Pests, Diseases and Weeds in a Community Garden Setting

a project of the Gardens Coalition for
Dane County Community Gardens

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Project Background:

In 2016, the Gardens Coalition of garden leaders in Dane County started a project to identify common insects, animals and diseases that affect area community gardens. A work group of experienced garden leaders and Dane County UW-Extension staff met to create lists of dozens of pests, diseases and weeds. A survey was sent to all Dane County community garden leaders to determine the top 10 problematic insect pests, animal pests, diseases and weeds at their garden. From that information, we worked with over a dozen Master Gardener Volunteers to create “information sheets” for each of these pests, diseases and weeds. These brief, one-page sheets included pictures, active periods, prevention and treatment methods, and additional resources to learn more. These sheets were presented at the 2017 Gardens Summit, as part of the “Tools for tackling the Top 10 Pests, Diseases and Weeds in a Community Garden” session. Subsequently, the information sheets were compiled into this single document for use by community garden leaders and gardeners. Many thanks to Lisa Johnson of Dane County UW-Extension and the Master Gardener Volunteers and garden leaders who worked many hours on the project. We could not have done it without your help.

INSECTS

Bean Leaf Beetles (Cerotoma trifurcata)

Figure 1 Adult

Figure 2. Larva

Damage

Adults usually eat the leaves of seedlings, especially the cotyledons (seed leaves). They inflict damage by scooping pits out of the seed leaves, and also by biting into the seed pods, which distorts their growth and can leave them susceptible to disease. The larvae feed on stems, roots, and nodules in the soil.

When Are They Active

Adults overwinter and become active in mid-May to early June. Before the crop sprouts, they hide in adjacent fields of weeds and plants such as alfalfa. Look for eggs at the base of stems soon after that time. Eggs hatch after one to three weeks, then larvae feed for 30 days. Adults emerge in mid-July, with another generation late August to September. That last generation will remain into the fall and overwinter till next year.

Susceptible Plants

These beetles like to eat legumes, green beans especially, but also soybeans, alfalfa, and clover. They also target cucurbits such as squash, pumpkins, melons, and cucumbers.

Prevention Methods

Remove plant debris, and mow down weeds growing near target crops. Plant beans later in the season, such as mid- to late June. Cover plants with floating row cover, taking care to pin it to the ground so the beetles can't crawl under.

Treatment Methods

Rotenone, pyrethrum, or neem are options for organic growers. The larvae of some tachinid flies parasitize larvae of bean leaf beetles, controlling their numbers.

Additional Information/Resources

- UW Extension Bulletin XHT1131 Bean Leaf Beetle
- Iowa State University Department of Entomology Bean Leaf Beetle
- Cornell Insect Diagnostic Laboratory Mexican Bean Beetle (different than leaf bean leaf beetle but also a problem)
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1- Frank Peairs, Colorado State University, Bugwood.org; Figure 2-Iowa State University Department of Entomology Bean Leaf Beetle website, photo by Jeff Bradshaw

Imported Cabbageworms (*Pieris rapae*)

Figure 1 Imported cabbageworm caterpillar

Figure 2 Cabbageworm Adult

Adults, white butterflies with black spots on the forewings, are commonly seen flying around susceptible plants. The eggs hatch into green caterpillars, or cabbageworms, marked with faint yellow stripes running lengthwise down the back and sides. Full grown cabbageworms are about 1 inch long.

Damage

The caterpillars feed between the midribs and large veins of cole crop leaves. Young caterpillars produce small leaf holes that usually don't break through to the upper leaf surface. Mature caterpillars chew sizable, ragged holes in the leaves, leaving large leaf veins intact. Caterpillars often crawl to the center of cabbage, broccoli, or cauliflower to feed as they mature, leaving fecal matter, or frass, where they have been feeding.

Figure 3 feeding damage on older plant

Figure 4 Cabbageworm frass

When Are They Active

Adults start appearing in early-May and begin laying their eggs which hatch within one week. Early in the season the larvae develop on *Brassicaceae* weeds and early planted cole crops. The second generation emerges mid-July and causes the most damage as the larval development occurs almost entirely on cole crop cultivars. There are 3-5 overlapping generations a year. The cabbageworm caterpillars feed continuously after hatching, until maturing into the adult butterfly.

Susceptible Plants

Cole crops, including cabbage, cauliflower, broccoli, kale, rutabaga, radish, turnip, and collard. They also feed on weeds from the *Brassicaceae* family such as wild mustard, peppergrass, and shepherd's purse.

Photo Credits: Figure 1-Ward Upham, Kansas State University, Bugwood.org; Figure 2-David Cappaert, Michigan State University, Bugwood.org; Figure 3-Department of Entomology, University of Minnesota; Figure 4-Jeff Hahn, University of Minnesota

Prevention

Start checking for caterpillars on cole crops immediately after planting and inspect at least once a week, more often as the season progresses. Check both sides of leaves for caterpillars, frass and damage. Destroy crop residue immediately after harvest to eliminate potential overwintering sites for cabbageworms. Eliminate alternate host weeds such as wild mustard, peppergrass, shepherd's purse.

Treatment Methods

Handpick caterpillars and drop them into soapy water. Use floating row covers throughout the season. Paper wasps and parasitic wasps are natural enemies. Bt (*Bacillus thuringiensis*) applied early in the season with good plant coverage is an organic control.

Additional Information/Resources

- UW Extension Garden Fact Sheet A3724-E Caterpillar Pests of Cole Crops
- University of Minnesota Extension Caterpillar pests of cole crops in home gardens
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Colorado Potato Beetles (Leptinotarsa decemlineata)

Figure 1 Eggs

Figure 2 Larvae

Figure 3 Adult

Damage

Both adults and large larvae are voracious leaf feeders. They can chew holes larger than 1/8 inch across into the leaves of susceptible plants. They often consume entire leaves beginning with young, succulent leaves. Larvae typically feed in groups and may completely defoliate plants. The larger larvae (later stages) do the most feeding damage. Heavy defoliation will severely reduce plant yields, particularly if it occurs when potatoes are flowering.

When Are They Active

Begin looking for eggs in early May on the undersides of leaves. Continue checking plants through the end of July for eggs, larvae and adults.

Susceptible Plants

The beetles prefer to feed on potato, but they will also feed on eggplant and weeds such as nightshade, groundcherry, jimsonweed, horsenettle and mullen.

Prevention Methods

Planting crops other than potato and eggplant for a year will help reduce populations. Be sure to eliminate alternate host weeds mentioned above. Consider planting potatoes earlier or later than surrounding growers. Floating row cover may be helpful in preventing initial adults from accessing young plants when they move into the area.

Treatment Methods

Regular observation and intervention is recommended every 2-3 days when activity level is highest. Smash eggs with gloved hand when discovered on the backs of leaves. Smash or hand-pick larvae and adults. Groups of larvae may be tapped off the plant into a pan of soapy water held underneath. Organic chemical control can be attempted with Bacillus thuringiensis var. tenebreonis (Btt). However, it is only effective against first and second larval stages and must be applied as an early spray against small larvae. It will only last 1-2 days and should be applied weekly for 2-3 applications. The more commonly available Bt var. kurstaki (Btk) has no effect on beetle larvae. You must use Btt as described above. For more information, see UW Extension Bulletin A3678 Colorado Potato Beetle.

Additional Information/Resources

- UW Extension Bulletin A3678 Colorado Potato Beetle
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1-David Cappaert, Bugwood.org; Figure 2-Ward Upham, Kansas State University, Bugwood.org; Figure 3-Eugene E. Nelson, Bugwood.org

Cucumber Beetles - (Striped, Acalymma vittatum, Spotted, Diabrotica undecimpunctata howardi)

Figure 1 Striped, 1/5-1/4" long

Figure 2 Spotted, 1/5-1/4" long

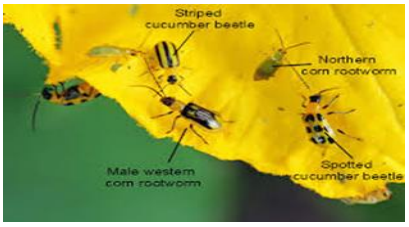


Figure 3 Among similar looking insects

Damage

Adult cucumber beetles feed mainly on foliage, pollen and flowers. This is most serious when plants are young and can result in complete defoliation or girdling of the plant stem. However, this damage is usually minimal compared to bacterial wilt which can result when cucumber beetles transmit, *Erwinia tracheiphila*, the pathogen that causes wilt in cucumbers and melons. For more information on bacterial wilt, see Additional Resources listed below.

When Are They Active

In Wisconsin, the striped cucumber beetle is the more serious problem. Adult spotted beetles migrate north from southern states two to four weeks after the emergence of the striped, and as a result of their late appearance are not as problematic as the striped. Striped cucumber beetles become active mid-spring, often mid-May, when temperatures increase. There is no good way of predicting when the activity will begin.

Susceptible Plants

Adult striped feed almost exclusively on cucurbits, including cucumber, cantaloupe, winter squash, pumpkin, gourd, summer squash and watermelon. The spotted may feed on 200 alternate host plants including beans, corn and potatoes.

Prevention Methods

Cover young plants, which are more susceptible to feeding damage and bacterial wilt infection, with floating row cover. Uncover flowering plants to allow bees to enter and pollinate. Grow susceptible crops on rotation every third year. Grow varieties that tolerate bacterial wilt, like butternut or acorn squash and Saladin and County Fair 83 cucumbers.

Treatment Methods

Scout for adult beetles 2-3 times per week early in the season (May) and weekly thereafter. Pay particular attention to field edges where beetles initially congregate. Smash or hand-pick adults. If bacterial wilt is spotted, remove diseased plants immediately.

Additional Information/Resources

- UW Extension Fact Sheet XHT1092 Cucumber Beetles
- University of Minnesota Extension Cucumber beetles in vegetable gardens
- UW Extension Bulletin A3272 Vine crops disorder: Bacterial wilt
- Wisconsin Master Gardener Program, UW Extension, Cucumber Beetles
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1-University of Minnesota Extension Cucumber beetles in vegetable gardens publication, Photo by Jeff Han; Figure 2- Russ Ottens, University of Georgia, Bugwood.org; Figure 3-Wisconsin Master Gardener UW Extension Cucumber Beetles publication

Cutworms (larva of moths belonging to family Noctuinae)

Figure 1 Damage to plant and larva (black cutworm)

Figure 2 Adult (black cutworm)

Figure 3 Larva (dingy cutworm)

Cutworms are the larvae (caterpillars) of several species of night-flying moths in the family Noctuidae. Cutworms can be quite distinct from one another, and their coloring can vary from brown or tan to pink, green or gray and black. Much of the information below is about the Black Cutworm (Agrotis ipsilon).

