UMass Extension
Vegetable Notes
For Vegetable Farmers in Massachusetts since 1975

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In this issue:

A farmer checks seeding depth of spaghetti squash using his no-till seeder in a reduced tillage field with Tony Kramer, Northeast Regional Conservationist, NRCS.

Crop conditions

Another good soaking rain and more sunshine this week has been a good recipe for crop growth. Field harvests now include lettuce, summer squash, zucchini, garlic scapes, chard and kale, and some of the first cucumbers that were started under cover. Direct seeded and transplanted cucurbit successions continue to go in. Growers who used reduced tillage this spring were pleased with the faster rate of germination in very dry soils. In a spring with more moisture, most fields are disced and left to sit for a few days before planting, but this year some growers followed the disc with seeding equipment and transplanters immediately to pack the soil back down and keep the moisture from evaporating. Now that we've had some rain it is a good time to assess sidedressing needs of your crops. Also, cultivators are out to stay ahead of the weeds all over the state. As we know all too well, weeds can quickly take over your establishing crops. See the article this issue on cultivation practices for shepherds purse, galinsoga and quack grass.

Pest alerts

Vegetable scouting sheets can be found on the UMass Extension Vegetable Program website. When not given here, refer to the New England Vegetable Management Guide for scouting thresholds and treatment options.

Allium: Onion thrips: Treat if thrips reach 1 per leaf. A field scouted in Hampshire Co., MA was well above threshold (3/leaf) in bare ground onions, but onions grown on adjacent black plastic were below threshold (0.25/leaf). Leek Moth chewing damage and one pupa were observed in a Chittenden Co. VT onion field. This pest has only been documented in NY and VT, but not yet in MA, NH, CT or RI.

Basil downy mildew has been reported in a New Jersey field, and last week on home gardener basil plants in CT and VA. Basil growers should scout this week and initiate a preventive fungicide program if the disease is reported anywhere in their state.

Brassica: Cabbage root maggot are pupating in Franklin Co., MA, but we also saw new eggs so newly planted crops may still be at risk (worth scouting).. In Washington Co., RI one broccoli and kale crop scouted was 12% affected by feeding damage on roots but no maggots were found. Diamondback Moth larvae and pupae were seen on cabbage but not broccoli in Washington Co., RI Imported cabbage worm is at threshold of one caterpillar per plant in Washington Co. RI.

Diamondback moth pupa photo: A. Radin

Corn: European corn borer: Based on the accumulated growing degree days (Table), European Corn Borer (ECB) is laying eggs in all locations but Middletown, RI (egg laying begins at 450 GDD base 50F). Egg hatch is expected at approximately 540 GDD and peak flight (631 GDD) is expected in the next week for some locations. Both the New York (EII) and Iowa (Z1) strains are now being captured from the locations reporting (Table 3). Scout emerging tassels for the presence of ECB larvae by inspecting the tassels of 50 to 100 plants, in groups of 5 to 20 plants,

Location	Weekly ECB reported
Western, MA	
Hadley	1
Sheffield	0
South Deerfield	12
Whately	8
Central & Eastern MA	
Leominster	0
Millis	0
Sharon	0
Swansea	7
NH	
Litchfield	8
Hollis	0
Mason	0

Accumulated Growing Degree Days (F): 1/1/15 - 6/10/15	
Location	**GDD Base 50°F**
Pittsfield, MA	438.3
S. Deerfield, MA	527.5
Northboro, MA	538.5
Dracut, MA	512.5
Boston, MA	517.8
Sharon, MA	526.6
Seekonk, MA	509.3
Burlington, VT	547.6
Middletown, RI	389.7

throughout the field. Treat if more than 15% of the plants have one or more larvae present. If you have early corn in silk now, this corn will attract the most egg-laying, but treatment decisions should not be based on scouting. ECB will lay eggs near the ear and emerging larvae will bore directly into ears. Therefore, if you have silk now and GDDs indicate that ECB is laying eggs) or eggs are hatching, one or two insecticide applications at 5-7 day intervals can be effective for controlling ECB on this advanced corn. Traps were recently put out in VT and RI and have not yet reported any moths. **Corn Earworm:** If you have corn coming into silk, it is time to put out Corn Earworm traps. Three traps in Erie, Yates and Monroe Cos. NY reported CEW captures with one capturing as many as 7 moths per trap.

