

Letter to the Editor

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In the paper 'Added phosphorus is associated with reduced severity of *Mycosphaerella cryptica* in *Eucalyptus globulus*' by Carnegie and Ades in *Australian Forestry* **64**(4), 203–208, 2001, the authors reported evidence that application of phosphorus fertiliser (up to 200 kg P ha⁻¹) reduced disease severity of *Mycosphaerella cryptica* in *Eucalyptus globulus*. Hypotheses were proposed that the effect could be a result of increased tree vigour due to phosphorus fertilisation and/or micro-climatological factors. While these may be valid hypotheses, the phosphorus in the experimental trial was added as single superphosphate (9.6% P) and hence calcium and sulphur were also applied. For example, the highest treatment of 200 kg P ha⁻¹ also contained 490 kg Ca ha⁻¹ and 296 kg S ha⁻¹. These additional elements were not discussed and it is just as likely that the reported reduction in disease severity was due to nutritional factors other than phosphorus.

Relationships exist between nutrition and pathogen or insect infection, since mineral elements affect tree growth rates, chemical composition and anatomical features, and have been shown to either increase or decrease susceptibility to fungal diseases and insect pests (for example, White 1969; Bogenschütz and König 1976; Dimitri 1976; Marschner 1986). An example of such a relationship is the biochemical imbalance caused by inorganic nutrient deficiency leading to an accumulation of food sources for fungal infection. When sulphur is low due to an actual or induced deficiency of sulphate-sulphur in the foliage, there is an increased accumulation of the nitrogen-rich amino acid, arginine, and an increased incidence of disease. The converse has been found to occur in field trials when sulphur is added in fertiliser (Lambert and Turner 1977; Eldridge *et al.* 1981; Lambert 1986). This published work is generally related to sulphur and/or nitrogen nutrition but also recognises effects of trace elements. A similar process may occur due to accumulation of proline as a result of water stress. Another factor is that *E. globulus* is a species with relatively high requirements for calcium and the effect of this element also needs to be taken into account.

In the study of Carnegie and Ades, it is not possible to differentiate the variation in disease severity as a result of adding phosphorus, sulphur or calcium since the nutritional status of the trees at the

time of assessment was not reported. Operationally, the rates of fertiliser applied in the trial were very high (up to 2 t P ha⁻¹ and 400 kg N ha⁻¹) which if applied as single superphosphate and urea are about 2.5 t of fertiliser, and would probably be economically prohibitive in plantations.

The long-term success of plantations requires an understanding of interactions between nutrition and biological aspects, together with the actual conditions of trials, and hypotheses which need to be clearly reported. In the trial reported, it may be concluded that the addition of phosphorus, calcium and sulphur with or without nitrogen increased tree growth. Tree health improved as measured by a decrease in foliage loss from about 8% to about 2%, but no cogent hypothesis was proposed other than faster-growing trees being healthier.

References

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