FUNGI COLONIZING TREE IMPROVEMENT PEAT-VERMICULITE MEDIA USDA FOREST SERVICE NURSERY, COEUR D'ALENE, IDAHO

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Nursery Disease Notes #85

May 1989

Containerized conifer seedlings are usually grown in a medium composed of a combination of peat and vermiculite. Often this medium is pre-mixed by manufacturers in a 50:50 (w/w) combination. Although peat-vermiculite media affords good aeration and drainage, it provides a suitable substrate on which many fungi can grow. Fungal growth is especially enhanced in greenhouses where high temperatures and moist conditions prevail. Past experience with peat-vermiculite growth media indicated that once pathogens are introduced and become established, they thoroughly colonize the media and may attack seedling roots (James 1985; James, Dumroese and Wenny 1989). Fortunately, growing media are often colonized to a large extent by beneficial fungi, such as Trichoderma spp., which may compete with and be antagonistic toward pathogens (Papavizas 1985).

Peat-vermiculite growing media recently prepared for production of tree improvement container stock at the USDA Forest Service Nursery, Coeur d'Alene, Idaho was suspected of being contaminated with potential pathogens. Extensive mycelial growth was evident on the inside surface of clear polyethylene bags in which the media was packaged (fig. 1). Such growth was usually not evident in bags of commerically prepared growing media previously used by the nursery. Growers were concerned that this mycelial growth may have been the result of colonization of the media by potential pathogens.

Close examination revealed that the mycelial texture, color, and morphology was more characteristic of a Basidiomycetous fungus, rather than one that normally causes conifer seedling diseases. Fungal growth appeared similar to that found in forest litter, which is caused by organisms responsible for decay of organic debris and nutrient recycling (Edmonds 1984; Spain 1975). Basidiomycetes are

also the major type of fungal symbionts responsible for ectomycorrhizae of conifer trees (Marx 1972).

Table 1. Groups of fungi isolated from peat-vermiculite growing media used for production of tree improvement seedlings at the USDA Forest Service Nursery, Coeur d'Alene, Idaho.

Sample No.	Fungi Isolated: Water Agar	Potato Dextrose Agar	Komada's Agar
1	Penicillium	Penicillium Trichoderma Thamnidium (Mucorales)	Penicillium
2	Penicillium Trichoderma	Penicillium Trichoderma Mucor (Mucorales)	Penicillium Trichoderma
3	Penicillium Trichoderma	Penicillium Trichoderma	Penicillium Trichoderma
4	Penicillium Trichoderma	Penicillium Trichoderma	Penicillium Trichoderma
5	Penicillium Trichoderma	Penicillium Trichoderma Rhizopus (Mucorales)	Penicillium

To verify presence or absence of potential pathogenic fungi in the growing medium, 5 samples were collected (one from each of 5 different bags) and analyzed in the laboratory. Small pieces of growing media were sprinkled on the surface of three types of agar media: standard 2% water agar (WA), potato dextrose agar (PDA), and a selective medium for Fusarium and related fungi (Komada 1975). Plates were incubated under cycles of cool fluorescent light at about 22-24°C for 5-7 days. Hyphal tips of fungi emerging from pieces of growing media incubated on WA were transferred to PDA slants after incubation for 72 hrs. Fungal genera were identified using the taxonomic guide of Barnett and Hunter (1972).

No potentially pathogenic fungi were isolated from the growing media (table 1). The most commonly isolated fungi included species of Penicillium and Trichoderma. Occasionally, fungal species of the Mucorales, common saprophytes of organic matter (Webster 1970), were isolated. These fungi were most often isolated from growing media incubated on PDA. Basidiomycetes were not recovered. However, this is not suprising since the agar media used for isolation were more conducive to isolating fast growing Hyphomycetes

(Penicillium and Trichoderma) and common nursery pathogens (Fusarium, Cylindrocarpon, Pythium).

Although some growers of containerized seedlings steam treat or sterilize growing media prior to sowing (Jarvis 1989), treatment does not appear necessary for the tree improvement media sampled at the Coeur d'Alene Nursery. This media had high populations of Trichoderma spp., which may restrict development of some pathogens if they are introduced on seed or containers. Growers should consider the media "safe" for use in production of tree improvement stock.

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Figure 1. Mycelial growth on the inner surface of a polyethylene bag containing peat-vermiculite growing media for tree improvement stock production at the USDA Forest Service Nursery, Coeur d'Alene, ID.