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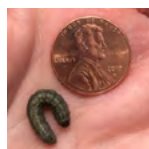
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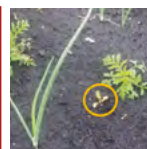
Add New and Old Melon Varieties to Your Market Mix

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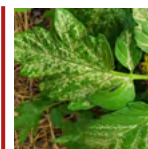
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Add New and Old Melon Varieties to Your Market Mix

Robert Hadad, Cornell Cooperative Extension, Cornell Vegetable Program

Several years back, I conducted a variety trial looking at old Casaba-type melons. Similar to cantaloupe, but in my opinion more flavorful, these melons were customer favorites when brought to several farmers markets by growers who tried them on their farm. The melons are later than cantaloupe, ripening mid-late August through September but mostly tolerant to downy mildew. They like long hot summers and require a fair amount of water.

Many of the Casaba varieties have dark green hard rinds or bright yellow (Canary-type). Size ranges from 3-5 lbs sometimes with ribbed rinds. The melons tend not to have a slip stem so it's a bit harder to judge when they are ripe. The best way is to look for drying tendrils close to the stem, and the glossy green rind color starts to lose its sheen. Harvest a few and taste for yourself. If the flesh has a bit of lime green color, then they are about 3-5 days away from prime ripeness.

As mentioned, these melons are old varieties having been around in catalogs going back about 100 years. Some can still be found in a few of the smaller seed companies and through Seed Savers Exchange. Sometimes they were called winter melons, Christmas or Santa melons because they ripened later in the season and were often seen in the markets well into September or even later. Some actually can store for several weeks in the cooler at temps in the mid 30sF. If you grow a variety or two, try having the varieties spaced far apart to avoid cross pollinating and save the seed from a few of the fruits. Grow them out year after year. Some of the varieties related to these old timers are Piel de Sapo, Bidwell, Valencia Winter, and Golden Beauty.



Casaba trial with harvest in early September, 2016.

Photo by R. Hadad, 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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The next issue of VegEdge newsletter will be produced on June 9, 2021.

Growing Degree Days (GDDs)

Emma van der Heide, CCE Cornell Vegetable Program

Accumulated Growing Degree Days (AGDD)

Base 50°F: April 1 - May 31, 2021

Location**	2021	2020	2019
Albion	321	253	229
Arkport	279	233	253
Bergen	300	265	247
Brocton	346	289	276
Buffalo*	356	288	227
Burt	237	221	181
Ceres	283	235	322
Elba	285	255	218
Fairville	297	270	227
Farmington	316	280	236
Fulton*	291	291	227
Geneva	330	279	260
Hammondsport	310	277	263
Hanover	320	285	275
Lodi	308	300	288
Niagara Falls*	304	259	198
Penn Yan*	356	288	292
Rochester*	321	277	291
Sodus	342	263	224
South Bristol	325	278	256
Varick	364	309	295
Versailles	312	287	288
Williamson	264	255	198

* Airport stations

** For other locations: <http://newa.cornell.edu> ●

WHAT'S NEW?

A few seed catalogs are highlighting new Canary and Casaba type hybrid (and non-hybrid) melon varieties (Johnny's Selected Seeds, Harris, Seeds from Italy etc.). The descriptions touch on the flavor, attractive rind coloration, and disease tolerance. If you can provide some taste sampling at your farmers market, do it. Customers will rave about these melons and they will be big hits for certain. Also, being a bit later, they will also be a novelty as well. Some of these new varieties are Durasol, Tweety, Sensation, Brilliant, Torpedo, King Show, Melon Tendral Valenciano, and Giallo da Inverno.

To read more on the Cornell Vegetable Program melon trial, check out https://rvpadmin.cce.cornell.edu/uploads/doc_440.pdf ●

Black Cutworms in Vegetable Crops: Scout Now!

