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Phomopsis Blight of Junipers

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Phomopsis blight has been a serious problem for more than 75 years in nurseries producing juniper seedlings and grafts. *Phomopsis juniperovora* Hahn, the fungus causing this disease, is widespread in the United States (fig. 1).

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Description

Losses have been most severe in seedling and transplant beds of eastern redcedar and Rocky Mountain juniper. (See cover photo.) Other junipers are susceptible, as are some species in the genera *Chamaecyparis, Cupressus,* and *Thuja.* Arizona cypress seedlings have been seriously damaged in some Southern States.

Phomopsis juniperovora initially infects foliage, then spreads to and sometimes kills stem tissues. Newly developing needles are especially susceptible while they are still in

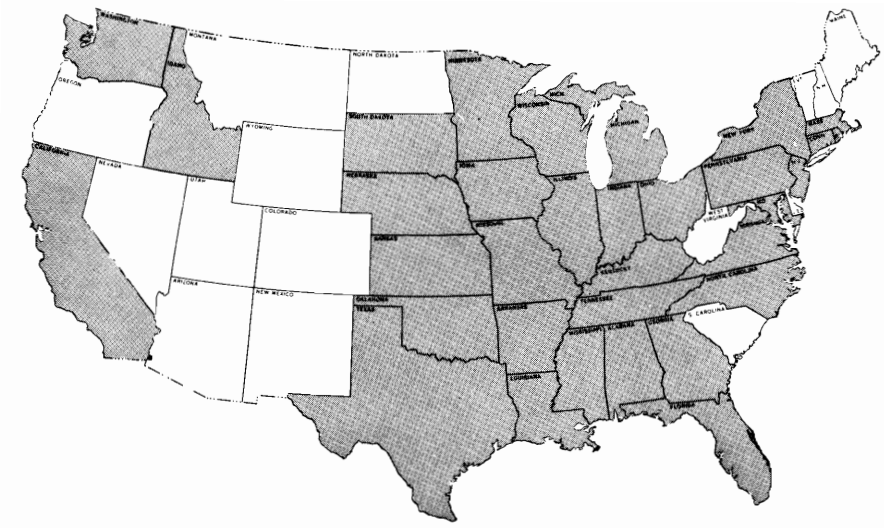

Figure 1.—*States in which* Phomopsis juniperovora *is present.*

the yellowish-green stage; after needles become a normal deep green, they are no longer susceptible. Small yellow spots appear on young needles of eastern redcedar and Rocky Mountain juniper within 3 to 5 days after infection. The fungus ramifies within infected needles and rapidly invades and girdles young stems. When a side shoot is infected, the fungus progresses to the main stem, which it may girdle if the stem is less than 1 centimeter (0.39 in) in diameter. The portion of the seedling above the girdled area then dies (fig. 2). At first, infected tissues turn light green; but they rapidly change to the characteristic red-brown color of dead shoots, which finally turn ashen gray. Lesions on larger stems frequently develop into cankers, but the stems are not girdled. The fungus does not spread far below cankers. Survival of even lightly blighted nursery stock in outplanting sites is very poor because new shoots continue to be infected by spores produced on old, infected tissues.

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Figure 2.—*Top of seedling killed after spread of the fungus from branch to stem.*

When junipers in landscape plantings become infected, they may become unsightly because of numerous dead branch tips (fig. 3). Older trees are seldom killed because only small-diameter stems are girdled. For this reason, Phomopsis blight does not cause significant damage in natural stands of junipers.

Total loss of first-year seedlings is common in epidemic years if control measures are not used. Losses are particularly high in areas where water tends to stand and in new seedlings adjacent to beds of infected stock. Some of the worst epidemics occur late in the growing season, when there is a late flush of growth on juniper seedlings.

Damage from drought may be confused with Phomopsis blight. In both cases, tips of branches may be killed. However, the demarcation between green and dead tissues is sharp in Phomopsis-blighted seedlings and gradual in seedlings affected by drought. Damage from the lesser cornstalk borer can be distinguished from Phomopsis blight by the straw color of the dead tops and by the feeding wounds on the lower stem and taproot present in the former. Needle blight of junipers and other species in the Cupressaceae caused by *Cercospora sequoiae* Ell. & Ev. var. *juniperi* Ell. & Ev. can be easily distinguished from Phomopsis blight. Cercospora infection starts on the oldest needles of lower branches and spreads upward and outward, while Phomopsis infection starts at or near the tips of the shoots.

Recently, *Kabatina juniperi* Schneider & v. Arx has become a problem in juniper outplantings and in production of grafted junipers.

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Figure 3.—*Dead branch tips on eastern redcedar caused by* Phomopsis juniperovora.

The fungus causes symptoms similar to those caused by Phomopsis. The tips of branches are killed for a short distance and the dark fruiting bodies (acervuli) develop on ashen-gray tissues, as is the case with Phomopsis. A specialist can recognize differences in spore size and fruiting bodies between this fungus and Phomopsis. The time of symptom development is also helpful in distinguishing between these two blights. Kabatina blight symptoms develop only when new growth begins in the spring, while Phomopsis blight symptoms develop anytime during the growing season.

Life Cycle

Spores produced in fruiting bodies (pycnidia) formed on leaves and stems of seedlings infected the previous year are the most important source of inoculum early in the growing season. Pycnidia with viable spores may develop within 3 to 4 weeks after seedlings become infected, but usually are not well developed until infected tissues have dried considerably. These spores are most commonly found on tissues that have turned ashen gray. The pycnidia are at first embedded in needles and stems, but partially erupt through the epidermis (fig. 4). Two types of spores (alpha and beta) develop in the same or different pycnidia (fig. 5) and are extruded in whitish tendrils. The fungus can produce spores for as long as 2 years in dead parts of infected plants.

Spores are dispersed primarily by rain splash. Infection is caused by alpha-spores; the filamentous beta-spores do not germinate. Only a short period of high humidity is needed for infection to occur; for example, seedlings exposed to 100 percent relative humidity (24° C) for only 7 hours can be-

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Figure 4.—*Pycnidia on leaves and branches.*

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Figure 5.—*Alpha and beta (long) spores of* Phomopsis juniperovora.

come infected. Spore germination, germ-tube development, and infection are optimum near 24° C; however, disease development is enhanced by higher temperatures (32° C).

Control

Because susceptible new foliage and viable fungus spores are present throughout the growing season in juniper seedling beds, protective fungicides need to be applied regularly during this season. The only chemical currently registered for control of Phomopsis blight is benomyl. This chemical applied at 7- to 10-day intervals, combined with a vigorous schedule of roguing infected seedlings over the same interval, will give excellent control of Phomopsis blight.

Other actions can be taken to reduce losses. Sowing juniper seed adjacent to beds containing juniper stock should be avoided if possible. Poorly drained areas should be avoided because losses are often greater where water tends to stand. If overhead sprinklers are used, seedlings should be irrigated so that water on seedlings dries before nightfall. Because shading frames increase the length of time that moisture remains on foliage, they should not be used unless absolutely necessary. Junipers or other hosts of this fungus should not be used in nursery windbreaks or in landscape plantings on nursery grounds because they may be a source of inoculum (spores) for nursery stock. Such trees are more likely to be extensively infected if pruning re-

sults in the development of juvenile foliage.

There is considerable variation in susceptibility to *Phomopsis juniperovora* among junipers (fig. 6). Research is seeking to determine if there is genetic resistance to *Phomopsis juniperovora* among and within progenies from select eastern redcedar trees.

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Figure 6.—*Eastern redcedars resistant to* Phomopsis juniperovora *adjacent to a severely infected juniper.*

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