MORTALITY OF MUGO PINE SEEDLINGS AT THE FANTASY FARMS NURSERY, PECK, IDAHO

by

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Investigations were conducted at the Fantasy Farms Nursery, Peck, Idaho to determire possible causes of stunting and mortality of 1-0 bareroot Mugo pine (Pinus mugo Turra) seedlings. Beds were sparsely populated with stunted, chlorotic, and necrotic seedlings (figure 1). Soil had accumulated around the base and partially covered the lower foliage of many seedlings and extensive seedling mortality was evident. Very few roots were found on stunted seedlings, although necrosis was not common on these roots.

Figure 1.--1-0 Mugo pine seedlings at the Fantasy Farms Nursery, Peck, Idaho. Seedlings were stunted, chlorotic, and necrotic. Low seedling density was common.

Samples of chlorotic and recently killed seedlings were taken to the laboratory for isolation of associated organisms. Isolations were made from needle, stem, and root tissues on 2 percent water agar. Emerging fungi were identified after being transferred to potato dextrose agar (PDA). Necrotic needles were also incubated in moist chambers with superficial fungi identified and compared with those obtained from isolations.

The most commonly isolated fungus from seedlings was Phoma eupyrena Sacc. This fungus also sporulated abundantly on needles within moist chambers. Phoma euprena was identified on the basis of production of one-celled, hyaline conidia (figure 2) from nonstromatic, brown-black pycnidia (figure 3), and development of chained chlamydospores (figure 4) in PDA cultures several days old (Boerema 1976; Domsch et al. 1980; Dorenbosch 1970). Growth habit in culture and pigmentation production on PDA (figure 5) were also characteristic of this species (Dorenbosch 1970).

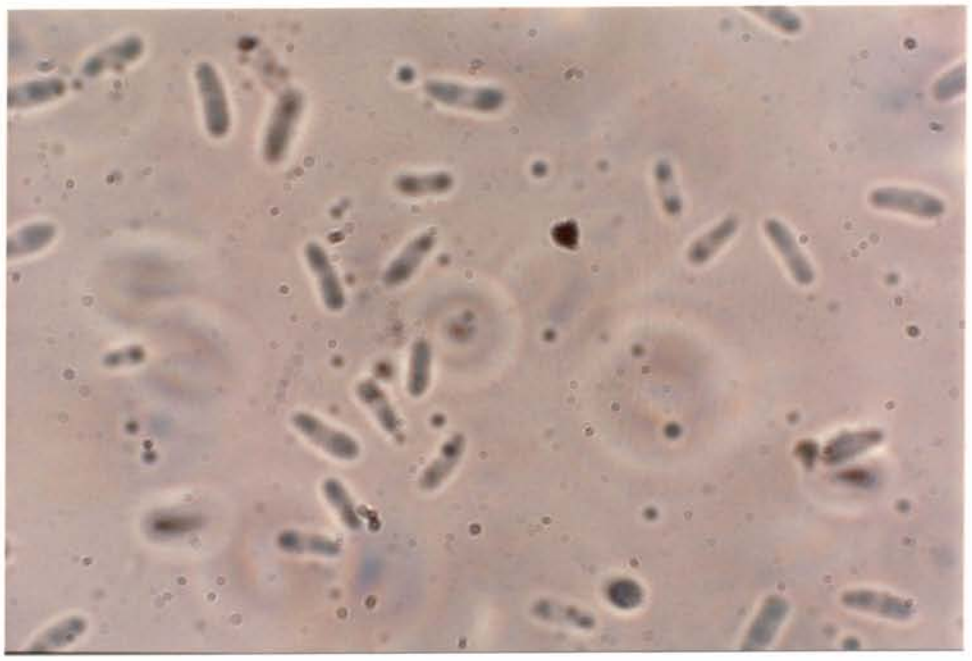

Figure 2.--Conidia of Phoma eupyrena isolated from 1-0 Mugo pine seedlings (X450). Conidia were hyaline, one-celled, and produced within nonstromatic pycnidia.

Figure 3.--Pycnidium of Phoma eupyrena isolated from 1-0 Mugo pine seedlings (X200). Pycnidia were nonstromatic, ostiolate with brown pigmentation.

Figure 4.--Chlamydospores of Phoma eupyrena isolated from 1-0 Mugo pine seedlings (X450). Chlamydospores are resting spores that serve as sources of survival of the fungus in soil in absence of its host.

Figure 5.--Growth of Phoma euprena isolated from 1-0 Mugo pine seedlings in PDA culture. Cultures are 7 days old.

Phoma eupyrena is a common soil-inhabiting fungus which has been reported in the United States (Diener et al. 1976; James 1983) and Europe (Dennis 1946; Dorenbosch 1970). It occurs in nursery soils and is usually considered a weak parasite (Boerema 1976; Hampel 1970; James 1979). The fungus has been implicated in several nursery diseases in the western United States, including mortality of 1-0 red fir at the Humboldt Nursery in California (James 1983b; Kliejunas et al. 1983), mortality of 1-0 Engelmann spruce at the Coeur d'Alene Nursery in Idaho (James 1980), and associated with cankers of Russian-olive seedlings at the Montana State Nursery in Missoula (James 1983a). Phoma eupyrena has also been associated with tip dieback symptoms of several different conifer species at nurseries in Montana and northern Idaho (James 1984). It is suspected that the fungus, which resides in soil as chlamydospores (Dorenbosch 1970), attacks seedlings when soil particles are splashed onto foliage (James 1979; Srago 1978). If seedlings are stunted and infested soil is light or sandy, foliage can be covered with soil particles, resulting in extensive infection (James 1983d; Kliejunas 1983). Because of its consistent association with symptomatic seedlings, it is likely that P. eupyrena was responsible for Mugo pine mortality at the Fantasy Farms Nursery. However, tests are needed to confirm pathogenicity of this fungus on seedlings.

Other fungi isolated from seedlings included Diplodia pinea (Desm.) Kickx., Boyrytis cinerea Pers. ex. Fr., and Alternaria sp. Diplodia produced a few black, subepidermal pycnidia on the needles of recently killed seedlings. This fungus was also commonly isolated from the tips of nearby 1-0 ponderosa pine seedlings (James 1984) and may have contributed tomortality of the Mugo pine seedlings. Botrytis and Alternaria were isolated infrequently and are probably sparophytic, although they can cause diseases.

Attempts to control Phoma blight have usually involved fungicide application after foliage symptoms appear. Although several chemicals have been used with varying success, chlorothalonil (Bravo 6F®) is usually effective (Kliejunas 1983). Phoma inoculum can be eliminated from the soil by fumigating beds with methyl bromide and chloropicrin prior to seeding. However, Phoma may quickly reinvade fumigated soil if precautions are not taken (Domsch. et al. 1980). Proper cultural practices are also important for disease control. Since Phoma is usually unable to successfully invade rapidly growing, vigorous seedlings, it is important to properly irrigate and fertilize seedlings (Srago 1978). Sufficient nitrogen is especially important. Also, if seedlings are parasitized by root-invading fungi, such as Fusarium and Pythium, they will be more susceptible to successful attack by Phoma. There is evidence of Fusarium root disease within certain beds of the Fantasy Farms Nursery (James 1983); this may partially account for the poor seedling density evident in Mugo pine beds. If first-year seedling growth can be enhanced, losses from Phoma should be reduced (James 1979; Srago 1978).

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