intervals may be required for adequate control. It's also important to read the labels—it's amazing some of the information you will find! For example, azadirachtin works best in water pH that is between 5.5 and 6.5. How many of you have tested your water to see what the pH is? If you've had failures before with this product, maybe it wasn't the products fault, but something else like your water pH! Other hints: I like applying Pyganic and azadirachtin in the late evening in order to allow it more time to be active before the sunlight breaks it down. I also think tank mixing it with Surround (kaolin clay) gives you some added repulsion of the leafhoppers. Or you might want to add a spreader sticker to your Pyganic or azadirachtin applications for improved control. This said, you may also increase the chances of crop injury, but I rarely see that. The other key is to make sure you get in there when you first find leafhoppers and I don't mean when you see the damage—by then it's already getting late and you will probably already have suffered some yield loss.

The most susceptible varieties tend to be the early ones such as Dark Red Norland, Superior and Yukon Gold. Also, russet varieties tend to be more susceptible and less tolerant of leafhopper damage. Scout all your potatoes, but spend extra time in those earlier maturing varieties. There are several varieties of potato that show higher tolerance or even resistance such as Elba, Prince Hairy and King Hairy. Cornell staff studied which varieties are more susceptible than others for hopper damage. That study can be found at: http://nysipm.cornell.edu/reports/ann_rpt/AR05/projects/seaman2.pdf.

If You Have Not Staked Tomatoes Yet...

Meg McGrath, Cornell University

Important Tomato Disease Management Step - Disinfecting Used Stakes

Wooden stakes are a place where the bacterial pathogens that plague tomatoes can survive between crops. In fact, stakes from a tomato planting where research was conducted on bacterial diseases have been used as a source of the pathogen for subsequent experiments! Therefore, it is prudent for growers to disinfect stakes that were in a field where a bacterial disease occurred last year. This step is worth-while even if there is uncertainty about occurrence considering how difficult bacterial diseases are to manage.

There are three bacterial diseases of concern on tomato: speck, spot and canker. Bacterial canker is sufficiently destructive that dis-carding stakes is recommended after an outbreak. Before the field season is in full swing often presents an opportunity to find time for disinfecting stakes.

Step one in disinfecting anything is removing as much dirt and debris as possible because this can protect pathogens and deactivate disinfectant, therefore start by hosing down used tomato stakes.

Clorox or other household chlorine bleach (5.25% sodium hypoclorite) is commonly used as an agricultural disinfectant, but it is not the best choice. Use bleach at a rate of 0.5% (= 1 part bleach + 9 parts water), and use in a well-ventilated area. Soak stakes for 30 minutes. While bleach is highly effective, it is short-lived after mixing in water, with a half-life of only 2 hours, and it is especially prone to being inactivated by organic matter, thus pre-cleaning is critical. A disinfectant containing quaternary ammonium chloride salts like Green-Shield is more stable than bleach after diluting with water. Use at 1 Tablespoon (= 0.5 fl oz) of Green-Shield in 1 gallon water. While this disinfecting solution will be more stable than bleach, it should not be used more than 24 hours after preparation. Soak stakes for at least 10 minutes. OxiDate is an OMRI-listed disinfectant containing hydrogen dioxide. Use 0.5-1.25 fl oz/gal water for disinfecting stakes.

Bacterial Canker on fruit. Photo: Tom Zitter, Cornell.

Keeping Your Crops Irrigated

Kevin Besler (Edited by Teresa Rusinek, ENYCHP)

You probably don't need me to tell you that soils are dry. Most of the region has seen very little rain so far this season and temperatures have often been unseasonably high. It is unusual to be dealing with drought-like conditions this early in the season but with so little snow over the winter, it seems that subsoils never recharged, exacerbating the lack of rain we are experiencing now. We've observed really dry soil conditions so far this season, including in perennial fruit systems where educators are monitoring soil moisture with tensiometers. It is imperative that plants receive adequate moisture to achieve proper germination, nutrient availability and growth. Below are some methods for efficient water use as well as a table detailing the water requirements for several vegetable crops.

