Cornell University Cooperative Extension

Eastern NY Commercial Horticulture Program

Vol. 4, Issue 21
September 29, 2016

Vegetable News

Winter Squash Storage

Ethan Grundberg & Chuck Bornt, ENYCHP

Hopefully everyone finished harvesting their winter squash before the light frost hit the Hudson Valley over the weekend. Many squash plantings seemed to experience late ripening due to the extremely hot dry conditions earlier in the summer that delayed plant development and fruit set. If you weren't able to bring squash into storage before the light frost, be sure to check fruit thoroughly for cold damage in the field and cull aggressively. Even small spots of cold damage create compromised outer cell layers on the skin of the squash that are ideal locations for secondary infections by pathogens that may already be present on the exterior of the fruit (anthracnose and black rot primarily). Even one infested squash in storage can, as most growers have unpleasantly experienced, create a blowout of rot as spores are released and spread fruit-to-fruit in bulk bins. Certain varieties, particularly darker-skinned ones like acorn squash, are more susceptible to yellowing from ethylene exposure. Take care to avoid storing squash near heavy ethylene producers like apples. Here are some additional tips on how best to store your winter squash from Ruth Hazzard, formerly of U Mass Extension:

Harvested and cured specialty winter squash ready for market or storage. Image: Ethan Grundberg

"A period of curing after harvest can help extend storage life of squash. This may be done in windrows in the field -- especially with a series of warm, dry days -- or by placing squash in a warm dry atmosphere (70-80°F) with good air circulation, such as a greenhouse, for up to two weeks. This pre-storage treatment permits rapid drying of the outer cell layers, and when combined with a dry atmosphere for storage inhibits infections that can take place at this time. Any clean cuts during harvest are likely to heal over and are no longer a source for injury or infection.

Take care to avoid subjecting squash to chilling injury. Chilling hours accumulate when squash or pumpkin is exposed to temperatures below 50°F in the field or in storage. Injury increases as temperature decreases and/or length of chilling time increases. Chilling injury is of particular concern with squash intended for storage because it increases the likelihood of breakdown. If squash has been exposed to chilling injury, it should be marketed first and not selected for long-term storage. Remove squash from the field if temperatures likely to drop below fifty degrees for any length of time.

After curing, move squash or pumpkins to a dry, well-ventilated storage area. Pressure bruises can also reduce storage life, so avoid rough handling, tight packing, or piling fruit too high. Fruit temperature should be kept as close to the temperature of the air as possible to avoid condensation,

continued on next page

In this issue of Vegetable News:

which can lead to rot. Ideally, the storage environment should be kept at 55-60°F with a relative humidity of 50-70%. Lower relative humidity increases water loss, resulting in reduced weight, and if excessive, shriveling of fruit. High relative humidity provides a favorable environment for fungal and bacterial decay organisms. Under ideal conditions, disease-free pumpkins should have a storage life of 8-12 weeks and butternut squash up to three or four months. Even if it is difficult to provide the ideal conditions, storage in a shady, dry location, with fruit off the ground or the floor, is preferable to leaving fruit out in the field."

And, here are a few more pointers from our own Chuck Bornt:

- Handle pumpkins and squash as gently as possible to avoid bruising or cutting the skin. Wounds will allow soft rot bacteria and other disease to invade and reduce the storage life of your squash.
- Avoid picking up squash that is wet with dews or recent rain. This increases the risk of pressure bruise and breakdown.
- Many growers will remove the stem especially from butternut and acorn. This practice helps reduce puncturing that can happen in the bins but squash should definitely be cured for up to a week before going into storage.
- Moving squash and pumpkins: too often I think we overlook one crucial component of our harvest – moving squashes and pumpkins from the field to either the packing facility or storage! Moving bins of squash and pumpkins on forklifts or wagons on bumpy farm roads can cause a fair amount of bruising as well so take your time and pay attention.

So, the bottom line is that it's worth it to take the extra time to harvest, cure, and store your squash properly now so that you aren't paying even more labor to clean up putrid rotting bins in a few weeks.

