



UMass
Extension

Vegetable Notes

For Vegetable Farmers in Massachusetts since 1975



Volume 32, Number 16

July 9, 2020

IN THIS ISSUE:

- Crop Conditions
- Pest Alerts
- Garlic Harvest, Curing, & Storage
- Culling Garlic: Don't Store or Plant Infected Bulbs
- The Garlic Mosaic Virus Complex
- The Scientific Truth About Garlic Varieties
- News
- Events
- Sponsors



The Garlic Issue! We've pulled all of our garlic articles together for this week, just in time for garlic harvest. We hope it gives you some food for thought as you plan your harvest, and something to discuss while you're pulling garlic! Photo: UMass Vegetable Program

CROP CONDITIONS

While more frequent storms have been occurring of late, it is still dry out there. There is a tropical storm heading our way, which is likely to bring a lot of humidity and rain, and also potentially plant diseases, with it. While it may seem counter-intuitive, it is advisable to put down a preventative fungicide spray for crops like tomatoes, potatoes, and especially cucurbits, with downy mildew lingering nearby, in order to prevent diseases from establishing, since fungicides cannot cure diseases once they infect.

We want to let you all know that MDAR has a [new grant program](#) in response to the COVID-19 crisis that is aimed at strengthening and shoring up our local food system and all commercial farms are encouraged to apply. The program covers a really wide range of small to large-scale projects, from signage to storages, so be sure to [check the RFP](#) and get your application in sometime before September 15.

Dry conditions earlier this season caused irregular stands of corn, and the crop is still maturing unevenly, making for more difficult management and harvest, but the first corn is now being harvested--was just in time for the Fourth of July on many farms. Strawberry season has come to a close while blueberry harvest is now starting, and those with small fruits on their farms are getting busy managing spotted wing drosophila, a huge task, on top of everything else. Tomatoes are rolling out of tunnels now and field harvest of tomatoes, as well as other fruiting crops like peppers, and eggplants is just beginning on some farms. Loads of summer squash, zucchini, and cucumbers are being picked and bunches of carrots and fresh onions are rounding out the mix. And it's garlic harvest time, which means it's really summer-time! We hope you enjoy this garlic-themed issue of *Veg Notes*, as you prepare to pull garlic out of the field and into barns and greenhouses for curing!

PEST ALERTS

Alliums

Diseases of garlic including [Fusarium bulb rot](#), [Botrytis](#), [White rot](#), and [bloat nematodes](#) continue to be reported across the region. See articles this issue on recognizing and managing diseases in garlic, and be sure to save only the best-looking, disease-free plants for seed stock.

Basil

[Downy mildew](#) was confirmed in a small commercial planting of

basil in Barnstable Co., MA this week. Several susceptible varieties were infected while resistant varieties remained clean, except for the variety ‘Passion’, which did also have symptoms. Excellent control of downy mildew can be achieved with conventional fungicides applied weekly on a preventive schedule, but control is greatly reduced when applications are started after disease detection. Research trials have shown that the phosphite fungicides (eg. K-Phite, Prophyt, Fungi-phite) are among the most effective chemical controls. Other effective materials include mandipropamid (eg. Revus), cyazofamid (eg. Ranman), and azoxystrobin (eg. Quadris). All of these except Quadris can be used in both field and greenhouse in MA—Quadris is labeled for field use only.

Cucurbits

Angular leaf spot was confirmed in the butternut variety ‘Honeynut’. This bacterial disease is usually among the first to show up because it is often seed-borne. Small, round water-soaked spots appear on leaf tissue, and expand until they are confined by veins, giving them the characteristic angular look. Similarly, water-soaked spots may appear on stems, petioles, and fruit, drying out to form a whitish crust. Affected plants will grow poorly, produce less fruit, and affected fruit is unmarketable. Bacteria proliferate in warm, moist weather and are spread from plant to plant by water, commonly in the form of splashing rain or runoff, as well as by insects or workers moving through the field. If caught early, copper products can help slow the spread of disease.

Downy mildew is spreading from points south and west of us, and, with a tropical storm forecast to move up the coast this weekend, we could see the pathogen move quickly to MA and other New England states. All cucurbit crops could be at risk, though cucumber is most susceptible and most outbreaks outside of Florida this season have been on cucumber. Growers should consider putting down a preventive spray before the rain starts today or tomorrow, and including a downy mildew targeted material with a protectant fungicide is warranted. For a list of the most effective materials updated for this year, consult the [New England Vegetable Management Guide](#).