Damage

Most cutworm damage occurs on vegetable seedlings early in the season when plants are small and have tender tissue. When soil is moist and plants are still small, cutworms emerge on the surface at night and attack the first plant they can reach, cutting off the stems. When the soil is dry, cutworms stay in the soil and gnaw on roots below the surface, causing plants to wilt. Some "climbing" cutworms climb the stem to eat the leaves of more mature plants.

When Are They Active

Black cutworms overwinter in the south and migrate, arrive in Wisconsin in the spring, and lay eggs in large clumps. Other species overwinter in Wisconsin as eggs or larvae. Although cutworms are active throughout the summer, they are rarely a problem after spring.

Susceptible Plants

Cutworms eat beans, asparagus, cabbage and related plants, beets, peas, celery, peppers, carrots, tomatoes and potatoes, leafy greens, onions, squash and other cucurbits, and especially corn.

Prevention Methods

Surrounding transplants with collars made of aluminum foil or cardboard can block access by cutworms, if the collar extends a few inches deep into the soil and rises a few inches above the soil surface. Remove weeds a few weeks before planting, and again in the late summer and early fall, to curb the larvae's numbers. A number of parasitic wasps, flies and ground beetles help keep cutworm populations down. Birds feed on the larvae.

Treatment Methods

Spinosad or Bacillus thuringiensis can be effective organic pesticides for larger garden plants damaged by climbing cutworms.

Additional Information/Resources

- UW Extension Bulletin A3821 Black Cutworm
- University of Minnesota Extension Cutworms in home gardens
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1- W.M. Hantsbarger, Bugwood.org; Figure 2-James Kalisch, University of Nebraska, Bugwood.org; Figure 3- Canadian National Collection, The Canadian National Collection (CNC) of Insects, Arachnids and Nematodes, Bugwood.org

Earwigs (Forficula auricularia)

Figure 1 Adult male earwig, approx. 5/8" long

Figure 2 Earwig damage on common mallow

Damage

Earwigs are scavengers, feeding on damaged and decaying plant matter and weakened or dead insects and other small organisms. Larger plants can usually tolerate earwig feeding, but seedlings and flowering plants cannot and may be severely damaged or killed. Look for a scattering of black earwig excrement around the damaged plants (looks like poppy seeds). Sometimes earwig damage can be mistaken for slug damage. Slugs leave a slime trail. Earwigs do not.

When Are They Active

Earwigs are most active at night. They hide during the day in dark, confined, damp areas such as under potted plants, leaves, mats, wood piles, mulch. You might see the first earwig in early June. Wet springs and summers intensify earwig infestations.

Susceptible Plants

Their preferred flowers are marigolds, dahlias, butterfly bush, roses, and hostas. They will also feed on celery, lettuce, tender greens, potatoes, strawberries, raspberries, peaches, and herbs, **especially basil**, and corn silk and seedlings.

Prevention Methods

Clean up debris that harbor earwigs, such as leaves, plant litter, bricks, piles of lumber and wood, stones from your garden space. Avoid using thick organic mulches, planting susceptible plants, and overwatering. Frequent, shallow disruption of soil in early spring will disrupt and destroy nests and eggs.

Treatment Methods

Trap earwigs by placing clean shallow tuna or cat food cans filled halfway with vegetable oil around susceptible plants. Make sure level of oil is about 1 inch below edge of the container. Loosely rolled moistened newspaper, secured at both ends with rubber bands and placed near susceptible plants, make good traps. Bait with wheat germ or wheat bran before rolling. Place rolled paper near susceptible plantings in the evening. In the morning collect the rolls, seal in a plastic bag and dispose. Sprinkle food grade diatomaceous earth around the base of affected or susceptible plants.

Additional Information/Resources

- University of Minnesota Extension European earwigs in homes and gardens
- UW Extension Bulletin A3640 Controlling earwigs
- University of Maryland Extension Earwigs
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com
- Arizona Cooperative Extension Pest Press Diatomaceous Earth

Photo Credits: Figure 1- David Cappaert, Bugwood.org; Figure 2- Whitney Cranshaw, Colorado State University, Bugwood.org

Flea Beetles (various species, in the Family Chrysomelidae)

Figure 1 Damage on potato leaf

Figure 2 Crucifer (e.g., cabbage) flea beetle

Damage

The tiny adult flea beetles, that have a jumping action, chew many holes in the leaves. A heavily infested plant may look as if small shots had been fired into it. The foliage may be so badly eaten on many garden plants that the plants die. Larvae feed on the roots and tubers of host plants.

When Are They Active

Flea beetles become active in early spring when temperatures reach 50 degrees. Feeding attacks occur at any time in the plant lifecycle, from seedlings to mature plants. Flea beetles are most active during dry weather and sunny days.

Susceptible Plants

Adult flea beetles feed on the leaves of cabbage, kale, tomato, potato, cucumber, melon, grape, spinach, eggplant and related crops.

Prevention Methods

Check leaves (including undersides) every 1-2 days. Physical barriers such as row covers may help to protect plants from early damage. Row covers should be put in place when transplants are set or seeds are sown. Row covers should be removed before temperatures get too hot in mid-summer (often after 4 to 6 weeks). Keeping down weeds in and around the garden is also helpful.

Treatment Methods

When the weather is cool and beetles are less active, such as early morning, if flea beetles are on just a few garden plants, you may be able to brush them off the leaves into a large bowl or bucket containing water and a generous squirt of dish detergent, which prevents the beetles from floating or jumping out.

Additional Information/Resources

- UW Extension Garden Fact Sheet A3720-E Flea Beetles
- University of Minnesota Extension Flea beetles in home gardens
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1- Whitney Cranshaw, Colorado State University, Bugwood.org; Figure 2-University of Minnesota Extension Flea beetles in home gardens Publication, photo by Jeff Hahn

Japanese Beetles (Popillia japonica)

Figure 1 Adults and Damage

Figure 2 Larva(e)

Damage

While larvae eat the roots of grasses and ornamentals, it is the adult beetles who do the most damage in community gardens, eating leaves and flowers of many plant species. They consume the upper surface of leaves, but leave behind the veins, creating a "skeletonized" look to the leaf.

When Are They Active

Larvae become active and pupate in the spring and adults emerge in June, when they mate and lay eggs. Adults are most active in sunny afternoons, and prefer to shelter in ornamental plants. Eggs take about two weeks to hatch into grubs, who then begin eating roots through the summer, doing the most damage in August. They remain active until the temperature falls below 50°F.

Susceptible Plants

Adult beetles eat over 350 species of plants, including vegetables, fruits, grains, ornamentals, and trees. Some of their favorites are raspberry, grape, bean plants, as well as fruit trees and shrubs in the rose family.

Prevention Methods

Grubs need moist soil to flourish, so not watering during dry spells can curb their numbers. Geranium plants produce a compound that kills the beetles, so planting them can help. Floating row cover can be used on low crops. Early or late plantings circumvent feeding injury. There are many predators, including grackles, starlings, moles, shrews and skunks, but few native insects prey on Japanese beetles.

Treatment Methods

Handpick adults or tap infested leaves over a container of soapy water – the beetles will fall in and drown. Avoid baited traps: they attract extra beetles that will increase damage. Neem and pyrethrum sprays are "organic" insecticides that may be effective.

Additional Information/Resources

- UW Extension Bulletin XHT1062 Japanese Beetle
- University of Maryland Extension Japanese Beetles - Edibles
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1 & 2- David Cappaert, Bugwood.org

Root Maggots (Onion - Delia antiqua; Cabbage - Delia radicum)

Figure 1 Adult, 1/4" long

Figure 2 Root maggot larvae, 1/4" long

Figure 3 Damage to onion

Damage

The maggots feed on the roots and the bulbs (in the case of onions), creating numerous tunnels. Plants first begin to wilt and can eventually become stunted and yellowed. Heavily infested plants can ultimately die.

When Are They Active

Root maggots overwinter in the top few inches of garden soil. In late April - early May adult flies emerge to lay 50-200 white eggs on the soil near the base of crops. Eggs hatch in 3-7 days and larvae immediately begin feeding on the roots of the plants. Feeding continues for 3-4 weeks before larvae pupate in the soil.

Susceptible Plants

Onion maggots are an early season pest of root vegetables such as onion, garlic, carrot, and radish, whereas cabbage maggots are mainly a pest of cabbage, broccoli, cauliflower, Brussels sprouts, radishes, and turnips.

Prevention Methods

Most root maggot adults are attracted to rotting organic matter; avoid incorporating animal manure or green manure in spring. When possible, delay planting susceptible plants until the threat of root maggots is reduced, which is generally after June 1st. Plant crops in well-drained soils and only when the soil temperatures exceed 50° F. Row covers are effective during flight periods and must be set up in your garden by the time adults flies are laying eggs which is usually early to mid-May. Don't use row covers if onions or other root vegetables or cucurbits were planted in the same area the previous year. This is because root maggots overwinter in the soil as pupae near their host plants. Remove infected plants and turn crop residues after harvest to reduce overwintering sites.

Treatment Methods

Once damage is noticed it is too late to treat root maggots. Concentrate efforts on prevention methods.

Additional Information/Resources

- UW Extension Garden Fact Sheet XHT1030 Cabbage Maggot
- University of Minnesota Extension Root maggots in home gardens
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figures 1&3-University of Minnesota Extension Root Maggots in home gardens Publication, photos by Jeff Hahn; Figure 2-UW Extension Cabbage Maggot publication

Squash Bugs (Anasa tristis)

Figure 1 Adult squash bug

Figure 2 Newly emerged squash bugs

Damage

Both adults and nymphs of the squash bug feed by sucking the sap of the plant and leaving a toxic saliva. Leaves will get yellow spots and wilt, eventually turning brown or black. Small plants may be killed entirely.

When Are They Active

Adult squash bugs spend the winter under leaf litter and seek out squash plants in the spring or early summer. Adult females lay groups of yellowish-brown eggs on undersides of leaves throughout the summer. After a week or so, eggs will hatch greyish black nymphs. However, as summer progresses, many of the eggs are used for wasp larvae and never hatch.

Susceptible Plants

The squash bugs attack all squash and pumpkin plants, but can also attack other cucurbits, such as cucumbers.

Prevention Methods

The most important times to control squash bugs are when the plants are young seedlings and when they are flowering. Squash bugs are less important to control later in the growing season. Early detection of nymphs is important, as adult squash bugs are difficult to kill. Clean up plant matter around the garden in the fall to reduce the number of overwintering sites. Covering vines with row cover until blossoming begins will help, or you can delay planting squash plants until the early months of summer. Nasturtium and tansy are companion plants that repel squash bugs.

Treatment Methods

Remove or knock off and kill nymphs and adults by dropping them into a pail of soapy water. Crush eggs that are attached to the undersides and stems of leaves. Trap squash bugs by laying out boards or pieces of newspaper. Squash bugs will congregate under the boards at night, and then can be collected and destroyed in the morning. Remove plant debris around the garden during the growing season to reduce the potential harborages where squash bugs may hide.