Cucurbit: Striped cucumber beetle: Cucumber beetles were reported above threshold of 1 beetle per 2 plants in a field of summer squash in Washington Co., RI. In Hampshire Co., MA striped cucumber beetle is below threshold in a field but above threshold in a high tunnel in Hampshire Co. MA. Reports from NH indicate this pest is active there on very young pumpkin and squash just germinating. **One Squash vine borer** was captured in a trap in a summer squash field in Hampshire Co. MA but not in traps in RI or NH; time to put out Heliothis net traps with squash vine borer lures in summer squash, zucchini, or pumpkin fields to monitor this pest on your farm. Spray threshold of 5 moths per trap has been successful for both organic and conventional farms. Population pressures vary greatly from farm to farm, so it is important to trap in your own fields for this pest. **Melon aphids** were found heavily infesting high tunnel cucumbers with some mummified by wasp parasites in Washington Co., RI.

Melon aphids with mummies photo: A. Radin

Green and pink potato aphids on high tunnel tomatoes. photo: A. Radin

Solanaceous: Colorado potato beetle: Adults and eggs have been found in Franklin and Hampshire Cos., MA and Washington Co., RI at high pressure. Larvae must be active out there somewhere! Thresholds are (per plant, or stalk once plants reach 12"): 0.5 Adult, 4 small larvae, or 1.5 large larvae. Keep an eye out for CPB as they emerge! **Three-lined potato beetle** adults are active in Hampshire Co., MA, Chittenden Co.,VT and Washington Co., RI but pressure is low. **Tomato hornworm** adult moth and pupae were found in high tunnel tomatoes, which means that this pest is overwintering. This is an important pest for those growing tomatoes consecutively in tunnels. Scout tomatoes in tunnels and greenhouses now. **Potato aphid** (both pink and green) were found in hot spots on high tunnel tomato in Washington Co., RI and throughout the crop in greenhouse tomato in Roxbury, MA.

Tomato hornworm moth (left) and pupa (right) photo: A. Radin

Multiple: Verticilium wilt in okra is affecting 100% of a crop in a field with a history of the disease in Franklin Co., MA. Submit samples to a diagnostic lab if eggplant, tomato, pepper, potato

or okra are exhibiting the symptomatic yellowing and wilting of lower leaves followed by V-shaped lesions which are widest at the leaf margin. **Leaf miner** eggs were scouted above threshold of 5% of plants with egg masses in Franklin Co., MA on Swiss chard indicating that this pest is still a potential threat in spinach, chard and beet greens. **Milkweed** is budding now in Washington Co., RI. Now is the ideal time to cultivate or even mow this weed down if it is in your pasture or vegetable fields since the plant has expended most of its energy reserves to flower.

COLORADO POTATO BEETLE

CPB adults are actively laying eggs in potato fields and egg hatch is expected soon.

Colorado potato beetle (CPB) adults are actively moving into potato fields and laying eggs. Egg hatch can be expected soon. Increasing temperatures mean faster development and feeding rates. While a period of cold, rainy weather slows everything down, it may allow for eggs to pile up. We can expect a surge of shiny yellow eggs and young larvae to appear with warmer weather. Scouting fields–and knowing what to look for– is key in determining when to use appropriate controls. Colorado potato beetle is also an important pest of eggplant, and these fields should be monitored as well. Good control of CPB in June will not only protect vulnerable crops now; it will also reduce the number of beetles that will reproduce in fields and overwinter to feed on next year's crops. Both adults and larvae cause feeding damage, but larval damage is the most severe. Because the fourth and final larval stage (instar) does 85% of the feeding damage it is critical to control larvae while they are small.

Colorado potato beetle small larvae just hatched (top). Large larva (bottom)

Life Cycle: In the Northeast, CPB survives on solanaceous crops and weeds, including horsenettle, nightshade, eggplant, potato and tomato (primarily seedlings). CPB overwinters in the adult stage, generally in soil (up to 12 inches deep) in the woods and brushy borders next to host crops, though some burrow into soil in the field. In spring the beetles search for host plants by walking from the field edges. Heavy feeding may occur on edges on non-rotated fields. If beetles do not find host plants via walking they will fly in search of food. Once host plants are found, adults feed, mate and lay eggs. One female can lay up to 300 eggs in her lifetime. Eggs hatch in 7-10 days, depending on temperature. Feeding damage and larvae are easily seen on leaves. Larvae go through four molts (instars) before they pupate. In the first instar, the larvae are about the same size as the eggs and in the second instar they are about an eighth of an inch long. Mature, fourth instar larvae are hump-backed and plump, and reach 5/8"-long before they drop to the soil and pupate. Adults emerge from pupae after 10-14 days, leaving round exit holes at the soil surface. In southern New England there is a second generation of eggs, larvae and adults, while in northern New England there is only one generation. Beetles fly out of fields in August, seeking overwintering sites at field edges.

