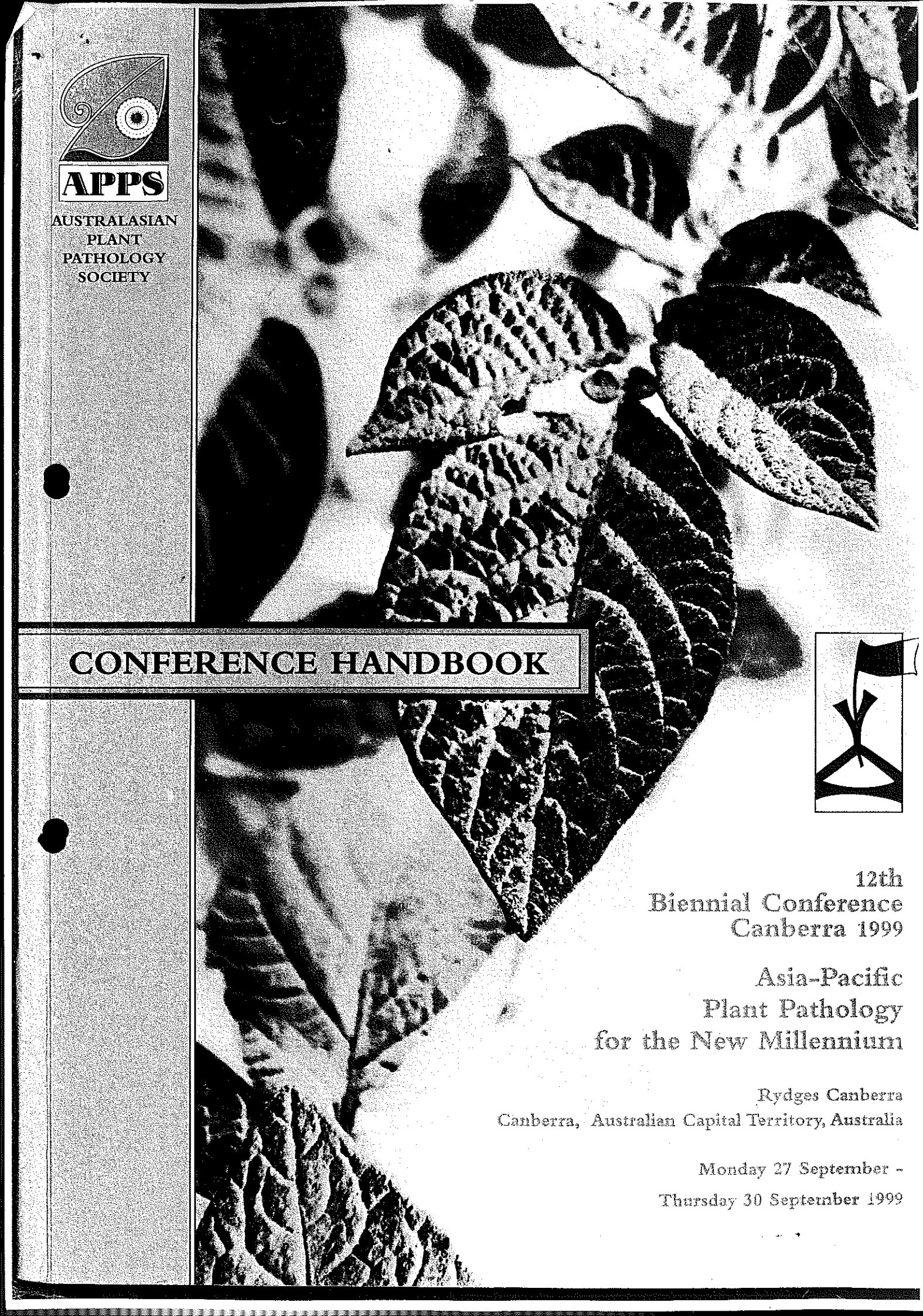

APPS

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PHOSPHITE HAS NO EFFECT ON ECTOMYCORRHIZAL FORMATION OR PERSISTENCE

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INTRODUCTION

Phosphite has been successfully used to control Oomycete diseases in a range of horticultural and ornamental crops. In Western Australia, aerial applications of phosphite have been used to protect large areas of native bushland from the devastating soil-borne plant pathogen *Phytophthora cinnamomi*. However, the effects of phosphite on beneficial microorganisms, such as mycorrhiza, has not been studied in natural ecosystems. In horticultural and agricultural studies, results are contradictory. Phosphite significantly increased vesicular-arbuscular fungi (VAM) in leek (1), while in maize, it decreased the colonisation of roots (2) and the percentage of onion root length infected (3).

