



UMass
Extension

Vegetable Notes

For Vegetable Farmers in Massachusetts since 1975



Volume 30, Number 21

August 30, 2018

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CROP CONDITIONS

We ended this year's twilight meeting series on Tuesday with "Reduced Tillage and Transplanters for Vegetable Farmers" at Ward's Berry Farm in Sharon, MA. Equipment really seems to be a popular topic, bringing out more than 50 people to stand in 95°F temperatures for a few hours. Stay tuned for photos and a review from the farmers who brought their equipment in next week's issue of Vegetable Notes.

Short on labor, farmers are prioritizing the crops they harvest for market now, choosing to sell \$30 boxes of tomatoes rather than \$12 boxes of squash or half-bushel boxes of cucumbers. Now is also when a farmer may be reflecting on their markets and ability to sell products. For example, one grower is considering dropping okra, because even though it draws folks to his farmstand, he only sells 2 lbs per day, compared to 60 lbs of tomatoes at \$2.99/lb. Another crop that may find itself on the chopping block is broccoli; a lot of folks struggled to get quality, uniform broccoli heads this year due to erratic and hot weather.

This dry spell has been a blessing for western MA farmers, who have finally been able to get back into wet fields get their fall crops direct-seeded, or to cultivate or spray in fields where crops have not been lost. Many cucurbit fields went down early this year, and farmers are wondering, when is it okay to harvest the winter squash and pumpkins for curing and storage? See the article in this issue to find out.



Tomatoes galore! Tomato harvest overflowing into the shop at this farm in Middlesex Co., MA.

Photo: K. Campbell-Nelson

PEST ALERTS

Brassicas

[Cabbage root maggot](#): 4th generation flight is forecast to occur over this weekend in Amherst, MA, according to the [NEWA Cabbage Maggot model](#). Recent transplants and germinating brassica crops should be protected with insecticides or row covers now—see article this issue for more information.

[Caterpillars](#) remain active through the fall and we are still seeing them out there—continue to scout these crops and spray when a damaging population is present, which may be weekly at this time of year.

Cucurbits

[Downy mildew](#) seems to have caught some pumpkin and winter squash growers by surprise this year. Farmers may be caught by surprise because downy mildew can be difficult to diagnose on these crops or perhaps they are just too busy this time of year to notice until the symptoms are widespread. According to the Cucurbit Downy Mildew IPM Pipe, the disease has been confirmed on cucumber, jack-o-lantern pumpkin, cantaloupe, watermelon, pumpkin, butternut squash, and summer squash so far in the US this year. When downy mildew was first diagnosed on cucumbers

rethroid insecticides (group 3A), like Warrior, on CEW. Resistance to this class is well-documented and increasing in recent years, and growers should rotate to group 5 (Radiant, Entrust, Blackhawk), 1A (Lannate), or 28 (Coragen) to achieve better control. Those growing B.t.corn should consider adhering to spray schedules recommended for non-Bt sweet corn, although Attribute II varieties are not known to support CEW larvae.

European corn borer: A few adults are still being caught in traps around the state indicating that the second generation adult flight is not quite over yet. The Iowa strain is now predominantly the one being caught in traps.

Bacterial stalk rot caused by *Dickeya zeae* was diagnosed in sweet corn in NH for the first time in many years. UNH Extension Educator George Hamilton suspects prolonged periods of very wet, hot weather have contributed to disease development. Symptoms include orange to brown, slimy lesions that rot and give off an odor. The bacterium can move into the ears, and stalks may collapse within weeks of infection. Copper fungicides will not help, but incorporating residue into the soil will reduce local inoculum that may spread to plants through rain splash.

FALL CABBAGE MAGGOT ALERT

Cabbage root maggot (CRM) has four successive generations over the season at this latitude, and has late-season flights that typically peak in mid-August and again in mid-September. Larval feeding can cause root injury in fall brassicas, especially in the marketed roots of radishes, turnips, daikon, and rutabagas. Scarring of the surface and tunneling through the root reduce marketability. The timing of controls is more difficult than in spring crops, because the timing of the flight is more difficult to pinpoint than in the spring, and there are two flights during the growth period of fall crops. Root crops are often planted before the fly is active and roots are subject to larval feeding damage later in crop growth. The organophosphate insecticides (diazinon, chlorpyrifos) that are labeled for use against maggot flies need to be applied before, during, or shortly after planting, as pre-plant incorporated applications, as transplant or furrow drenches, or as directed sprays right after planting; fortunately these products have long residual periods in the soil.