Monitoring & Thresholds: Scout for beetles on 30 to 50 plants (or individual stalks later in the season). One recommended procedure is to walk the field in a V-shaped pattern and stop at 10 sites across the field. Randomize your selection of sites using a set number of paces, e.g. stop every 10 to 30 paces, depending on field size. At each location, select 3 to 5 *plants* (from when plants emerge until 12"-18" tall); thereafter select 3 to 5 *stalks* at each site. Alternatively, select plants or stalks individually at random across the field. Count adults, large larvae (greater than half-grown) and small larvae (less than half-grown) separately. A treatment should be considered for adults when you find 25 beetles per 50 plants or defoliation has reached the 10% level. The spray threshold for small larvae is 4 per plant; for large larvae, 1.5 per plant (or per stalk in midseason). Potatoes can tolerate 15- 20% defoliation without reduction in yield.

Scout weekly. If population size is increasing, such as when new eggs are hatching or larvae are small, scout again in 3-4 days, especially if numbers are above the following thresholds: 15 adults, 75 small larvae or 30 large larvae per 50 plants/stalks. Use these scouting sheets to help keep track of beetle populations and determine when economic thresholds are reached: Potato, Eggplant, Tomato. These can be used for a range of insects and diseases in each crop.

Controls & Prevention:

Rotation. The single most important tactic for CPB management is to rotate potatoes, eggplants and tomatoes to a field that is at least 200 yards from the previous year's fields. Barriers such as roads, rivers, woodlands, and fields with other crops are helpful. This single practice delays and reduces colonization by adults, and therefore number of eggs and larvae in the field later on.

Crop health. Production practices that include healthy seed and good crop nutrition help plants grow well and withstand feeding injury.

Straw mulch. It has been well documented that when potatoes or eggplants are mulched with straw, fewer Colorado potato beetle adults will settle on the plants and fewer eggs will be laid. This can be accomplished on larger plantings by strip planting in a rye mulch, followed by mowing and pushing the rye straw over the plants after they emerge. For smaller plots, straw may be carried in.

Barriers. Mechanical barriers such as trench traps, trap crops and straw mulch also delay and reduce infestation. Install plastic-lined trench traps next to overwintering sites at least one week before adults emerge. Trenches should be 1' to 2' deep and 6" to 24" wide at the top. They can be U- or V-shaped with side walls sloping at angles between 65° and 90°. Beetles walking from field borders fall into the trench and cannot fly out.

Flaming. Flame weeders can be used to kill colonizing adult beetles when emerging crop is under 3-4 inches high. Move rapidly using a tractor-mounted or hand-held flamer. The goal is to scorch beetles, as injury to antennae and legs render them unable to orient and climb plants. At this early stage, healthy emerging potatoes have sufficient reserves to regrow foliage and establish well.

Perimeter trap cropping. Potato trap crops may be planted earlier than the main crop to attract beetles before the main crop emerges, or planted between overwintering sites and this season's crop. Flame, vacuum or spray border crop before beetles move into the main crop. Another approach is to plant three to five rows of potatoes treated with a systemic insecticide in a perimeter around the field; this treated border will kill up to 80% of the colonizing beetles. Late planting may cause beetles to leave the field before potatoes emerge, resulting in lower beetle numbers.

Biological control. Predators and parasites of CPB suppress populations and help prevent crop injury. Natural enemies that attack CPB eggs or larvae include twelve-spotted ladybeetle (*Coleomegilla maculata*), spined soldier bug, a carabid beetle (*Lebia grandis*) and a parasistic tachinid fly. *Beauvaria bassiana* has been shown to suppress beetle populations, though it does not provide immediate control. If insecticides will be used, use selective rather than broad-spectrum products to conserve natural enemies. Be aware that ladybeetle egg masses look very similar to the egg masses of Colorado potato beetles, though lady beetle eggs are slightly smaller (~1mm) than CPB eggs (~1.7 - 1.8mm) and more yellow in color.