Squash Fruit Storage Conditions

Culinary type	Temperature (°F)	Percent relative humidity	Storage life expectancy
Pumpkins, general	50-55	50-70	8-12 weeks
Squash, general	50	50-70	Varies with variety
Acorn	60-70	60	4 weeks
Acorn	50-60	60	4-7 weeks
Buttercup	50	50-70	13 weeks
Butternut	50-60	60-	7 weeks
Butternut	50	60-	8-11 weeks*
Hubbard	50-60	60-70	27 weeks
Turban	50	50-70	13 weeks

Source: Cornell VegMD (http://vegetablemdonline.ppath.cornell.edu/factsheets/

Crucifers: Alternaria Leaf Spot, Caterpillars & Cabbage Aphids!

Chuck Bornt, ENYCHP

In recent days I have seen a fair amount of Alternaria Leaf Spot in many different crucifers including Brussels sprouts, cabbage, cauliflower and broccoli. Look for brown to black circular spots with concentric rings usually starting on older, lower leaves and moving into younger leaves and/or heads Figure 1). This disease loves conditions that typically occur in the fall including the cooler weather and heavy dews or prolonged leaf wetness! On Brussels sprouts I have seen it "speckle" the sprouts at first. After harvest, try and destroy all crop residues. A three year rotation from crucifers is recommended to help reduce the disease pressure. Bravo is also fairly effective at controlling this disease but has a 7 day PHI. Other effective materials can be found in Table 1. The fungicides listed for organic control are numerous, but only a few have reported to be somewhat effective including Regalia and Serenade Max. See Table 1 for rates and other information on these fungicides.

continued on next page

Table 1: Labeled Fungicides for control of Alternaria Leaf Spot in Brassicas

Name	FRAC	Rate	PHI (days)	REI (hours)	Comments
Endura 70 WDG (boscalid)	11	6-9 oz	0	12	Do not make more than one foliar application of this fungicide before alternating with a fungicide that has a different Group # (MOA).
Bravo Weather Stik or OLP 6 lb/gal (chlorothalonil)	M5	1.5 pints	7	12	Note WPS provisions that apply for 6.5 days after an application because chlorothalonil is a severe eye irritant.
copper	Rates, PHI and REI vary with copper product chosen – please read product label before using.				
Switch 62.5WG (cyprodinil + fludioxonil)	9 + 12	11-14 ozs	7	12	After 2 applications, alternate with another fungicide with a different Group # (MOA) for 2 applications. Do not apply more than 56 oz of product/A/season.
Inspire Super (difenoconazole + cyprodinil)	3 + 9	16 -20 fl. Oz	7	12	Make no more than 2 sequential applications before alternating to a fungicide with a different Group # (MOA). Do not apply more than 80 fl oz of product/A/season.
Reason 500SC (fenamidone)	11	8.2 fl oz	2	12	Do not make more than 1 application of this fungicide before alternating to a fungicide with a different Group # (MOA).
Manzate Pro-Stick or OLP (mancozeb)	M3	1.6-2.1 lbs.	7	24	Labeled for broccoli and cabbage only. Do not apply more than 12.8 lb product/A/season.
Catamaran (phosphoric acid + chlorothalonil)	33 + M5	4 pints	7	12	Do not apply more than 40 pts. per acre per season of this fungicide.
Cabrio EG (pyraclostrobin)	11	12 – 16 oz	0	12	In NYS, no aerial application within 100 feet of aquatic habitats. Do not make more than 2 sequential applications before alternating to a fungicide with a different Group # (MOA).
Procure 480SC (triflumizole)	3	6 -8 fl oz	1	12	Procure 480SC is labeled for Alternaria leaf spot and Powdery mildew only.
Regalia Biofungicide *(Reynoutria sachalinensis)*	P5	1–4 quarts per acre	0	4	For ground applications, apply this product in 50-100 gallons of water per acre. Repeat applications at 5–10 day intervals. Under moderate to heavy disease pressure, tank mix this product with another fungicide.
Serenade MAX *(Bacillus subtilis)*	Bio 44	1 – 3 lbs	See comments	4	Serenade MAX can be applied up to and including the day of harvest.

Figure 1: Alternaria leaf spot lesions: note the concentric rings.