Additional Information/Resources

- UW Extension Garden Fact Sheet XHT1135 Squash Bug
- University of Minnesota Extension Squash bugs in home gardens
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1 & 2-University of Minnesota Extension Squash bugs in home gardens Publication, photos by Jeff Hahn

Squash Vine Borers (*Melittia cucurbitae*)

Figure 1 Adult

Figure 2 Squash borer larvae in vine

Damage

The first symptom of feeding damage is when plants wilt midday. This wilting is caused by larvae as they tunnel through vines and destroy the tissue that transports water. Look for entrance holes near the base of wilting vines. If frass (i.e. feces) is present near the entrance holes, carefully split the stem lengthwise to confirm the presence of larvae.

When Are They Active

Squash vine borer pupate over the winter in the soil. They emerge as moths in late June – July. Female moths lay small, brown eggs, near the base of the plant. Eggs hatch in 7-10 days and the larvae immediately begin to burrow into vines. Here they feed for 14-30 days. Fully grown larvae then leave the plant to pupate. There is only one generation a year.

Susceptible Plants

Pumpkins and squash, especially winter squash, are susceptible.

Prevention Methods

Plant vine crops that are usually not attacked by squash vine borers, such as butternut squash, cucumbers, melons, and watermelons. A second planting of summer squash made in early July will mature after adult borers have finished laying eggs. Promptly pull and destroy any plants killed by squash vine borers. To prevent the flying adults from laying eggs at the base of plants in late June or early July, monitor for their presence and cover plants with floating row cover during this period. Don't use row covers if cucurbits were planted in the same area the previous year because borers may have overwintered and will be trapped under the row cover. Row covers should be removed during blooming to allow pollination.

Treatment Methods

Although the chance of saving the plant is not good, you can try to kill the borer inside the vine. As soon as wilting is noticed, use a sharp knife to cut a slit in the affected stem. Slice carefully up the vine until you locate the borer (or borers). Once you have killed any borers with the tip of the knife, mound moist soil over the cut area and keep this spot well watered. New roots may grow along the cut stem, allowing the plant to survive.

Additional Information/Resources

- UW Extension Garden Fact Sheet XHT1136 Squash Vine Borer
- University of Minnesota Extension Squash vine borer management in home gardens
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1 & 2-University of Minnesota Extension Squash vine borer management in home gardens Publication, photos by Jeff Hahn

ANIMALS

Norway or Brown Rat (Rattus norvegicus), Roof or Black Rat (Rattus rattus)

Figure 1 Brown rat

Figure 2 Black Rat

The two species of rats commonly found in Wisconsin are the Norway (brown) rat and the Roof (black) Rat. The Norway rat is stocky and tends to burrow along building foundations, beneath rubbish or wood piles and in moist areas around gardens and fields. The roof rat is generally smaller with a very long tail. Roof rats are good climbers and usually live in above ground nests in shrubs or trees.

Damage

Rats eat a wide variety of foods as well as cause damage to structures, packaging materials (such as seed packages) and containers by gnawing. They are particularly problematic because they can spread disease through their feces, urine and through biting. They may be infested with fleas and mites which also can spread disease.

When Are They Active

Rats do not hibernate and are active throughout the year. Because they are mostly active at night they often are not seen, however, they leave evidence such as gnaw marks, droppings, tracks, burrows and nests made of shredded materials.

Susceptible Plants

Rats are omnivores, eating a variety of food, but generally prefer cereal grains, nuts and fruit. The more common problem associated with rats is contamination of food stuff and animal feed from droppings and urination as well as damage caused by gnawing.

Prevention/Control Methods

Successful management of rats is dependent on maintaining good housekeeping in and around gardens and garden structures to reduce shelter and food sources. Off the ground storage of gardening equipment, supplies, boxes and containers as well as keeping the garden free of debris and trash will create an environment less suitable for rats. Rodent proof garden sheds and other buildings by plugging any openings with steel wool, wire screen or sheet metal can help keep rats out, however, since they are excellent climbers, be sure to seal off openings above ground level, too. Trapping can be an effective method for controlling rats, however, be sure to check traps often. Do NOT touch dead rats with your bare hands and wash your hands thoroughly after disposing of rat carcasses.

Additional Information/Resources

- University of California Agriculture and Natural Resources, Integrated Pest Management Rats
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo credits: Figure 1- Tomas Čekanavičius via Wikimedia Commons; Figure 2- http://www.scienceimage.csiro.au/image/10564

Chipmunk - Eastern (Tamias striatus)

Chipmunks have five dark brown stripes that run from their head to their rump. They keep their tails straight up when they run. They live in underground burrows and do not hibernate. They have two litters, one in spring and the other in late summer, with 6 or so young per litter.

Damage

Chipmunks uproot plants by their tunneling. They eat nuts, berries, seeds, plants' buds, flowers and leaves. They will dig up and eat spring flowering bulbs.

When Are They Active

They are active during the day and year around. They prefer the edge of wooded areas and particularly sloped areas with woody underbrush. They will climb trees to find food.

Susceptible Plants

Newly planted seeds can be eaten and plants can be uprooted by chipmunks. They will dig up newly planted spring bulbs. They will not bother squills, grape hyacinths, alliums, daffodils and crown imperial bulbs.

Prevention Methods

Placing fine gravel or chicken grit in newly dug holes for spring bulbs can help deter burrowing up to get the bulbs. Chicken wire over newly planted bulb areas will prevent digging. To prevent chipmunks from burrowing into the garden install 18 inch high, one-quarter to one-half inch mesh screen buried six inches into the ground. Remove wood and rock piles and trim back plantings that provide cover for the chipmunks. They are easily frightened so using scarecrows, plastic bags on sticks and other objects that move in the wind will work. Chipmunks will grow used to these objects, so change the location or type of objects periodically.

Treatment Methods

Products with the active ingredient of capsaicin or oil of mustard can be sprayed on plants or areas that the chipmunk is damaging. A mixture of 1 gallon of water and 2 tablespoons of hot sauce or garlic puree will help deter. Applying commercial predator urine repellent like Shake Away (which contains fox urine) will help deter also. Any spray needs to be reapplied after heavy dew and rain.

Additional Information/Resources

- Wikipedia Chipmunk
- Forest Preserve District of DuPage County Chipmunk
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credit: R.A. Nonenmacher, Wikimedia Commons

Rabbit, Eastern Cottontail (Sylvilagus floridanus)

Figure 1 Cottontail Rabbit


Figure 2 Angled cuts

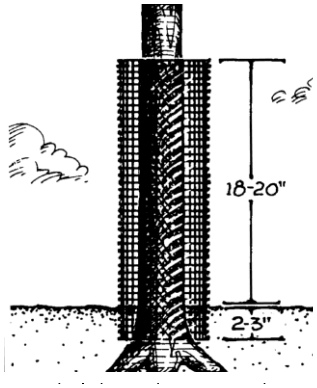


Figure 3 Wire mesh cylinder on woody plant

Damage

Rabbit-chewed plants are cut off cleanly and small, round droppings are usually found nearby. Stems of herbaceous plants are nipped off cleanly at an angle. Rabbits damage woody plants by gnawing bark or clipping off branches, stems and buds. When the ground is covered by snow for long periods, rabbits can clip off plants at snow height. Rabbits carry a disease called tularemia that can be passed on to people who handle infected rabbits. Seek medical attention if fever, chills, aches and pains develop within one to two weeks after handling rabbits.

When Are They Active

Rabbits are active year-round and primarily at night.

Susceptible Plants

Flowers, vegetables, trees and shrubs are susceptible at any time of year. In spring and summer, rabbits primarily feed on herbaceous plants. In fall and winter, rabbits feed on woody vegetation, preferring those of the rose family. In the vegetable garden beans, peas and greens such as lettuces and spinach are commonly damaged. Corn, squash, cucumbers, tomatoes, peppers, potatoes are usually rabbit resistant.

Prevention/Control Methods

Excluding rabbits from areas using non-plastic fencing is very effective. A fence of 2-foot chicken wire with 1-inch mesh with the bottom tight to the ground or buried a few inches is sufficient. Cylinders of wire hardware cloth with ¼ inch mesh size will protect young orchard trees or landscape plants and should be buried 3 inches below the soil surface; guards must be at least 18" higher than the average winter snow line. Extermination is usually not necessary or advisable. Natural ways to reduce a local rabbit population include encouraging the rabbits' natural enemies (hawks, owls, fox, mink, weasels, snakes) and manipulation of the rabbit's habitat. Remove brush piles, weed patches, junk dumps, stone piles, and debris. Repellents containing blood or bone meal, predator urine, pepper and moth balls may be effective.

Additional Information/Resources

- Protecting Gardens and Landscape Plantings from Rabbits (G1654)
- Rabbit Ecology & Damage Management (G3997)
- Internet Center for Wildlife Damage Management http://icwdm.org
- Rutgers If Plants Could Talk Series Keeping Rabbits From Desirable Plants in Your Garden
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo/Illustration Credit: Jeffrey Strobel, UW-Extension

Raccoon (Procyon lotor)

Figure 1

Figure 2 Live-trapped raccoon

Figure 3 Corn damage

Damage

Damage arises when raccoons upset trash containers, raid gardens and bird feeders, or take residence in chimneys, attics and other places where they are unwanted. Raccoons can transmit canine distemper, parvovirus, rabies and *Baylisacaris* (roundworm) to domestic animals and humans. Parasite eggs are shed in the feces of raccoons and can be transmitted to humans – be careful if cleaning up raccoon feces.

When Are They Active

Raccoons are naturally active at night – from an hour before sunset to an hour after sunrise. However, if they become habituated to humans, they may appear during the day. Raccoons do not truly hibernate but may become inactive when temperatures fall below 25°F.

Susceptible Plants

Raccoons are omnivorous (eat both plant and animal matter). Raccoons are fond of many garden crops, especially sweet corn and melons. Partially eaten ears of sweet corn or broken stalks are signs of raccoon damage.

Prevention/Control Methods

Plant prickly vine crops around the border. Remove whatever is attacting them (bird feeders, pet food that is outside, etc). Enclose compost piles that can attract raccoons and other animals that raccoons eat. Scare tactics don't usually work with raccoons. Check wildlife damage laws and regulation of raccoons on the WDNR website. Contact animal control or 911 if animal appears sick or injured.

Additional Information/Resources

- Professional Wildlife Removal Directory Raccoon
- Raccoon Ecology & Damage Management (G3997-005)
- Wildlife Damage Management Fact Sheet – Raccoons
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1-Johnny N. Dell, bugwood.org; Figures 2 and 3 – Scott Craven, WI DNR.

