American Ginseng in Iowa: Pest Management

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ISU FORESTRY EXTENSION

Regardless of the production method utilized, there are numerous pest issues that must be managed when growing American ginseng. The most frequent of these are fungal pathogens, slugs, insects, herbivory, weeds and poaching. Frequently visiting ginseng plantings during the growing season to inspect for signs and symptoms of pests allows for early detection and proper management. Diseases are a more frequent problem with cultivated than woods grown plants, but can be the most difficult pests to manage. Some diseases result from a combination of pathogens, as an early infection weakens the plant allowing for another infection by a different pathogen which can make identification of the diseases difficult. Spacing 1 to 2 plants per square foot generally reduces the rapid spread of disease and allows for easier weeding. Thinning may be required as ginseng stands age to reduce competition or to remove infected plants. Selecting an optimal planting location is the best way to prevent many of the pests that frequent ginseng plantings. The following is a list of the more common pest issues reported by growers and is not meant to be a comprehensive disease guide. When applying pesticides be sure to follow the manufacturer's label and only use products registered for use on ginseng in your area. Remember this is a food crop and our food safety starts with the grower!

Foliar Diseases:

Alternaria panax, is the most prevalent foliar disease, which thrives in conditions of warm moist stagnant air. Typical symptoms include small, 1/2 inch diameter, water soaked leaf spots in a "bull's eye" shape. These lesions latter dry and leave a tan, paper like center surrounded by a yellow ring. The center of the lesion may dry and form holes in the leaf as the infection ages. Alternaria blight symptoms can occur on the stalk and result in girdled stems which kill the foliage. Mature plants are usually able to survive the disease by entering dormancy early, but young seedlings can be killed by the pathogen. Alternaria is known to overwinter on dead plant material, and removing infected plants may help reduce the spread of this disease. Fungicides such as boscalid, mancozeb and chlorothalonil are labeled for Alternaria blight on ginseng.

Alternaria blight can appear as yellowing fringes, yellowing spots with minor leaf curling. Photo by B. Beyfuss.

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Additional foliar diseases include Botrytis blight caused by *Botrytis cinerea* and powdery mildew caused by *Erysiphe spp.* Both of these diseases are much more uncommon and tend to infect plants late in the growing seasons. Botrytis blight causes symptoms of water-soaked lesions with black sclerotia on infected tissue. Powdery mildew appears as leaves covered in white mycelium, which then turn a reddish purple. As with all foliar diseases, the host plant usually survives infection, but the loss of foliage can reduce general plant health, seed production, winter hardiness and root size. Plants with nutrient deficiencies are most prone to infection. Good air circulation through plantings can reduce the incidence of foliar diseases and can be accomplished by selecting growing sites with sparse understory growth and avoiding overcrowded planting beds.

Stem collapse from lesion near soil surface caused by Damping-off of young seedling. Photo by J. Cook

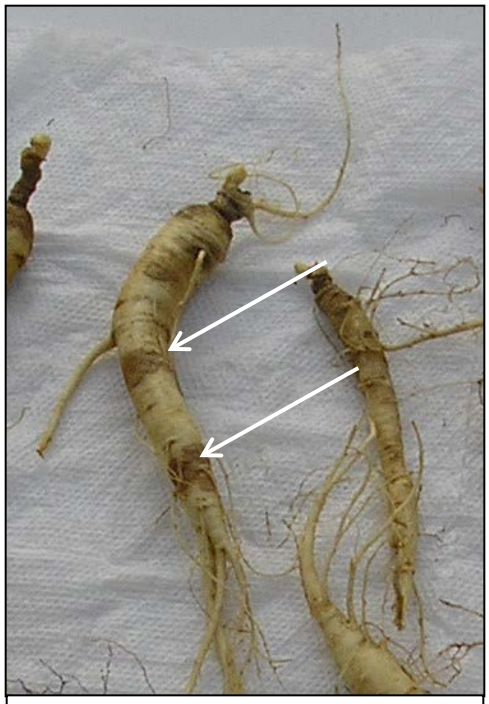
Damping-off: Damping–off is a fungal disease caused by an association of soil or seed-borne pathogens including; *Pythium spp., Fusarium spp.* and *Rhizoctonia solani*. This disease is typically found in cool, wet soils that lack adequate drainage and affects one or two year old seedlings early in the growing season. Damping-off can cause pre-emergence decay of the seeds and seedlings, or post-emergence rotting of stems and roots near the soil surface. Occasionally *Phytophthora cactorum* has been known to contribute to damping-off, but this fungal pathogen is more frequently a cause of root rot. Planting in well-drained soil can reduce the incidence of Damping-off and root rots. Damping-off disease is characterized by pale green wilting leaves turning purplish to brown with interveinal chlorosis. Treatments of seed in a 10% bleach solution for 10 minutes immediately before planting can kill seed-borne damping-off fungi, while pre- and post-planting applications of Ridomil® are effective at controlling the soil-borne forms of this disease.