This week I am also seeing a rise in the number and damage being caused by Imported Cabbage Worm (ICW). Now is the time to really control these worms before they work their way into the heads of Brussel sprouts and cabbage. Remember, with cooler temperatures now, Bt's such as Dipel, XenTari etc., will not be as effective as they are in warmer conditions because of slower feeding by the worms. See Table 2 (Found on page 4) for a list of effective insecticides for controlling the 3 main worm pests in brassicas.

continued on next page

Table 2: Relative Efficacy of Insecticides for Control of Worm Pests in Cole Crops

Material, Formulation and Rate	ICW	Sm CL	Lg CL	DBM[3]
Diamides (Group 28):				
Coragen *(3.5 – 5 fl oz)*	xxx	xxx	xxx	xxx
Voliam Xpress[8] (5-9 fl oz)	xxx	xxx	xxx	xxx
Exirel (7 -13.5 fl oz)	xxx	xxx[2]	xxx[2]	xxx
Belt SC *(2-2.4 fl oz)*[9]	xxx	xxx	xxx	xx
Spinosyns (Group 5):				
Radiant SC *(5-10 fl oz)*	xxx	xxx	xxx	xx
Entrust SC *(1.5 – 4 fl oz)*	xxx	xxx	xx	xx
Indoxacarb (Group 22):				
Avaunt 30WG[5] *(0.15 – 0.22 lb)*	xxx	xxx	xxx	xxx
Avermectin (Group 6):				
Proclaim 5G *(2.4 – 4.8 oz)*	xxx	xxx	xx[2]	xxx
Pyrethroids (Group 3A):				
Warrior II w/ Zeon Technology *(1.28 – 1.92 fl oz)*	xxx	xxx	xx	x
Endigo ZC *(4 – 4.5 fl oz)*[7]	xxx	xxx	xx	x
Danitol 2.4 EC *(10.6 – 16 fl oz)*	xxx	xxx	xx	x
Brigade/Capture 2EC *(2.1 – 6.4 fl oz)*	xxx	xx	xx	x[2]
Pounce/Ambush *(0.05 – 0.2 lb ai)*[10]	xxx	xx	x	x
Baythroid XL (1.6 – 2.4 fl oz)	xxx	xx	x[2]	x
Perm-Up 3.2 EC *(2-4 fl oz)*	xxx	xx[2]	x[2]	-
Mustang Maxx *(2.24 - 4 fl oz)*	xxx	xx[2]	x[2]	-
Asana XL 0.66EC *(5.8 – 9.6 fl oz)*	xxx	x[2]	x[2]	-
Hero *(4-10.3 oz)*	?[6]	?	?	?
Bts (Group 11):				
Bt kurstaki (see labels) (Biobit, Javelin, DiPel, Crymax)	xxx	xx[2]	x[2]	x[2]
Bt aizawai (see labels) (Xentari, Agree)	xxx	x	x	xx[4]
OPs (Group 1B):				
Orthene 97 *(1.0 lb)*	xxx	xx	xx	x
Carbamates (Group 1A):				
Lannate LV 2.4L *(1.5 – 3 pt)*	xxx	x[2]	x[2]	x[2]
Larvin 3.2F *(16 – 40 fl oz)*[10]	xxx	x[2]	x[2]	x[2]
Sevin 4F (1-2 qt./A)	x	-	-	x

Table 2 Key and Footnotes:

xxx = most effective (usually good control expected)
x = least effective (fair or poor control)
- = not labeled or not effective.
Not all formulations listed.
Rates in amount of formulated product unless otherwise indicated.
[1] 4.5 – 6 oz for CL
[2] higher rates needed
[3] Where insecticide resistance is not a problem better control of DBM with some materials may be expected
[4] *Bt aizawai* may provide better control of DBM where populations are resistant to *Bt kurstaki*
[5] Avaunt is not labeled for use on Long Island.
[6] Has not been trialed in University studies.
[7] a premix of Warrior + Actara/Cruiser.
[8] A premix of Coragen + Warrior.
[9] Continued registration status for Belt is expected July 6. It can't be sold, but growers with Belt on hand can still use it.
[10] Ambush and Larvin are still registered but in 'discontinued' status (ending in 2017)

Figure 2: Cabbage Aphids found on the underside of a cabbage leaf.