Chemical Controls & Pesticides:

Scout to determine whether or not a damaging population is present. When using products that control only larvae or only small larvae, scout for eggs, note egg hatch and apply controls before larvae reach third instar to avoid the worst feeding injury. For materials that control all stages, you may wait and scout for adults and larvae to determine the need to apply insecticides.

Resistance management must be part of every potato grower's plan. CPB has a remarkable capacity to develop resistance to insecticides. Based on a fifty-year track record, we can expect that any insecticide that is used repeatedly on the same population of CPB (that is, those in the same field or a farm with nearby fields) will lose its efficacy in less than five years. Where potato production is concentrated and rotation has been limited, resistance may develop on a region-wide basis. If your farm is isolated from other farms where potatoes are grown, it's up to you to manage resistance in the population of beetles on your farm. Note the resistance group number of each insecticide and avoid using chemistries from the same group. Wherever possible, growers should rotate classes of insecticides and avoid using the same chemistry more than once per year or even better, once every other year. Do not use the same chemical class on successive generations in the same year. Note that in the New England Vegetable Management Guide, as well as on pesticide labels, each insecticide has a Group Number, which identifies chemistries with the same mode of action. Avoid using insecticides from the same group. Use newer chemistries first. For conventionally managed fields, there are enough different products to do a two-year rotation that will effectively control CPB while effectively delaying resistance to any one product. Keeping insecticides effective with careful rotations is a worthwhile investment. For organically managed fields, the selection

of insecticides is limited to fewer active ingredients including spinosad (Entrust), azadirachtin (Azatin, Azera), pyrethrin (Pyganic, Azera), and *Beauvaria bassiana (*Mycotrol O, Botanigard).

For current information on potato insect management including an up to date list of insecticide groups that have products registered for Colorado potato beetle, please visit the New England Vegetable Management Guide.

Do not try to kill every beetle in the field. Potato crops can withstand 15% defoliation without affecting yields. Avoid spraying the beetle in late season, as food reserves in the foliage two weeks prior to senescence add little to final tuber bulking.

--Ruth Hazard, UMass Vegetable Extension

USING COPPER EFFECTIVELY

Copper products play an important role in disease management in both conventional and organic fields. They are the most effective controls for most bacterial diseases. In organic production, copper products are the main protectant fungicide used in the control of diseases caused by oomycetes such as late blight and downy mildews. There are more copper products becoming available, and it is helpful to understand the differences and benefits of different active ingredients and formulations. Solubility, phytoxicity, human health risks, impact on soil ecology, labeled crops and diseases, and efficacy are important considerations in using particular copper products.

Copper residue on melon.

How copper works

When copper (Cu) is mixed with water, copper ions (Cu^{2+}) are released into solution. Modern copper products typically use insoluble or "fixed" forms of copper, creating a suspension of copper molecules in the spray solution. These undissolved copper particles persist on plant surfaces after the spray dries and copper ions are released from these deposits each time the plant surface becomes wet. The gradual release of copper ions from the copper deposits provides residual protection against plant pathogens present on the leaf surface. Copper ions kill pathogens primarily by destroying cell membranes and proteins and by disrupting protein synthesis. Since the mode of action of copper targets such fundamental components of living tissues, it affects a wide range of plant pathogens including bacteria, fungi, and oomycetes, but can also damage plant cells and be toxic to humans and other non-target organisms. Achieving the best control without injuring plant foliage and fruit depends on the concentration and rate of release of copper ions on the leaf surface, which is determined largely by the solubility of the copper formulation.

Solubility

- Less soluble (fixed) formulations release copper ions more slowly. This slow-release lowers the risk of phytotoxicity and provides longer residual activity. The following are low-solubility active ingredients: copper oxide (e.g., Nordox), copper hydroxide (e.g., Kocide, Champ), copper oxychloride (e.g., COCS and BadgeX2), and copper octanoate (copper ions linked to fatty acids to form a soap, e.g., TennCop, Cueva).
- More soluble formulations act rapidly but have higher risk of phytotoxicity and shorter residual activity. Basic copper sulfate and copper sulfate pentahydrate are highly soluble.

Metallic Copper Equivalent

Product labels list percent active ingredient (eg., 23.8% copper oxychloride or 98% basic copper sulfate), but this doesn't tell you the actual metallic copper by weight, as the formulation also impacts the total copper present. Look for the "metallic copper equivalent" listed below the active ingredients to determine the amount of actual copper by weight. A product with 40% metallic copper has 0.4 lb metallic copper per lb of product. The range in MCE among products is vast, ranging from under 1.8% to over 50% copper by weight, so it is important to consider the MCE because the effectiveness of a copper spray is highly correlated to the amount of copper applied.