Squash bugs are still active and can cause damage to plants that reduces yield. Both adults and nymphs have needle-like mouthparts that they use to extract plant juices. The plant vascular system may become clogged, causing the plant to wilt, darken and die. Time squash bug sprays to kill young nymphs which are easiest to control. Thorough coverage is necessary. As this often coincides with the bloom period, treat late in the day to reduce risk to bees and select products with lower bee toxicity.

Solanaceous

Early blight is starting to show up in field tomatoes. Given the impending storm, it would be wise to put on a preventive spray to slow spread of any and all tomato diseases before the rain. Leaf spots can cause a lot of defoliation, and fruit can become infected either in the green or ripe stage through the stem attachment, causing losses of 30-50% of immature fruit. Potatoes can also be affected by early blight—foliar symptoms on potato are similar, though defoliation rarely results.

Sweet corn

European corn borer (ECB) numbers are still fairly low (0-9 moths/week) with many locations reporting 0 trap captures, though damage is still being reported in the field at levels exceeding the threshold for treatment. Given the low



*Basil downy mildew sporulation on the underside of the leaf.
Photo: A. Madeiras*



*Angular leaf spot.
Photo: S.B. Scheufele*



Cucurbit downy mildew symptoms on the top of the leaf (above) and underside of the leaf (right). Photos: UMass Vegetable Program

Table 1. Squash Vine Borer (SVB) trap captures June 26-July 2, 2020	
Location	SVB
Deerfield	3
North Easton	25
Westhampton	14
Whately	0
Leominster	19
Sharon	2

Location	GDD (base 50°F)	ECB NY	ECB IA	CEW	FAW	CEW Spray Interval
Western MA						
Sheffield		0	0	1	-	<i>no spray</i>
Southwick	1111	0	0	0	0	
Whately	1132	1	2	0	-	<i>no spray</i>
Central MA						
Bolton	1031	7	2	0	-	<i>no spray</i>
Leominster	1028	5	0	-	-	-
Spencer	985	0	0	0	0	
Eastern MA						
Ipswich	965	0	0	0	0	
Concord	1004	1	0	0	0	
Millis	1114	0	0	0	N/A	<i>no spray</i>
Sharon		3	0	2	N/A	<i>6 days</i>
Seekonk	1125	0	0	7	1	<i>5 days</i>
Swansea		2	0	6	-	<i>5 days</i>
- no numbers reported for this trap N/A this site does not trap for this pest						
*GDDs are reported from the nearest weather station to the trapping site						



Fall armyworm damage in whorl-stage corn. Photo: UMass Vegetable Program

the coast, but move inland as well. The flights are sporadic and difficult to predict, and do not necessarily correspond with corn earworm flights, so monitoring with pheromone traps in whorl stage corn is very useful. Damage caused by FAW caterpillars occurs first in whorl stage corn, deep within the whorl, on leaves and in the newly forming green tassel; see photo at left. Watch whorl stage corn for ragged feeding damage and masses of sawdust-like excrement. Fall armyworm larvae eat into the side of corn ears, leaving behind frass and a large hole. They also feed in the tip, making a mess of the kernels. The most effective way to prevent ear damage is to apply controls during whorl and pretassel stage. If flights are very high, silk sprays may be needed. No FAW damage has been reported so far, and sprays for ECB and/or CEW should control FAW as well.

Sap beetles are active in sweet corn that is being harvested now. Scout silk for sap beetles when silks begin to wilt and through harvest. Inspect the silk area at the tip and the husks of 50-100 ears across the field, and determine the percent of ears infested with adults, eggs, or larvae. If 10% of ears are infested within the last 7-10 days before harvest, a spray may be warranted. Pyrethroids used to control European corn borer (ECB) and corn earworm (CEW) infestations will reduce sap beetle, but if populations are high, a combination of pyrethroid and methomyl (Lannate) may provide additional control. Bt hybrids that produce Bt toxin at the cellular level do not protect against sap beetles, so you may need to spray even in the absence of ECB and CEW in those plantings.

Spray trials conducted by Gaylon Dively of UMD indicated that sprays on the 3rd and 6th days of silk were most effective, and additional, later sprays did not improve control. Efficacy trials have shown that carbaryl (Sevin), lambda-cyhalothrin (Warrior II), bifenthrin (Bifenture), and methomyl (Lannate) are more effective than most other insecticides. However, carbaryl cannot be used during the early silk period while corn is shedding pollen and does not allow for hand harvesting after use.

