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PHOSPHITE: ITS PHYTOTOXICITY AND EFFECTIVENESS IN THE PROTECTION OF *EUCALYPTUS MARGINATA* FOREST FROM *PHYTOPHTHORA CINNAMOMI*

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Background and objectives

Recent trials conducted by the Western Australian Department of Conservation and Land Management have shown that phosphite protects trees in *E. marginata* forest from *P. cinnamomi*. However, phytotoxicity has been observed in some plant species, and phytotoxic concentrations of phosphite have increased the susceptibility of *Banksia coccinea* to *P. cinnamomi*.

The aim of this project was to examine the effect of phosphite concentration on phytotoxicity and on colonisation by *P. cinnamomi* in three understorey species of the *E. marginata* forest.

Materials and methods

Adenanthos barbiger, *Daviesia decurrens* and *Xanthorrhoea preissii* plants at Alcoa of Australia Limited's Jarrahdale mine were sprayed to run-off with 0, 0.2, 0.5 and 2% phosphite. Plants were monitored regularly for phytotoxicity symptoms. One week after phosphite treatment, stems of *A. barbiger* and *D. decurrens* were underbark inoculated with *P. cinnamomi*. In *X. preissii*, roots were underbark inoculated with *P. cinnamomi* 30 days after treatment. The stems and roots were harvested between 23-31 days after inoculation, then plated sequentially on *Phytophthora*-selective agar. The leaves of *A. barbiger* and *D. decurrens* and roots of *X. preissii* were analysed for phosphite content using gas chromatography and a flame photometric detector.

Results and conclusions

The foliar application of 0.2, 0.5 and 2% phosphite was effective in restricting colonisation by *P. cinnamomi* in stems of *A. barbiger* and *D. decurrens*, but not in the roots of *X. preissii*. However, treatment with 2% phosphite resulted in severe phytotoxicity symptoms. Plants with severe phytotoxicity symptoms recovered by producing new growth. Leaf necrosis developed in all three species at a phosphite concentration as low as 0.2%, which is in contrast with the reported low phytotoxicity of phosphite [1]. However, the observed phytotoxicity symptoms were not severe in the 0.2 or 0.5% phosphite treatments. Phytotoxic concentrations of phosphite did not predispose *A. barbiger* or *D. decurrens* to more colonisation by *P. cinnamomi*.

Although phosphite is phloem mobile and has been detected in the roots of treated plants [2], very little is known about the distribution of phosphite after foliar application. Very low concentrations of phosphite were detected in the roots of *X. preissii* in comparison with the phosphite concentration measured in the foliage of *A. barbiger* and *D. decurrens* plants treated with phosphite. This suggests that phosphite was not translocated from the leaves to the roots in *X. preissii*.

The results indicate that phosphite has the potential to contain *P. cinnamomi* in native plants. It is generally accepted that phosphite does not eradicate the pathogen, but it may slow the destruction of native plant communities long enough for a more permanent solution to be found.

References

1. Guest DI and Grant BR, 1991. Biological Review 66, 159-87.
2. Ouimette DG and Coffey MD, 1989. Plant Disease 73, 212-15.