Effects of pH, Spray Additives, and Weather

- Under acidic conditions, copper solubility and the potential for phytotoxicity increases. Spray solutions should be kept above pH 6-7, depending on the formulation, to prevent excessive amounts of copper ions from being released and possibly damaging fruit and foliage.
- Adding maneb or mancozeb to copper products as a tank mix increases the release of copper ions in solution. There are pre-mixed products (e.g., ManKocide) available, or growers can make their own mixtures. This may be especially helpful for controlling bacterial diseases such as bacterial speck, spot and canker of tomato.
- Using an approved adjuvant or 'sticker' may help the product to be more rainfast, but when used with the highly soluble copper sulfate formulations, can cause phytotoxicity.
- Finely ground compounds will be more active than coarser ground materials because the smaller particles result in better coverage of the leaf and are less likely to be removed from the leaf by wind and rain.
- Copper can accumulate to high levels on plant tissue when sprayed repeatedly to cover new growth and there is no rain. In this situation, after a rain event, a large amount of copper ions may be released leading to phytotoxicity.
- The risk of plant injury increases when the spray solution dries slowly due to cool wet weather, as the duration of active release of copper ions on the leaf is increased.
- Always read the label instructions. When mixing, follow the tank mix partner instructions.
- For each product, application rates vary with crop and disease. The recommended rate for a given crop may have a 2-fold difference between the high and low rate. Higher rates are recommended when disease pressure is high or conditions are especially favorable. Most products are labeled for a wide range of vegetable crops.

Safety

Human Health Hazards. Eye exposure is the most serious risk associated with using copper hydroxide. Eye damage can be irreversible. There is moderate risk from skin contact, ingestion and inhalation. Products vary in EPA hazard rating, most are "Warning" or "Danger" but Badge SC has a lower risk "Caution" label. The greatest health risk is to the person who mixes and sprays the material. Proper protective equipment should be worn when handling or applying copper products as with any pesticide or fertilizer. The required protective equipment is specified on the label and usually includes: long-sleeved shirt and long pants, chemical resistant gloves made of any waterproof material such as polyethylene or polyvinyl chloride, shoes plus socks, and protective eyewear. Though not usually required, you may also want to consider wearing a respirator or dust mask, especially for mixing dry formulations. Dry product sometimes comes in a paper bag that has a tendency to leak out of the seams and needs additional containment such as a plastic bin.

Restricted Entry Interval (REI). Most copper products have an REI ranging from 24-48 hours, which means that workers are not allowed to go into treated fields to pick fruit or do any other field work for that duration of time. Plan your spray and harvest schedule to accommodate your marketing needs as well as the REI. Fruit may need to be polished before marketing, to remove the blue residue left on fruit.

Environmental Hazards. Some farmers have expressed concern about copper toxicity in the soil or with respect to soil microbes and earthworms. Additionally, copper can be very toxic to fish and aquatic organisms, if drift and run-off occur. This should be a concern in sandy, acidic soils or near surface water. Copper is actually an essential plant micronutrient and, in New England, it is more often deficient than excessive in soils. The amount found naturally in soils in MA ranges from 0.1 to 8 ppm while nationally soils range up to 200 ppm. Crops remove less than 0.1 lb/A copper per year. Copper usually accumulates on the soil surface where it becomes chemically bound to organic matter and clay minerals. In acidic soils, the solubility of copper increases and toxicity or run-off may occur. An application of 1 lb of active ingredient per acre is estimated to raise the copper levels about 0.5 ppm. A single application of Nu Cop at 2 lb per acre with 77% active ingredient adds about 1.5 lb copper per acre to the soil, or could raise the concentration in the soil by 0.5 to 0.75 ppm. Therefore, the level of copper in soil would increase slowly over time, except in perennial planting systems such as apple orchards. In annual rotational systems, where copper applications might only be made every 4-6 years, copper accumulation is less of a concern. Nonetheless, copper use is regulated and certified organic farmers in the US are required to restrict their use of copper products. Regular soil tests should be taken and copper levels in the soil should be monitored.