Julie Kikkert, Cornell Cooperative Extension, Cornell Vegetable Program

My colleagues in field crops maintain traps for black cutworm because they are regular pests in field corn. While cutworms are also pests of vegetable crops, we haven't focused on them too much unless populations are high in the area. According to the NYS IPM Field Crops Report on June 1, 2021, there have been some very large trap catches this year, and migrations have increased this week with some very high captures in western and northern, NY. Mike Stanyard from the CCE Northwest NY Dairy, Livestock, and Field Crops Team reports that all locations have reached the 100 degree days for development and eggs have hatched. Using degree days, it is predicted that the time for larval feeding is now through the month of June at least. The last two growing seasons, I observed some large fields of table beets, carrots and snap beans hit by this pest.

BLACK CUTWORM (*AGROTIS IPSILON*)

The larvae feed on newly emerged vegetable crops and often clip many young plants at or below the soil line each night. Crops grown from seed are more prone to damage than transplants. According to R. Groves, Univ. of Wisconsin-Madison, susceptible crops include beets, carrots, cucumber, leafy greens, melons, peas, potato, pumpkin, snap beans, squash, and sweet corn.

Scout fields near any woods or weedy hedgerows that border fields. Look closely for plants that have been sheared off at ground level or areas where plants are not emerging well. There may or may not be cut leaves laying nearby. Cutworms sever young plants near the soil line and pull the plant into the ground as they feed. Severely infested fields last year had beautiful stands of beets that seemed to disappear overnight! If you dig up the cut off plants, you will likely find cutworms in the soil near the base of the plant or just underground. You may also see holes where the worms come in and out of the soil. The larvae are nocturnal feeders, but on rainy days you



A black cutworm larva that has curled up into the typical C-shape when disturbed. Photo by J. Kikkert, CCE Cornell Vegetable Program



Hole in a beet row where a black cutworm larva was discovered feeding on young beets and pulling them below ground. Photo: J. Kikkert, CVP



Suspect black cutworm feeding on beets. Note clipped leaves on plant and leaves lying on the ground. Photo: J. Kikkert, CVP

may see them coming out of their holes and feeding during the day. The larvae curl into a characteristic C-shape when disturbed.

Black cutworm moths fly up from the south and lay their eggs on weeds near field borders. The larvae then crawl to the crop field. Thus, damage can typically be seen near field borders. The best control is to apply an insecticide along the edges of the field where the caterpillars are feeding. It is usually not worthwhile spraying the entire field; however, if cutworm damage is detected deeper within fields, then the entire field could be treated. In a perfect world, insecticides would be applied in late evening or at night so that the chemical would directly contact the caterpillars.

TREATMENT THRESHOLDS FOR BLACK CUTWORMS

Economic treatment thresholds for black cutworms have been developed for the following crops (Univ. of Wisconsin):

- Snap bean= 2 larvae/row foot
- Potatoes= 4 larvae/row foot
- Sweet Corn= >5% of plants damaged
- Leafy greens= <3% of the stand affected

Several pyrethroid products are labelled in New York for the control of cutworms. Please check the label for your specific crop. For organically grown crops, our current best thinking is that a mixture of azadirachtin and pyrethrin provides the best chance of control. Contacting the caterpillars with the spray might improve efficacy, so spraying in the late evening or night might be beneficial. While Bt's (*Bacillus thuringiensis*) are labeled, the caterpillars must ingest the product and it may not be very effective on large caterpillars.

MORE INFORMATION

For more information on black cutworm biology and management, see <http://labs.russell.wisc.edu/vegento/pests/black-cut-worm/> ●

BEETS

Dry soils over the past few weeks have delayed germination of beet seeds causing uneven stands. For processing growers this can mean unwanted variation in the root size of the beets at harvest and too many roots larger than the desired grade. For fresh market growers, you may see more beets germinating over time as more soil moisture is available. Beets tend to sit there until the conditions are favorable. Weed control is critical at this time. It is a balance of letting the beets grow to the 2 to 4 leaf stage before starting herbicide applications, but not letting the weeds get too large or they will not be controlled. See the Cornell Vegetable Guidelines for POST emergence herbicide use. Start scouting for black cutworms. - JK