Moths/Night	Moths/Week	Spray Interval
0 - 0.2	0 - 1.4	no spray
0.2 - 0.5	1.4 - 3.5	6 days
0.5 - 1	3.5 - 7	5 days
1 - 13	7 - 91	4 days
Over 13	Over 91	3 days

numbers of ECB moths in traps relative to the amount of damage observed across the region this year, we suspect that the hybrid NY/IA strain, which is not captured with either NY or IA lures, may be increasing in numbers in our area.

Corn earworm (CEW) are still being caught in low numbers in pheromone traps, ranging from 0-7 moths/week, putting spray schedules at 0-5-day intervals (see Table 3)

Fall armyworm numbers are increasing in monitoring traps around the region. FAW does not overwinter in New England, but rather, fertile moths are carried northward on storm fronts from southern states from mid-July into September. Flights are heavier near



Sap beetles and larvae on corn. Photo: J. Obermeyer, Purdue University

When spraying for sap beetle please consult the labels and try to spray in such a way as to protect bees.

GARLIC HARVEST, CURING & STORAGE

Many farmers are beginning to harvest garlic, a big task that usually occurs around mid-late July. Timing the harvest can be tricky—heads should be left in the ground as long as possible to attain maximum bulb size (which doubles in the last stage of growth), but not so long that the cloves begin to separate, as overripe bulbs sell and store poorly. Harvest when leaves begin to turn yellow, but when about 60% are still green. Crystal Stewart-Courtens, Cornell Extension Vegetable Specialist, recommends checking bulbs by cutting through the head sideways to see how well developed the cloves are. Cloves should fill the wrappers - if they seem a little loose, the garlic has a little ways to go, see photos. A little of the outermost wrapper may have started to discolor at this point. Harvest before the bulbs pop, which can happen relatively quickly, especially in a wet year. Remember that it is better to harvest too early than too late. Ms. Stewart-Courtens advises that plants should be pulled when there are a minimum of three leaves left that have not begun to brown at the tips. Use hand tools to loosen soil under the bulbs or a mechanical harvester to undercut the bed. Pulling bulbs out when they are tight in the ground can open wounds at the stem-bulb junction and allow for fungal infections. Fresh bulbs bruise easily and these wounds can also encourage infection. Don't knock off dirt by banging bulbs against boots, shovels, or buckets— shake or rub gently, and leave the rest to dry out during curing.

If short on curing space, tops can be cut in the field, with a sickle bar mower or by hand, down to 1.5 to 6 inches long. Cornell trials indicated that disease incidence does not increase when trimming garlic down at this stage, though leaving tops on can facilitate hanging.

Curing is important for successful bulb storage and finding the ideal conditions for curing can be a challenge. Curing in the field runs the risk of sunscald, while curing in poorly ventilated barns can result in yield loss from disease. Good airflow around the bulbs is critical. Avoid high temperatures (generally above 90°F) and bright sunlight. Ms. Stewart-Courtens notes that garlic will dry well at 110°F but at about 120°F waxy breakdown, a physiological disorder, starts to occur, so be sure to monitor temperatures in the drying area. Rapid curing can be achieved by placing trimmed bulbs roots-up on 1" wire mesh in a hoop house covered with a shade cloth, and with the sides and ends open. A well-ventilated barn will also work, but be sure that bulbs are hung with adequate air circulation or on open racks up off the floor. Curing takes 10-14 days and is complete when the outer skins are dry and crispy, the neck is constricted, and the center of the cut stem is hard.



Image 1: Garlic is not yet mature. Notice the cloves are tight to the scape and do not have definition (bumps) along the outside of the bulb.

Photo: C. Stewart Courtens, CCE

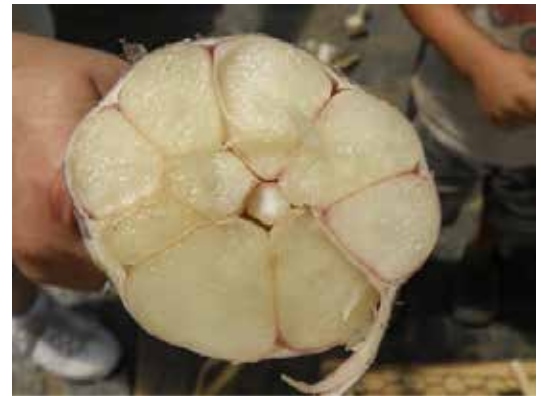


Image 2: Garlic is mature. You can use a knife or fingernail to carefully peel back and count the wrapper leaves on the bulbs while examining cloves.

Photo: C. Stewart Courtens, CCE

CONTACT US:

Contact the UMass Extension Vegetable Program with your farm-related questions, any time of the year. We always do our best to respond to all inquiries.