Managing blights in organic tomato and potato using copper

Copper-based fungicides are labeled for use in organic systems and have demonstrated effectiveness in preventing late blight. Copper fungicides do not kill infections that are already present, they must be used preventatively in order to effectively protect plants from initial infections. Most pathogens have latent periods, when the plant is infected but does not show any symptoms. Thus, when symptoms appear, it is too late to protect the crop effectively–especially with late blight. Some strains of late blight are more aggressive than others and this will also influence the efficacy of copper spray programs. Regular applications of copper will also help protect tomatoes from early blight and Septoria leaf spot, which can progress rapidly and cause plantings to produce far less than their full yield potential.

Several copper products are OMRI-listed for use in certified organic production and are registered for use in Massachusetts including: NuCop 50DF, Badge X2, Basic Copper 53, and Cueva. Check the OMRI website for updates or consult your certifier. As with insecticides, dry formulations are more commonly approved for use in organic systems. Note that OMRI approval is for specific formulations, and there are often multiple formulations with the same trade name (eg. Badge X2 and Badge SC, of which only Badge X2 is OMRI approved).

High Tunnel and Greenhouse Considerations

- Read the label to be sure that a product is not restricted from use in the greenhouse. Many copper products are.
- The same protective gear and restricted entry interval would apply.
- Apply with sides open for ventilation.
- Most labels require that in addition to the standard REI, an eyewash station and notice of eye risk should be available for 7 days after application.
- If you suspect late blight, have the disease identified. Fulvia leaf mold, powdery mildew, and Botrytis gray mold or ghost spot are common diseases in high tunnel tomatoes and can look very much like late blight.
- If tomatoes (or other crops on which copper is used) are grown in the same area year after year, and copper is used, build-up in the soil is more likely. Include copper levels in your annual soil testing. Rotate to other crops!

-- S.B. Scheufele and R.Hazzard. Adpated from T. Zitter & D. Rosenberg, Cornell Plant Pathology, E. NY Commercial Horticulture Weekly Vegetable Update. June 26, 2013.

WEED MANAGEMENT THROUGH CULTIVATION; KEY PROBLEM WEEDS

--Editor's Note: the following article was written for organic farmers, but applies to any farmer who depends on cultivation for all or part of their weed management program.

Weed management on organic farms is primarily based on two practices, crop rotation and cultivation. Both of these practices have the same 3 goals: using up seeds in the weed seed bank; preventing new seeds from going into that bank; and starving out perennial weeds by using up the food in their storage organs, while not letting the plants put new food back.

Cultivation is basically the same practice whether you do it with tractor mounted equipment or a hoe. Basically, the goal of cultivation is to scratch the top layer of soil just deep enough to kick up germinated weeds and have them dry out in the sun. If you do not cultivate deep enough then the roots of the weeds remain in contact with the soil and the plant lives. If you cultivate too deeply then you stimulate new weed seeds to germinate by bringing them up to the surface and exposing them to light. Obviously, cultivation works best in sunny dry weather. The goal of cultivation during the cropping season is to use up the seeds in the top layer of soil as soon as possible. Deeper weed seeds will be dealt with later with crop rotation and field tillage.

In order to make these practices work the best they can for you, they should be adapted to the specific life history of the particular species of weeds you are dealing with. Using crop rotation to meet these goals is a longer topic for discussion and something that you need to plan ahead for, but cultivation is something that you need to be doing now, even though you are behind on everything else. As an example of how important it is to fit your practices to specific weed biology in order to get best control here is a discussion of 3 weed species that are out there right now.

Shepherd's Purse

For pictures of this weed see: ***https://extension.umass.edu/landscape/weeds/capsella-bursa-pastoris***

Raceme of Shepherd's purse seed pods.

Shepherd's purse is in the mustard or brassica family. It is usually a winter annual plant–meaning its seeds germinate in fall or winter and it grows actively in spring. Seeds germinate when the soil is below 60°F, in the fall or spring. Typically, seeds that germinate in the fall form a rosette that overwinters. In the very early spring the rosette resumes growth and sends up flowers that quickly produce seeds. Each plant can produce about 50,000 seeds. Shepherd's purse becomes a problem where fields are cover cropped in the fall and the Shepherd's purse germinates and survives under the cover crop unnoticed. Furthermore, the seeds can continue to mature and become viable even on plants that have been pulled or mowed down before the seeds were mature.

If Shepherd's purse is already going to seed in your fields, I suggest getting out there and hand pulling all of these plants and taking them out of the field with their seeds still attached. If Shepherd's purse is a problem already for you, then you will have to time your fall cultivating to kill the rosettes, or kill them in the spring before seeds begin to form. Shepherd's purse seeds may live for a while in the soil seed bank before germinating (half the seeds will be gone in less than three years) but not really that long compared to lambsquarters (it takes nearly 8 years for half the seeds to be gone).