CARROTS

Scout carrots for any seedling issues such as wirestem disease, wind and heat damage, etc. Weed management is also critical at this stage. Scouting for black cutworm should commence this week and through June. - JK

CUCUMBERS

Cucumber beetle activity has started in some locations, other areas have none, and still others fields the numbers are increasing. If treated seed or drenched transplants were not used, damage could be severe. Row cover can reduce the onslaught providing the weave is tight and edges held down. The Cornell Vegetable Crop Guidelines has a full list of products available for use in NY. Some for the treatment of cuke beetle adults include Pounce 25 WP, Warrior II w/Zeon, and Voliam Xpress. - RH

LETTUCE AND GREENS

Be on the lookout for aphids in lettuce. Hard to manage because killing them will leave dead aphids on the leaves. To a customer, a dead aphid might as well be a live one. Rinsing out heads after harvest will be necessary to remove unsightly pests. Rinsing with water spray or dunking into a bubbler tank can help wash out aphids. For more information on bubbler tanks, please contact Robert Hadad at 585-739-4065 or rgh26@cornell.edu - RH

ONIONS

Earliest direct seeded onions are in the 3-4 leaf stage with most of direct seeded crop in 1-2+ leaf stage. Earliest transplanted onions are in 6-7 leaf stage. Both onions and weeds have been growing nicely. Not sure yet how the colder temperatures of the past week affected the "toughness" of the onions or the weeds, as I have not had a chance to check out the full effect of herbicide sprays that were made last Saturday. There are some weed populations in onion fields on the verge of "blowing out". When weeds are 3-4 inches in size, they can escape control with herbicides. Ideally, post-emergent herbicides should be applied when weeds are 2 inches or less. See "Effective Post-Emergent Weed Control in Onion: Knocking Back and Knocking Out" on page 6 for tips and examples for selecting different post-emergent herbicide options. CVP onion scouting programs will start next week in all regions. Although we have not been looking at hundreds of onion leaves each week for leaf diseases, we have not seen any Botrytis leaf blight (BLB) yet. The dry and windy weather has not been conducive to BLB. Necrotic spotting caused by Goaltender herbicide can look similar to BLB halo lesions (Fig. 1). Onion maggot is just getting started and will be evident by wilting plants, usually in onions with at least 2 leaves. **Growers should scout transplanted onions in 5-6 leaf stage or larger for onion thrips.** We did not do counts this week, but have seen adult thrips and new hatches in these larger onions and suspect that some fields may be at the spray threshold of 0.6 to 1.0 thrips per leaf for the first application of Movento. - CH



Figure 1. Necrotic spotting caused by Goaltender (left) can be confused with halo lesions of Botrytis leaf blight (right). Although similar in color, spots caused by Goaltender have a defined border, are slightly sunken and several are smaller. Photos: C. Hoepting, CVP

Allium Leaf Miner (ALM) has been confirmed in Seneca County this week on spring onions grown from sets. Foliar damage in bulbing onions (var: Candy) is also apparent in the form of herbicide-like distortion. This invasive pest is relatively new to the CVP region and we are still researching effective management. Damage is more common in smaller acreage allium crops such as leeks and chives, although ALM pupae can be found in the bulb area of harvested onions.

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A small maggot is visible under the layers of this spring onion. The eggs were likely laid in April and May. *Photo by J. Reid, CVP*



Silver metallic mulch may reduce damage from ALM. *Photo by J. Reid, CVP*

From research conducted by Teresa Rusinek, Ethan Grundberg (ENY Commercial Horticulture Program) and Dr. Brian Nault: “conventional insecticides already labeled for use on bulb crops in New York are effective at reducing damage from ALM, including Exirel (cyantraniliprole, IRAC Group 28, 2(ee) label required at 13.5 fl oz/acre, Radiant (spinetoram, IRAC Group 5) at 8 fl oz/acre, and Warrior II with Zeon Technology (lambda-Cyhalothrin, IRAC Group 3A) at 1.6 fl oz/acre.” Metallic silver mulch has also been shown to reduce ALM damage. Entrust is an organic option, and row covers over the flight period (March-June) may also be of benefit. - JR

