

The effect of MCPA and dicamba on take-all disease and growth of wheat seedlings

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MCPA (4-chloro-2-methylphenoxyacetic acid) and Dicamba (2-methoxy-3,6-dichlorobenzoic acid) are herbicides commonly used to control some broad-leaved weed species. A report in 1978 (1) showed that several broadleaf herbicides increased take-all lesions on roots by an average of 60% with dicamba giving the greatest increase. Despite farmer reports in SA of the increase in the number of white heads (the field symptoms of take-all at grain fill) following applications of dicamba and MCPA there has been no follow up research on possible disease herbicide interactions. This poster presents the results of an experiment to test the effect of Dicamba and MCPA herbicides on the growth of wheat infected with the take-all fungus.

Methods

The experiments used a dark brown loamy fine sand (pH 8.4 in water) classification Dy 5.43 (2). The soil was collected from a sandhill at Avon, SA (34°14'S., 138°18'E.) that had never been cropped or treated with herbicides. Cultures of the take-all fungus, isolate 500, growing on sterile ryegrass seed was used as inoculum. Inoculum was added in a single layer and seven wheat seeds, cultivar Spear, were sown to each pot. The experiment was a completely randomised block design with 5 replicates. After germination the number of wheat seedlings were reduced to five. Herbicides were applied to the plants in a herbicide spraying cabinet 21 days after sowing. The herbicide treatments were commercial herbicide formulation applied at field rates. Treatments were, Dicamba (200 g ai/L) 700 mL/ha, MCPA (500 g ai/L) 2000 mL/ha, Dicamba/MCPA mix (80/340 g ai/L) 1500 mL/ha and nil herbicide control. The pots were incubated in a glasshouse in root temperature tanks at 15°C. After 2 weeks pots were harvested and the roots rated for the percent of roots showing take-all lesions. Shoots and roots were oven-dried and weighed.

Results and discussion

The percent of roots with lesions was significantly increased by the application of Dicamba and MCPA at field application rates (Fig.1). Root growth was significantly reduced by up to 37% by the application of the herbicides (Fig.2). Application of the herbicides significantly reduced shoot growth by up to 28% (Fig.3). The increased root damage caused by the application of Dicamba and MCPA to wheat infected with take-all which was demonstrated in this experiment may cause heavy yield losses in the field. if the conditions were favorable for the development of the take-all fungus.

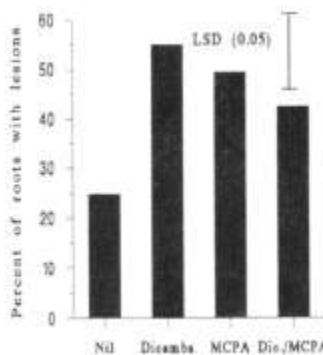


Figure 1. The effect of Dicamba and MCPA on length of root with lesions

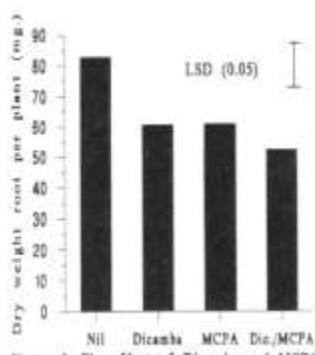


Figure 2. The effect of Dicamba and MCPA on root dry weight

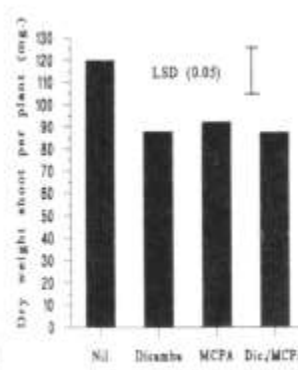


Figure 3. The effect of Dicamba and MCPA on shoot dry weight

References

1. Tottman, D.R. and Thompson, W. 1978. Brit. Crop Prot. Cont Weeds. 609-615.

2. Northcote, K.H., Hubble, G.D., Isbell, R.F., Thompson, C.H. and Bettenay, E. 1975. A description of Australian Soils. CSIRO. Australia.