



GINSENG DISEASE CONTROL - PHYTOPHTHORA AND ALTERNARIA

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Phytophthora Leaf Blight and Root Rot

Phytophthora leaf blight and root rot is a devastating disease which causes a leaf blight and root rot on ginseng. The disease is caused by a fungus, *Phytophthora cactorum*, which produces spores that are spread by wind, rain, splashing water, and surface water runoff. Root rot is the most serious form of the disease. Therefore, if foliar symptoms are present, preventing spread of the disease from foliage to roots is essential.

Phytophthora leaf blight symptoms begin as dark, water-soaked lesions on the leaf surface. The lesions eventually become papery thin, brown, and dry. The large brown, irregular shaped spots do not have the concentric ring pattern as seen in *Alternaria* leaf blight lesions (discussed later). During wet, rainy periods, the disease will develop and spread rapidly, resulting in severe blighting of the foliage. The crown, or neck, of the plant may also be affected.

The first symptom of *Phytophthora* root rot is a wilting plant. Affected root surfaces have a brown discoloration and the interior vascular ring of the root will be darkened. The rest of the root interior, which should be creamy white, will appear beige. In later stages, the root will feel soft and rubbery, have a foul, rotten odor, and will eventually disintegrate.

P. cactorum overwinters in the soil and on infected roots. The fungus is spread by water and by movement of infested soil on equipment. Disease development is favored by cool, wet, humid conditions and is most severe in poorly drained sites.

Control of *Phytophthora* leaf blight and crown rot is very difficult if control measures are begun after symptoms appear. Cultural practices and chemical control should be applied preventatively for best results. Avoid planting ginseng in poorly drained sites, on heavy clay soils, and in low lying areas. Good soil drainage and air movement will discourage development of the disease. Use as wide an in-row spacing as is economically feasible to permit good air circulation. Most severe and rapidly spreading outbreaks of *Phytophthora* have been observed in very dense plantings. Use high, rounded raised beds to further improve soil drainage and to prevent contamination by surface run-off. For woodland or organic plantings, several small plantings widely separated are recommended instead of one large planting.

Monitor plants closely during periods of weather favorable for the disease and carefully remove and destroy foliage of any suspicious plants. If symptoms appear on more than just a few plants, obtain a positive identification of the disease. If the disease is found in one planting, reduce the risk of spreading the disease by cleaning equipment, shoes, and hands before moving into another planting. If only a few plants are infected, the plants may be

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completely removed and destroyed. To prevent moving infested soil to healthy plants, mark the affected areas, cover the ground with mulch to prevent rain from moving the soil, and keep out of the areas.

There are two fungicides, Aliette and Ridomil Gold, that are registered for control of Phytophthora leaf blight and root rot. Aliette (80% fosetyl-al) is available in a WDG and a WSP formulation. These may be applied as foliar sprays mixing 5.0 lb of product per 100 gal water per acre. Do not use a more concentrated solution! Plants can be sprayed at 7 day intervals, beginning when conditions favor disease development, for a maximum of 9 applications per season and with a preharvest interval of 31 days. Do not use Aliette with copper compounds or with any adjuvant materials as phytotoxicity may result. Aliette is recommended only when Phytophthora has been confirmed and not as a routine treatment.

Ridomil Gold EC and Ridomil Gold GR are registered for the root rot phase of Phytophthora leaf blight and root rot on ginseng. Growers may use either formulation in the spring BEFORE plants have begun to grow. Use either $\frac{3}{4}$ pt Ridomil Gold EC per acre as a drench in 100-400 gal water or broadcast 15 lb Ridomil Gold GR per acre uniformly to the soil surface. Three subsequent monthly applications of Ridomil Gold GR at 15 lb per acre may also be made following the pre-growth treatment. NOTE: Ridomil Gold EC is labeled for use only before spring growth commences and Ridomil Gold GR may be applied both before spring growth and monthly after the first application of either formulation. Do not apply more than 60 lb of Ridomil Gold GR per acre per season if only this product is used. Do not apply more than 45 lb Ridomil Gold GR per acre per season following a spring Ridomil Gold EC treatment. Also, do not harvest ginseng within 9 days of the last Ridomil Gold GR application.

Alternaria Leaf Blight

Alternaria leaf blight is caused by *Alternaria panax* and is the most common ginseng disease in the mountains of North Carolina. This disease causes premature defoliation which results in reduced root weights.

Symptoms of Alternaria leaf blight include stem lesions, leaf spots, and blighting. Stem lesions develop just above the soil line, are light to dark brown, and

often girdle the stem. The stem then collapses, bends over, and the shoot dies. Leaf spots are light tan to brown and usually have a concentric ring or target pattern with a yellow halo. As leaf spotting increases, blighting and defoliation soon follow.

A. panax can survive the winter on infected crop debris. The following spring, the fungus produces spores which are spread to new growth by wind, rain, and splashing water. Disease development is favored by warm, wet, and humid weather. Fungal spores germinate and infect the plant when stems and leaves are wet.

To prevent Alternaria leaf blight, avoid planting ginseng in areas with poor air circulation and avoid close plant spacing. Keep foliage as dry as possible. Once the disease is identified, collect and destroy all foliage with disease symptoms. If more than a few plants are infected, and a positive identification of the disease has been made, use of a fungicide is recommended. Even if a planting is defoliated by leaf blight, new buds are unaffected and the plants will usually emerge the following spring. If a planting is defoliated by Alternaria, the possibility of reinfection the following year can be reduced by removing and replacing the mulch in the affected areas.

Rovral (iprodione) is registered for control of Alternaria leaf blight on ginseng in North Carolina and is available in 3 formulations (50W, WG and 4F). Use 1.5-2.0 lb of the 50W or WG products or 1.5-2.0 pt of the 4F product per 100 gal of water. Spray at first appearance of the disease and repeat at 7 to 14 day intervals as long as conditions favor disease development. Do not make more than 10 applications and do not apply within 36 days of harvest. Only use if necessary since Alternaria can develop resistance to Rovral. To help prevent development of Rovral resistant Alternaria, Aliette may be used as an alternating treatment on a 14 day interval with Rovral. Follow rates and precautions for Aliette as given for Phytophthora leaf blight and root rot. Aliette will suppress Alternaria but cannot control it. Thus, it is not effective against Alternaria if used alone. Efforts are underway to obtain additional registration for fungicides for ginseng disease control.

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