UMass Extension

Vegetable Notes

For Vegetable Farmers in Massachusetts since 1975

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In this issue:

Intercropping is the name of the game at Flats Mentor Farm in Lancaster, MA, where 300 immigrant and refugee farmers grow culturally relevant crops using modern and traditional methods. Photo: S.B. Scheufele

Crop Conditions

Some parts of MA got two inches of rain in last week's storm, but much of the state was skipped over. Same story with the rain forecast for yesterday and today—some fields remain very dry while others just down the road are fairly wet. These sporadic and patchy storms make it difficult to plan field work and make decisions about when and where to irrigate. Nonetheless, growers are busy harvesting, weeding, irrigating, and planting. Corn is starting to come in more steadily, blueberries are being picked, and garlic is being harvested and cured—see article from the July 26, 2018 issue of Veg Notes to read up on harvesting, curing, and storage practices. The first tomatoes, peppers, and eggplant are also coming in.

The super-hot and humid weather in the forecast has folks worried about their plants and crews alike. Lettuce crops are starting to bolt and some signs of heat stress are being seen in other crops. High heat can cause pollination issues including blossom drop and fruit abortion in tomatoes and other fruiting crops, and can cause plant stress from excessive internal heat in many other crops. Heat stress starts with decreased photosynthesis and increased photorespiration, which inhibits growth and slows transpiration. Plants are then less able to cool themselves and internal temperatures may rise. The best way to reduce heat stress in plants (and people!) is by giving them enough water to meet their evapotranspiration needs. Overhead watering, sprinkling, and misting can reduce plant tissue temperature. Mulches, including white or reflective plastics and straw, can help keep moisture in the soil and have a cooling effect on soil. In contrast, surfaces of black plastic mulches can exceed 150°F, and heat can radiate off the mulch causing damage to plant tissue or sunburn to fruit. Sunburn can be avoided first by developing good leaf canopy, using shade cloths, or using film protectants like kaolin clay (e.g. Surround). Stay cool and drink water!

Pest Alerts

Basil:

Basil downy mildew has been confirmed in several locations across New England. If the disease is not yet in your crop, preventative fungicide applications can be effective. Phosphite fungicides (e.g. K-Phite, Prophyt) are most effective against this disease; mandipropamid (e.g. Revus), cyazofamid (Ranman), and azoxystrobin (e.g. Quadris) are also effective. There are many OMRI-approved products labeled for basil downy mildew control but little data demonstrating their efficacy. See the New England Vegetable Management Guide for labeled products—carefully check labels as basil is a specialty crop that is often not listed.

Bean:

Mexican bean beetle egg laying has begun. Monitor eggs and release the biocontrol agent *Pediobius* when eggs hatch. See our Mexican Bean Beetle Biological Control fact sheet for updated contact information for ordering *Pediobius* through the New Jersey Department of Agriculture.

Brassica:

Cross-striped cabbageworm. Photo: Clemson University.

Cross-striped cabbageworm (CSCW) was observed in CT and RI this week. Unlike other caterpillar pests of brassicas, CSCW moths lay clusters of up to 25 eggs. Infested plants quickly become skeletonized, while neighboring plants remain unaffected. Eggs are yellow, flattened, and overlap each other like fish scales. Caterpillars are light bluish-grey on top and green underneath, with numerous black bands across their backs and a yellow line down each side. Moths fly at night so are rarely seen. Scout now for eggs and caterpillars and treat if 5% of your crop has 1 or more caterpillars. See the New England Vegetable Management Guide for labeled products.