Squirrel, Eastern Grey (Sciuridae carolinensis)

Squirrels are the most familiar member of the rodent family that most people see. Squirrels bury food in the ground then later use their sense of smell to find the food. Squirrels' teeth grow continuously and to prevent over-growth, they gnaw to keep their teeth sharp. They have two litters a year, first born between February and April and the next between August and September.

Damage

Squirrels damage gardens by digging to bury their food or by eating all or parts of plants and garden fruits. They will dig up and eat freshly planted seeds, consume blossoms and damage fruits. Seedlings may be eaten, also entire plants are sometimes cut off. They can eat the spring buds of trees and will dig up freshly planted tulip and crocus bulbs.

When Are They Active

They are mainly active during the day especially early morning and late afternoon. They do not hibernate in winter but are less active in bad weather.

Susceptible Plants

Numerous plants are susceptible to damage. The spring buds of trees as well as the bark, nuts and fruits of trees, will be eaten by these squirrels. They enjoy freshly planted vegetable seeds, tulips and crocus bulbs. Favorites in the home vegetable garden include tomatoes, squash, beans and eggplants. They will not bother allium, daffodils, squills, grape hyacinths or crown imperial bulbs.

Prevention Methods

Spring flowering bulbs can be protected by placing anchored chicken wire over the planted area. Exclude them from plantings with row covers, bird netting, hardware cloth and chicken wire. Discourage digging by mulching bare soil, especially around newly planted seedlings.

Treatment Methods

Repellant products with the active ingredient of capsaicin or oil of mustard can be sprayed on plants but must be reapplied after rain.

Additional Information/Resources

- Wikipedia Tree Squirrel
- Forest Preserve District of DuPage County Tree Squirrels
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo credit: Public Domain, https://commons.wikimedia.org/w/index.php?curid=268975

Thirteen-Lined Ground Squirrel (Ictidomys tridecemlineatus)

Identification

Thirteen-lined ground squirrels live in underground burrows in sunny open areas. The holes to their burrows are about 2 inches wide. They have 13 lines (some spotted) on their backs, running from head to rump. Eyes are large; ears are small and short. They survey their surroundings on hind legs. If they sense danger, they dive into their burrows. They may be seen with their nose poking out and giving a bird-like trill. They have one litter per year of six or so young usually in late May. They are also called striped gopher, leopard ground squirrel and squinney.

Damage

These squirrels will dig into planted containers and dig up newly planted plants, tulips and crocus. In spring they eat tender new green growth and grasses. Later in the season, they will eat seeds, grains, vegetables, fruits and nuts.

When Are They Active

They are active during the day and especially on warm days. They hibernate in winter.

Susceptible Plants

Any newly planted gardens that contain seeds and young plants are great locations for these squirrels to eat. They even eat vegetables, but they also eat weed seeds and harmful insects.

Prevention Methods

Placing chicken wire over newly planted tulips and crocus will prevent the digging of the bulbs. They are easily frightened so using scarecrows, plastic bags on sticks and other objects that move in the wind will work. The squirrels will grow used to these objects, so change the location or type of objects when they are not working.

Treatment Methods

Spray with a mixture of 1 gallon of water and 2 tablespoons of hot sauce or garlic puree to help deter. Solution will need to be reapplied after a heavy dew or rain. Commercial predator urine repellent like Shake Away (which contains fox urine), will help deter these squirrels.

Additional Information/Resources

- Wikipedia Thirteen-lined ground squirrel
- University of Illinois Extension Ground squirrel
- Forest Preserve District of DuPage County 13-Lined Ground Squirrel
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credit: Laetitia C. Wikimedia Commons

Vole or Meadow Mouse (Microtus pennsylvanicus)

A heavyset, greyish/brown mouse-like animal with tiny ears, short tail and small, dark eyes.

Damage

Voles (meadow mice) in large number can seriously damage orchard trees, Christmas trees and other woody plants. In the winter, when other food is scarce, voles will gnaw on trees and shrubs causing severe damage by girdling trunks, stems and roots. They can burrow in the snow and may cause damage to trees as high as the snow accumulates.

When Are They Active

Most mouse damage occurs in winter but start looking for evidence of them in early autumn. Look for nests and runways in grass or other surface vegetation. The presence of chewed fruit and small feces, along with frequent sightings, may be indicators of a large meadow mouse population.

Susceptible Plants

Meadow mice prefer younger and thinner barked trees and shrubs but can cause severe damage to older trees with exposed roots or older fruit trees under snow or grass cover.

Prevention/Control Methods

Hawks, owls, fox, skunks, weasels, mink and snakes are beneficial predators that eat great numbers of meadow mice and their presence should be encouraged. Trapping and baiting may be necessary if natural predators are inadequate. Mid-October through mid-November, before there is snow cover, is the best time to attempt trapping. Keeping grass mowed and maintaining grass free areas around trees and shrubs can help eliminate mouse habitat. Hardware cloth or 1/4" wire mesh wrapped around the base of fruit or ornamental trees can protect the trunks from mouse damage. The mesh should be buried 2-3 inches below ground level and extend 18-20 inches above ground level.

Additional Information/Resources

- UW Extension Bulletin A2148 Meadow Mouse Control
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credit: Wikimedia Commons, https://upload.wikimedia.org/wikipedia/commons/b/bc/Microtus_pennsylvanicus.jpg

White-Tailed Deer (Odocoileus virginianus)

Damage

Damage may occur at any time of year but is most severe in the late winter and early spring. Most damage is in the form of browse damage to crops and landscaping. Deer lack upper incisors and leave a ragged, broken end on browsed branches. Damage occurs from ground level up to 6 feet.

When Are They Active

Deer are active year round and at any time of the day. They are most active at dawn and dusk near the edge of woodlands.

Susceptible Plants

Deer feed on flowers, fruits, vegetables and the buds and twigs of fruit trees and ornamental shrubs. No plants are completely deer-proof if they are hungry enough. They favor plants in the rose family (service-berry, apples, other fruit trees) and many evergreens, especially cedar, yew and white pine. In the spring, damage can be extensive to emerging perennials and tulips.

Prevention/Control Methods

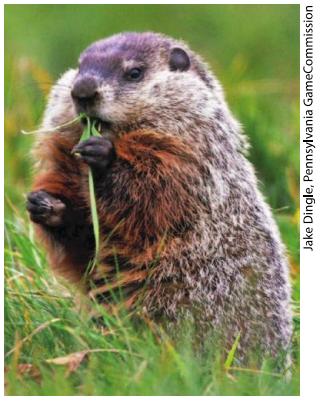
Barrier fencing can be installed. The larger the garden, the higher the barrier fence must be; a home garden may only require a 5-foot barrier. Plastic netting and wire cages can be used to prevent deer browsing of individual plants. Apply area repellents near plants you want to protect. Border applications may protect large areas at relatively low cost. Home remedies such as human hair in mesh bags, blood meal, feather meal, cat feces, moth-balls, and rotten eggs have been used with mixed success. Bar soap can reduce deer damage. Drill a hole in each bar and suspend with a twist tie or string. Each bar protects an area about one yard in radius. Any inexpensive brand of bar soap will work. A variety of commercially prepared repellents containing capsaicin and rotten eggs are also available.

Additional Information/Resources

- UW Extension Learning Store Controlling Deer Damage in Wisconsin G3083
- UW Extension Learning Store Plants Not Favored by Deer A3727
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credit: Iamjohnm, Wikimedia Commons

Woodchuck/Groundhog (Marmota monax)



Damage

Woodchucks are diggers. They can quickly turn a manicured garden into a mess of freshly dug earth. In the garden they may extensively damage or make off with a wide variety of plants and fruits. They gnaw and claw fruit trees and ornamental shrubs.

When Are They Active

They are most active in early morning and early evening. They are primarily active during the daytime preferring early morning and evening hours for feeding. They mostly stay in fields but are also excellent climbers. In the winter, they hibernate typically from October to March or April. Usually burrows are found in gardens in the spring.

Susceptible Plants

Woodchucks are mostly vegetarian and feed on a variety of fruits and green plants including vegetables, grasses and legumes. They can damage peas, beans, corn, carrots, lettuce, apples and other garden crops. They may also eat flowers, insects, and the bark of young trees.

Prevention/Control Methods

Fencing is the most effective way to protect vegetable gardens from woodchucks and has the advantage of keeping other animals out as well. Mesh fencing with the lower edge buried 10-12 inches in the ground discourages burrowing. Fencing should have an outward projecting lip to discourage climbing. Fences should be erected in the spring before feeding activity begins. Harassment techniques such as a scarecrow, a motion-activated device that sprays water, makes noise or uses lights have proven effective. Rotate harassment techniques to keep the woodchuck off guard. Cultural practices which modify the habitat include eliminating brush piles and overgrown areas.

Additional Information/Resources

- Professional Wildlife Removal Directory Woodchuck/Groundhog Removal
- Woodchuck Ecology & Damage Management (G3997-007)
- Cornell Cooperative Extension Woodchuck fact sheet
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Jeffrey Strobel, UW-Extension and Jake Dingle, Pennsylvania Game Commission in Woodchuck Ecology & Damage Management (G3997-007)

DISEASES

Allium Rust (Puccinia porri)

Figure 1 rust on garlic leaves

Figure 2 rust on onion leaves

Damage

Early symptoms occur on the foliage and stem as small, white flecks that develop into bright orange spots (spores) or pustules on both sides of infected leaves. Leaves on severely affected plants turn yellow, wilt, dry up, and die prematurely. Garlic bulbs on such plants can be shrunken and of poor quality.

When It Is Active

Conditions favorable for the development of rust disease include high humidity and low rainfall and a temperature between 45 degrees and 55 degrees Fahrenheit. Stressed plants are particularly affected.

Susceptible Plants

Rust in North America is primarily a disease of garlic, and other alliums may only be affected when growing near garlic with rust. Leek, shallot, and elephant garlic have not been found to be susceptible to rust strains in North America.

Prevention Methods

Prevention is not easy, because the rust may be introduced in infected planting material or by spores dispersed potentially long distances by wind from infected garlic in another planting. To reduce the possibility of infection, use healthy seed in well-drained soil. Infection is worse on nitrogen-rich soils with low potassium, so take care with fertilizer applications. Do not crowd plants, as this raises humidity and increases the likelihood of infection.

Treatment Methods

Snip infected leaves as they appear. Disinfect tools and shears, and wash hands frequently. Once introduced to an area, rust infections can overwinter in crop residue and in volunteer plants and weeds. Dispose of all plant debris in the trash, not the compost. Rotate away from allium crops for 2 to 3 years and destroy volunteer allium plants during this period.