- Water plants frequently for shorter durations (e.g., 2-3 times per week for a few hours) **not** once per week for 10 to 12 hours. Long periods of constant water can reduce the availability of oxygen in the soil and also create conditions that favor the development and spread of soil borne pathogens. Letting plants dry out too much before inundating them with water can also cause fruits and roots to become misshapen or split.
- Consider your soil type. Sandy soils drain very efficiently and therefore require more frequent applications than clay or silty soils.
- Apply water early in the morning to reduce evaporative losses.
- Reduce runoff and erosion by not applying water at a faster rate than your soil can absorb.
- Properly space your sprinkler heads to avoid overlap.
- Install a rain gauge to monitor precipitation amounts and adjust your watering schedule accordingly.
- Use timers, automatic shut off valves, and pressure regulators to avoid overwatering.
- Replace overhead irrigation with micro-irrigation, such as drip tape, whenever possible. Reduce evaporative losses further by installing plastic or organic mulch.

CROP	CRITICAL PERIOD	WATER REQUIREMENTS (INCLUDING PRECIPITION)
Asparagus	During establishment During harvest	1 inch every 7 days after planting 2 inches after harvest Mature plantings can be irrigated less frequently
Beans	During flowering and pod set	1 inch per week during flowering and pod set can increase yields significantly during droughts
Carrots	General growth and root fill	1 inch per week Post-establishment irrigation usually only necessary during drought
Cole Crops (Broccoli, Cabbage, Cauliflower)	Head formation and enlargement	1 to 1.5 inches per week Require 15 to 20 inches during growing season
Corn	Tasseling, pollination and ear filling	0.5 to 1.0 inches per week prior to critical period 1.5 inches per week during critical period

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CROP	CRITICAL PERIOD	WATER REQUIREMENTS (INCLUDING PRECIPITION)
Cucurbits (Cucumbers, Melons, Squash, Pumpkins)	Flowering, fruit set and development During rapid growth and fruit sizing	1 inch per week after seeding/transplanting Up to 1.5 inches per week during critical period Don't allow to dry out during critical period
Eggplant	Flowering, fruit set and enlargement	1 inch per week
Garlic	Bulb formation and enlargement	1 inch per week through mid-June Stop irrigating when garlic becomes mature and ready to harvest
Lettuce	Germination and throughout growth; especially during head formation	0.5 to 0.75 inches per week Don't allow soil profile to dry out
Onions	Bulb formation and enlargement	1 to 1.5 inches per week Require 14 to 20 inches during the season
Peas	Flowering, pod set and fill	0.5 to 1 inch per week prior to critical period 1.0 to 1.5 inches per week during critical period
Peppers	Flowering, fruit set and enlargement	1.0 inches per week prior to critical period 1.5 inches per week during critical period
Potatoes	Tuber initiation and sizing	Require 1.5 to 1.75 inches per week during critical period
Radishes	Root fill	Don't allow soil to dry out Post-establishment irrigation usually only necessary during drought
Tomatoes	Flowering, fruit set and enlargement	1 to 1.2 inches per week
Sources: CCE Vegetable Production Handbook & http://www.agric.gov.ab.ca/		

Weather and Prices Lead to A Drop in NYS Vegetable Value in 2015

Steve Reiners, Cornell

Fresh market vegetable acres continued a slow decline in New York, down more than 10% since 2013 (Table 1). Acreage for three crops dropped significantly over the past several years – pumpkins, potatoes and sweet corn. New York, once a leader in pumpkin production has seen the acreage reduced 40% in ten years. New York had been one of the leading states in sweet corn production but acres have declined 20% in two years. Potatoes, unfortunately, have seen planted acres decline over the past thirty years.

