Supra-optimal manganese suppresses the effect of gaeumannomyces graminis var. tritici on grain yield of wheat

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Take-all (caused by Gaeumannomyces graminis var. tritici)(Ggt) is a serious disease of wheat world-wide. Control of this disease by conventional means has had limited success. Recently, Wilhelm *et al. (1),* showed that manganese (Mn) fertiliser depressed disease score and enhanced grain yield when wheat was grown on a Mn deficient soil. The results presented here show that Mn fertilization also has positive effects on grain yield of wheat plants grown with added *Ggt* inoculum on soils not regarded as Mn.deficient.

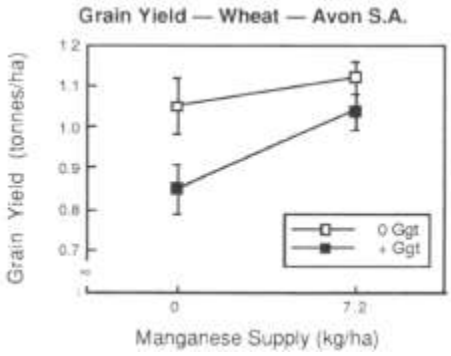
Methods

Wheat seeds and basal fertilisers were direct drilled in small plots at Avon, SA. The experiment was a randomised block design with five replicates. Treatments were imposed in a factorial combination of two *Ggt* treatments (0 or 4.5 x 10^6 propagules/ha) and two Mn treatments (0 or 7.2 kg/ha Mn) as $MnSO_4$ Ggt propagules were prepared on sterilised ryegrass seeds (2).

Results and discusssion

Grain yield: Statistical analysis suggested that grain yield responded to the main effects of both treatments. Although the interaction was not significant, Fig. 1 shows a trend for greater suppression of grain yield by added *Ggt* inoculum in the absence of Mn than in its presence. *Tissue Mn concentration:* The Mn concentrations in the youngest emerged blade of 8 week old plants (37, 35, 30, and 31 mg/kg dry matter in + Mn 0 *Ggt, +Mn* + Ggt, 0 Mn 0 Ggt, and 0 Mn +*Ggt* respectively) indicated that plants of all treatments were probably adequate in Mn, being greater than the 10 to 12 mg/kg considered critical (3). This is not surprising the experimental site is not regarded as a Mn deficient site.

Figure 1. Effect of Mn and Gaeumannomyces graminis var. One interpretation of these tritici on grain yield of wheat grown at a site not regarded as results is that the effects of Ggt responsive to Mn. Vertical bars represent the standard error of may be responsive to levels of the mean. Analysis of variance indicated a significant (N0.05) effect of both Mn and *Ggt* treatments with no interaction. Mn normally considered supra. optimal and that Mn fertilisation may provide some protection against take-all even in areas considered Mn sufficient. If this is so, then the standard techniques for establishing critical levels may need to be revised to include potential diseases. Furthermore, soils traditionally regarded as "micronutrient replete" may need to be reassessed, especially if they are so-called "conducive" soils.



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