*Cabbage root maggot damage on turnips.
Photo: Illinois State Extension*

Pesticides. Now there are several other materials labeled for use in controlling CRM post-planting in certain crops. A soil drench use pattern is newly registered for the organic spinosad Entrust and the conventional spinetoram Radiant but these products may only be used on leafy brassicas such as kale, collards, or cabbage—not on root crops (see labels for details). Another new chemistry available for maggot control is the diamide product Verimark (cyantraniliprole) which can be applied as a transplant drench, furrow drench, or through drip. It is systemic and works best when taken up by the roots. Verimark is also only labeled for leafy brassicas, including cabbage and broccoli (*Brassica oleraceae*) etc., Chinese cabbage, bok choy, and greens, but not for root crops like radish, turnip or rutabaga. It showed very good control of CRM in UMass trials in spring cabbage.

CRM models on the NEWA forecast system suggest that peak flight of the third generation occurred around August 7th, and the fourth flight is likely to begin this weekend, when many root crops will be emerging and establishing in the field. Another tool that was developed in western NY based on research done in the 1980s correlates flowering of wild plants with CRM flights. This showed that onset of flowering of Canada thistle and goldenrod correlates with the third generation flight, and New England aster with the fourth generation flight. You may also look for eggs at the base of the stem to determine presence of CRM. To follow the cabbage maggot emergence in your location, see the [NEWA forecasting model](#).

Row Cover. While row covers are a valuable tool in spring, the added heat and reduced light has been shown to reduce good root quality and yield in turnips and rutabagas. If row covers are used, select a non-heating type like Proteknet and apply before crop emergence or immediately after transplanting, to ensure that aphids are not trapped under the cover—protected from all the natural enemies in the field, aphid populations can explode under the cover.

Crop Rotation. Adults flies do not migrate long distances, but will move into nearby fields (<400m) which see a spike in adult flight after a nearby field has been harvested, and in spring fields that are planted near fall's brassica fields. Longer distance rotations will reduce CRM populations.

--Written by R. Hazzard

SEEDING FOR FALL THROUGH SPRING MARKETS

You may be worrying that it is too late now to extend your harvest season into late fall or early next spring, but there are still lots of crops that can be seeded now for winter markets. Depending on what you plan to grow, and for which markets, crops can be grown outside with the possibility of using covers—row covers, low tunnels, caterpillar tunnels—or into high tunnels. Below are some recommendations collected over the years for crops, varieties, and recommended seeding dates.

Field: At this point in the season, the options include direct seeding leafy crops or small, fast-growing root crops in the field. Here are some crops suggested by Danya Teitlebaum of Queens Greens in MA to seed by mid-August for a fall harvest.

Roots: Hakurei turnips, radishes, and fast-growing beet varieties for bunching.

Leaves: Lettuce, mustard greens & other Asian bunching greens, arugula, kale, chard, spinach, bok choi.

Herbs: Cilantro, parsley, and dill.

For growing outside in the open or with protection from hoops and row cover, you can seed and transplant through mid-September, depending on your location. Growth rates decline rapidly at this time of year as day length shortens and temperatures gradually drop. These crops would be ready for harvest from October through November.

High Tunnel: For production in high tunnels for late fall, winter, or spring harvest, seeding or transplanting may go even later. Transplanting can give you a 3-week head start which may be needed when a tunnel is occupied with tomatoes until October. When planning your plantings and choosing seed, look for varieties that are specifically labeled as cold hardy. In winter high tunnels, they will be subjected to sub-freezing temperatures and multiple freeze-thaw cycles. Some crops will only be in the ground for a relatively short time, while others will need more time to mature for harvest. Below are some good variety choices in each category:

Shorter residency varieties:

- **Spinach:** Space, Gazelle, Kolibri, and more...look for varieties with resistance to downy mildew which is becoming more prevalent in spring tunnels (see research reports below for other recommended varieties)
- **Brassica greens:** Red Russian Kale, Tatsoi, Komatsuna, Mizuna, Green Wave
- **Bok Choi:** Black Summer, Mei Qing Choi
- **Lettuce:** Tango, Red Salad Bowl, Rouge D'Hiver, Salanovas
- **Claytonia**

Longer residency varieties:

- **Radish:** Tinto, Cherriette, D'Avignon
- **Beet:** Red Ace, Merlin, Touchstone Gold
- **Chard:** Fordhook Giant
- **Leek:** Tadorna
- **Scallion:** White Spear
- **Turnip:** Hakurei
- **Carrot:** Napoli, Mokum, Nelson
- **Kale:** Winterbor, Redbor, Toscano, Siberian, Red Russian
- **Collards:** Champion
- **Head Lettuce:** Scyphos, Ermosa, Winter Density