In addition to the crops listed above, there are another fifteen "minor crops" grown in NY for which no statistics are kept. These include peppers, eggplant, carrots, endive/escarole, spinach, lettuce, garlic, carrots (both fresh market and processing), melons, radishes, broccoli, asparagus, Chinese cabbage, greens, and herbs. These crops would likely add at least another 10,000 acres and $50 million to the industry totals.

Average yields (Table 2) declined significantly in 2015 for sweet corn, pumpkins, squash and cauliflower and rose for onions and tomatoes, while other crops remained about the same. Certainly the weather played a role as a relatively dry May was followed by record-breaking rains in June in some areas. Unfortunately, even with less produce available, growers with product did not benefit in the prices they received with the exception of huge gains in prices for tomatoes and cucumbers, and smaller increases for onions and cauliflower. The huge reduction in planted pumpkins may be due

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to the reduced value of the crop in NY, as price per cwt. went from $31.40 in 2013 to $22.60 in 2015. The price for sweet corn sold in NY was low at $22.40 per cwt. Prices in neighboring states were significantly higher – $32.20 in New Jersey, $38.50 in Pennsylvania, $40 in Massachusetts.

Table 1. Value and planted acreage of New York fresh market vegetables, 2013 -2015. (USDA Ag Statistics)

	2013		2014		2015	
CROP	VALUE (Million $)	**PLANTED ACRES**	VALUE (Million $)	**PLANTED ACRES**	VALUE (Million $)	**PLANTED ACRES**
Cabbage	71.4	9,000	72.4	8,600	59.6	8,300
Potatoes	66.5	17,500	54.9	16,000	47.4	15,000
Snap Beans	50.4	10,500	52.1	10,200	58.4	10,900
Sweet Corn	78.1	23,500	42.4	19,300	31.4	18,100
Onions	31.6	7,000	33.8	8,200	40.5	7,800
Squash	38.0	4,600	31.4	4,500	25.0	4,500
Tomatoes	32.4	2,900	24.0	2,800	31.4	2,500
Pumpkins	30.1	6,600	20.5	5,500	11.0	4,700
Cucumbers	9.2	1,800	10.1	1,800	17.3	2,000
Cauliflower	3.2	460	2.6	500	2.3	500
TOTALS[1]	**410.9**	**83,860**	**344.2**	**77,400**	**324.3**	**74,300**

Planted acres for processing vegetables remained largely unchanged in 2015, but farm gate value was down almost 40%, largely due to poor weather conditions (Table 3), Unfortunately, individual statistics are no longer provided for processing sweet corn, peas, beets, kraut cabbage, carrots, snap and lima beans.

Table 2. Average yield and marketing year average price for fresh market vegetables in 2013 -2015. (USDA Ag Statistics

	Average Yield (cwt/Acre)				Average Price ($/cwt)			
CROP	**2013**	**2014**	**2015**	**% Change (14-15)**	**2013**	**2014**	**2015**	**% Change (14-15)**
Cabbage	450	400	400	0.0	19.70	21.80	18.40	-15.6
Potatoes	290	280	285	1.8	13.40	12.40	11.40	-8.1
Sweet Corn	110	98	84	-14.3	31.40	23.90	22.40	-6.3
Snap Beans	55	63	65	3.2	89.80	84.50	84.00	-0.6
Onions	310	295	345	16.9	16	15.30	17.60	15.0
Squash	190	160	140	-12.5	43.90	45.50	42.00	-7.7
Pumpkins	160	135	110	-18.5	31.40	29.70	22.60	-23.9
Tomatoes	165	120	130	8.3	72.60	76.80	105.00	36.7
Cucumbers	140	160	160	0.0	38.50	37.10	56.90	53.4
Cauliflower	125	130	110	-15.4	59.80	43	50.00	16.3

Table 3. Value and acreage of New York processed vegetables (snap beans, peas, sweet corn, beets, kraut cabbage, carrots, lima beans), 2013 - 2015. [1] (USDA Ag Stats).