PEAS

Post-emergence weed management is critical in peas before the bloom stage. See the general article in last week's issue of VegEdge. - JK

SNAP BEANS

Planting continues. Make note of any stand issues and scout for weeds! - JK

NY Sweet Corn Trap Network Report, 6/1/2021

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

Statewide, 14 sites reported this week. No European corn borer (ECB)-E, ECB-Z, corn earworm (CEW), fall armyworm (FAW), or western bean cutworm (WBC) were caught at any of the reporting sites. Traps for the hybrid ECB are located at 5 sites this year: Bellona, Geneva, Penn Yan, Seneca Castle, and Hurley. The only moths caught this week were 4 ECB hybrids at the Hurley site.

ECB moths are attracted to the most advanced corn, especially fields started under plastic or row cover. In these early plantings, larvae don't feed in the whorl and emerge in the tassel as they do in bare ground corn and the usual scouting and threshold recommendations do not apply. For management recommendations for ECB in early corn, please see [Managing ECB in Plastic, Row Cover, or Transplanted Sweet Corn](#).

European corn borer (bivoltine) development estimated using a modified base 50F degree day calculation

Development Stage	Accumulated Degree Days
First Generation	
First spring moths	374
First eggs	450
Peak spring moths	631
First generation treatment period	800-1000
Second Generation	
First summer moths	1400
First eggs	1450
First egg hatch	1550
Peak summer moths	1733
Second generation treatment period	1550-2100

WNY Pheromone Trap Catches: June 1, 2021

Location	ECB-E	ECB-Z	ECB Hybrid	CEW	FAW	WBC	DD to Date
Batavia (Genesee)	0	0	NA	0	0	0	429
Bellona (Yates)	NA	NA	NA	NA	NA	NA	411
Brockport (Monroe)	NA	NA	NA	NA	NA	NA	440
Collins (Erie)	NA	NA	NA	NA	NA	NA	401
Eden (Erie)	0	0	NA	0	0	0	420
Geneva (Ontario)	NA	NA	NA	NA	NA	NA	407
Hamlin (Monroe)	NA	NA	NA	NA	NA	NA	411
Leroy (Genesee)	NA	NA	NA	NA	NA	NA	418
Lyndonville (Orleans)	0	0	NA	0	0	0	396
Oswego (Oswego)	NA	NA	NA	NA	NA	NA	342
Panama (Chautauqua)	NA	NA	NA	NA	NA	NA	380
Penn Yan (Yates)	NA	NA	NA	NA	NA	NA	398
Portville (Cattaraugus)	NA	NA	NA	NA	NA	NA	397
Ransomville (Niagara)	0	0	NA	0	0	0	444
Seneca Castle (Ontario)	0	0	0	0	0	0	391
Williamson (Wayne)	NA	NA	NA	NA	NA	NA	354

ECB: European Corn Borer; CEW: Corn Earworm; FAW: Fall Armyworm; WBC: Western Bean Cutworm; NA: not available; DD: Degree Day (base 86/50) April 1st accumulation [Climate Smart Farming](#)

Average Corn Earworm Catch			Days Between Sprays
Per Day	Per Five Days	Per Week	
<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. ●

Effective Post-Emergent Weed Control in Onion: Knocking Back and Knocking Out

Christy Hoepting, Cornell Cooperative Extension, Cornell Vegetable Program

KNOCKING BACK

When temperatures warm up after a slow cold spring, everything grows quickly – onions, barley and weeds. The result can be onions in various stages of flag-leaf with a new flush of weed seedlings breaking through. Goal 2XL 0.25-0.5 fl oz/A with barley-kill herbicides can wipe out seedlings in cotyledon stage (~0.25") and "burn back" other slightly larger weed escapes (0.5"). Below is a summary of my research trial results from 2018 and 2019 on spraying onions at 1.25-leaf stage with respect to crop safety. Specifically, 1.25-leaf stage is when the second leaf is starting to come in and is about a quarter of the size of the first-leaf. Herbicide applications at 1.25 leaf can kill seedlings and "hold back" weed seedlings until higher rates of herbicides may be applied at the 2-3 leaf stage.