Office phone: (413) 577-3976 *We are currently working remotely but checking these messages daily, so please leave us a message!*

Email: umassveg@umass.edu

Home Gardeners: Please contact the UMass GreenInfo Help Line with home gardening and homesteading questions, at greeninfo@umext.umass.edu.

The UMass Plant Diagnostic Lab and the UMass Soil & Tissue Testing Lab are both now open: See the News section of this issue for more info.

Storing Bulbs. After curing, garlic can be kept in good condition for 1 to 2 months at ambient temperatures of 68 to 86°F under low relative humidity (< 75% RH). However, under these conditions, bulbs will eventually become soft, spongy and shriveled due to water loss. For long-term storage, garlic is best maintained at temperatures of 30 to 32°F with low RH (60 to 70%). Good airflow throughout storage containers is necessary to prevent any moisture accumulation. Under these conditions, well-cured garlic can be stored for 6-7 months. Storage at higher temperatures (60°F) may be adequate for the short term, but it is important to select a place with low relative humidity and good air flow. As with onions, relative humidity needs to be lower than for most vegetables because high humidity causes root and mold growth; on the other hand, if it is too dry the bulbs will dry out.

Storing Seed. Garlic bulbs that are to be used as seed for fall planting of next years' crop should be stored at 50°F and at relative humidity of 65-70%. Garlic cloves break dormancy most rapidly between 40 to 50°F, hence prolonged storage at this temperature range should be avoided. Storage of planting stock at temperatures below 40°F results in rough bulbs, side-shoot sprouting (witch's-brooms) and early maturity, while storage above 65°F results in delayed sprouting and late maturity.

Garlic cloves used for seed should be of the highest quality, with no disease infections, as these can be spread to new fields and to the next year's crop. Be on the lookout for garlic bloat nematode which may have been distributed around New England on infested seed garlic. The UMass Plant Disease Diagnostic Lab can make a positive identification; for submission instructions and contact info visit <https://ag.umass.edu/services/plant-diagnostics-laboratory>. See article below for more information on preventing the spread of bloat nematodes and garlic diseases.

--UMass Extension Vegetable Program (originally R. Hazzard, from resources including New England Vegetable Mgt Guide, Oregon State, ATTRA, Wishongstone Farm, Astarte Farm, USDA Handbook 66 and Considerations for Timing of the Garlic Harvest by Crystal Stewart-Courtens, Cornell Cooperative Extension). Last Edited 2020.

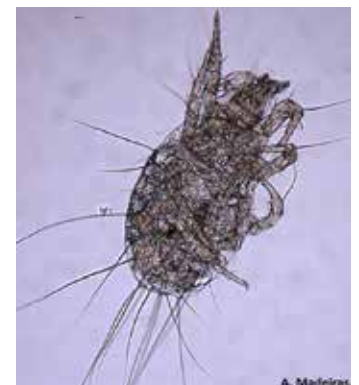
CULLING GARLIC: DON'T STORE OR PLANT INFECTED BULBS

There are several opportunities to inspect garlic for symptoms of nematode and disease infection and cull compromised bulbs: during harvest, when crops are going into storage, or as you cut and sort for seed vs. food. At any of these times, we recommend carefully checking and culling garlic in order to prevent disease from spreading through storage and to prevent contaminating another field or next year's crop by planting infected bulbs this fall. Most disease symptoms we see in garlic bulbs result from infections that occurred in the field, and most of the pathogens persist for many years in the soil, so identifying any diseases in your crop now will tell you which fields to avoid planting garlic into in years ahead. Inspecting your garlic is also very important if you will be selling any garlic as seed; diseases and pests can quickly spread from one source of infected seed. If you suspect any of the problems below, the UMass Plant Disease Diagnostic Lab can make a positive identification; for submission instructions and contact info visit <https://ag.umass.edu/services/plant-diagnostics-laboratory>. Below are descriptions of the most common pests and diseases that will affect garlic seed and storage crops.

Bulb mites (*Aceria tulipae* and *Rhizoglyphus* spp.) are an increasing problem in garlic production across the Northeast. They feed on the garlic roots and basal plate in the field, causing stunting, deformed, yellow leaves, and lack of vigor. In storage, the mites move into the garlic bulb, where their feeding activity causes sunken tan to brown spots to form on cloves. Feeding activity also provides entry points for secondary pathogen like soft-rot bacteria and fungi. Desiccation may occur. Garlic seed infested with bulb mites may fail to germinate. In the field, plants may outgrow the damage if the infestation is not heavy, but mites may increase in number over the growing season and over years of planting infested seed. In the field, mites feed mainly on the roots and basal plate. Bulb mites can overwinter in the soil, especially in soils with high levels of decaying organic matter, and can survive on the residues of a number of crops. Plant only in fields where crop residue is thoroughly decomposed. **Avoid planting alliums directly after brassicas, corn, grain, or grass cover**



*Sunken brown spots on garlic cloves and basal plate damage from bulb mite feeding.
Photo: E. Sideman*



Rhizoglyphus mite at 10x magnification. Photo: A. Madeiras

crops.