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	2013		2014		2015	
CROP	VALUE (Million $)	PLANTED ACRES	VALUE (Million $)	PLANTED ACRES	VALUE (Million $)	PLANTED ACRES
TOTAL, Proc.	**32.0**	**31,930**	**53.5**	**40,610**	**34.8**	**40,810**

[1]Not published to avoid disclosure of individual operations

Table 4. Value and acreage of all New York vegetables, 2013 - 2015. (USDA Ag Stats).

	2013		2014		2015	
CROP	VALUE (Million $)	PLANTED ACRES	VALUE (Million $)	PLANTED ACRES	VALUE (Million $)	PLANTED ACRES
TOTAL, Proc.	**32.0**	**31,930**	**53.5**	**40,610**	**34.8**	**40,810**
TOTAL, Fresh	**410.9**	**83,860**	**344.2**	**77,400**	**324.3**	**74,300**
TOTAL, All	**442.9**	**115,790**	**397.7**	**118,010**	**359.1**	**115,110**

Average Weekly Farmers' Market Prices

Product (NC = nonconventional)	Unit	Mid-Hudson	Capital Region	Saratoga - Lake George
Beefsteak Tomatoes	1 lbs		$3.95	$3.95
Beefsteak Tomatoes NC	1 lbs		$4.50	
Blueberries	Pint	$4.00		
Carrots	Bunch	$2.00	$3.00	$4.00
Carrots NC	Bunch	$3.00		
Cherry Tomatoes	1 lbs	$3.50		$10.00
Cherry Tomatoes NC	1 lbs		$5.00	
Heirloom Tomatoes	1 lbs	$3.75		
Heirloom Tomatoes NC	1 lbs			$4.50
Raspberries	Pint		$6.50	
Raspberries NC	Pint	$4.00	$3.50	
Red Potatoes	1 lbs	$1.25		
Red Potatoes NC	1 lbs	$2.00		
Russet Potatoes	1 lbs	$1.25		
Russet Potatoes NC	1 lbs	$2.00		$4.00
Salad Mix	1/2 lbs	$5.00	$4.00	
Salad Mix NC	1/2 lbs	$5.00	$5.06	$3.75
Shelled Peas	Pint	$8.00	$3.00	
Shelled Peas NC	Pint		$4.50	
Strawberries	Pint	$4.25	$4.20	$4.50
Strawberries NC	Pint		$4.25	$4.00
Sugar Snap Peas	Pint	$4.00	$3.72	
Sugar Snap Peas NC	Pint	$2.50	$4.50	
Yellow Potatoes	1 lbs	$1.25		
Yellow Potatoes NC	1 lbs	$2.00		$4.00

Reminder to Growers in the Northeast to Observe ENTRUST SC Resistance Management

Last year, Dow AgroScience, manufacturer of Entrust, sent out a letter to University researchers and extension personnel asking for assistance in alerting growers to the over-use of Entrust against Spotted Wing Drosophila and Colorado potato beetle. Their letter addressed issues with "non-compliance with labelled resistance management restrictions for Entrust SC in organic cropping systems".

The letter stated that "they have been made aware that Entrust SC is allegedly being used at a greater frequency than the label allows per crop. Dow is monitoring the situation to understand if these were isolated cases or more widespread occurrences... if the non-compliance issue continues then Dow will pursue corrective action which could include a withdrawal of the product from the Northeastern United States
Dow is concerned that resistance to Entrust SC (group 5 insecticide) will translate into pest resistance to their conventional spinosad-analogue products, Radiant SC and Delegate (also Group 5 chemistry), resulting in the loss of efficacy for conventional growers as well. The possibility of resistance developing in Colorado potato beetle and Spotted Wing Drosophila to Entrust will eliminate one of the most effective tools organic growers have in managing these pests. Withdrawal of Entrust from the Northeast would also eliminate its use for a host of other hard to control pests.