CROP SAFETY ON 1-LEAF ONION (TECHNICALLY 1.25-LEAF = 2ND LEAF STARTING) in order from safest to onion to causing most injury to onion				
(1) Goaltender 1 fl oz = Goaltender 2 fl oz	(2) Chateau 2 oz	(3) Goal 2XL 2 fl oz	(4) Buctril 2E 8 fl oz	(5) Goal 2XL 4 fl oz = Buctril 2E 8 fl oz + Goaltender 2 fl oz = Chateau 2 oz + Goaltender 1 fl oz
Categories (1-3) less than 5% crop injury 7 days after treatment (DAT)			Category (4) 5-10% crop injury 7 DAT	Category (5) 10% or more crop injury 7 DAT

KNOCKING OUT

The 2 to 2.5-leaf stage tends to be the minimum most tolerant leaf stage to post-emergent herbicide injury. By the time onions are this big, weed escapes from pre-emergent programs may range from cotyledon stage to 4-6" in height/diameter. Table 1 provides some very general information on the ability of single application of post-emergent herbicide to kill the most common weed species in muck-grown onion. Most often, **if after a week and the weeds are not yet dead and the onions can tolerate another herbicide application, make a second application. You may need to switch post-emergent herbicides or rates to tailor to which species are not dying.** Maximum leaf stage for Buctril and Chateau are 5-leaf and 6-leaf, respectively. The risk of crop injury should always be weighed against the risk of an out-of-control weed problem. Sometimes there are not enough weed escapes to warrant hurting the onions. Other times, injured onions is a small price to pay for excellent weed control.

Table 1. General weed size that post-emergent herbicides kill in onion, from herbicide trials conducted 2017-2019 (Hoepting).

Herbicide Treatment (single application)	Maximum Size of Weed Killed						
	PW	LQ	SW/LT	RW	MYC	YNS	PRE-emergent Activity
Chateau 2 oz	2-4"	none	0.5-1"	1" Some 2"	1-2"	2" VG burn	YES!
Goal 2XL 4 fl oz	4"	1"	1-2"	none	none	1-2" G burn	No
Goaltender 2 fl oz	1-2"	none	--	none	none	--*	No
Buctril 2E 8 fl oz	1"	1"	1"	2-3"	--	--	Some
Buctril 2E 8 fl oz + Goal 2XL 4 fl oz	4"	1-3"	4"	3"	4-6"	--	Some
Buctril 2E 8 fl oz + Goaltender 2 fl oz	3"	1-2"	4"	3"	4-6"	--	Some

PW: pigweed; LQ: Lamb's quarters; SW/LT: smartweed/Lady's thumb; RW: ragweed; MYC: marsh yellowcress; YNS: Yellow nutsedge

*have not tested

Chateau 2 oz (WSSA Group 14) – Excellent mortality of species within its size limit

- Excellent on controlling select small weeds (less than 1"). Great utility for killing small marsh yellowcress (MYC), ragweed (RW) and smartweed/Lady's thumb (SW/LT).
- Pigweed is the only species that it can kill larger sizes, sometimes up to 4".
- **Generally, Chateau results in a very high mortality rate of the species and size of weeds that it is good at, but beyond that it has very little burning, stunting or ability to "hold back" the weeds.**
- Exception to this is **yellow nutsedge**, where Chateau can do a great job burning back (but not killing) this perennial weed.
- Weak on Lamb's quarters (LQ), which will escape when Chateau is used alone.
- Another advantage of Chateau is that the rates used for post-emergent weed control have very good pre-emergent control as well.
- Do not apply past 6-leaf stage.

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Goal 2XL (WSSA Group 14) - Broad-spectrum weed control, less weed mortality, more burn

- Compared to Chateau, Goal 2XL has more broad-spectrum weed control, but tends to have lower mortality rates.
- Instead, it causes much more “injury” to the weeds that it does not kill and has better ability to “hold back” a weed flush.
- Multiple applications progressively kill more individuals and continue to burn back the population, but larger weeds (>3-4”) can be tough to kill.
- Leaves can be burned up all the way up the stem, but the growing point at the top is still green. I call this the “green eye”.
- Goal 2XL is notably weaker on mustards compared to Chateau and Buctril.