Additional Information/Resources

- University of Minnesota Extension Growing Garlic in Minnesota
- Cornell University CALS Vegetable Pathology, Long Island Horticultural Research and Extension Center Garlic Rust
- UW Extension Bulletin A3785 Growing Onions, Garlic, Leeks, and Other Alliums in Wisconsin
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1-Cornell University CALS Vegetable Pathology, Long Island Horticultural Research and Extension Center Garlic Rust publication; Figure 2- Howard F. Schwartz, Colorado State University, Bugwood.org

Aster Yellows spread by Aster Leafhopper (Macrosteles fascifrons)

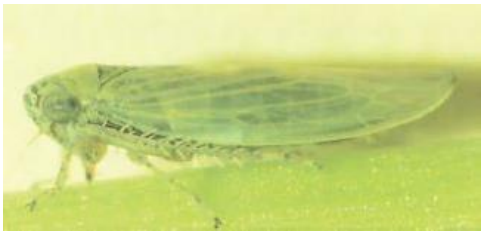


Figure 1 Adult (actual size 1/8")

Figure 2 Healthy carrot (top); affected carrot (bottom)

Description

Aster yellows is a systemic plant disease caused by a bacterium-like organism called a phytoplasma and is vectored (carried) by the aster leafhopper.

Damage

Aster yellows causes leaves and stems to turn yellow (chlorotic) and become stunted and twisted. Occasionally plants produce a proliferation of leaves. Flowers are discolored, mottled, distorted and sterile. On carrots, symptoms begin as a yellowing or twisting of new foliage. Later they produce a dense growth of chlorotic shoots, and older leaves become bronzed and break off easily. Taproots of carrots are thin, small, covered in many root hairs, and often taste bitter. Once a plant is infected by aster yellows, it will never recover.

When Active

Most plants do not develop symptoms until 21 to 30 days after they've been infected with the pathogen from the leafhopper. However, on lettuce and salad greens, symptoms can appear within 10 days.

Susceptible Plants

The aster yellows phytoplasma (AYP) affects over 350 plants, primarily in the aster family, including many common vegetables, annual flowering plants, perennial flowering plants and weeds. Leafhoppers prefer lettuce, carrots, celery and small grains for feeding and breeding, while other crops such as potatoes and onions provide a temporary source of food or refuge.

Prevention Methods

Removing infective weed reservoirs and infected crop plants can reduce the spread of aster yellows to vegetable and flower crops. Covering plants with floating row covers will prevent leafhoppers from reaching the plants and transmitting the disease but will also block pollinators from reaching the flowers.

Treatment Methods

Light colored or reflective mulches will disorient aster leafhoppers and can reduce feeding on plants. Insecticides are not effective in reducing aster yellows in the home garden.

Additional Information/Resources

- UW Extension Bulletin A3679 Aster Leafhopper
- Wikipedia Aster Yellows
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1- UW Extension Bulletin A3679 Aster Leafhopper publication; Figure 2- Whitney Cranshaw, Colorado State University, Bugwood.org

Bacterial Speck, Bacterial Spot (Pseudomonas Syringae pv. tomato, Xanthomonas campestris pv. vesicatoria)

Figure 1 Bacterial speck on tomato leaf

Figure 2 Bacterial speck on tomato

Figure 3 Bacterial Spot on pepper/leaf

Damage

Symptoms of bacterial speck initially appear as small, black spots (less than 1/8 inch diameter) on leaves of affected plants. As the disease progresses, the spots will spread to branches, petioles, and flowers and affected fruit will develop tiny, dark spots that do not penetrate deeply. Bacterial spot produces larger, "water-soaked" brown lesions on the leaves and stems of affected plants; these are initially yellowish-green but darken as they age. A severe infection can cause extensive yellowing and leaf loss in affected plants. Affected tomatoes and peppers will develop small, raised blister-like spots, which become larger and turn brown and scabby as the plants mature.

When Active

Bacterial speck thrives in cool, wet weather and is most commonly introduced through infected seed and transplants. In contrast, bacterial spot thrives in warm, wet weather and can be introduced through seed, transplants, or contact with infected plant material.

Susceptible Plants

Most varieties of tomatoes are susceptible to bacterial speck and bacterial spot; some varieties of pepper are susceptible to bacterial spot.

Prevention Methods

Prevention is key as treatment options are limited. Remove all tomato and pepper debris from your garden at the end of the season, and burn or bury debris from infected plants. Avoid replanting tomatoes or peppers in the same area each year. Water from the base of the plant and avoid getting the foliage wet and avoid working in your garden when plants are wet (e.g. after a rain) to minimize the spread of disease.

Treatment Methods

Symptomatic plants can be removed to minimize the spread of disease to healthy plants, but the fruit from infected plants is edible and you may choose to just let the disease run its course. Bactericides containing copper are available and may help in controlling both diseases if applied early and regularly.

Additional Information/Resources

- UW Extension Bulletin A2604 Tomato and Pepper Disorders: Bacterial Spot and Speck
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F 9 a.m.-12 noon, April 15-October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1- Daren Mueller, Iowa State University, Bugwood.org; Figure 2- Penn State Department of Plant Pathology & Environmental Microbiology Archives, Penn State University, Bugwood.org; Figure 3-UW Extension Bulletin Tomato and Pepper Disorders: Bacterial spot and speck publication

Bacterial Wilt on Cucurbits (Erwinia tracheiphila)

Figure 1 Wilt symptoms

Figure 2 Striped, 1/5-1/4" long

Damage

On cucumbers and muskmelon, infected leaves turn dark green and wilt during the day, but recover at night or on cloudy days. Later the infected leaves wilt and die. On pumpkin and squash plants, only the margins of leaves die.

When Are They Active

The bacterial wilt pathogen is spread by cucumber beetles ingesting bacteria when feeding on infected plants, which is spread to new plants through their feces and contaminated mouthparts. Even though the spotted and the striped cucumber beetles can spread the pathogen, the striped beetle is a more serious problem in Wisconsin. These beetles become active in mid-spring, often mid-May, when temperatures increase. However, there is no good way of predicting when the activity will begin.

Susceptible Plants

Primary crops affected are cucumbers and muskmelon. Pumpkins and squash may also be affected but damage is not as severe. Watermelon appears not to be affected and certain varieties of cucumber and squash show varying degrees of resistance to this disease.

Prevention Methods

Control involves preventing the beetles from accessing the plants. Cover young plants, which are more susceptible to feeding damage and bacterial wilt infection, with floating row cover. Uncover flowering plants to allow bees to enter and pollinate. Grow susceptible crops on rotation every third year. Grow varieties that tolerate bacterial wilt, like butternut or acorn squash and Saladin and County Fair 83 cucumbers.

Treatment Methods

Scout for adult beetles 2-3 times per week early in the season (May) and weekly thereafter. Pay particular attention to field edges where beetles initially congregate. Smash or hand-pick adults. If bacterial wilt is spotted, remove diseased plants immediately.

Additional Information/Resources

- UW Extension Bulletin A3272 Vine crops disorder: Bacterial wilt
- Wikipedia Bacterial Wilt
- UW Extension Fact Sheet XHT1092 Cucumber Beetles
- University of Minnesota Extension Cucumber beetles in vegetable gardens
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F 9 a.m.-12 noon, April 15-October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1- Gerald Holmes, California Polytechnic State University at San Luis Obispo, Bugwood.org; Figure 2- University of Minnesota Extension Cucumber beetles in vegetable gardens publication

Blossom End Rot (Lycopersicon)

Figure 1 Blossom end rot on tomato

Figure 2 Blossom end rot pepper

Damage

Blossom End Rot is a physiological disorder resulting when calcium uptake is inhibited by low soil moisture or inconsistent watering. Initially a water soaked light tan spot appears at the blossom end of the fruit. The spot may enlarge and darken as the fruit develops, turning dark brown or black and leathery, or it may remain small and superficial. Lesions may provide an entry area for secondary organisms that can cause soft rot and fruit decay.

When It Occurs

Symptoms usually appear when the fruit is growing quickly and is one-third to one-half full size.

Susceptible Plants

Tomatoes (especially Roma tomatoes) are very susceptible to blossom end rot. Peppers, eggplant and squash (zucchini) can also be affected.

Prevention Methods

You can reduce the incidence of blossom end rot by providing timely irrigation, mulching to conserve soil moisture, and avoiding excessive nitrogen fertilizer applications. Plants should receive one inch of water per week. Irrigate evenly every five to ten days, depending on the soil type and frequency of rain. Avoid conditions of too much or too little water.

Treatment Methods

Since Blossom End Rot is a physiological problem, fungicides and insecticides are useless as control measures. Consistent watering is the best way to address the problem.

Additional Information/Resources

- UW Extension Bulletin A3687 Growing Tomatoes, Peppers, and Eggplants in Wisconsin
- UW Extension Bulletin A3798 Tomato Disorder: Physiological Fruit Problems
- UW Extension Garden Fact Sheet Blossom End Rot XHT1140
- Cornell University Blossom End Rot of Tomato
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9am-12 noon, April 15-October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1- William M. Brown Jr., Bugwood.org; Paul Bachi, University of Kentucky Research and Education Center, Bugwood.org

Downy Mildew (Peronosporacae Family)

Figure 1 Downy mildew on basil

Figure 2 Downy mildew on cucumber

Damage

Downy mildew affects the leaves, branches, and stems, developing first on the lower leaves. Initial symptoms include leaf yellowing with yellow brown spots on the upper leaf surface, followed by leaf browning. Affected leaves will curl and wilt, and on the underside of the leaves a fuzzy material will develop (gray/purple in the case of basil, brown to purple in cucurbits, fluffy white in cole crops such as broccoli, cabbage, cauliflower).

When Active

The pathogen thrives in high humidity (more than 6 hours of 100% relative humidity) with air temperatures of 59 -77 degrees Fahrenheit. It can spread rapidly.

Susceptible Plants

There are a number of varieties of the pathogen, affecting a range of hosts: basil, cucurbits (cucumber, watermelon, butternut squash, muskmelon, pumpkin, cantaloupe), grapes, peas, broccoli, cauliflower, cabbage, Brussels sprouts, spinach, garlic, leeks, and shallots.

Prevention Methods

Plant cultivars that are bred with resistance to downy mildew. In the case of basil, avoid planting sweet basil. Purple leafed varieties, Thai basil, lemon basil, and spice basil have greater resistance to the pathogen. If you do decide to plant sweet basil, choose the variety 'Eleonora' which has been bred with some resistance to the disease. Keep your plants as dry as possible. Leave sufficient space between plants to insure good air circulation and avoid overhead watering.

Treatment

There is no known cure for downy mildew. Use of fungicide treatments is NOT recommended. If you detect basil downy mildew, harvest the unaffected plants and leaves immediately (to make pesto). Remove and bag all affected plant remains and dispose of this material in your garbage.