Also for the first time this week I found Cabbage aphids in the heads of Brussel sprouts which concerns me as Brussel sprout harvest hasn't even begun yet. These aphids are very distinctive from other aphids as they have a waxy coating which gives them a whitish blue appearance that looks like they have been dusted in powdered sugar (see Figure 2). Heavy infestations and feeding damage can cause stunting of the plant and leaf curl. My other concern is as a contaminant in harvested product as well. Materials that are labeled can be found in Table 3. Please be mindful of PHI and REI if you are harvesting any brassicas. There are also a number of organically approved insecticides labeled for Cabbage aphid and can be found in Table 3 on the following page.

continued on next page

Table 3: Labeled Insecticides for control of Cabbage Aphid in Brassicas

Name	IRAC	Rate	PHI (days)	REI (hours)	Comments
Assail 30SG (acephate)	4A	2.0 – 3.0 oz	7	24	
*†Exirel (cyantraniliprole)	28	13.5-20.5 fl oz	1	12	
Beleaf 50SG (flonicamid)	9C	2.0-2.8 oz	0	12	Do not apply more than 3 applications at the 2.8 oz rate.
Leverage 2.7 (imidacloprid + cyfluthrin)	4A + 3A	3.8 fl oz	7	12	Maximum per season is 19.2 fl oz
Fulfill (pymetrozine)	9B	2.75 oz	7	12	Apply when aphids first appear but before populations build to damaging levels. Do not exceed 5.5 oz/A per season. Allow 7 days between applications.
Movento (spirotetramat)	23	4-5 fl oz	1	24	Do not apply more than 10 fl oz/A per season. Allow 7 days between applications.
Actara (thiamethoxam)	4A	1.5-3.0 oz	See comments		For foliar application only. PHI for head and stem Brassica is 0 days; for leafy Brassica greens is 7 days.
Grandevo (*Chromobacterium subtsugae* str. PRAA4-1)	UC	2-3 lbs	0	4	
Mycotrol O *(Beauveria bassiana Strain GHA)*	UC	0.25 – 1 qt	See comments	4	PHI – Up to day of harvest.
azadirachtin containing products (Aza-Direct, AzaGuard etc.)	UN	Because there are a number of these products labeled, please refer to the label of the product you purchased for rates, PHI, REI and other application information.			
Pyganic EC 5.0	3A	4.5 – 17 fl oz	Until spray has dried	12	

Whiteflies in High Tunnel Tomatoes

Amy Ivy, ENYCHP

Whiteflies do not overwinter this far north and are not a regular occurrence in vegetable production here. They are most often seen in heated greenhouses that stay in some kind of production through the winter, especially if potted stock plants or 'pet' plants are kept by the grower. They have a wide host range and are very difficult to control in a heated tunnel once established. They can arrive on infested transplants shipped in from the south or move from a farm's propagation house to a high tunnel on seedlings. They love high tunnel tomatoes, so once they arrive their population can quickly explode, making biocontrol options impractical. Because they are an infrequent pest, they often catch us by surprise and once a population is well established it can be difficult to control even with sprays. Whiteflies are not actually flies but are true bugs, in the Hemiptera order. They lay their eggs in clusters on the undersides of leaves and hatch in about 5-10 days. The first nymph stage is mobile, but once it settles down to feed it can no longer move. It remains in place for about 2 weeks feeding on the plant juices and exuding a sticky honeydew that drips onto leaves and fruits below. The adults are tiny, about $1/10^{th}$ of an inch but they are easy to see as they rise up in clouds of flies when the leaves are disturbed. Adults live about 3 weeks and females can lay about 300 eggs.

According to our colleague, Judson Reid, insecticide options for tunnels include Danitol with Belay, Agrimek and Admire. Be sure to check the days to harvest. Because biocontrols need to be in place at the earliest stage of infestation they are not practical to use in a seasonal tunnel once

an infestation is established. Letting the tunnel freeze over winter will kill off any remaining whiteflies.
Resource: https://entomology.ca.uky.edu/ef456

Above: These tomato fruits have sticky, black spots on them from the honeydew that drips down from insects on the leaves above. This can be washed off the fruit but it is an extra step during a very busy season.

These yellowed leaves might be mistaken for nutrient deficiency, so turn the leaf over to look for nymphs and resting adults or brush the leaves to see if adults fly up.

Left: The underside of this leaf has whitefly nymphs and eggs as well as spider mites and their eggs.