Cucurbits:

Cucurbit downy mildew on cucumber: angular yellow areas trapped by leaf veins will appear on upper surface of leaves. Corresponding areas on undersides of leaves will have fuzzy gray sporulation. Photos: UMass Vegetable Program

Cucurbit downy mildew was diagnosed this week on several cucumber varieties in Barnstable Co., MA, jumping up from the nearest previous report in New Jersey. Downy mildew is a very destructive disease and progresses rapidly under favorable conditions. Fungicides are much more effective when applied well before symptoms are visible. Initiating a downy mildew control program *after* symptoms have been detected is much more likely to fail. Cucurbit growers across MA should be inspecting their crops carefully, and especially those in Southeastern MA should consider adding a targeted downy mildew fungicide to their regular cucurbit spray program at this time. Consult the New England Management Guide or this article from Meg McGrath of Cornell University for the most current recommendations for controlling cucurbit downy mildew.

Squash bug eggs are hatching across western MA this week. Squash bug feeding disrupts plant uptake of water; young plants are especially susceptible to the resulting wilt. Use pyrethroids (e.g. Asana, Mustang, Pyganic^{OG}) on adults and switch to azadirachtin-containing materials (e.g. Azatin O^{OG}, Aza-Direct, Molt-X, AzaGuard, Azatrol) when nymphs are present.

Squash vine borer moth (above). Tachinid fly (below). Photos: L.J. Buss, Univ. Florida and D. Roos, NC State

Squash vine borer: Adult flight continues and egg-laying is happening now. Growers should check susceptible crops for eggs and, if observed or if there is a history of this pest on your farm, make 2 to 4 weekly applications if more than 5 moths per week are captured at monitoring sites near you (see map on next page). Timing is very important. Treat base of stems thoroughly to target hatching larvae. Some selective materials used for other caterpillars in squash, such as spinosyns and *Bacillus thuringiensis aizawi*, have demonstrated efficacy in trials. Several farmers have been confused by a squash vine borer lookalike in and around their crops and traps. See photos at right. Look for the black spots on the squash vine borer moth abdomen, and for large helmet-like fly eyes on the beneficial tachinid fly.

Bacterial wilt is continuing to develop in cucurbit fields that were not effectively treated for striped cucumber beetle. The bacteria that cause this wilt are transmitted when SCB feed, but crops vary in the time it takes to wilt and die—cucumbers tend to go down more quickly, about 2 weeks after transmission of the bacteria, whereas squash plants that are infected when they're already fairly large can take longer to go down. Plants will wilt and die more quickly under drought stress.

Pepper:

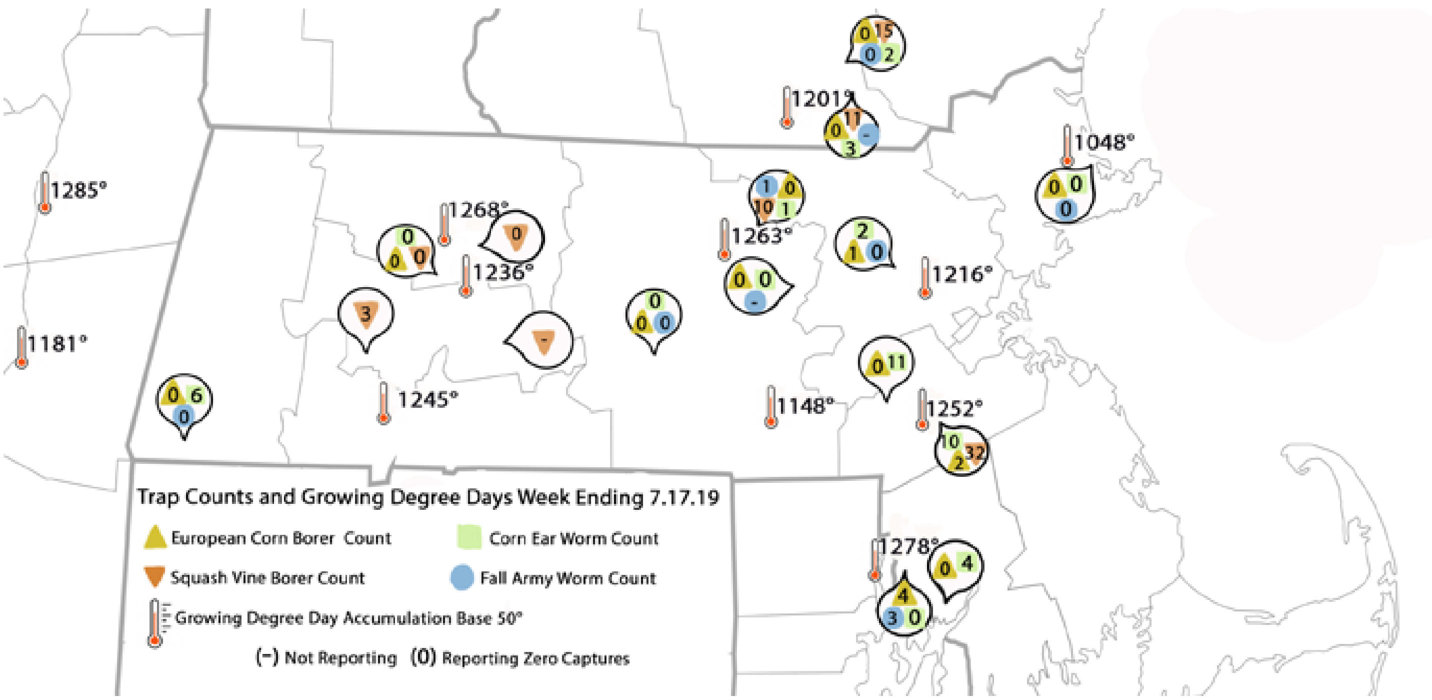
Hopperburn from potato leafhoppers was observed in 'Numex' peppers in Rhode Island this week. Hopperburn is not commonly seen in peppers, but *Capsicum chinense* species seem to be more susceptible than other bell or hot peppers. Symptoms are similar to those on potatoes, eggplants, or beans: leaves turn yellow at the margins and appear burned as the tissues die.

Bacterial leaf spot was diagnosed in CT and MA in the last two weeks. Chemical control of this disease is difficult; field and greenhouse sanitation as well as crop rotation is crucial for management. Start with clean seed from a reputable source, or hot water treat your seed. Tables of available resistant varieties are available here.

Tomato:

Tomato hornworm caterpillars are being seen now. There is no set economic threshold for this pest in tomato, but foliar sprays can be applied if damage to foliage or fruit is unacceptable. Use selective insecticides to preserve natural enemies of secondary pests like aphids. Spot treat if damage is limited to certain areas. See the New England Vegetable Management Guide for labeled products.

Powdery mildew was seen this week in a home garden. Powdery mildew is more common on high tunnel and greenhouse tomatoes but can develop in the field if conditions are right (high humidity). For organic production, micronized sulfur (e.g. Microthiol Disperss) and mineral oil (e.g. JMS Stylet Oil) provide the best control. For more labeled products, see the New England Vegetable Management Guide. Remember to check labels for protected versus field tomatoes.



Sweet Corn:

Corn earworm (CEW) is arriving now throughout MA—some areas of the state are on 4-6 day spray schedules, depending on nearby trap captures, while other sites have not yet captured any moths. See spray interval table at right.

Spray intervals for corn earworm		
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

European corn borer (ECB) trap counts dropped mostly to zero this week, indicating the end of the first flight. If CEW is not triggering a spray schedule on your farm, continue scouting for ECB damage to inform sprays. After late whorl stage, spray if a 15% infestation threshold is reached; for younger corn use a 30% threshold. If CEW has arrived in your area and trap captures warrant spraying (see map and table on previous page), scouting for ECB damage is no longer necessary. Second flight begins at 1400 GDDs base 50°F—GDDs are currently between 1048 and 1278 across MA.

Fall armyworm (FAW) has just started arriving in New England, with a few trap captures reported from MA and NH this week. FAW arrives on storm fronts from the southern US every year but arrival does not always coincide with CEW, which is also blown northward on storms. Scout for FAW damage when moths are trapped in your area and when CEW numbers do not warrant a spray. Treat if 15% or more plants are infested with either FAW or ECB.