Additional Information/Resources

- UW Extension Garden Fact Sheet XHT1257 Basil Downy Mildew
- UW Extension Bulletin A3978 Cucurbit Downy Mildew: Identification and Management
- UW Extension Bulletin A3684 Growing Broccoli, Cauliflower, Cabbage, and Other Cole Crops in Wisconsin
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F 9 a.m.-12 noon, April 15-October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1-Rebecca A. Melanson, Mississippi State University Extension, Bugwood.org; Figure 2-Gerald Holmes, California Polytechnic State University at San Luis Obispo, Bugwood.org

Early Blight, Septoria Leaf Spot (Altemaria solani, Septoria lycopersici)

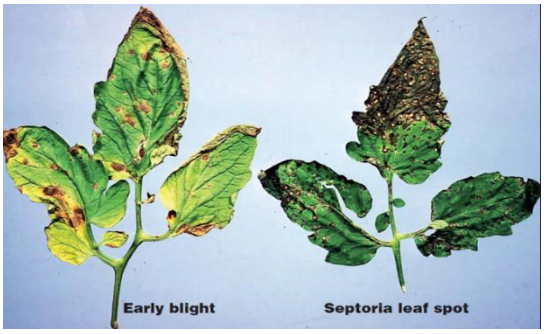


Figure 1 Tomato leaves (early blight and leaf spot)

Figure 2 Potato leaf (early blight)

Damage

Early blight is characterized by roughly circular brown spots on lower leaves and stems of affected plants; these get larger as the disease progresses, and are often surrounded by concentric rings and a yellow halo. Early blight can cause lesions and rot in fruit. Septoria leaf spot primarily damages the leaves and stems of affected plants, but does not affect fruit. Early symptoms are similar to early blight, but the spots that develop on leaves typically are small, and have a light center and darker border. Both early blight and septoria leaf stop can lead to extensive, bottom-up defoliation of affected plants, destruction of fruit (in the case of early blight) and eventual death of the plant.

When Active

Fungi spores flourish in warm, wet environments. They are spread by wind and rain, also by gardeners who come in contact with infected plant material and then handle healthy plants.

Susceptible Plants

Most varieties of tomatoes and potatoes are susceptible to early blight, as are other plants in the nightshade family (e.g. eggplant, peppers). Septoria leaf spot primarily affects tomatoes.

Prevention Methods

Fungi can survive in plant debris and seed from previously infected plants. Healthy, well-nourished plants will have greater resistance to disease. Use resistant vegetable varieties, and plant with adequate spacing to ensure good air flow and thus reduce humidity. Mulch with good quality mulch and water at the base of the plant to avoid splashing and the spread of infection. Destroy infected plants by burning or burying them. If possible, rotate vegetables to different parts of your garden each year to avoid areas where infested debris (and thus fungus spores) may be present.

Treatment Methods

Once symptoms appear, it is difficult to control either disease. Preventative measures are key. Thinning plants or removing infected branches may slow the progression of the disease, primarily by increasing air flow and thus reducing humidity. Early and regular use of copper fungicides may help to control the disease.

Additional Information/Resources

- UW Extension Bulletin A2606 Tomato Disorders: Early Blight and Septoria Leaf Spot
- UW Extension Garden Fact Sheets XTH1073 Septoria Leaf Spot and XHT1074 Early Blight
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F 9 a.m.-12 noon, April 15-October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1-UW Extension Bulletin Tomato Disorders: Early Blight and Septoria Leaf Spot publication; Figure 2-Howard F. Schwartz, Colorado State University, Bugwood.org

Late Blight (Phytophthora infestans)

Figure 1 Late blight tomato leaf

Figure 2 Late blight on tomato fruit

Damage

The first symptom of late blight is pale or dark green areas on leaves and stems of infected plants. These enlarge and become brownish black, water soaked, and oily looking. The fruit on late-blight affected tomato plants develop large, sunken golden-to-chocolate brown spots with distinctive rings. Potato tubers from plants affected by late blight develop sunken areas with a reddish brown discoloration under the skin. If the weather is cool and wet, the entire plant can collapse and die within 7 to 10 days.

When Active

Spores are active in cool, wet environments and periods of dry heat help to slow the progression of the disease. Spores can be spread into an area on prevailing winds, or introduced on infected plants e.g. tomato seedlings, seed potatoes that are brought into an area for sale at local garden centers or other retail outlets as well as on plant materials kept through the winter.

Susceptible Plants

Many varieties of tomatoes and potatoes are susceptible, as are eggplants and peppers but to a lesser degree.

Prevention Methods

It is impossible to save plants infected with late blight. Dispose of any volunteer tomato and potato plants that emerge in the spring; they are potential sources of late blight infection. Purchase certified seed potatoes from a reliable supplier and avoid using tubers saved from a previous year's potato crop. Purchase tomato seedlings from reliable growers, and consider tomato varieties with late blight resistance.

Treatment Methods

Pull affected plants (roots and all) and seal them in plastic bags for trash pick-up. Diseased plants or plant parts should not be left in your garden plot or dumped in common compost areas. Fungicides that contain copper can help to reduce impacts of late blight, but application must before initial symptoms of the disease.

Additional Information/Resources

- UW Extension Bulletin A4052-01 Tomato Late Blight
- UW Extension Garden Fact Sheet XHT1195 Late Blight
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F 9 a.m.-12 noon, April 15-October 31) or horticulture@countyofdane.com

Photo Credits: Figures 1 & 2-UW Extension Garden Fact Sheet Late Blight publication

Powdery Mildew (Erysiphales)

Figure 1 Powdery mildew on squash

Figure 2 Powdery mildew on pumpkin

Damage

The upper and (less frequently) lower surfaces of leaves as well as the stems of infected plants have a white powdery appearance. Powdery mildew is caused by several closely related fungi that survive in plant debris or on infected plants. These fungi grow primarily on leaf surfaces and send small root-like structures into the leaf cells to extract nutrients. Infected leaves usually wither and die. Infected plants may experience early dieback and a shortened growing season.

When Active

High humidity creates conditions favorable to the development of powdery mildew on a wide variety of plants. Begin scouting for powdery mildew in early July after fruit initiation when plants are most susceptible.

Susceptible Plants

These fungi are fairly host specific. The powdery mildew that affects one type of plant (e.g., pumpkins) is not the same powdery mildew that affects another (e.g., phlox). Cucurbits, including squash, pumpkins, muskmelons, and gourds are the vegetables most frequently affected.

Prevention Methods

Consider buying plant varieties that have been developed with resistance to powdery mildew. Prune diseased tissue and destroy it. Gather and destroy dead leaves and stems in the fall since they can be a source of spores for the next growing season. Space plants for good air circulation and plenty of sun. Water early in the day and avoid overhead watering.

Treatment Methods

Early detection is important. A combination of baking soda (1 ½ teaspoons) with 3 Tablespoons of light weight horticultural oil (e.g. Sunspray® oil) dissolved in a gallon of water has been shown to be effective in controlling powdery mildew. The solution should be applied every 7-14 days from bud break until the humid weather subsides.

Additional Information/Resources

- UW Extension Bulletin A3688 Growing Pumpkins and Other Vine Crops in Wisconsin
- UW Extension Garden Fact Sheet XHT1005b Powdery Mildew
- Cornell University Powdery Mildew of Cucurbits
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1- Gerald Holmes, California Polytechnic State University at San Luis Obispo, Bugwood.org; Figure 2- Howard F. Schwartz, Colorado State University, Bugwood.org

Verticillium Wilt (Verticillium albo-atrum/V. dahliae)

Figure 1 Verticillium on eggplant

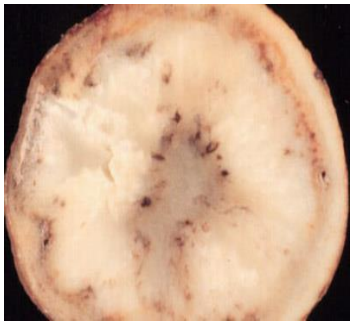


Figure 2 Verticillium wilt potato tuber

Figure 3 Verticillium wilt tomato plant

Damage

Wilting is the most characteristic symptom of infection by verticillium wilt. Wilting symptoms may appear first on older, bottom leaves. Leaf edges and areas between the veins turn yellow and then brown; the leaves dry up and drop prematurely. The upper shoots may also wilt especially during mid-day. Leaf tips curl upward at the margin and defoliation may continue up the plant. In affected plants only part of the plant, such as one or two stems, will be wilted at first. Diseased plants usually appear in patches within the growing area.

When It Is Active

Symptoms usually appear on the lower leaves in mid-August. Infected plants wilt during the warmest part of the day, and then recover at night. This disease most commonly develops when temperatures are between 65° and 83°F.

Susceptible Plants

Tomatoes and potatoes, cucumber, eggplant, pepper, rhubarb, watermelon, artichoke, beet, broad bean, strawberries, and raspberries.

Prevention Methods

Do not repeatedly grow crops susceptible to verticillium wilt in the same area of your garden each year. Try to plant vegetable varieties that are resistant to verticillium wilt, especially tomato varieties (labeled V on seed packages). Plant early-maturing varieties rather than late-maturing ones. Remove and destroy any infected plant material to prevent the fungi from overwintering in the debris and creating new infections. Disinfect any tools that may have come into contact with infected areas. Keep gardens weed-free since many weeds are hosts for the pathogen.

Treatment Methods

Plants infected with Verticillium cannot be cured and will eventually die.

Additional Information/Resources

- UW Extension Garden Fact Sheet XHT1146 Verticillium Wilt of Vegetables
- University of Minnesota Extension Verticillium Wilt of Tomatoes and Potatoes
- Cornell University Verticillium Wilt of Tomato (Source of Fig. 3, below)
- Missouri Botanical Garden, William T. Kemper Center for Home Gardening, Tomato Diseases and Disorders
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Photo Credits: Figure 1-UW Extension Garden Fact Sheet Verticillium Wilt of Vegetables, photo courtesy of Amanda Gevens; Figure 2-University of Minnesota Extension Verticillium Wilt of Tomatoes and Potatoes publication; Figure 3-Cornell University Verticillium Wilt of Tomato publication

WEEDS

Canada Thistle (Cirsium arvense)

Fig 1. Small early rosette of leaves.

Fig. 2 Mature flowering plant.

Canada thistle is a perennial weed classified as a restricted invasive by the Wisconsin DNR. It becomes established from seeds and regrows from crown buds or its extensive root system. Roots can extend several feet both horizontally and deep. Canada thistle emerges from its root system in late April to May with a second growth in the fall.

Identification

Emerges as a small rosette of spiny leaves which later become 3-4 inches long and are shiny with crinkled spiny edges. The stem is smooth and the purplish pink flowers appear in late spring to early summer.