Agricultural Water Withdrawal Annual Reporting

Sourced from DEC website: http://www.dec.ny.gov/lands/86904.html

All agricultural facilities withdrawing water equal to or in excess of an average of 100,000 gallons per day in any thirty day consecutive period (3 million gallons during a 30 day period) must file an annual report with the New York State Department of Environmental Conservation by March 31st of each year. Facilities should also submit annual reports in years that the threshold volume was not exceeded in order to maintain continuity. Please note that multiple non-contiguous parcels of land under the ownership or control of the same person are considered to be one agricultural facility although there are exceptions.

Water use must be reported by completing the Agricultural Water Withdrawal Reporting Form, (http://www.dec.ny.gov/docs/water_pdf/wwrag1215.pdf) Please note that this form does not work with "Chrome" internet browser. **If you have trouble accessing or need a paper copy, call Maire at 845-344-1234 or e-mail mru2@cornell.edu and we'll get it to you**. DEC prefers submission email; but you may mail a completed paper form. Required information on the form includes:

- The water source, location of the water source and the source capacity if known;
- The amount of water withdrawn for the reporting period, including the average and peak withdrawals;
- A description of the use of the water withdrawn;
- The estimated amounts of water returned, if any, the locations of such returns, and the method of such returns;
- The actual or estimated average monthly and annual volumes and rates of water lost or consumptively used from the withdrawal; and
- The water conservation and efficiency measures undertaken during the reporting period.

Please note that water withdrawal applies to both groundwater or surface water.

For more information on water withdrawals and reporting see: http://www.dec.ny.gov/lands/55509.html

UPCOMING EVENTS

Cover Crop Field Day: *Not what grandpa used to plant!*

ENYCHP would like to invite you to see hands on over 20 different species and combinations of cover crops planted no-till directly into standing sweet corn! Guest speakers will discuss species selection, and our host farm will demonstrate their Unverferth Ripper Stripper unit and discuss their reduced tillage and cover crop experiences used for vegetables.

Guest Speakers: Dr. Paul Salon, *Northeast Soil Health Specialist* & Dave Wilson, *Research Agronomist and Cover Crop Specialist*

Thursday, October 13,
10:30 am – 2:00 pm

Stanton's Feura Farm
210 Onesquethaw Creek Road
Feura Bush , NY 12067

$5 per person (lunch provided)
Please Pre-Register!

To register visit http://enych.cce.cornell.edu/event.php?id=609
or call Abby at 518-746-2553
For more information about the program, call Chuck Bornt at 518-859-6213

Vegetable Growers Twilight Meeting: Cultivation Equipment Demonstration

The demonstration will highlight the use of several cultivation implements, including :
- Buddingh Basket Weeder
- Williams Flex Tine Cultivator
- I & J Two Row 3-Point Cultivator
- HAK steerable S-Series hoeing machine
- Jean-Martin Fortier style flame weeder.

In addition to the equipment demo, we will discuss how these tools are used in conjunction with cover cropping, plastic mulching and stale seed-bedding for weed management on diversified vegetable operations.

Wednesday, October 19th
3:30 – 5:30 PM
Poughkeepsie Farm Project
51 Vassar Farm Lane
Poughkeepsie, NY 12603

There is NO FEE for this program. The meeting will be held rain or shine. Please Pre- Register by Monday October 17th at http://enych.cce.cornell.edu/event.php?id=610 or call Abby Henderson at 518-746-2553

⇒ **Sunday October 9th & Monday October 10th - Tractor Operation, Safety & Basic Maintenance: A Two-day Class for New, Beginning, and Seasoned Farmers©,** Blue Star Farm in Stuyvesant. Day one of the program will discuss how tractors work and basic operation. In day two, participants will learn basic and regular maintenance in a hands on workshop. Cost: $75 (includes lunch and refreshments) Register at: http://www.nebeginningfarmers.org/2016/09/14/2-day-tractor-training-intensive-with-shane-labrake-in-the-hudson-valley/. For questions contact Matt Weiss at 607-255-9911 or mw84@cornell.edu

⇒ **October 27th – GMO's: Distinguishing Fact from Fiction,** Gardenworks Farm, 1055 County Rte 30, Salem, NY 12865 http://gardenworksfarm.com/. Register at: http://www.sunyacc.edu/academics/continuinged