Western bean cutworm has arrived on one farm in Berkshire Co., MA. This is a relatively new pest in MA and is not widespread—we've captured it in pheromone traps and seen damage at one Berkshire Co. location for 3 years, and we captured it at our research farm in South Deerfield, MA last year but never saw damage. In New York, where it is more of an issue, WBC has emerged in Orange and Dutchess Cos., and GDDs indicate 25% emergence. WBC usually arrives around the same time as CEW, so infestations are generally cleaned up by CEW treatments.

Smartweed flea beetles were seen affecting many vegetable crops and weeds this week. Photo: S.B. Scheufele

Other/Multiple Crops:

Large flea beetles were observed in high numbers this week on a farm in central MA; we suspect that it is the **smartweed flea beetle** (*Systena hudsonias*). Feeding damage and beetles were found on bean, basil, cabbage, eggplant, Swiss chard, okra, and sweet potato, in addition to several weeds including smartweed, lambsquarters, and redroot pigweed. These are large (3.5-5.5mm long) flea beetles that are all black and have long segmented antennae. Products used to control other flea beetles should be effective. Consult product labels to determine if the crop is listed.

FRAC GROUP 11 FUNGICIDES—THE QUINONE OUTSIDE INHIBITORS (QOIS)

Quinone outside Inhibitors (QoIs) are among the most frequently applied fungicides in agriculture worldwide. Unless your farm is certified organic, chances are good that you have used a QoI fungicide in the course of your career. Some of the most widely used stobilurins include Quadris (azoxystrobin), Cabrio (pyraclostrobin), and Flint (trifloxystrobin), for example. But how much do you really know about them? This article provides some information about their background and behavior.

History

The QoI fungicides are also sometimes referred to as strobilurins, a name that references their origin. In 1977, a German scientist isolated two fungicidal molecules from the pine cap mushroom, Strobilurus tenacellatus, and named them strobilurins A and B. Strobilurin A showed strong antifungal activity in the laboratory, but it was very photosensitive. Chemists modified the molecule to make it more stable in sunlight, and a new class of fungicides was born. The first commercially produced QoIs (azoxystrobin and kresoxim-methyl) became available in 1996. By 2013, azoxystrobin (Quadris) was the best-selling fungicide on the planet, accounting for over $1 billion in sales.

There are currently 20 compounds in FRAC group 11, the fungicide resistance group that includes all QoIs. 18 of these compounds are strobilurins, which all end in –strobin except for kresoxim methyl. Famoxadone and fenamidone are classified as QoIs and therefore included in group 11 but are actually not strobilurins; however, they have the exact same mode of action. In addition to stand-alone products, the QoIs have become popular tank mix partners for other fungicides and are frequently found in combination products (e.g. Quadris Opti and Top, Ridomil Gold, Tanos, etc.)

Mode of Action and Spectrum of Activity

The electron transport chain (ETC) is a cascade of molecular reactions that cells use to produce the energy they need in order to carry out the basic functions of life. Several fungicide classes (including QoIs as well as FRAC groups 7, 21, and 45) work by blocking specific steps in the ETC inside fungal cells, thereby preventing them from producing energy. Although these fungicide groups all affect the ETC, they work on different molecular targets within the cascade, and therefore belong to different FRAC groups.

The QoIs have an unusually broad spectrum of activity for a systemic fungicide. They are effective against oomycetes as well as several different types of fungi, a fact that contributes at least in part to their popularity. In addition, several QoIs are considered "reduced risk" pesticides, meaning that they have a low toxicity to mammals.

The QoIs in general are very effective in preventing spore germination and infection. For this reason they are excellent protectants and are best used early in the season to prevent diseases from taking hold. They are less effective against mycelial growth, and have limited effect against fungi inside the plant due to a tendency to bind tightly to plant cuticles. For this reason, the QoIs in general have limited curative ability.

