SOIL POPULATIONS OF *FUSARIUM* AND *PYTHIUM* IN FIELD 10, USDA FOREST SERVICE NURSERY COEUR D'ALENE, IDAHO

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Field 10 at the USDA Forest Service Nursery, Coeur d'Alene, Idaho is scheduled to be used for both a western white pine early growth trial and a western larch early selection trial. The white pine early growth trial will be planted in the spring of 1987 and will occupy about 1 acre in a square configuation. The western larch early selection test will be planted in the spring of 1988 and occupy about 3.7 acres.

Populations of soil-borne fungi of the genera *Fusarium* and *Pythium* were estimated for a portion of Field 10 using standard soil dilution techniques on selective media (Hendrix and Kuhlman 1965; Komada 1975). Twenty samples were collected and processed-four each along 5 equidistant transects run linearly in an east-west direction. Each sample consisted of three cylindrical cores of soil (2.5 cm diameter each) collected to a depth of about 6 inches. The three cores were mixed together in a paper bag.

Each soil sample was passed through an 8-mesh sieve to remove rocks and larger pieces of organic material. A 5g subsample of each sample was used to calculate oven-dry weight. Samples were dried at about 100°C for at least 24 hrs. or until the weight had stabilized.

For estimates of *Fusarium* populations, 0.5g of wet soil were combined with 100 ml of 0.3 percent water agar. The agar-soil solution was thoroughly mixed and 1 ml of the solution placed on each of three plates of selective media (Komada 1975). The solution was spread uniformly over the agar surface. Plates were incubated at about 22-24°C under 12 hr. diurnal cycles of cool fluorescent light and darkness for 5 days. Colonies of *Fusarium* were counted and populations (propagules-colony forming units per gram) determined on an oven-dry basis.

For estimates of *Pythium* populations, 5.0g of wet soil were combined with 100ml of 0.3 percent water agar. The agar-soil solution was thoroughly mixed and 1 ml of the solution placed on each of three plates of selective media (a V-8 base medium with antibiotics). The solution was spread uniformly over the agar

surface. Plates were incubated in the dark at about 24°C for 3 days. Colonies of Pythium were counted and populations (propagules-colony forming units per gram) determined on an oven-dry basis. Questionable colonies were transferred to cornmeal agar amended with pimaricin to confirm that they were Pythium.

Estimates of soil populations of Fusarium and Pythium are summarized in table 1. These estimates include all organisms in these genera, both pathogenic and saprophytic. No attempt was made to differentiate organisms into species or determine pathogenicity.

Table. 1. Soil populations of Fusarium and Pythium from Field 10, USDA Forest Service Nursery, Coeur d'Alene, Idaho.

Sample No.	Fusarium PPG (Oven Dry Wgt.)	Pythium PPG (Oven Dry Wgt.)
A1	68	150
A2	137	218
A3	273	144
A4	202	87
Ave.(Transect A)	170	150
B1	0	138
B2	68	96
B3	137	116
B4	341	88
Ave.(Transect B)	137	110
C1	270	75
C2	272	102
C3	0	116
C4	205	123
Ave.(Transect C)	187	104
D1	271	88
D2	68	69
D3	748	88
D4	359	72
Ave.(Transect D)	362	79
E1	142	156
E2	342	109
E3	947	81
E4	136	102
Ave.(Transect E)	392	112
Ave.(All Samples)	249	111

Fusarium populations varied from 0 to 947 with an average of 249 PPG. These values were relatively low for non-fumigated nursery soil (Norris 1983; Vaartaja and Bumbieris 1964). However, samples approaching 1000 PPG were found, indicating the potential for population increases, particularly if susceptible hosts are planted on the site. Other samples of soil in beds recently fumigated at the Coeur d'Alene Nursery indicated very low or no detectable populations. It is probable that Fusarium populations have increased gradually since the site was last used for seedling production. We would expect the populations to increase to higher levels when a susceptible crop is planted.

Pythium populations ranged from 69 to 218 with an average of 111 PPG. These were relatively high counts for nursery soils (Edmonds and Heather 1973; Vaartaja and Bumbieris 1964). Recently fumigated soil in another part of the Nursery yielded average counts of only 59 PPG. Populations above 100 PPG are probably high enough to warrant concern, although how disease severity relates to soil population levels has not yet been fully evaluated.

Based on the estimates of soil populations of Fusarium and Pythium, we would recommend soil fumigation prior to planting conifer seedlings in Field 10. Such fumigation would likely eliminate or reduce populations of these potentially harmful fungi to acceptable levels.

LITERATURE CITED

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