Stem and bulb/Garlic bloat nematode (*Ditylenchus dipsaci*) infests garlic stems and bulbs, causing bulb decay at both the neck and the basal plate of the bulbs. This damage can look similar to *Fusarium* basal plate rot. In the field, plants may be stunted and leaves may be distorted and yellow and may die back prematurely. Bulb tissue begins softening at the neck and gradually proceeds downward; the scales appear pale gray to dark brown, and the bulbs become shrunken, soft, and light in weight. Under moist conditions, secondary invaders such as bacteria, fungi, and onion maggots induce soft rot and decay of the bulbs. The stem and bulb nematode is spread through infested seed, so affected bulbs may still be sold as food, but be clear with customers that the bulbs should not be used as seed. Once this pest is present in a field, it cannot be eradicated.



Sytmpoms of stem and bulb/garlic bloat nematode. Photo: B. Watts UMaine.

Downy mildew (*Peronospora destructor*): Affected bulbs may be small and shriveled, with a blackened neck. Some bulbs may sprout prematurely.

White rot (*Sclerotium cepivorum*): Similar to the general field symptoms of bulb mites and garlic bloat nematode, white rot will cause stunting and leaf yellowing and dieback in the field. When infected plants are pulled, white fluffy growth around the stem plate and bulb and small, black, poppyseed-sized sclerotia are visible, often around the neck. Sclerotia are small, dense masses of fungal tissue surrounded by a dark rind that allow the pathogen to persist for years in the soil. White rot sclerotia can survive for 15 years or more in the soil, making this disease one of the hardest diseases of garlic to manage; if you suspect white rot in your garlic, it's especially important to get it diagnosed so that you don't introduce it into a new field this fall. This disease will continue to grow and spread in storage if humidity is not kept low.



Garlic bulb infected with white rot (left) and white rot sclerotia embedded

Fusarium basal rot (*Fusarium oxysporum* f. sp. *cepae*) causes red to purple discoloration of the exterior of the bulb. Sometimes, white fluffy mycelial growth at the base is present. If the bulb is cut open, one or several cloves may appear brown and watery. Later, the stem plate becomes pitted and a dry rot develops. The disease continues to develop in storage.



Fusarium basal rot. Photo: Oregon State

Botrytis neck and bulb rot (*Botrytis porri* and *B. allii*, respectively) infections start in the fields but symptoms usually do not develop until the bulbs have been moved into storage—a good reason to check your curing garlic periodically! Affected neck or bulb tissue is initially water soaked, but later turns dry and necrotic. Sclerotia—those hardy black resting structures—form in the neck or adhere to the rotten outer scales of the bulb. Sclerotia of *Botrytis* are shriveled and look a little like a small raisin; they are much larger than white rot sclerotia, but survive in the soil for much fewer years.



Penicillium decay.
Photo: Oregon State Univ.



Botrytis bulb rot with sclerotia present.
Photo: Oregon State Univ.

Penicillium Decay (*Penicillium* spp.) is a major cause of bulb decay in storage and can spread to healthy bulbs via airborne spores. The fungus causes fuzzy, blue-green growth on diseased cloves, usually starting at the base.

Disease Prevention Tips for Harvest and Storage

- **Do not irrigate within 7 days before lifting or harvesting.** Avoid harvest after heavy rains.
- **Avoid mechanical injury and bruising of bulbs during production and harvest.** Avoid banging cloves together to remove mud and dirt from roots.
- **Properly cure bulbs.** Cure in a well-ventilated area at 70-80°F. Practices that hasten curing include undercutting bulbs to sever all roots, avoiding nitrogen fertilization later than two months after seeding, and proper plant spacing. Under wet conditions when bulbs cannot be cured adequately, artificial drying with forced hot air followed by normal storage should be considered.
- **For long-term storage, garlic is best maintained at temperatures of 30 to 32°F with low RH (60 to 70%).** Good airflow throughout the vented bins or other storage containers is necessary to prevent any moisture accumulation. Under these conditions, garlic can be stored for more than 9 months.