Chemical Attributes

All QoIs have translaminar activity and may be referred to as 'local systemics'. Azoxystrobin and fluoxastrobin also have true systemic activity and will move via the xylem into plant tissues above the point of application. Trifloxystrobin, picoxystrobin, and kresoxim-methyl are sometimes called 'meso-systemics' because they also have a vapor phase—they evaporate from treated plant surfaces and move to other plant surfaces by wind currents. It has been shown scientifically that this can increase their effectiveness against some diseases, but it is difficult to determine whether or not the effect is significant.

QoI fungicides have a high affinity for the waxy plant cuticle and bind to it readily; over time, they are gradually released and absorbed into plant tissues. Cuticle binding slows absorption into plant tissue, so the concentration of QoI fungicides within plant tissue can remain low after applications. Pyraclostrobin, kresoxim-methyl, and trifloxystrobin have a higher affinity for the cuticle—full distribution of the fungicide can take several days, and high concentrations of the chemicals in plant tissues is never achieved. Azoxystrobin binds to the cuticle more weakly, and so it can move into plant tissues faster and achieve a higher concentration in plant tissue than some other QoIs.

The risk of phytotoxicity increases when QoIs are mixed with penetrants, which solubilize the cuticle. Always read product labels and understand what products are compatible with each other.

Resistance Issues

The highly specific single-site mode of action of the QoI fungicides makes them prone to resistance development. Resistance to QoIs is common in some types of fungal pathogens, such as the powdery and downy mildews, whereas it is uncommon in other types, such as rusts. Fungal genetics are responsible for these differences.

Fungicide resistance may be qualitative or quantitative. Qualitative resistance is an all-or-nothing response, in which a fungus is resistant to a fungicide regardless of the concentration it's exposed to. Quantitative resistance occurs when the pathogen can survive at low doses of the fungicide but is killed at higher doses. Qualitative resistance the most common type seen with the QoIs—quantitative resistance has been documented, but it is rare.

There is also strong cross-resistance among all QoIs, meaning that if a fungus becomes resistant to one fungicide in the group, it is resistant to all of them. If we are to preserve the usefulness of the Group 11 fungicides, resistance management is critical.

Resistance management

Rotating fungicides from different FRAC groups is the most important tool in the box for preventing resistance. Always follow the resistance management guidelines on product labels—the label is the law and will help keep chemistries effective for longer! In addition, there are a few rules of thumb to keep in mind:

- Limit the total number of QoI applications. Product labels often provide information on maximum number of applications allowed per season. If no guidelines are given, make no more than 3 applications.
- Use a maximum of 1 QoI spray out of every three fungicide applications when using a QoI alone (as opposed to a tank mix or combination product).
- Use a maximum of 1 QoI spray out of every two fungicide applications when using tank mix or combination product.
- Do not make consecutive applications of QoI fungicides.

- Tank mix with a contact fungicide or use a combination product containing a contact fungicide (e.g., chlorothalonil, mancozeb, sulfur, oil).

For more information:

Fungicide Resistance Action Committee (FRAC): http://www.frac.info/

--Written by Angie Madeiras, UMass Plant Diagnostic Lab

UNDERSTANDING WEED LIFE CYCLES: THE KEY TO BETTER MANAGEMENT

When trying to figure out how to manage weeds better, it helps to understand why they are so darn successful in the first place. Weeds are plants that thrive in disturbed environments, like roadsides or annual vegetable systems that are repeatedly tilled. But all weeds are not created equal, and each species has its own lifestyle—when and why it germinates, where it thrives, and so on—which you can use to your advantage when it comes to managing them. Here we have broken them down into the following groups: summer annuals (small- or large-seeded broadleaves, and grasses), winter annuals, biennials, and perennials (stationary or wandering). Get to know your most problematic weeds and determine when and how you can get the most out of your weed control efforts. It will also help to have a good field guide around to help identify weeds in the field. We recommend *Weeds of the Northeast* by Uva, Neal, and DiTomaso.