Control Methods

- Dig out plants completely, including roots
- Avoid hoeing as this cuts roots into small fragments which can generate new plants
- Maintain loose soil through cultivation and use of compost or deep-rooted cover crops as thistle thrives in compacted soil

Additional Information/Resources

- UW Extension Fact Sheet A3924-04 Management of Invasive Weeds in Wisconsin: Canada Thistle
- University of Minnesota Extension Thistle Control
- Penn State Extension Canada Thistle: Bane of Gardeners
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits. Figure 1 - University of Illinois Department of Crop Sciences; Figure 2 - Rob Routledge, Sault College, Bugwood.org

Crabgrasses - Large (Digitaria sanguinalis) and Smooth (Digitaria ischaemum)

Figure 1 Smooth crabgrass

Figure 2 Large crabgrass

Identification

Large crabgrass and smooth crabgrass are summer annuals. They are native to Europe.
Seedlings resemble small corn plants, leaves are flat, ¼ inch or more wide with a prominent mid-rib. Crabgrass spreads by stolons or runners and produces seed heads throughout the growing season. Smooth crabgrass has a prostrate growing habit up to 6 inches high, leaf color ranges from green to bluish, reds and purples. Large crabgrass is more erect and grows up to 3 ½ ‘ in height and has coarse hairs where the leaves and stems meet.

Control Methods

In a vegetable garden, regular weeding and hoeing are effective methods to control and even eliminate crabgrass. When digging, remove all runners which can be very long but not necessarily deep.

Additional Information/Resources

- Weeds of Nebraska and the Great Plains, Nebraska Department of Agriculture
- University of Wisconsin Extension Weed Science website
- Garden Counselor Lawn Care Crabgrass
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1-Joseph M. DiTomaso, Univ. of California-Davis, bugwood.org; Figure 2-Steve Dewey, Utah State Univ., bugwood.org

Creeping Charlie (Glechoma hederacea)

Creeping Charlie (aka ground ivy, creeping Jenny) is an herbaceous perennial plant that spreads by seed and by creeping stems (called stolons) that grow along the ground.

Identification

Creeping Charlie produces bright green, round or kidney-shaped leaves that have scalloped edges. The leaves are produced opposite each other on square (i.e., four-sided), creeping stems that root at the nodes. In spring, small, bluish-purple funnel-shaped flowers appear. When the plant is crushed, it produces a mint-like odor

Control Methods

The control method of choice in vegetable or flower gardens is frequent and persistent hand removal. Dispose of plants where they will not re-root.

Additional Information/Resources

- UW Extension Fact Sheet XHT1170 Creeping Charlie
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo credit: University of Wisconsin Fact Sheet XHT1170

Field Bindweed (Convolvulus arvensis)

Identification

Field bindweed is a perennial vine that can exceed 6’ in length and form dense mats. Leaves have prominent veins, and are indented at the tip. Mature leaves are 1–2” long. It flowers July through August, producing tubular white to pink blossoms resembling morning glories. Seeds are produced in a small oval to round capsule. The root system is perennial. The initial taproot sends out lateral roots, which produce additional vertical roots. Buds along horizontal roots give rise to new plants.

Control Methods

Complete and repeated pulling and digging are effective techniques for individual plant control. All roots, which can grow very deep and widely must be removed. Do not allow plants to flower or set seed. It may take a number of years of continual and repeated removal to eradicate established stands of bindweed.

Additional Information/Resources

- UW Extension Fact Sheet Management of Invasive Plants in Wisconsin A3924-19 Field Bind Weed
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1-Howard F. Schwartz, Colorado State University, bugwood.org; Figure 2-Steve Dewey, Utah State University, bugwood.org

Garlic Mustard (Alliaria petiolata)

Figure 1. First year rosette

Figure 2. 2nd year plant in flower

Figure 3. Mature plant with seed pods.

Garlic mustard was introduced from Europe as a culinary and medicinal plant. Garlic mustard is a biennial plant with a two-year life cycle.

Identification

First year plants form a rosette of round, scalloped-margined leaves that stay semi-evergreen through winter. The second year, it sends up a flower stem with triangular toothed leaves that bears tiny white flowers with four petals. The plant dies after producing long narrow seedpods. At maturity, garlic mustard plants may be 3 to 4 ft. tall and bear up to 500 seeds per plant.

Control Methods

Hand-pull or dig out plants, repeating over several years since garlic mustard seeds can survive in the soil for up to 7 years. Do not compost the plants because most compost piles do not get hot enough to kill the seeds.

In the city of Madison, small amounts can be placed in a plastic bag and placed in your tan refuse cart. Larger amounts should be bagged in plastic and taken to the City's yard waste drop off sites. Inform the attendant that it is garlic mustard so that it is not composted. In other municipalities call the Bureau of Endangered Resources at 608-266-7012 for permission to landfill garlic mustard.

Additional Information/Resources

- UW Extension Garden Fact Sheet XHT1081 Garlic Mustard
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: UW Extension Fact Sheet XHT1081

Lambsquarters (Chenopodium album L.)

Figure 1. Seedling

Figure 2. Mature plant with white granules

Figure 3. Flower head.

Lambsquarters is an annual weed. It emerges throughout the summer and peaks in mid to late spring. It grows well in rich, fertile soil. Some people consider this to be an edible plant but it's not advisable to consume it raw in large quantities because of its oxalic acid content (the same chemical in spinach that some perceive as gritty or metallic in taste). If growing as an edible, maintain control so it doesn't spread to others' gardens.

Identification

Seedlings have oval opposite leaves. As the plant matures, the leaves become alternate and triangular shaped with irregular, shallow-toothed margins. Beginning with the seedling phase, the leaves can become covered with white granules giving the *album* part of its scientific name (Latin for white) and a fuzzy appearance. The stems are grooved and hairless and can be green or reddish. Mature plants can reach 2 to 6 foot in height with very small green flowers tightly clustered at the tips of the stems and branches. The clustered compact flowers develop into seeds with a thin, papery covering.

Control Methods

In a garden, hoeing or digging out lambsquarters is highly effective. Since most of the seedlings have emerged by late spring, planting in mid-May after tilling the garden reduces the amount of lambsquarters. Mulching prevents sprouting of seedlings.

Additional Information/Resource

- Michigan State University Weed Science Common Lambsquarters

Photo Credits: Bugwood.org Figure 1 - Phil Westra, Colorado State University; Figure 2 - Lynn Sosnoskie, University of Georgia; Figure 3 - Joseph M. DiTomaso, University of California – Davis

Pigweed (Amaranth)

Figure 1 Red root pigweed seedling

Figure 2 Mature pigweed

Figure 3 Pigweed seed/flower head

Pigweed is an annual that grows very fast in open, sunny areas producing multiple thousands of seeds and producing new plants year after year. There are over 60 varieties with some being ornamental and others used for its seeds. The smooth and red root varieties are common garden weeds.

Identification

Seedlings have alternate, ovate leaves; depending on variety, stem and veining may be reddish. Mature plants are tall, strong plants with oval-ish leaves and lots of small greenish flowers set close together. Pigweeds have taproots, not too deep, but branching and often reddish in color like some stems and undersides of leaves.

Control Methods

Remove before flowers and seeds develop.
Pull by hand or dig out, removing all roots.

Additional Information/Resources:

- Iowa State University Extension Identification of the weedy pigweeds and water hemps of Iowa
- Pigweed Identification, Wisconsin Crop Weed Science, UW-Madison Pigweed Identification
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Wikipedia Commons

Purslane (Portulaca oleracea)



A low growing, low calorie, highly nutritious succulent annual plant that can spread quickly in almost any type of soil. It does particularly well in warm, moist areas. Also known as common purslane, garden purslane, little hogweed, pusley, or wild portulaca. All parts are edible, cooked or raw. Most people tend to use young fresh plant parts in salads, but purslane may be boiled, used in stir-fries or as a thickener in soups/stews. If growing as an edible, maintain control so it doesn't spread to others' gardens.

Identification

The leaves are succulent (fleshy). It is an annual with stems that are smooth and reddish and creep out from the center root to form a mat-like plant close to the ground. Leaves that look a lot like jade plant leaves. Small yellow star shaped blossoms, if weather has been wet enough, on hot sunny days. Flowers will produce many, many tiny black seeds with or without pollinators.

Control Methods

Pull by hand, or digging, while plants are new and before seeds have developed and been distributed. The plant can re-root from any small part left in the garden. Purslane seeds can last in the soil for years. Do not put in compost bin because seeds will just be redistributed when you use the compost.

Additional Information/Resources

- University of Illinois Extension The Homeowner's Column Purslane: Weed it or Eat it?
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo credit: Wikipedia Commons

Quack Grass (*Elysmus repens*)

Figure 1. Close up of early quackgrass

Figure 2. Quackgrass seed heads

Quack grass is a perennial weed that spreads underground by rhizomes. Quackgrass is a classified as a DNR not restricted invasive.

Identification

Quack grass has thin, flat bright green leaf blades and grows to an unmowed height of 1 to 4 feet with a seed spike of 3 to 8 inches long appearing in July. The rhizomes (underground stems) are yellow to white, 1/8" in diameter with distinct nodes very inch or so.

Control Methods

Newly germinated plants forms rhizomes in 2 to 3 months so it is important to remove the plant before rhizomes form. Once rhizomes form, the grass blades may be shallowly cut and mulched to prevent photosynthesis or dug out completely. Deep hoeing cuts the rhizomes into multiple pieces each of which can form a new plant.

Additional Information/Resources

- University of Minnesota Extension Controlling quackgrass in gardens
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1-Ohio State Weed Lab, The Ohio State University, Bugwood.org; Figure 2-Steve Dewey, Utah State University, Bugwood.org

Reed Canary Grass (Phalaris arundinacea)

Figure1

Figure 2

Identification

Reed canary grass is one of the worst invasives in Wisconsin. It is a large, coarse grass that reaches 2 to 9 feet in height. It has an erect, hairless stem with gradually tapering leaf blades 3 1/2 to 10 inches long and 1/4 to 3/4 inch in width. Blades are flat and have a rough texture on both surfaces. Single flowers occur in dense clusters in May to mid-June. They are green to purple at first and change to beige over time. This grass is one of the first to sprout in spring, and forms a thick rhizome system that dominates the subsurface soil. The shiny seeds may be green, brown or purplish in color.

Control Methods

- Hand-pulling or digging may work on small stands in the early stages of invasion. Small, discrete patches may also be covered by black plastic for at least one growing season. This method is not always effective and must be monitored because rhizomes can spread beyond the edge of the plastic.
- Larger stands can be mowed twice yearly (early to mid-June and again in early October) to remove seed heads before they mature.
- Frequent and continued cultivation that disrupts the roots weakens the plants and depletes the seed bank is important since one or two cultivations would simply cut the roots up and increase the number of individual plants.

Additional Information/Resources

- Southeastern Wisconsin Invasive Species Consortium Reed Canary Grass
- Invasive Species of Wisconsin, UW-Green Bay Herbarium Reed Canary Grass
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo credits: Figure 1-Franz Xaver, Wikimedia Commons; Figure 2-Gary Fewless, Invasive Species of Wisconsin, UW-Green Bay

Wild Parsnip (Pastinaca sativa)

Figure 1 – Mature plant showing yellow flower umbel.