The threat of resistance to this material is real. Already, Western Flower Thrips, a serious pest in ornamentals, vegetable, field crops and greenhouse production, are known to be resistant to spinosaid. Resistance management directions on the label state that rotation to other insecticide classes should occur after two consecutive applications, check the label for details. Please pay attention to resistance management directions on the label for each crop so we do not lose this material. *-Teresa Rusinek, ENYCHP*

WPS Mock Inspection Training Course

UPCOMING EVENT

Tuesday, July 12

Indian Ladder Farm
342 Altamont Rd,
Altamont, NY 12009

Registration 9:30am- 10:00am
Training 10:00am- NOON

As many of you already know, the EPA passed legislation in 2015 that institutes changes to the Farmworker Protection Standard. **The new rules will be in effect and enforced as of January 1, 2017.** "The Worker Protection Standard seeks to protect and reduce the risks of injury or illness resulting from **agricultural workers'** (those who perform hand-labor tasks in pesticide –treated crops, such as harvesting, thinning, pruning) and **pesticide handlers'** (those who mix, load, and apply pesticides) use and contact with pesticides on farms, forests, nurseries and greenhouses. The regulation does not cover persons working with livestock." *source: https://www.epa.gov/sites/production/files/2015-09/documents/worker-protection-factsheet.pdf*

The WPS does apply to farms using Organic OMRI listed Pesticides who have workers and handlers. The only exemption is for farm owners and their immediate families.

DEC will be hosting this WPS Mock Inspection Training Course in an effort to help farmers in the area understand the WPS regulations, changes that will soon be in effect, and what farmers need to do on their farms in order to comply. We encourage all growers to attend as the information will be relevant whether you are a large-scale conventional fruit farm with 60 workers or small scale organic vegetable producer with 2 workers.

The DEC will be issuing 2 pesticide applicator's recertification credits in the following categories – commercial 1A, 1D, 10 and private 21, 22, 23, 24, 25. You must be in attendance for the full two hour course/mock inspection in order to receive credits. Please arrive early to register and sign the roster for credits. Please bring your pesticide applicator's license. There is no charge.

2016 Weekly and Seasonal Weather Information

	Growing Degree Information Base 50^{O} F			Rainfall Accumulations		
Site	2016 Weekly Total 6/21-6/28	2016 Season Total 3/1-6/28	2015 Season Total 3/1-6/28	2016 Weekly Rainfall (inches) 6/1-6/28	2016 Total Rainfall (inches) 3/1-6/28	2015 Total Rainfall (inches) 3/1-6/28
Albany	147.1	927.9	1033.5	0.21	7.02	11.28
Castleton	141.6	890.9	976.0	0.39	10.43	11.47
Glens Falls	128.5	806.9	853.0	0.78	9.19	12.81
Griffiss	124.0	720.3	810.5	0.56	13.39	18.97
Guilder-land	120.0	821.5	919.5	0.64	12.56	16.77
Highland	153.1	1007.2	1049.3	NA	11.6	17.1
Hudson	153.1	978.7	1043.3	0.96	12.43	16.06
Marlboro	143.3	939.4	990.6	2.17	10.25	12.63
Montgom-ery	141.7	925.9	1031.0	1.81	9.09	14.11
Peru	127.1	731.5	781.7	0.54	7.1	14.13
Red Hook	148.5	933.8	984.0	0.81	8.01	12.39
Willsboro	126.4	723.4	754.2	0.35	7.79	16.57
N. Adams, MA	115.0	704.8	770.5	0.93	11.61	12.59

Sweet Corn Pest Chart (week ending 6/27)

Location	CEW	ECBZ	ECBE	FAW	WBC
N. Clinton					
S. Clinton					
N. Washington	0	0	0	0	0
S. Washington	0	0	2	0	0
Albany	0	1	0	0	0
Rensselaer	0	0	0	0	0
Saratoga	NA	1	0	NA	0
Fulton	NA	0	0	NA	NA
Schoharie	0	0	0	NA	NA
Greene	NA	0	0	NA	NA
Orange	0	0	1	0	0
N. Ulster	0	1	0	0	0
S. Ulster	1	1	0	0	0

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