ANNUAL WEEDS germinate from seeds and complete their life cycles within one year, while perennial weeds survive from year to year through underground storage structures from which they re-grow.

Summer annuals germinate in spring and set seed during the growing season—some may have multiple generations per season. Many of our most common and troublesome vegetable weeds fall into this category, including crabgrasses, foxtails, pigweeds, lambsquarters, hairy galinsoga, velvetleaf and purslane. Since the summer annuals are such a big and diverse group, it is helpful to further break them down:

Small-seeded broadleaf weeds germinate when seeds are within the top one inch of soil. They grow very quickly and produce a huge amount of seeds (tens to hundreds of thousands), to improve the chances that some individuals will survive in a highly disturbed area. Because the seeds are small, seedlings of these species are very small and fragile, so it is important to take advantage of this vulnerability and control them at this stage.

Hairy galinsoga, a small-seeded summer annual. All photos courtesy UMass Weed Herbarium.

Examples: Pigweeds (*Amaranthus* spp.), lambsquarters (*Chenopodium album*), galinsoga (*Galinsoga ciliata*), smartweeds (*Polygonum* spp.), purslane (*Portulaca oleracea*)

Control Strategies:

- Cultivate the top 1 to 2 inches of soil 2 to 4 times within the first month following tillage to eliminate most individuals that will emerge during the season.
- Organic mulches like straw or wood chips are also highly effective—reduce weed density by hoeing or shallow cultivation before placing the mulch.
- Plant crops densely if the crop will tolerate it, since these weeds are easily shaded-out.
- Flaming may be effective on plants < ¼ to ½ inch tall.
- Cultivating in the evening can reduce emergence of seeds brought to the surface by tillage.
- Remove escapes before they set seeds since they produce so many long-lived seeds.

Velvetleaf, a large-seeded broadleaf weed.

Large-seeded broadleaf weeds emerge from seeds buried between 0.5 and 2 inches deep in the soil. They grow rapidly and are more competitive than small-seeded annuals, since they have more stored energy and bigger leaves, and are more competitive with your crops. They produce fewer seeds (hundreds to thousands per plant) but seeds can survive for longer periods of time (decades).

Examples: Velvetleaf (*Abutilon theophrasti*), giant ragweed (*Ambrosia trifida*), common cocklebur (*Xanthium strumarium*), morning glories (*Ipomea* spp.)

Control Strategies:

- Delay planting until early-June to allow most seeds to germinate and be killed when preparing seedbeds (velvetleaf).
- Cultivate repeatedly in the early season to prevent establishment.
- Mulches are NOT as effective because more energy is stored in large seed and emerging plant is bigger and stronger.
- Don't allow escapes to go to seed, as the seeds last many years in soil.

Yellow foxtail, a summer annual grass.

Summer annual grasses emerge mostly from the top 0.5 to 1 inch of soil. They produce a huge amount of seed and seeds are very long-lived. Abundance of summer annual grasses is associated with shallow or reduced tillage practices or compacted soils.

Examples: Foxtails (*Setaria* spp.), Crabgrasses (*Digitaria* spp.), Barnyardgrass (*Echinochloa crus-galli*), Fall panicum (*Panicum dichotomiflorum*)

Control Strategies:

- Use transplants and plant into clean beds—vigorously growing crops can outcompete relatively shade-intolerant grasses.
- Use stale-seedbed for small-seeded crops or those with a wimpy canopy like carrots.
- Cultivate before plants exceed ¼ inch.
- Pay attention to ends of rows, between rows, or edges of plastic where there is no competition from crops and/or the soil is compacted.

Field pepperweed, a winter annual producing flowering stalks in spring.