Goaltender (WSSA Group 14) – Safer on onions and weeds, higher rate of active ingredient can be delivered to small onions with much more safety than Goal 2XL

- Compared to Goal 2XL at equivalent rates (Goal 2XL 4 fl oz = Goaltender 2 fl oz), Goal 2XL provides better weed control including better burn and ability to kill larger weeds.
- Single app of Goaltender does not kill anything except for PW, although it can hold back other weed species.
- Notably safer on the onions, so it can be used on young onions or in tank mixes where Goal 2XL is too injurious.
- To achieve similar weed control as 2XL, its rates would have to be bumped up.

Buctril/Broclean/Brox (a.i. bromoxynil, WSSA Group 6) – best for ragweed

- Strength of Buctril is its activity on RW and mustards.
- Weak on PW, LQ and purslane.
- Compared to Chateau and Goal 2XL, Buctril is the safest to the onion at 2-leaf. Buctril label specifies 50-70 gpa for improved crop safety.

Buctril + Goal 2XL – best for overall broad spectrum weed control, crop injury variable

- Buctril 2EC 8 fl oz + Goal 2XL 4 fl oz will kill PW, LQ, SW/LT, RW and MYC (and other mustards) up to 3”, as well as other weed species.
- Follow-up application of Buctril 2E 4 fl oz + Goal 2XL 4 fl oz may finish off what wasn’t killed with the first app, including some 6-8” weeds (such as RW, MYC, SW/LT).
- These rates can cause greater than 10% injury to onion. Do not apply past 5-leaf stage.

Buctril + Goaltender

- Slightly safer than Buctril + Goal 2XL
- Comparable for RW and SW/LT control/mortality, but not quite as good on PW and LQ.

EXAMPLES OF POST-EMERGENT WEED CONTROL IN ONION



Example 1. These onions had Goal 2XL 0.5 fl oz/A with barley-kill herbicides and Chateau 2 oz at 1.25-leaf, which killed pigweed in cotyledon to 0.5” (yellow circles) and burned back/knocked back ragweed. Now in the 2.25 to 2.5-leaf stage they are ready for Buctril 2EC 8 fl oz + Goal 2XL 4 fl oz/Goaltender 2 fl oz to knock out the up to 3” ragweed. *Photo by C. Hoepting, CVP*



Example 2. Left: This 2” ragweed is too big for Chateau. In this case, Goaltender 2 fl oz would work better in these 1 to 1.25-leaf onions to burn it back until a “knock-out” herbicide may be applied at 2-3 leaf stage. Right: Goaltender/2XL can do a great job of burning back weed seedlings, but they often do not die and the growing point is still green, the “green eye”. *Photos by C. Hoepting, CVP*



Example 3. Onions growing in a yellow nutsedge (YNS) patch not treated (left) and treated with Chateau (right). Chateau is the best option for burning back YNS. It can kill above-ground plants 1-3”. Although it continues to grow back, it accumulates a lot less biomass both above- and below-ground and results in less destructive hand weeding. *Photos by C. Hoepting, CVP*



Example 4. All of these 2-3” weeds are too big for Chateau and Goal. Although Buctril would be good on the mustard (yellow), it would miss the smartweed/ Lady’s thumb (blue) and Lamb’s quarters (pink). Buctril 2E 8 fl oz + Goal 2XL 4 fl oz would be the most effective to knock out this weed population, which would also knock out ragweed and pigweed. For improved safety, Goal 2XL may be switched out for Goaltender, but it may not be as good on the LQ. 5-leaf is the maximum leaf stage for this heavy hitter. *Photo: C. Hoepting, CVP*

The Many Looks of Chilling Injury

Elizabeth Buck, Cornell Cooperative Extension, Cornell Vegetable Program

This article isn't exactly rocket science, but I'm hoping it will be helpful to newer growers trying to sort out what to do and why things look so different following the cold. We're receiving widespread reports of chilling injury following sleet and temperatures in the mid to upper 30s from Friday into Sunday morning. Frost seemed to be fairly limited, perhaps in higher elevations in the S. Tier. Many crops just can't tolerate these temperatures and the result is chill injury. Some crops can tolerate lower temperatures if they are acclimated to cool weather - the opposite of going from days of 85 to 38.

