Introduction

Twenty-seven vineyard sites including more than 500 acres of vines were examined over three growing seasons (2001-03) to quantify the extent of vine decline and to isolate fungi from declining vineyards. Petri dish assays were performed with Petri dish plates amended with Mn sulfate. Twenty-four percent of the fungi isolated from Mn amended plates had notable pigment production and a qualitative determination of Mn oxidation could not be determined.

Establishing Biological Characters with Taxonomic Significance

Phaeoacremonium spp. and Phaeoacremonium chlamydosporiose in association with basaloidoximes are implicated as associated agents of a disease complex referred to as esca or black meathes that causes a decline of mature grapevines. Magni et al. (1999) showed that Petri disease fungi involved in esca produced ligninolytic enzymes in the peroxidase family. Two white rot basaloidoximes have been found associated with esca, Pseudoperonospora and Streptom hirtum. White rot fungus produce families of oxidative enzymes, lignin peroxidases (LiP), manganese-independent peroxidases (MnIPs), and manganese-dependent peroxidases (MnP). MnIPs are Mn-dependent oxidase enzymes that act as a diffusable agent that can oxidize lignin moieties (Glen et al., 1986). Streptom hirtum has an MnP that can be used for the bio-bleaching of kraft pulp (Moreira et al., 1999). It is possible to assay for manganese-dependent peroxidase using Mn-amended agar plates because oxidized manganese will form a brown pigment or black crystals of Mn dioxide in vitro (Otrosina and Illman, 1994).

1. Can esca-related fungi, specifically Phaeoacremonium chlamydosporiose and Phaeoacremonium spp., oxidize manganese in vitro? See Table 1.

2. Can Manganese-amended media be used to separate species based on ability to oxidize Mn? See Figs. 2–3.

CONCLUSIONS

1. Two Phaeoacremonium spp. oxidize manganese in vitro. Phaeoacremonium angustius s.l. and P. viticola s.s. oxidize Mn. Phaeoacremonium alophobium had no visible physiological response to manganese sulfate-amended media. Remaining Phaeoacremonium spp. were negative or results inconclusive (Table 1).

2. The genebank sequence AF197974 from the ex-type culture CBS 249.95 deposited by Groenewald et al. (2001) matches ITS DNA sequences from isolates obtained during our New York and Pennsylvania survey (See isolate 316 for example). However, the ex-type culture of P. angustius in P. viticola has a different ITS DNA sequence (Table 1, Fig. 5). Based on ITS DNA sequences, P. angustius s.l. (AF197974, 316 and others included here) and P. viticola s.s. are not identical.

3. Isolates of P. mortoniae had a variable response to Mn sulfate-amended media. Crystals were never observed in Mn sulfate-amended media, but a brown rust colored pigment was observed near the hyphal tips. The ex-type culture of P. mortoniae produced some rust colored pigment near the hyphal tips, but it was not as strong as in isolates obtained from our survey and scored as a negative.

4. Phaeoacremonium chlamydosporie isolated reduced growth at 3000 ppm manganese-sulfate and did not grow at higher concentrations, nor was there a response indicating the presence of oxidize manganese.

5. Streptom hirtum and Phaeoacremonium spp. were manganese sulfate-tolerant with no reduced growth even at the highest concentration of Mn sulfate (6000 PPM).

6. Fomitopsis punctata was Mn sulfate sensitive exhibiting reduced growth at 300 PPM and no growth at higher concentrations. Both the PDA control (no Mn sulfate) and Mn sulfate-amended plates had suitable pigment production and a qualitative determination of Mn oxidation could not be determined.