In contrast, winter annuals germinate in late-summer or fall and overwinter as small plants or rosettes, resume growth in spring, and set seed in late-spring or summer. These weeds are most problematic in winter (think chickweed in overwintered greens!) or in early spring crops and in no-till systems.

Examples: Wild mustard (*Brassica kaber*), horseweed (*Conyza canadensis*), shepherd's purse (*Capsella bursa-pastoris*), field pepperweed (*Lepidium campestre*), henbit (*Lamium amplexicaule*), purple deadnettle (*Lamium purpureum*)

Control Strategies:

- Fall tillage for spring-planted crops is effective, or till in spring and delay planting.
- Rotation with warm season crops like squash and tomato tends to break the life cycle of these cool season weeds.
- Organic mulches are very effective since winter annuals occur as small, prostrate plants or rosettes over the winter.
- Use up all applied nitrogen by end of season, as these can be effective N scavengers.

Common teasel, a biennial weed, produces rosettes (left) in the first year and flowers (right) in the second year.

BIENNIAL WEEDS are propagated from seeds but generally take more than one full year to complete their life cycles. They grow vegetatively during the first growing season, overwinter as a root, then bolt and flower during the second season. They are very similar to winter annuals, but they can start growing earlier in the season of their first year so that they may live longer than one full calendar year. They are also similar to stationary perennials since they survive as a taproot.

Examples: Wild carrot (*Daucus carota*), wild parsnip (*Pastinaca sativa*), common burdock (*Arctium minus*), bull thistle (*Cirsium vulgare*), common teasel (*Dipsacus fullonum*), white campion (*Silene alba*)

Control Strategies:

- Fall tillage for spring-planted crops is effective, or till in spring and delay planting.
- Organic mulches are very effective since biennials start as small, prostrate plants or rosettes over the winter.
- Frequent mowing or cutting is effective. Take care not to allow flower heads to form.
- Tillage is usually very effective, but if the crown is cut up, new plants may be produced.

PERENNIAL WEEDS survive for multiple years from underground structures, and can be stationary or wandering.

Stationary perennials are slow-growing at first but later become very competitive. They reproduce by seeds, which they produce each year, and individuals survive for several years. These plants overwinter as large taproots in the case of broadleaf weeds like chicory, or large clumps of fibrous roots as in grasses like tall fescue. When the aboveground plant parts are killed through mowing, cultivation, or frost, the plant later regrows from these underground reserves.

Curly dock is a stationary perennial.

Examples: Curly and broadleaf docks (*Rumex crispus* and *R. obtusifolius*), chicory (*Cichorium intybus*), dandelion (*Taraxacum officinale*)

Control Strategies:

- Cultivation and tillage can be effective at exhausting storage roots and will not cause spreading, as with wandering or creeping perennials
- Mowing down foliage will also exhaust storage organs
- Removing taproots or crowns from the field is highly effective if scale-appropriate

Wandering perennials reproduce by seed but also by underground vegetative structures like rhizomes (root-like stems), stolons (creeping stems like strawberry runners), or tubers. Fragments of stolons or rhizomes can generate new individuals.

Horsenettle is a wandering perennial which reproduces via underground rhizomes.

Examples: Johnsongrass (*Sorghum halapense*), quack grass (*Elytrigia repens*), yellow nutsedge (*Cyperus esculentus*), horsenettle (*Solanum carolinense*), milkweed (*Asclepias syriaca*), bindweeds (various), and Canada thistle (*Cirsium arvense*).

Control Strategies:

- Organic and synthetic mulches are NOT effective since the plants have so much stored energy and can poke up through thick mulch.
- Persistent removal of the shoots (mowing or hoeing) before they attain several leaves will exhaust the storage roots within two years—this effort should be focused in the spring when storage reserves are at their lowest.
- Deep tillage (e.g., to 1 foot, or 30 cm) will chop up and thereby weaken the storage roots.
- Watch for creeping perennials moving into fields from hedges and fences.

