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Michigan State University Extension Service

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by

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Spruce cankers may be caused by the fungus *Phomopsis occulta*, and may severely damage the aesthetic value of spruce or in severe cases even kill affected trees. Colorado blue spruce (*Picea pungens glauca*) and white spruce (*Picea glauca*) are most susceptible, but Black Hills spruce (*P. glauca* 'Densata'), Norway spruce (*P. abies*), and Siberian spruce (*P. obovata*) can also be affected. Other spruce species may be hosts to this fungus.

Symptoms

The initial symptom of *Phomopsis* infection is a barely discernable chlorotic flecking of the needles.



Figure 1.

Colorado blue spruce (*Picea pungens glauca*) seedlings one month after inoculation with *P. occulta*.



Figure 2.

Phomopsis cankers are visible when outer bark is removed.

The discoloration is very subtle and may be difficult to distinguish from mite injury. Infection of the stems results in very small purplish lesions below the bark. These lesions are not visible in an intact branch and may cause no symptoms. The latent infections do not develop until the tree is stressed in some way, as under conditions of drought, flood, transplanting, or other root injury. Under such conditions symptoms develop in a period of three to four weeks.

In seedlings, the terminal leader and all other branch tips may be affected (*fig 1*). This disease has the potential to be devastating in nursery seedling produc-

tion. In larger plants, the bottom whorls of branches are most affected. Cankers expanding under the bark remain inconspicuous, with no visible depression on the stem. A resinous exudate is often present on the stem in the area of the canker. Cankers are easily seen in infected branches by shaving the bark away with a knife (*fig 2*). Needles on in-

fectured branches may turn brown or purple then drop, leaving the twig bare. The most dramatic symptoms occur in spring as new shoots expand, then rapidly wilt and die. The wilted tips curl and often turn a char-



Figure 3.

Symptoms of *Phomopsis* infection on a white spruce (*P. glauca*).

acteristic pink before turning brown and shedding needles (*fig 3*). Girdling cankers can develop on plants which are heavily infected or severely stressed, leading to the death of the tree. The damage is usually not fatal but can destroy the aesthetic value of the plant for use as an ornamental or Christmas tree (*fig 3*).

Fungal root rots, soil nematodes, and other cultural and environmental stresses likely predispose plants to *Phomopsis* infection. Due to the difficulty in distinguishing *Phomopsis* from other canker and needlecast diseases of spruce, submit samples of affected branches to a diagnostic service for positive identification of the fungus before beginning control measures.

Cultural Control

Spores (conidia) of *Phomopsis* ooze from fruiting bodies (*pycnidia*) during wet weather in spring and summer. Rain splash spreads them to infect nearby needles and stems. Blighted stems do not recover and should be promptly removed. Prune during dry weather. Sterilize tools with bleach between each cut to avoid spreading the conidia. Remove severely diseased plants, including the stump. Burn or bury affected branches and trees as soon as possible. Also remove all dead conifers in the area, as this fungus can live and produce spores as a saprophyte on many conifer species. Establishing new spruce plantations in fields which have been fallowed or used for a non-coniferous crop for 2-3 years before planting is advisable. *P. occulta* may persist in fields after rotation, but the level of inoculum is reduced, decreasing disease pressure on young trees.

Cultural management of plant vigor can help reduce damage caused by plant pathogens, because wounds, water stress and the presence of other pests play important roles in plant susceptibility to infection and disease development. Pruning practices can affect the number and severity of infections. *Phomopsis* mycelia growing on the surface of the plant can enter wounded needles and stems, colonizing the tissue and causing infection. Prune only for shaping and removing damaged branches. Prevent root injury and water stress to help reduce or prevent symptom development. Water ornamental spruce during periods of dry weather and after transplanting to maintain tree vigor. Cultural controls should provide adequate control of *Phomopsis* in landscape situations if healthy planting stock is used.

Chemical Control

Because research shows that cultural strategies alone generally do not satisfactorily control *Phomopsis* in spruce production, chemical control measures are needed to prevent production losses. Fungicidal suppression of *Phomopsis occulta* will be improved by using combinations of several appropriate fungicides and proper timing. The benzamidoles, such as benomyl, provided the best control of *Phomopsis* in the laboratory. Because Benlate is no longer registered for use on ornamentals, use other benzamidoles such as Cleary's 3336, Fungo 85 and FL, and Topsin M. Other fungicides that have provided good control of *P. occulta* in the laboratory include Daconil 2782, and Manzate 200. Read the product label to be certain the fungicide you choose bears a current registration for spruce or woody ornamentals.

Apply fungicides to protect spruce during periods of maximum susceptibility. These conditions occur when the inoculum level is high and the host plant is at a venerable stage of growth. The optimum conditions for infection and colonization include warm, humid weather and a tree with tender new growth. Incipient infections may also form during less ideal conditions, but protecting the plant during peak susceptibility should provide adequate control. Fungicide sprays should be timed to protect the new growth from conidia penetration and to suppress the development of existing infection sites when the plants are most susceptible. A series of applications of protectant fungicides should start at the first indication of bud break and continue at approximate 3-week intervals until the new shoots are fully developed and hardened off, (about 8-10 weeks after bud break). An efficient fungicide program, applied as a part of a comprehensive management strategy which includes careful cultural management, should provide good control.



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