This study investigated the effect of phosphite treatments on three species of early colonising ectomycorrhiza fungi (*Laccaria, Pisolithus* and *Descolea*) with *Agonis flexuosa*, *Eucalyptus marginata* and *E. globulus*.

METHODS

Experiment 1 Mycorrhizal formation and plant growth Non-mycorrhizal two month-old *E. marginata* and *E. globulus* seedlings and ten month-old *A. flexuosa* seedlings were sprayed to run-off with phosphite (0, 0.25, 0.5, 0.75 or 1%) and then planted into soil from a 5 year old *E. globulus* plantation. Plant height was recorded. Ectomycorrhizas were quantified using the intercept method (4) after 90 days. The dry weight of roots and shoots were determined.

Experiment 2 Continued mycorrhizal colonisation of new roots *E. globulus* seeds were inoculated with spores of *Laccaria, Pisolithus* and *Descolea* species at time of planting. After 6 months, the plants were treated with phosphite and planted into steam sterilised peat/perlite. Ninety days after treatment, the new root growth was harvested by taking cores, and the amount of ectomycorrhizal root was quantified.

RESULTS

Experiment 1 Plant growth Phosphite significantly decreased (p=0.001) the height of *A. flexuosa* at 30 and 90 days, by 24-30% and 12–20%, respectively. Phosphite also decreased (p=0.02) the shoot dry weight of *A. flexuosa* by 12–34 %. In contrast, phosphite did not affect plant height or dry shoot weight in *E. marginata* and *E. globulus* (p=0.913 and 0.09). The dry weight of roots showed no significant difference to phosphite treatment in any of the three species.

Experiment 1 Mycorrhizal formation Phosphite did not have any significant (p>0.1) effect on the percentage of mycorrhizal roots formed in *E. marginata, E. globulus* or *A. flexuosa* (Figure 1).

Experiment 2 Phosphite did not affect the percentage of new mycorrhizal roots in *Laccaria* (p=0.44), *Pisolithus* (p=0.26) or *Descolea* (p=0.12) in *E. globulus* (Figure 2).

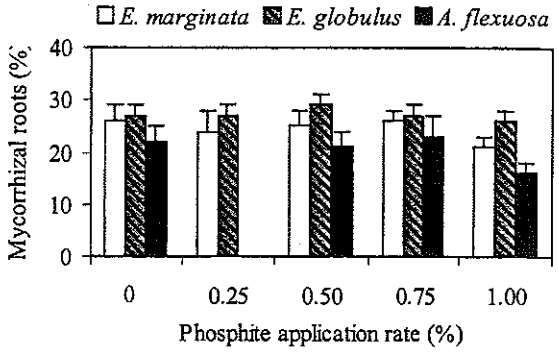

Figure 1: Percentage of ectomycorrhizal roots *in Agonis flexuosa, Eucalyptus marginata and E. globulus*, 90 days after phosphite application.

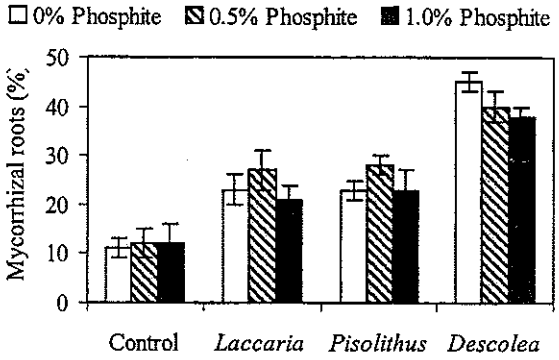

Figure 2: Percentage of new mycorrhizal colonisation of roots in *Eucalyptus globulus* 90 days after treatment with phosphite.

DISCUSSION

Phosphite applied at operational rates (0.5-1.0%) did not significantly effect existing ectomycorrhizal associations or the development of new associations on developing roots. The greatest response to phosphite treatment was seen in *A. flexuosa* where a significant reduction in plant height and dry shoot weight was recorded. This reduction is attributed to the decrease in plant vigour where higher numbers of VAM were found.

However, this study is not conclusive as there is still a need to investigate the effect of phosphite on the formation of the Hartig net, mantle, and its effect on spore germination.

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