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

Spotted wing drosophila update

Spotted wing drosophila (SWD) is being found/reported at moderate levels in all counties of the state at this time. It is very important for all fruit growers to take this pest seriously this year. The heat over the coming week may limit population growth somewhat but numbers are climbing rapidly now. Please take a moment to review the recommendations below for managing this very destructive pest:

Basic recommendations for SWD management:

- **Strawberries:** Renovate promptly as soon as harvest is done. The potential for rapid build-up on fruit left behind prior to renovation is significant. Some states are recommending insecticide spray to the field prior to tilling in order to knock down SWD that might be building up in unharvested fruit. This could be especially helpful if strawberries are near other berry plantings (summer raspberry or blueberry).
- **Manage Canopy Environment:** Keep rows of **raspberries** narrow at the base (18”) and thin canes to allow 6” between canes if possible to allow for good air circulation and light penetration. In **blueberries**, eliminate branches below knee high (on mature bushes) that cast shade on the ground and open the upper canopy to allow for good air circulation and light penetration. This will improve spray penetration and efficacy, too. If necessary you can support spreading branches with a make-shift trellis to minimize the shade at the base of the bush. In other berry crops, maintain an open canopy as much as possible.

Prune raspberries to allow for good air circulation and light penetration to the base.

- **Monitor with traps:** This is a good practice for earlier in the season to determine when SWD has become active in a location. At this time (mid-July), traps may not provide useful information. Infestations should be assumed in fields with susceptible fruit.
  - o However, monitoring traps in sprayed fields can help verify the effectiveness of your spray program.
  - o Information about how to set up traps can be found here.

Simple traps like this, with apple cider vinegar, dish soap, and some optional additives can be deployed in the spring to determine when SWD is active in your area.

- **Good Harvest Practices:** Remember to harvest frequently (daily if possible) and thoroughly and avoid allowing fruit to fall to the ground if possible. Training harvesters and/or PYO customers to pick cull fruit into a separate container (with some incentive) can reduce the amount of cull fruit left in the field.
- **Postharvest Fruit Handling:** Transport harvested fruit as quickly as possible to refrigeration. Holding fruit at 32-33˚F can arrest the development of any egg/larvae that may be present in the fruit and maintain fruit quality.
- **Spray Practices:** Spray recommended materials (organic or conventional) on a tight schedule (5-7 days) once crop is ripening and SWD have been confirmed at or near the crop. Some recommend spraying in the evening to increase residual efficacy because some materials degrade more quickly in sunlight. SWD may also be more active in the evening, especially when the weather is very hot.
  - o Also, it is recommended to **add 4-16 oz Nu Film P/100 gal** with all materials to improve SWD efficacy and, if it rains after you spray, re-apply a pesticide material. (Read the label for any re-application restrictions of the same material.)
  - o See here for current list (courtesy of Mary Concklin at UConn Extension) of labeled spray materials for SWD.
  - o Always read the label of any pesticide material to be sure of rates and restrictions.
- **Fruit Sampling:** Sample fruit regularly during harvest and do salt flotation test to determine SWD larval presence and density. This is an important practice to establish how well your management program is working and to prevent the sale of infested fruit to your customers. Those customers will be hard to win back. See excellent how-to video at https://www.youtube.com/watch?v=TXij-udedqI.

Please contact the UMass Extension Fruit Program at umassfruit@umass.edu if you have questions about how to manage this pest at your farm.

--Written by Sonia Schloemann, UMass Extension Fruit Specialist

Events

Save the Date! 2019 UMass Vegetable Program Research Tour

Join us for an evening learning about the research being conducted this year at the UMass Research Farm, followed by dinner. Stay posted for an agenda in a few weeks!

When: Tuesday, August 20, 2019, 4-7pm

Where: UMass Crop and Animal Research & Education Farm, 89 River Rd., South Deerfield, MA

REGISTRATION: Please RSVP for food ordering. Click here to register for this event.

Thank you to our sponsors:

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

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