Galinsoga

For pictures of this weed in different stages see: https://extension.umass.edu/landscape/weeds/galinsoga-ciliata

Hairy galinsoga. Photo by Randy Prostak.

Galinsoga is in the composite family. It is a summer annual–meaning that it emerges in the spring or early summer, grows during the summer, produces seed in mid to late-summer, and is killed by frost in the fall. It is just beginning to germinate in the fields now, so this is the time to kill it by cultivation.

Galinsoga can become a problem because it produces new seeds so quickly. It is not day-length sensitive, and goes from a germinating seed to producing new seeds in a bit over a month. By the time you see the flowers open wide they probably have viable seed in them. Pulling up plants with flowers and leaving them in the field is just adding to the weed seed bank. Get out and cultivate today before flowers form.

Galinsoga has no seed dormancy. That means that the seeds produced or laying in the seed bank will germinate as soon as the conditions are right (exposed to light when it is warm and moist enough). This makes Galinsoga easier to get rid of than something like lambsquarters that has a physiological dormancy. Lambsquarters produces two types of seeds. The brown ones are not dormant, but the black ones are dormant and will sometimes sit in the seed bank for many years before being triggered to germinate. All your crop rotations and cultivation will not get these seeds until they are ready to germinate.

Quack Grass

For a picture of quack grass and how to identify it see: https://extension.umass.edu/landscape/weeds/elytrigia-repens

Quackgrass with rhizomes.

Quack Grass is a perennial, native grass. It is very common in old fields and is a primary reason that farmers and gardeners are advised to get their fields prepared a year in advance before trying to grow crops. Those who do not follow the advice spend years battling quack grass.Quack grass is often referred to as witchgrass in Maine. I do not know why because witchgrass is a different weed (see http://www.noble.org/imagegallery/Grasshtml/CommonWitchgrass.html for a picture of witch grass) that does not look like quack grass at all

and has a different life history.

Quack grass is easily recognized by its rhizomes, which are underground stems that send up shoots as they spread under the soil surface. If you chop up the rhizomes into small pieces by tilling you have made the problem worse because each piece of the rhizome is likely to have a node and send up a new shoot from that node. And you are likely to have dragged these pieces of rhizomes all over the field.

Quack grass begins growth early in the spring and has become well established in fields that were too wet to work early. A quick tilling and planting in these fields is going to produce a mess later in the year, as all the pieces of rhizomes start growing with the crops and a single cultivation does not kill the quack grass. Cultivation tends just to cut off the shoot but leaves the rhizome to send up a new one. Actually, that is the best method left if you do not have the quack grass gone before planting. BUT, you have to stay with it and cultivate off the shoots every time they come up, and if you miss a cultivation you are essentially back to ground zero. The goal of this practice is to starve out the rhizome. The rhizome is a food storage organ and each time it sends up a shoot it uses some food. If you never let the shoot get large enough to replenish this food eventually the rhizome will be starved to death. Good luck.

-- Eric Sideman, Maine Organic Farming and Gardening Association, Pest News, June 3 2005

Events

Ruth Hazzard, Vegetable Specialist of 26 years to retire

Invitation to an Open House Reception for Ruth Hazzard

To celebrate her retirement from UMass Extension

Monday June 29, 2015, 4-7 PM

UMass Cold Spring Orchard Research and Education Center, 391 Sabin St, Belchertown MA 01007

Hosted by her friends and colleagues at UMass Extension and the Stockbridge School of Agriculture. Click Here to RSVP.

Farm Food Safety for Post-Harvest Handling and Small-Scale, Low-Cost Facility Design

When: Wednesday, June 17, 2015 from 2pm to 6pm

Where: Red Fire Farm, 184 Meadow Road, Montague MA 01351

Join Cornell Vegetable Program's Robert Hadad to learn how to design, build, and operate a small-scale, DIY post-harvest handling system! This great workshop will focus on the trifecta of good washing and handling—food safety, maintaining high quality and efficiency, and affordability for new and small growers.

To register, go to: https://www.surveymonkey.com/s/umassproducesafety

Contact Amanda Kinchla at amanda.kinchla@foodsci.umass.edu or 413.545.1017 for more info.