Figure 2 – Wild parsnip burns after sun exposure

A sun loving, invasive member of the carrot family. The WI DNR has labeled it as a **restricted invasive** because of its "potential to cause significant environmental or economic harm or harm to human health." The long tap root is edible, but you can get sun-induced burns or rashes on your skin from the sap. The burns can be quite serious, blistering and leaving scars.

Identification

A sturdy plant with upright leaves growing up to 5' tall with multiple yellow or yellow/green blooms. It is a perennial that can quickly overtake native plants in open fields, along roadsides and prairies especially. As a non-native plant it has no insects or diseases to help keep in in check.

Control Methods

With a small area of wild parsnip, you might be able to dig it out by getting in a few inches under the crown of the plant. Wear gloves, long pants and sleeves, goggles and do not expose to sunlight any skin that has come in contact with the plant.

Additional Information/Resources

- UW Extension Garden Fact Sheet XHT1083 Wild Parsnip
- New York Invasive Species Information Wild Parsnip
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com

Photo Credits: Figure 1- Wikimedia commons; Figure 2 – Andrew Link, LaCrosse Tribune, 2013.

ADDITIONAL RESOURCES

Best Practices for Community Gardens: Manage Pests, Weeds and Diseases

Keep Your Plants Healthy – grow the right plants, maintain soil health and fertility, provide adequate moisture
Keep Your Garden Clean – control weeds, remove plant debris
Spend Time in Your Garden – visit your garden frequently to control weeds and scout for pests and disease

Prevent and Manage Insect Damage

- Crop Diversity and Rotation - Grow a variety of crops and move crop families to different beds each year to prevent buildup of eggs, pupae, or larvae in the soil (where some pests over-winter on host plant debris)
- Sanitation – Clear the garden each year of plant debris, some pests will overwinter on host plant debris
- Eliminate weeds in the same family as pest-susceptible crops e.g. shepherd's purse and yellow rocket will harbor pests of Brassica crops; nightshade will harbor pests of tomato, pepper, eggplant, and potato
- Row Cover – Use early in the season to protect from insect damage; remove to allow pollination. Row cover can exclude aphids, cabbage worms, Colorado potato beetles, flea beetles, cucumber beetles, squash bugs, squash vine borer, bean beetles, and leaf miners.
- Plant trap (sacrificial) crops to lure pests away from vegetables you want to protect
- Learn the life cycle of most common insect pests. Schedule plantings and management measures accordingly.
- Scout your garden frequently for signs of damaging insects and take measures to prevent spread

Manage Weeds in the Garden

- Never allow weeds to go to seed, attack them when they are young
- Learn to use a hoe - Shallow cultivation, like hoeing, removes seedlings and doesn't disturb seeds buried deep in the soil
- Annual weeds – destroy seedlings by hand pulling, shallow hoeing, prevent seeding
- Perennial weeds – persistently remove leaves and any underground parts
- Mulch with seed free materials to deprive weeds of light
- Clean garden tools to prevent carrying weed seeds/parts throughout the garden
- Grow vigorous crops to out compete weeds
- Water at base of plants; sprinkling between rows waters weeds and encourages their growth

Prevent and Manage Disease in the Garden

- Select disease resistant cultivars
- Water at base of plants, not overhead. Avoid working in garden when plants are wet.
- Allow for good air circulation by allowing ample distance between plants and controlling weeds
- Conserve soil moisture with mulches to avoid plant stress
- Harvest mature vegetables
- Remove old/non-bearing plants regularly
- Control insects – some can transmit viruses
- Control weeds – some attract and harbor pests and diseases

Resources/Additional Information

- *Insects in the Garden: Attracting Beneficials, Managing Pests*
  http://www.forsythcommunitygardening.com/documents/Insect_Overview.pdf
- *Outsmart the Weeds! Managing Weeds in Community Gardens*
  http://www.forsythcommunitygardening.com/Documents/Weed_Management.pdf
- *Disease Prevention in Home Vegetable Gardens*
  http://extension.missouri.edu/p/G6202
- *Common Diseases in the Home Garden*
  http://extension.missouri.edu/explorepdf/agguides/hort/g06203.pdf
- *Trap Cropping to Control Pests*
  https://www.growveg.com/guides/trap-cropping-to-control-pests/
- *Floating Row Cover – An organic gardening tool that improves plant growth and excludes pests*
  http://www.forsythcommunitygardening.com/documents/Floating_Row_Cover.pdf

Planning, Planting and Maintaining Your Dane County Community Garden

Good gardening practices increase the likelihood of a successful harvest by minimizing damage due to diseases, insects, weeds, and animals. Dane County community gardens use organic practices that exclude synthetic fertilizers, pesticides, or herbicides. Strategies contained in this document will assist community gardeners in planning, planting, and maintaining productive plots.

Planning

Decide which vegetables to grow by selecting vegetables you like to eat, are easy to grow, and are expensive to buy. Choose disease resistant cultivars but be aware that resistance does not make plants immune to disease. Seed availability may be limited in spring; some gardeners prefer to purchase seeds as early as mid-February.

Vegetables can be planted from transplants or seeds planted directly into the ground. Although not all vegetables are suitable for transplanting, transplants sometimes produce earlier crops or larger harvests. Gardeners who start seeds for transplanting begin with a prepared disease-free growing mixture or mix equal parts potting soil, peat or compost, and perlite or vermiculite. After seeding, plants grow either indoors under grow lights or outdoors in hot beds which are covered structures that have an artificial heat source, or in cold frames which are covered structures without an artificial heat source.

To benefit most from sunlight, plan rows to run north and south and grow taller plants on the north side of the garden to prevent shading smaller plants. Some gardeners use fencing to exclude animal pests but fences take up space, harbor weeds, protect insects, and harbor diseases.

Planting

Results from a soil test will recommend if soil amendments such as fertilizers or lime should be used. Sandy soils are generally low in nutrients and do not hold water well. Heavier soils hold water well but are harder to manage. Organic matter improves drainage and adds nutrients. Work organic matter into the soil before planting when the soil crumbles easily when pressed gently; if the soil clumps into a ball, it is too wet. Gardeners can use compost from leaves, untreated grass clipping, and disease-free plant materials to get organic matter into the soil.

For seed germination and transplant rooting, loosen and level the soil with basic hand tools such as a shovel, garden fork, garden rake, or garden hoe. Remove weeds before planting. Every second season, the soil ought to be tilled or turned over by hand 6”-8” in depth when the soil is dry. On the off year, cultivation can be shallow. Cultivating deeply every year exposes weed seeds to sunlight which promotes their growth and destroys soil structure. Soil is loosened only in areas designated for transplants or in trenches properly dug for seeds. Pat Lanza’s book, Lasagna Gardening and Lee Reich’s Weedless Gardening are good resources for gardening in no-till plots.

If planting seeds, use fresh seeds for best germination. If seeds are a couple years old, use slightly more seeds than recommended. Follow seed package instructions for planting depth, spacing, timing, and soil temperature. Hoe open trenches, sow seeds at an even depth, cover them, rake soil smooth, and cover seeds with a hoe or trowel, and tamp soil down lightly. In general, large seeds such as beans, can be spaced according to seed packet instructions. Small seeds such as lettuces should be sown in slightly higher numbers and thinned soon after sprouting to seed packet spacing recommendations.

If using transplants, gradually expose the plants to outdoor temperatures, wind, and sunlight before planting. Cool weather vegetables should be planted in April or May; warm weather plants are best planted around Memorial Day. An hour or two before planting, lightly water the area which will be used for transplants. Remove

surface soil to expose an open hole, set plants snugly into the ground with firm, moist soil around the roots, fill the hole with loose soil leaving a slight hollow around the stem. Transplant on cloudy days or during late afternoons to prevent wilting. Gently water plants at their base after they are in the soil.

Some gardeners put up barriers to exclude pests. Floating row covers are white, porous materials laid over plants; they generally do not have supports. Tunnels are similar but use wires or hoops to support the fabric or plastic. While these tools exclude insect pests, they also prevent pollinators from getting to flowering plant parts. To allow pollination, remove row covers and tunnels when plants flower.

Maintaining

Water plants, especially young seedlings, when needed. The best time of day is morning. Evening watering promotes fungus growth and daytime allows evaporation. Most plants require at least an inch of rain a week. Always water the base of the plants and avoid getting leaves wet. Occasional heavy watering promotes strong root growth as opposed to frequent light watering which keeps roots at the soil surface. Consistent watering for the first six weeks of growth allows adequate calcium uptake which can prevent blossom end rot commonly seen on tomatoes.

Gardeners should take preventive steps and monitor their plots to insure a vigorous crop. Compost helps soil hold water and adds nutrients. If using organic nitrogen fertilizers, slow-release types reduce the number of applications needed. Mulching with straw, hay, plastic, cardboard, or newspapers helps retain water and discourages weed growth. Check your garden's rules prior to using certain mulching materials such as plastic. Small seeds are over-seeded and need to be thinned soon after sprouting so plants are properly spaced for air circulation and strong root development. Tall, vining plants such as tomatoes, cucumbers, and pole beans need support with stakes or trellises for good air circulation.

Weeding is especially important early in the growing season when desired plants are seedlings. Weed as soon as weeds appear and are easily pulled or cut off at the soil line with a hoe. Never allow weeds to flower and go to seed. Watch for possible signs of disease or insect damage such as yellowing leaves, wilting, holes in leaves, and black or brown spots. Remove, bag, and dispose of diseased plant material to prevent spreading diseases. Clean pruning tools by spraying isopropyl alcohol after pruning each plant.

Yellowing, stunted growth, and malformations may indicate diseases which cannot be cured (e.g., Aster yellows); plants should be pulled and trashed. Organic pesticides and fungicides should be used only when a specific problem has been identified; directions on the container must be followed exactly. Organic pesticides are only effective when used at the proper insect life cycle stage and can harm beneficial pollinators. Fall cleanup is recommended, disposing of diseased plants and effectively composting other plant material in a well-maintained compost pile or using other methods such as trench composting. Gardeners sometimes mulch bare soil lightly or plant cover crops. A soil test can be done in the fall to determine if additions to the soil would be beneficial for the next growing season.

Additional Information/Resources

- UW Extension Bulletin A1989 The Vegetable Garden
- UW Extension People+Plants: How to Grow a Community Garden multimedia series (link to several useful publications)
- Gardens Network Grow A Garden web page listing links to dozens of useful publications for Dane County community gardeners
- Dane County UW Extension Horticulture Hotline 608-224-3721 (M-F, 9 am-12 noon, April 15 – October 31) or horticulture@countyofdane.com