Danya Teitlebaum of Queen's Greens in Amherst, MA with a winter kale crop. Photo: S.B. Scheufele

“Days to maturity” are longer as the daylight hours get shorter and temperatures drop. The date that crops are seeded, the climate in your growing zone, the microclimate both on your farm and inside of a tunnel, and the severity of the weather in a given year will all affect plant growth and survival. Short intervals between seeding dates become longer intervals between harvest dates. Cutting lettuce and cutting brassica crops need many seeding dates at close intervals. Full-sized

kale, chard, collards, spinach - plants where you harvest the outer leaves only - need 1 or 2 dates. Some farmers have had success planting during the period with less than 10 hours of daylight - in New England, this is from around the second week in November to the fourth week in January - but there are also reports of poor germination and early bolting. Good record keeping over the years will help you to develop a fall seeding schedule that is specific for your farm.

Here in Massachusetts, we may experiment with later planting dates as confirmed by research conducted in New Hampshire by Becky Sideman and Kaitlyn Orde (see research reports listed at the end of this article). Also, Johnny's Selected Seeds has developed a [useful tool to calculate fall seeding dates](#) for your area.

See Table 1 for seeding date recommendations from Eliot Coleman of Four Season Farm in Maine. Seeding recommendations for many other crops can be found in this [planting schedule chart](#) provided by Robert Hadad at Cornell Extension.

Table1. Summer-Fall seeding for Winter Markets on a 44th Parallel Vegetable Farm in Maine (Eliot Coleman)			
T/D¹	Crop	Sowing Dates	Notes
D	Arugula	8/29 -9/16, and 9/22-10/2	Sow successions every 2 days until 9/16 for outdoor fall harvest and sow in late-September in unheated high tunnel for winter harvest
T	Beets	7/5, 7/19, 7/26, 8/2	Sow early July for storage and later for outdoor harvested baby beets
D	Carrots	7/5, 7/28, 8/4 -8/15	Sow early July for storage and later for fall and winter markets. Cover after November 1 st and harvest before February to preserve sweetness
T	Kale	7/16, 8/1, 8/13, 8/27	Sow July for outdoor fall harvest, and mid-late August in high tunnels and greenhouses for winter harvests
T	Lettuce	8/12 -9/9	Sow outdoors and under cover. Baby leaf lettuce can be harvested outdoors when sown as late as 9/6
T	Onion	8/25 ²	For low tunnel overwintered onions
T	Scallion	7/21, 8/1, 8/8	For fall harvest
D	Spinach	8/16-9/3 and 9/15 -9/21 ³	Sow in August for harvest outdoors until thanksgiving. Sow in September for over wintering in high tunnels
D	Turnip	8/22-9/9 and 9/20 – 10/13	Sow late-August and cover with low tunnels for winter harvest. Sow in September-October in greenhouses for harvest until Christmas.
¹ T = transplant D = direct seeded. ² Note: n New Hampshire trials, the highest low tunnel yields came from onions seeded mid-August and transplanted September 15-October1. ³ Note: in New Hampshire trials, transplanting spinach was recommended for August-September high tunnel plantings to overcome VERY poor germination in high heat. Also, planting until late October did not compromise spring yields.			

Becky Sideman and her team at the University of New Hampshire have conducted research over the past several years on high tunnel spinach and low and high tunnel onion production. The full reports are available here: [Winter Spinach Production in Unheated High Tunnels](#) and [Overwintering Onions for Spring Harvest](#).

--Compiled by K. Campbell-Nelson and Lisa McKeag, from information provided by Danya Teitlebaum - Queens Greens, Hadley MA, Eliot Coleman - Four Season Farm, Harborside, ME, Becky Sideman and Kaitlyn Orde - University of New Hampshire Extension, and Robert Hadad - Cornell Cooperative Extension.

PUMPKIN AND WINTER SQUASH HARVEST, CURING AND STORAGE

It might feel a little early to be thinking about winter squash, but we're seeing fruit at various stages of ripeness out there and, in a year marked by frequent rains, folks might be starting to make plans for getting crops out of the field. Winter squash and pumpkin fruits that remain in the field face a daunting list of diseases, insects, and weather events that could threaten fruit quality. Once the fruit reaches maturity, prompt harvest and careful postharvest handling is generally preferable to leaving fruit in the field, particularly in a relatively wet season, such as this one. This is especially true if you know

that your pumpkins or squash are in fields that were previously infected with *Phytophthora* blight, which can explode after a heavy rain.