--Written by Susan B. Scheufele, UMass Extension Vegetable Program

THE GARLIC MOSAIC VIRUS COMPLEX

Onions and garlic are hosts to several viruses. The incidence of viral infections has increased in recent years, particularly in garlic, as all of these viruses are spread through vegetative propagation of infected material.

Identification: Foliar symptoms of garlic mosaic include deformed leaves, flecking, mottling, mosaic, and streaks. Plants may be stunted and bulbs decreased in size. Some infections remain symptomless. Symptom expression likely depends on the particular virus or combination of viruses present coupled with host genetics and possibly environmental conditions. Timing of infection can also affect symptoms, with more severe disease observed in leaves arising from infected seed garlic than in leaves infected post-emergence.

Causal Agents

Onion yellow dwarf virus (OYDV) is a potyvirus that can affect both onions and garlic; in the latter, it may occur alone or as part of the garlic mosaic complex. Its host range is limited to *Allium* species. Leek yellow stripe virus (LYSV) is another potyvirus commonly associated with the complex.

Iris yellow leaf spot virus (IYSV) is a tospovirus which affects most if not all *Allium* species. The viral genome is variable, resulting in strains that can differ widely in severity of symptoms and host range.

Symptoms of garlic mosaic are most severe when two or more viruses are present. At least one of these viruses is typically a potyvirus, a group named for potato virus Y, which includes aphid transmitted viruses that are spread quickly through probing and feeding. Other viruses involved in the garlic mosaic complex may belong to other groups of viruses, including the carlaviruses garlic latent virus (GLV) and garlic common latent virus (GCLV), and the allexiviruses garlic virus A through E (GVA-E) and garlic virus X (GVX). Symptoms may be mild or absent when a carlavirus or allexivirus is present but a potyvirus is absent, and vice versa.

Life Cycle

The primary mode of transmission for these viruses is the vegetative propagation of infected garlic bulbs. Transmission by insect vectors in the field also occurs. Volunteer onions and wild *Allium* species such as onion grass (*Allium vineale*) may also harbor viruses.

Potyriviruses are transmitted non-persistently—quickly, through probing and feeding—by several species of aphids including the green peach aphid (*Myzus persicae*). Populations of these aphids are usually transient visitors in *Allium* crops, passing through on their way to better host crops, but unfortunately this quick stop can be enough to spread the disease from plant to plant or field to field. Symptoms may not be evident prior to harvest, but if infected seed is planted it can



Garlic infected with a potyvirus.
Photo: A. Madeiras

give rise to infected plants.

IYSV is transmitted by onion thrips (*Thrips tabaci*). First and second instar larvae acquire the virus by feeding on infected plants. The ornamental plants Dutch iris (*Iris hollandica*), zonal geranium (*Pelargonium x hortorum*), alstroemeria (*Alstroemeria* sp.), and lisianthus (*Eustoma russeliana* and *E. grandiflorum*) are also susceptible.

Carlaviruses may also be transmitted in a non-persistent manner by aphids, but it is believed that aphid transmission of these viruses is less efficient than it is for the potyviruses.

Allexiviruses are transmitted by the eriophyid mite *Aceria tulipae*, a common pest in garlic. Like the virus itself, these mites may also be spread by propagation of infested plant material. Mite transmission of these viruses from bulb to bulb most likely takes place during storage.



Yellow flecking and streaking--classic viral symptoms in garlic. Photo: G. Higgins

Management

- Use only disease-free seed garlic.
- Grow resistant or tolerant cultivars when available.
- Eliminate any volunteer onions from nearby fields.
- Control onion grass and other wild *Allium* species.
- Manage thrips to mitigate the spread of IYLS virus. For current thrips management recommendations, see the Insect Management section of the appropriate crop in the [New England Vegetable Management Guide](#), or recent *Veg Notes* articles in the [June 11](#) and [June 25, 2020](#) issues.
- Aphid management is probably not very effective as the insects acquire and transmit the virus in a short window of time.
- Insect pest management and other methods of stress reduction may help to improve overall plant health and decrease disease severity.

THE SCIENTIFIC TRUTH ABOUT GARLIC VARIETIES

--Written by Lynn Byczynski. Originally published by [Growing for Market](#)

When getting started with garlic production, growers soon learn that there are literally hundreds of named cultivars or strains available in the U.S. and Canada. Choosing among that wealth of options is a challenge that has befuddled many beginners. As Ron Engeland wrote in his book [Growing Great Garlic](#), “Professionals have wrestled with the problem of garlic varieties for over 100 years and basically succeeded in creating a very fine mess with very little agreement.”

