

Phaeomoniella chlamydospora inhibits callus formation by grapevine rootstock and scion cultivars

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Introduction

Phaeomoniella chlamydospora (*Pch*; Figure 1) and *Phaeoacremonium aleophilum* (*Pal*; Figure 2) are hyphomycete fungi that inhabit the xylem tissues of grapevine wood causing vascular discolouration such as brown or black wood-streaking. Both have been implicated as causal agents of Petri disease of grapevines, symptoms of which are poor growth, decline and dieback of young vines. The most characteristic symptom of Petri disease is vascular discolouration of the wood which can only be seen when the trunk of an affected vine is cut open. Anecdotal evidence suggests that infected grapevine cuttings do not callus properly, resulting in poor planting material, and that some cultivars are more susceptible than others.

Materials and methods

Freshly-cut bases of grapevine cuttings (6 reps per treatment:cultivar combination) were inoculated with 100 spores (20 µL of 5x10³ spores/mL) of either *Pch*, *Pal* or a mixture of both. Control treatments were no inoculation and inoculation with 20 µL water only. The cultivars used were seven rootstock varieties: Ramsey, 99 Richter, Schwarzmann, Kober 5BB, Paulsen, 101-14 Millardet and SO4, and five scion varieties: Merlot, Cabernet Sauvignon, Pinot Noir, Shiraz PT10 and Shiraz PT23. After inoculation, the cuttings were layered in boxes of moist vermiculite and maintained at 25°C to callus and form roots as per nursery practice. After 10 weeks, the cuttings were assessed for root initiation, callus production and internal symptom development.

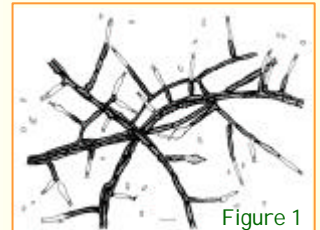


Figure 1

Phaeomoniella chlamydospora

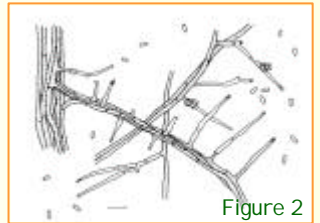


Figure 2

Phaeoacremonium aleophilum



Figure 3



Figure 4

Figure 5

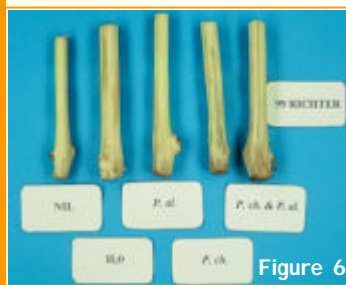


Figure 6



Figure 7



Figure 8

Results and discussion

Root initiation

Root initiation was not inhibited by either fungus (Figure 3), but was often poor in the rootstock varieties regardless of treatment (Figure 4). Grapevine rootstocks have been developed from hybrids of several native American *Vitis* species and are known to be difficult to strike, unlike grapevine scion cultivars which are all *Vitis vinifera*, a native European species.

Callus production

P. chlamydospora inhibited callus production on all cultivars (Figure 5) but *P. aleophilum* had no effect (Figure 4).

Internal symptoms

P. aleophilum did not cause visible internal symptoms in any cultivar (Figure 6). *P. chlamydospora* caused brown wood-streaking in all rootstock cultivars but not the scion cultivars (Figures 7, 8). Rootstocks are often reported to be more susceptible than *Vitis vinifera* cultivars and these results would support that. However, many vineyards planted with own-rooted *V. vinifera* cultivars are also affected by Petri disease, so perhaps internal symptoms develop more slowly in *V. vinifera*, outside the timeframe of this study.

In summary, we found that *P. chlamydospora* inhibited callus production and induced vascular streaking, but *P. aleophilum* did not cause any adverse effects. This conflicts with USA research which found both fungi to be equally pathogenic with regard to callus inhibition and brown wood-streaking (1,2). In Australia, we have been unsure what role *P. aleophilum* plays in causing Petri disease as, unlike *P. chlamydospora*, it is not consistently associated with diseased vines. The present study indicates that *P. chlamydospora* is certainly more virulent than *P. aleophilum* and therefore more likely to be the causal agent of Petri disease in Australia.

References

- Adalat et al. *Phytopathologia Mediterranea* (2000) 39, 92-99
- Eskalen et al. *Phytopathologia Mediterranea* (2001) 40, S433-S438