Pumpkin Harvest Timing: Since the pumpkin market lasts from Labor Day to Halloween, pumpkins may need to be held for several weeks before they can be sold. One factor in deciding when to harvest is the condition of the vines. Intact foliage protects fruit from the sun, and when vines and foliage go down from powdery or downy mildew, fruit can get sunscald. Foliar diseases, especially powdery mildew, can also reduce quality of pumpkin handles, leading to reduced marketability for jack-o-lantern pumpkins. As we move into September, the other major factor in deciding when to harvest is avoiding chilling injury. Chilling hours accumulate when squash or pumpkins are exposed to temperatures below 50°F in the field or in storage. Injury increases as temperature decreases and/or length of chilling time increases. This is particularly important for squash headed into long term storage.



When defoliation exposes pumpkins to sunscald, it may be better to harvest them rather than leave them in the field. Photo: UMass Extension

There can be extra work involved in bringing fruit in early and finding good storage locations, especially for growers who normally have pick-your-own harvest. However, we recommend that growers harvest as soon as crops are mature and store under proper conditions, if it is feasible. Proper curing and storage conditions are key for pumpkins in particular, because improper conditions can result in handles shrinking and shriveling, making the pumpkins unmarketable. If you need to hold fruit in the field for pick-your-own or any other reason, using a protectant fungicide (e.g. sulfur, oil, or chlorothalonil) along with one of the targeted powdery mildew products can help protect from black rot, powdery mildew, and other fungal fruit rots (see article in this past [Veg Notes issue](#)). Scout for insects feeding on the fruit and handles, which may include squash bug nymphs or adults and striped cucumber beetle, and control them if damage is evident. See the [New England Vegetable Management Guide](#) for treatment recommendations.

Harvest: Despite their tough appearance, squash and pumpkin fruit are easily damaged. It is important to avoid bruising or cutting the skin during harvest. Once the rind is bruised or punctured, decay organisms will invade the fruit and quickly break it down. Place fruit gently in containers and move bins on pallets. Use gloves to protect both the fruit and the workers. For some squash, especially butternut, stems can be removed to prevent them from puncturing adjacent fruit during harvest and storage. If stems are removed, allow the stem scars to heal before putting into storage (see Curing Conditions below).

Harvest Timing for Eating Quality: For pie pumpkins and winter squashes, harvest timing determines the flavor and texture of the fruit. Before understanding when the best time is to harvest squash, it's important to understand the difference between "mature" squash and squash that is ready to be eaten. As squash fruits grow, they accumulate starch, which is then converted into sugar both during maturation in the field and after harvest during storage. The balance of starch (texture) and sugar (sweetness) in a squash determines the eating quality. Squash is "mature" when seeds are completely filled. If squash is harvested before it is mature, the fruit will use starch reserves from the flesh to fill the seeds, resulting in poor flesh quality. Immature squash will also not have enough starch to convert into sugar later on. For some squash types (e.g. acorn and delicata), the mature fruit can be eaten immediately after harvest. Other squash types (e.g. butternut, hubbard, kabocha), need more time to convert starches to sugars and must be stored for specific amounts of time before they are eaten.

Most squash varieties are mature and ready to be harvested 50-55 days after fruit set, or days after pollination (DAP). In many varieties, this is many weeks after the fruit turns a marketable color, which can be misleading. According to Dr. Brent Loy, researcher emeritus at the NH Agricultural Experiment Station, days to maturity listed in seed catalogs are often in error, especially for acorn squash; catalogs often state 70-76 days to maturity (from time of seeding) when in reality it's more like 90-100 days to maturity. It's not necessarily easy to keep track of fruit set, so there are some other indicators—see the end of this article for more information about specific varieties.

Curing Conditions: In some cases, squash needs to be stored for a short period of time (5-10 days) at a high temperature (80-85°F) and 80-85% relative humidity immediately after harvest, either in the field if weather allows, or in a well-venti-

lated barn, greenhouse, or high tunnel. Night temperatures should not drop below 60°F. These conditions will speed up the conversion of starches to sugars to achieve good eating quality earlier on and will allow fruit skin to harden and wounds to heal. You may not want to cure squash if it's destined for long-term storage and if it is free of wounds—squash in long-term storage should have sufficient time to convert starches to sugars and can go directly into storage conditions without the extra boost. Squash types like acorn and delicata are ready to eat at harvest (if they're harvested when they're mature!) and only need to be cured if you want to store them and the skin is wounded.