Fortunately, science has come to the rescue of garlic growers and provided some definitive information about the confusing subject of garlic varieties. Now it’s known that all varieties can be sorted into 10 basic types; that there is a great deal of duplication among the so-called varieties; and that many with different names are genetically very similar. It’s also known that some of garlic’s most important traits are determined by location, soil, climate, and the skill of the grower.

For beginning garlic growers, here are the basics:

Botanically, all culinary garlics are in the species *Allium sativum*. There are two sub-species: the hardneck or ophio garlics, which have scapes; and the softneck garlics, which don’t.

Hardneck garlic is more flavorful and the cloves are bigger and easier to peel than softnecks. Softneck garlic, the kind usually found in supermarkets and often imported, has the best storage life and is easier to braid than hardnecks.

Growers with freezing winter weather can grow either hardneck or softneck garlic, but have the best success with hardnecks. Growers in warm winter areas do better with softnecks.

Sorting through the names

In 2003, Dr. Gayle M. Volk of USDA's National Center for Genetic Resources Preservation in Fort Collins, CO, did DNA fingerprinting of 211 varieties of garlic. Many were so genetically similar as to be statistically the same. However, she found that there are 10 distinct types: silverskin and artichoke are the two softneck types; rocambole, porcelain, purple stripe, marble purple stripe, Asiatic, turban, creole, and glazed purple stripe are hardneck types.

In 2005, Dr. Volk and David Stern of the Garlic Seed Foundation led a project in which 10 cultivars, one of each of the 10 types, were grown by garlic farmers in 12 locations around the United States and Canada. The cultivars were 'Ajo Rojo', 'Chesnok', 'German White', 'Inchelium', 'Purple Glazer', 'Red Janice', 'Sakura', 'Siberian', 'Silverwhite', and 'Spanish Roja'. The small-scale, sustainable farmers were provided with planting stocks from the same original sources and were asked to grow them on their farms for two consecutive years using their best practices. The harvested bulbs were analyzed for quality, wrapper color, yield, clove characteristics, and elemental composition. Here are the significant findings reported in the August 2009 issue of HortScience:

"Clove arrangement, number of topsets, topset size, topset color, number of cloves, clove weight, clove skin color, and clove skin tightness were generally stable for each cultivar regardless of production location and conditions. Soil potassium levels were positively correlated with bulb circumference and fresh weight. Soil sulfur and manganese levels were correlated with bulb sulfur and manganese content. Bulb wrapper color and intensity were highly dependent on location and cultivar. The Silverwhite cultivar was consistently white and 'Ajo Rojo', 'German White', 'Inchelium', 'Sakura', and 'Spanish Roja' were generally white with some faint violet or brown stripes or splotches across the locations. In contrast, cultivars Chesnok Red, Purple Glazer, Red Janice, and Siberian were more likely to have moderate or dark violet stripes, streaks, or splotches, particularly when grown at the northern Colorado, Minnesota, Nevada, New York, Ontario, Pennsylvania, or Washington locations."

The implication for growers is that the variety you plant may look different in size and color when you harvest it, especially if you purchased it from a distant supplier. Dr. Volk's advice is to trial a number of different varieties representing the different types. She suggests that, at the least, you grow an artichoke, silverskin, purple stripe, porcelain and a rocambole. Skilled growers can grow almost all types well, she said, so personal taste and market success may be the most important factors to consider when assessing a variety. Once you have determined the type that works best for your farm and markets, you can begin to propagate your own stock, selecting the biggest and best bulbs to plant the next year. In this way, you develop your own strain adapted to your conditions.

For detailed descriptions and photographs of the 10 types of garlic, visit www.bignewsforgarlic.com.

NEWS

UMASS SOIL & PLANT NUTRIENT TESTING LAB UPDATE

The UMass Soil & Plant Nutrient Testing Lab will be accepting new orders for ROUTINE SOIL ANALYSIS and PARTICLE SIZE ANALYSIS orders ONLY, beginning Monday, July 13, 2020. *Please do not send orders for other types of analyses at this time.* At this time, we can accept mail-in samples only; walk-in samples cannot be accepted at this time and the lab office will remain closed to the general public until further notice. Processing time will be longer than usual since we are operating with reduced staff and staggered shifts. Thank you for your patience and understanding. For updates and information about available services, please visit: www.ag.umass.edu/services/soil-plant-nutrient-testing-laboratory.

The UMass Plant Diagnostic Lab is also now receiving mail-in samples. For more information, please visit their website at www.ag.umass.edu/services/plant-diagnostics-laboratory.

PAYCHECK PROTECTION PROGRAM (PPP) UPDATES

The Paycheck Protection Program (PPP) has reopened the application period until August 8, 2020. The PPP original application period closed on June 30, 2020.