Susceptible crops are those that we plant the latest, when the weather usually stays warm. I know, rocket science. So work your planting date list in reverse and you've got a pretty good idea of relative susceptibility to chill. Eggplants, basil, sweet potato, melons, lima bean, cantaloupe, cucumber, squashes, snap bean, pepper and tomato is roughly the descending order of expected injury severity. Those further up on the list will start to show injury when exposed to temperatures below 55 or 50 for extended periods, especially if the soil is cold. That cold rain was good for the drought, terrible for chill injury as quite effectively cooled the root zone. Add in the cold wind, and it was just rough out there.

Chill injury shows up pretty fast and that can be worrisome. Depending on your species, minimum temperature, and duration of the chilling period, injury includes:

- wilting
- tissue collapse of leaves and stems
- graying or bleaching of leaves
- flower drop
- defoliation
- stunting
- death

You'll notice that usually within a day or so. Less severe symptoms are minor wilting and spots of collapsed, water soaked, bleached, or grayed/black tissue on the most exposed portions of the canopy. Corn may turn bright yellow, squashes may turn black. Less commonly, there may be damage that looks like the cuticle has been popped loose from the under layers (see photos), which should progress to collapsed bleached leaves with time.

Overly cool temperatures in the soil impede root function or directly damage roots. Damaged roots can't effectively pick up water and nutrients and are much more susceptible to root rots. Root rots also tend to like moist conditions. See where am I heading?

Cold, wet rain + cold for several nights + young plants + rapid switch from dry & hot to cold --> damaged roots + reduced microbial activity in the soil + good moisture for root rots --> Inability to pick up nutrients and water + reduced availability of microbially mediated nutrients (Nitrogen, Phosphorous being the main ones) + increased incidence of root rot --> plants showing wilt, nutrient deficiencies, elevated root rot risk, incidence, or severity, and becoming overall unthrifty.

What to do? Be patient – plants can tolerate a lot. Monitor their recovery with an eye out for secondary problems like root rots or botrytis gray mold and treat those accordingly if they begin to arise. Don't foliar feed, these leaves are injured and need to focus on their main function which producing sugar and not absorbing nutrients. Water and feed gently – don't over saturate. More frequent water in less quantities each time is gentle and the way to go if you have been struggling with pythium & friends. If you're on trickle and injecting fertilizer and use gentle (low-salt, low burn-risk N source) fertility sources that have a little P support. There is no point in trying to pack nutrients into a plant that has to regrow roots, stick to your regular root zone feeding schedule with an adjustment in fertility material if you feel the need to do something active.

All in all, if your injury was minor, give your plants time and have faith in their recovery. Things should turn around and new growth will push with a week of good growing conditions. Moderately injured plants will also likely recover, though you may be looking at reduced final plant size and delayed harvest. Severely damaged plants that are broadly defoliating or have softened stems and continue to wilt and go backwards will be difficult. Economics become tough in this situation, as the crop will be low-yielding and require additional investment. Consider if replanting is the better economical choice, if you have replacements available, and if you can swing a later market window.



Minor chilling injury symptoms in pepper transplants about 3 days after injury. These will be just fine. Photo by Elizabeth Buck, CCE Cornell Vegetable Program

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Watersoaking on the underside of a chill injured leaf shortly after the injury occurred. This will progress to discolored dead spots. *Photo by Crystal Stewart-Courtens, CCE ENY Commercial Horticulture Program*



Unusual presentation of chill injury where the cuticle has "popped" free of the underlying tissue. This damage should progress to collapsed, bleached markings. *Photo by Crystal Stewart-Courtens, CCE ENY Commercial Horticulture Program* ●

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