FUNGAL COLONIZATION OF PINE CELL CONTAINERS HORNING TREE SEED ORCHARD NURSERY BUREAU OF LAND MANAGEMENT

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Growers at the W. H. Horning Tree Seed Orchard Nursery at Colton, Oregon (Bureau of Land Management) fumigate pine cell containers filled with peat-vermiculite growing media with methyl bromide prior to sowing. Fumigation was more effective than heat sterilization in controlling soil-borne pathogens that cause disease of container-grown conifer seedlings. Efficacy of fumigation treatment in reducing actual levels of potentially-pathogenic fungi on their containers was unknown. Therefore, an evaluation was conducted to determine fumigation effects on fungal colonization of containers.

Two groups of pine cell containers were sampled. Containers had been fumigated (with growing media) in the spring of 1989 and sown with a crop of conifer seedlings shortly thereafter. After the crop was extracted in the fall, randomly selected containers were analyzed in the laboratory. Two types of containers were sampled: small capacity containers (122mm length) and large "super" cells. Twenty-five of each container type were sampled. Sampling for fungi was restricted to the bottom of containers because previous investigations (James 1989b; James and Gilligan 1988) indicated that most potentially-pathogenic fungi reside there. Four small pieces of pine cell container (2-3mm^2) were aseptically extracted from the bottom of each cell (pieces were taken from each of the four cardinal directions). Pieces were placed, inside surface down on an agar medium selective for ***Fusarium*** spp. and related fungi (Komada 1975). Plates were incubated under diurnal cycles of cool, fluorescent light at about 26°C for 7-10 days. Emerging fungi were identified to genus using the manual of Barnett and Hunter (1972). Selected ***Fusarium*** isolates were transferred to potato dextrose and carnation leaf agar for identification using the taxonomic guide of Nelson and others (1983).

Fungal colonization of pine cell containers is summarized in Table 1. ***Fusarium*** spp. were isolated from 40% and 16% of the small and large pine cell containers, respectively. Greater colonization intensity (based on numbers of cell pieces colonized) also occurred in the smaller containers. Three species of ***Fusarium*** were isolated: ***F. oxysporum*** Schlecht., ***F. scirpi*** var. ***compactum*** (Lambotte & Fautr.)Wollenw., and ***F. tricinctum*** (Corda)Sacc. Overall, more than 1/4 of the cells sampled were colonized with ***Fusarium*** spp., despite being fumigated with methyl bromide prior to growth of seedlings. ***Fusarium oxysporum*** is a proven pathogenic species on container-grown seedlings (James and Gilligan 1984; James and others 1989a). However, the other two species may or may not be pathogenic. ***Fusarium tricinctum*** has been infrequently isolated from conifer seedlings (James 1989a; James and others 1989b)and ***F. scirpi*** is rarely encountered. These latter two species have not had a history of causing problems on conifer seedlings.

Table 1. Colonization of pine cell containers from the W. H. Horning Tree Seed Orchard Nursery with fungi.

	Percent Colonization[1]					
	Small Containers		Large Containers		Both	
Fungus	C	I	C	I	C	I
Fusarium oxysporum	20	7	8	2	14	4.5
Fusarium tricinctum	12	7	0	0	6	3.5
Fusarium scirpi var. ***compactum***	8	4	8	3	8	3.5
All ***Fusarium***	40	18	16	5	28	11.5
Botrytis cinerea	4	1	4	1	4	1.0
Phoma eupyrena and ***P. herbarum***	64	38	80	63	72	50.5
Trichoderma	64	36	32	13	48	24.5
Penicillium	84	55	96	73	90	64.0
Alternaria	12	8	28	7	20	7.5

[1] Small cells were 122mm in height; large cells were "super" cells. C = percent of sampled cells (25 of each type) that were colonized with appropriate fungi; I = colonization intensity (percent of cell pieces colonized - 4 sampled per cell).

Two other groups of potential plant pathogens were isolated: ***Phoma*** and ***Botrytis***. ***Phoma*** spp. (comprised of ***P. eupyrena*** Sacc. and ***P. herbarum*** Westend.) were encountered at very high levels in both container types. ***Botrytis*** was isolated at low levels. Both groups of fungi can cause diseases of conifer seedlings (James 1984, 1985; James and Hamm 1985); however, they are usually not as serious as ***Fusarium*** spp. Saprophytic fungi in the genera ***Trichoderma***, ***Penicillium***, and ***Alternaria*** were also frequently isolated.

To summarize, ***Fusarium*** spp. still resided on pine cell containers despite treatment with methyl bromide. Another report (James and others 1988) confirms that these fungi may not be killed by treatment with methyl bromide. Recent experience with hot water treatments (James and Woollen 1989) indicates that, when conducted properly, such treatments clean containers sufficiently to greatly reduce chance of infection to new crops of conifer seedlings. It is possible that ***Fusarium*** was introduced either on seed or via other means during the crop cycle. In any event, ***Fusarium*** root disease did not occur at significant levels after fumigation.

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