IPM Field Walks

In this series, learn to identify and scout fruit and vegetable pests and select integrated pest management strategies that work for you whether you are a beginner, experienced, organically certified or not! We will walk farm fields with Extension Educators and farmers in Massachusetts, Rhode Island, and Vermont to learn how each farm is practicing IPM. Bring a hand lens if you have one. This series is funded in part by a Northeast IPM Center grant.

July 1st, 4-6pm
Matunuk Vegetable Farm, South Kingston, RI - 0.6 mile south of US Route 1 on Matunuck Beach Road, on the right- look for High Tunnel behind a stone wall. Learn how to scout for key pests and diseases of early summer on cucurbits, brassicas, beans, tomatoes and more. We will discuss a variety of control and prevention measures with the farmer and Exten-

sion Educators Andy Radin, URI and Katie Campbell-Nelson, UMass. **2 pesticide recertification credits available.**

July 22nd, 4-6 pm
Waltham Fields Community Farm, 240 Beaver Street, Waltham, MA
Learn to calibrate a backpack sprayer, select effective OMRI approved materials and calculate the economic threshold of vegetable crops after being trained to scout in the field with farmers Erin Roberts and Zannah Porter and UMass Extension staff Lisa Mckeag, Susan Scheufele and Rich Bonanno. **2 pesticide license contact hours available in the vegetable category.**

July 27th, 4-6 pm
Simple Gifts Farm, 1089 North Pleasant Street, Amherst, MA
Come to this field walk to learn how to use pheromone traps to monitor Squash Vine Borer, use a microscope to identify plant pathogens, and learn to scout multiple vegetable crops with farmer Jeremy Barker Plotkin, UMass Extension staff Katie Campbell-Nelson, Lisa McKeag and Plant Diagnostician Angie Madieras. Leave after a discussion of control strategies for these pests on organic farms. **2 pesticide license contact hours available in the vegetable category.**

August 25th, 3:30-6pm
Hurricane Flats, 975 S. Windsor St. South Royalton, VT
Join us to learn how to scout for disease and insect pests in the field and discuss effective organic control strategies with farmer Geo Honigford, Ann Hazelrigg and Gabriella Maia (UVM Disease Diagnostic Laboratory) and Katie Campbell-Nelson (UMass Extension Vegetable Program). Sponsored by Vermont Vegetable and Berry Growers Association and NOFA-VT.

UMass Agricultural Field Day

When: Wednesday, June 24, 2015 9:30am-4pm
Where: UMass Crop and Animal Research and Education Center, 91 North River Rd, S. Deerfield, MA 01373

The public is invited to come and take a guided tour through the farm to learn about current research projects at UMass. Professors and graduate students will be on hand to offer presentations on a variety of research topics. Closed-toed shoes are mandatory. Sunscreen and hats are recommended. There is no registration fee; however, pre-registration is strongly encouraged. Lunch will be provided. Certified Crop Advisors will receive CEU credits: .5 credits for nutrient management and 2.5 credits for crop management.

Projects will include but are not limited to:

- Cover Crops in Potato Production
- Dual-Purpose Cover Crops for Fall Nutrient Capture and Additional Forage Production
- Production of Quality Malt Barley in New England
- Hardwood Biochar Amendment of Agricultural Soils
- Growing Mustard as a Biofumigant Cover Crop
- Evaluation of Reduced Risk Pesticides for Cabbage Root Maggot Control
- Effect of Bee Disease on Hedgerow Plantings

Contact Kelly Kraemer at kkraemer@umass.edu or 413-545-5221 for more info.

2015 NOFA Summer Conference

When: Friday, August 14 to Sunday, August 16, 2015

Where: UMass Amherst Campus

This year's main conference features 144 individual sessions with 27 different topic areas. Workshops address organic

farming, gardening, land care, draft animals, homesteading, sustainability, nutrition, food politics, activism, and more. The theme for this year's Conference is "Healing the Climate, Healing Ourselves: Regeneration through Microbiology".

This year's conference will include sessions with UMass personnel:

- Amanda Brown, Director of the UMass Student Farm; Tour of the UMass Ag Learning Center
- Lisa McKeag, Extension Vegetable Program; Pest Scouting in the Field at Simple Gifts Farm
- Susan Scheufele, Extension Vegetable Program; Integrated Pest Management in Brassicas

Sponsors

Vegetable Notes. Ruth Hazzard, Katie Campbell-Nelson, Lisa McKeag, Susan Scheufele, co-editors.