Storage: Pumpkins and winter squash should be stored in a cool, dry, well-ventilated storage area. Store fruit at 50-60°F with 50-70% relative humidity. Chilling injury is possible at temperatures below 50°F, and long-term storage at temperatures above 60°F will result in weight loss due to increased respiration rates. Large fluctuations in temperature favor condensation on fruit within the bin, which encourages disease. Therefore, fruit temperature should be kept as close to the temperature of the air as possible to avoid condensation and fruit rot. Relative humidity above 70% provides a favorable environment for fungal and bacterial decay organisms, and relative humidity below 50% can cause dehydration and weight loss. In a greenhouse, temperature can be managed with ventilation on sunny days; heaters will be needed for storage into November and beyond. An inner curtain can reduce heat loss and cost.

Storage life depends on the condition of the crop when it comes in and your ability to provide careful handling and a proper storage environment. All fruit placed in storage should be free of disease, decay, insects, and unhealed wounds. See the end of this article for maximum storage times for different types of squash. Fruit that has been exposed to chilling temperatures (below 50°F) will not store well and should be marketed first.

Few farms have the infrastructure to provide ideal postharvest conditions for all of their fall crops. Fortunately, finding a method that is 'good enough' often does the job. 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.

- ***Cucurbita pepo* (acorn, delicata, sweet dumpling, some pie pumpkins):** Acorn squash turns dark green 2-3 weeks after fruit set, which is 40-50 days before it should be harvested. Because acorn squash can be marketed as soon as it turns dark green, regardless of eating quality, many acorn varieties will never accumulate enough starch and will therefore never be sweet. UNH has developed two varieties, 'Honey Bear' and 'Sugar Dumpling', that both have high sugar content at harvest. Harvest *C. pepo* squashes when the 'ground spot' (the part of the squash that lays on the ground) is dark orange. Pie pumpkins should be harvested when the skin is fully orange. These varieties can be eaten at harvest and will store for 2-3 months.
- ***Cucurbita maxima* (kabocha, hubbard, buttercup):** Stems becomes dry and corky when the fruit is ready to be harvested. These are more susceptible than other squash to sunburn and so if vines go down from disease, they should be harvested early (40 DAP), cured, then stored at 70-75°F for 10-20 days to achieve acceptable eating quality. These have high starch content at harvest and so need to be stored for 1-2 months before being eaten, with the exception of all mini-kabochas and all red-skinned kabochas, which can be eaten at harvest. They will store for 4-6 months.
- ***Cucurbita moschata* (butternut, some edible pumpkins):** Butternut will turn tan 45 DAP but should not be harvested for another 2 weeks. Mini-butternut can be eaten at harvest and will store for 3 months. All others should be stored 1-2 months before eating to allow for starches to be converted into sugars and will store for 4-6 months. Carotenoid, the pigment that gives squash its yellow/orange color, also increases in storage for these squash, giving them more color and making the more nutritious.

--Written by G. Higgins and R. Hazzard, compiled 2018 from *Eating Quality in Winter Squash and Edible Pumpkins and The Nuts and Bolts of Fruit Quality in Cucurbits* by Brent Loy researcher emeritus, New Hampshire Agricultural Experiment Station and professor emeritus of genetics, UNH.

NEWS RELEASE: REMINDER TO REPORT CROP DAMAGES PROMPTLY

Producers covered by a Federal Crop Insurance Policy are reminded to monitor their crops for insurable damage throughout the growing and harvesting season. If you notice damage contact your crop insurance agent within 72 hours of discovery, 15 days before harvesting begins and within 15 days after harvesting is completed on the insurance unit. Two other important reminders:



- Direct marketed crops must have a yield appraisal before they are harvested, if loss is anticipated.
- Do not destroy crop evidence that is needed to support your claim without clear direction, in writing, from the insurance adjuster.

Producers having coverage under the Noninsured Crop Disaster Assistance Program (NAP) administered by the USDA - Farm Service Agency have similar loss reporting requirements. NAP producers should contact the FSA Office that serves their farming operation to report losses.

UMass Extension works in partnership with the USDA Risk Management Agency (RMA) and various agricultural organizations to educate and inform Massachusetts producers about Federal Crop Insurance and Risk Management Programs. For more information, please visit www.rma.usda.gov or contact UMass Extension Risk Management Specialists Paul Russell at pmrussell@umext.umass.edu or Tom Smiarowski at tsmiarowski@umext.umass.edu or check out our website: <https://ag.umass.edu/risk-management>

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