As a recap, PPP is a program administered by the U.S. Small Business Administration (SBA) with applications being processed through an SBA-approved lending institution. While PPP is a loan, an important point to note is that the

loan will be fully forgiven if the funds are used for payroll costs, interest on mortgages, rent, and utilities (at least 60% of the forgiven amount must have been used for payroll). Forgiveness is based on the employer maintaining or quickly rehiring employees and maintaining salary levels. Forgiveness will be reduced if full-time headcount declines, or if salaries and wages decrease. The period used to cover eligible costs and expenses has also increased from 8 weeks to 24 weeks from loan disbursement, making it easier for PPP recipients to meet the 60% payroll requirement. Special consideration under PPP is provided for seasonal businesses such as farming operations.

More detailed information, including a list of SBA-approved lending institutions that process PPP applications can be found at: <https://www.sba.gov/funding-programs/loans/coronavirus-relief-options/paycheck-protection-program#section-header-5>

PPP is a program you should definitely look into if you employ agricultural workers on your farming operation!

OPEN APPLICATION PERIOD FOR FOOD SECURITY INFRASTRUCTURE GRANT PROGRAM

The Executive Office of Energy & Environmental Affairs (EOEEA) is accepting online applications for The Food Security Infrastructure Grant Program (FSIG) on a rolling basis now through September 15th, 2020.

The goal of the Food Security Infrastructure Grant Program is to ensure that individuals and families throughout the Commonwealth have access to food, with a special focus on food that is produced locally, and equitable access to food. The Program also seeks to ensure that farmers, fisherman, and other local food producers are better connected to a strong, resilient food system to help mitigate future food supply and distribution disruption. Participants selected to participate in the Program will be provided with reimbursement grants broken into three funding categories: \$0 to \$10,000; \$10,000 to \$75,000; or \$75,000 to \$500,000.

Eligible projects include: (i) information technology needs; (ii) facility adaptation to new safety guidelines; (iii) storage, processing, and delivery equipment, and (iv) other strategies that connect local food production with food insecure communities and residents. Project categories are broken into three funding sections.

Examples of eligible projects for agricultural operations include:

- Signage & Handwashing Stations
- Equipment for Remote Ordering & Payment
- Food Storage, Processing, and Delivery Equipment
- Food Safety Equipment (i.e. coolers and thermometers)
- Food Processing, Washing & Packing, and/or Cleaning & Sanitation Equipment
- Season Extension (i.e. greenhouses, cold storage)
- Food Processing Facilities
- Distribution Vehicles
- Infrastructure

For more information, or to submit an online application go to: www.mass.gov/service-details/food-security-infrastructure-grant-program. Please refer to the Request for Response (RFR) available on this website for full Program details. To apply online please review the RFR and then click on the 'Food Security Application Questions' to submit your application.

EVENTS

UNH WEBINARS:

- **Wednesday, July 15, 12-1pm. [North Country Lunch and Learn, Tarping: What the Heck is That!](#)** The third installment of this series will focus on using tarps to reduce tillage and control weeds on small-scale farms. Open to everybody, Great for people who are new to the concept of tarping.
- **Wednesday, July 15. 6:30-8:30pm. [Low-Risk Pesticides Webinar #1: Insecticide Modes of Action.](#)** In two zoom workshops, we will cover best practices for making the most of low-risk insecticides in small farm operations. Free to attend - 2 NHDAM&F - DPC Pesticide Applicators Credits pending, must attend the live Zoom event to earn credit.

Learn more and register at the link above.

- **Wednesday, July 22. 6:30-8:30pm. [Low-Risk Pesticides Webinar #2: Sprayers & Foggers for Small Scale Operations.](#)** In two zoom workshops, we will cover best practices for making the most of low-risk insecticides in small farm operations. Free to attend. Register at the link above. Free to attend - 2 NHDAM&F - DPC Pesticide Applicators Credits pending, must attend the live Zoom event to earn credit. Learn more and register at the link above.
- **Wednesday, July 29, 5-7pm. [Managing Humidity & Condensation in Coolers.](#)** Please join us for a virtual twilight meeting on how to manage humidity and condensation in coolers to increase shelf life and prevent food-borne illness. Our speakers will include Chris Callahan and Andy Chamberlain from UVM's Ag Engineering program, Mary Chaote from UNH Extension's Food Safety Team, and Paul Franklin from Riverview Farm in Plainfield, NH.

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Vegetable Notes. Genevieve Higgins, Lisa McKeag, Susan Scheufele, co-editors.

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