Root Rots: Similar to damping-off, root rots are also caused by a diversity of fungal pathogens including *Phytophthora cactorum, Cylindrocarpon destructans, Slerotinia sclerotium, Rhizoctonia solani* and *Fusarium* species. The first symptoms of root rot disease are often discoloration and wilting of water soaked foliage. Discolored vascular bundles may be visible from cross sectional cuts through symptomatic plant stems as well as dark-brown lesions on the lower portions of the stems. Further examination by digging can show discolored or deteriorated roots and is the best way to confirm an infection is not exclusively foliar. Depending on the severity and source of the infection, roots can have many different symptoms and all of the above possibilities should be examined for proper identification. If left untreated, root rot diseases can inflict major damage to a ginseng crop as they can readily spread throughout a planting bed. Because the highly valuable root is affected, it may be necessary to harvest before roots reach full maturity. Concerns of root rot prevent some growers from allowing their crops to gain additional size past maturity. Cleaning boots, tools and other equipment with a 10% bleach solutions after working in plots known to be infected, can prevent the spread of root rots to healthy plantings. Removing infected plants and a surrounding one foot wide buffer of healthy plants can further limit the spread of root rots within a planting.

Damage from root rot reduces the overall value of the ginseng. Photo by B. Beyfuss

Plants infected with *Phytophthora cactorum* first show symptoms of wilted foliage that may turn yellow or red, with serve infections exhibiting an expanding circle of dead, dying and wilting plants. Inspection of individual plants can show pale brown roots with a smooth exterior and soft rubbery interior texture. Phytophthora can cause both root rot and leaf blight, but does not exhibit the yellow bull's eyes symptomatic of Alternaria blight. This disease has a very complex life cycle with long lived spores and is often difficult to manage. Pre- and post-planting soil fumigation treatments with mefanoxam products such as Ridomil Gold EC® can greatly reduce the incidence of this disease. Ginseng replant disease is also thought to be caused by *Phytopthora cactorum* and it is recommended to never plant ginseng in the same beds if root rot has been a previous issue.

Plants infected with *Cylindrocarpon destructans* show symptoms moving from the root tips upward with major rotting of the top portion of the main root and eventually foliar dieback. Cylindrocarpon root rot can develop at any age and most of the root will have been destroyed by the time foliar symptoms develop. Early detection by sampling living roots is one of the only ways for early detection and management of this disease. *Fusarium spp.* can cause infections of the root stem and crown. Plants infected with Fusarium root rot are typified by foliar wilt and discolored vascular bundles that become evident when roots are cut in cross-section. Plants infected with *Slerotinia sclerotium* often have lots of black sclerotia and white mycelium on the root surface with severely decayed root interiors. Sclerotinia stem rot lacks the discolored vascular bundles common in *Fusarium* infections. Rusty root rot is thought to be caused by a combination of *Rhizoctonia solani* and other fungi. Infected rusty roots exhibit orange to reddish brown areas of dry and firm rot that can be washed away leaving a gouge in the root (See photo at right).



Symptomatic discoloration of rusty root rot infection. Photo by B.

Sun scald: Sun scalding of ginseng plants occurs when there is a rapid reduction in natural shade provided by the canopy. This change in shading conditions can occur as a result of tree canopy leaf defoliation caused by insects, pathogens causing decline and death in the overstory trees, wind/ice damage to the canopy, etc. Plants tend to tolerae direct sunlight better early in the season, but damage may not become visible for a few weeks after scalding occurs.

Sun scald can shock the leaves of ginseng. Photo by B. Beyfuss

Herbivory: Many forms of wildlife herbivory can be problematic with all ginseng production methods, but are perhaps most prevalent in woods grown production. Rodents, especially moles eat the roots, white-tailed deer and rabbits browse the foliage and birds frequently eat the berries of ginseng plants. Isolating the cause of herbivory can be difficult and are often successfully managed with rodenticides, fencing or hunting.

Slugs are one of the major defoliating pests of ginseng and can cause severe damage to leaves during nocturnal feeding activities. During the day they survive under leaves, rocks and woody debris. Slugs can be partially controlled by removing excess amount of these materials during the growing season to reduce their available habitats. A perimeter around planting beds of ash or sawdust have been used to form a barrier for slug entry, but the most effective means of control are pesticide treatments. Pelletized forms of metaldehyde, such as Deadline® slug pellets, are most commonly used, while Sluggo® or Escar-go® products are available to organic producers.

Typical leaf damage from nocturnal feeding of slugs. Photo by B. Beyfuss.

Insect pests include wireworms, cutworms and aphids. Wireworms will eat un-germinated seeds after planting. Cutworm damage can be confused with slug damage because they both occur at night, but cutworms will cut off entire leaves and stems at the soil level. Aphids cause leaves to cup as they feed on the bottom of the leaves and can reduce seed production when they feed on the base of the seed heads. Damage from wireworms, cutworms and aphids can be controlled with treatments of pyrethrum insecticides if detected early enough.

Weeds: Weeding can improve the health of planting by allowing for better air circulation, reducing competition for resources and reducing cover for pests. Weeding should be done extensively before planting and will be required for the first few years of a new planting. Be careful not to damage the roots of ginseng plants, especially seedlings. Because there are no selective herbicides for use on ginseng, hand weeding must be used exclusively once a planting is established.

Poaching: Poaching of a planted ginseng crop is more common in old woods grown ginseng plantings that are not frequently monitored. The bright red berries of mature plants are easily spotted from a distance in late summer and should be harvested for planting as they ripen to reduce the visibility of your crop. Some growers also choose to cut off the above ground plant early to reduce visibility, but this may have detrimental effects on plant growth the following year. It is best to keep your ginseng enterprise secret and out of sight from public roads or trails to prevent discovery by poachers. Selecting a growing site that you can frequently monitor and control access to, such as one close to a private residence, will help reduce these chances. The Iowa DNR offers a toll-free TIP HOTLINE for reporting poaching activities at 1-800-532-2020.

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