⇒ **November 16th -17th - GAPs and FSMA Produce Rule training, Brattleboro, VT. For Farmers:** The first day will provide training on Good Agricultural Practices (GAPs) *and* the Produce Rule of the Food Safety Modernization Act (FSMA). **This one-day workshop will satisfy the FSMA Produce Safety Rule requirement for growers who are covered by FSMA outlined** in § 112.22(c) that requires "*At least one supervisor from the farm must complete food safety training at least equivalent to the standardized curriculum recognized by the FDA.*" If you are unsure of whether the farm will be covered under the rule, you can use this online decision tree developed at the Agency of Ag to find out if you are likely to be covered: https:// www.surveymonkey.com/r/vtfsma. The workshop will be limited to 30 growers and 20 ag service providers. **We will be sending out details about both workshops in the coming weeks!** Questions? Contact Ginger Nickerson: gnickers@uvm.edu

Food For Thought

Jesse Strzok, ENYCHP

While meeting with the economics department at Iowa State University I was told I needed to see the 63rd Farm Progress Show which was underway in nearby Boone, IA. At the largest outdoor farm equipment show in the US, the biggest stir was being caused by Case IH's unveiling of their bright-red, self-driving, cabless, prototype tractor. Although we're seeing more and more automation in equipment this is the most I have seen to date. Of course there are concerns of what happens when it drives through the barn, or house, on its own - on the other hand you can think of major efficiency and cost savings. Although such technology and equipment is not likely to be cost effective here in ENY for quite a while it's neat thought for food (or food for thought). Go to www.caseih.com and look for Autonomous Concept Vehicle pictures and video.

Site	2016 Weekly Total 9/20-9/27	2016 Season Total 3/1-9/27	2015 Season Total 3/1-9/27	2016 Weekly Rainfall (inches) 9/20-9/27	2016 Total Rainfall (inches) 3/1-9/27	2015 Total Rainfall (inches) 3/1-9/27
Albany	161.5	2938.3	3018.0	0.07	18.6	21.1
Castleton	125.1	2849.3	3468.1	0.51	19.6	20.9
Glens Falls	105.5	2610.0	2592.0	0.09	25.0	18.7
Griffiss	97.0	2488.6	2450.5	0.16	30.9	28.0
Guilderland	111.0	2665.5	2720.0	0.01	18.1	25.4
Highland	142.4	3110.9	NA	0.46	19.9	NA
Hudson	135.9	3054.7	3004.8	0.39	27.3	25.9
Marlboro	133.6	2978.9	2909.1	0.29	19.1	19.2
Montgomery	133.6	2997.1	2947.0	0.32	18.1	21.1
Peru	109.3	2485.1	2477.3	0.62	12.1	20.8
Red Hook	130.8	2910.3	2864.1	0.24	16.9	21.6
Willsboro	105.0	2442.3	2429.6	0.47	16.4	24.3
N. Adams, MA	96.6	2359.3	2342.5	0.52	22.0	23.2

ENYCH Program Educators:

Fruit

Dan Donahue
Phone: 845-691-7117
Email: djd13@cornell.edu
Tree Fruit

Anna Wallis
Phone: 443-421-7970
Email: aew232@cornell.edu
Tree Fruit & Grapes

Laura McDermott
Cell: 518-791-5038
Email: lgm4@cornell.edu
Berries

James O'Connell
Phone: 845-691-7117
Email: jmo98@cornell.edu
Berries & Grapes

Vegetables

Chuck Bornt
Cell: 518-859-6213
Email: cdb13@cornell.edu

Amy Ivy
Phone: 518-561-7450
Email: adi2@cornell.edu

Teresa Rusinek
Phone: 845-340-3990 x315
Email: tr28@cornell.edu

Erik Schellenberg
Phone:845-344-1234
Email:jk2642@cornell.edu

Crystal Stewart
Cell: 518-775-0018
Email: cls263@cornell.edu

Maire Ullrich
Phone: 845-344-1234
Email: mru2@cornell.edu

Ethan Grundberg
Phone: 617-455-1893
Email: eg572@cornell.edu

Business and Economics

Jesse Strzok
Phone: 518.429.1464
Email: js3234@cornell.edu

Elizabeth Higgins
Phone: 845-691-7117
Email: emh56@cornell.edu