Foliar micronutrients and lime on wheat production

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Copper deficiency in wheat has been reported recently on duplex acid soils (pH H_20 range 5.4-5.6) in the southern Wimmera (A. Flynn, pers. comm.).As soils with a similar pH range are widely used for cropping in N.E. Victoria I was interested to examine the benefits of foliar applications of copper and other micronutrients to wheat on acid soils with and without lime.

Methods

Copper (Cu), zinc (Zn) and molybdenum (Mo) were applied as foliar sprays at 75, 150 and 30 g/ha respectively to tillering wheat (5-6 leaf stage) growing on a strongly acid soil (Rutherglen site, pH $CaCl_2$ 4.38) limed at three rates (0, 2.5 and 10 t/ha lime).The highest lime treatment (pH $CaCl_2$ increased to 7.18) was included to determine if lime induced any micronutrient deficiency. Two further sites were established on farmers' properties (Devenish, pH CaCl2 4.36; Goomalibee, pH $CaC1_2$ 4.72). The same three micronutrients were applied with boron (B, 200 g/ha) to adjacent limed and unlimed areas.

At the Rutherglen site plants were sampled on three occasions (3 leaf stage, jointing and flowering). The youngest fully emerged leaf (YFEL) was separated for chemical analysis (1). Herbage production, grain yield and yield components were determined at this site, whilst at the other two sites, grain yield was measured.

Results and discussion

At the Rutherglen site, Cu concentration in the YFEL's decreased rapidly over the growing season for all treatments. At flowering the Cu concentrations ranged from 8-12 ppm. There was no effect of lime or applied Cu to the concentrations in the YFEL's. These concentrations considerably exceed the suggested deficiency value of <2 ppm (2). Zn concentrations in YFEL's at flowering were above 20 ppm for all treatments, well in excess of the critical deficiency level (<10 ppm). There were no effects on YFEL Zn concentrations from applying Zn or lime. The levels of Mo were significantly increased ($P<0.01$) by lime from 0.3 ppm to 0.6 and 0.8 ppm respectively, for 2.5 and 10 t/ha lime (SED0.059).However, YFEL Mo concentrations were more than adequate for plant needs. There was no effect of foliar applied Cu, Zn or Moon grain yield. Lime has consistently increased grain yield at this site (3). At the Devenish and Goomalibee sites, lime significantly ($P<0.01$) increased grain yields (36% and 13% respectively) but there were no improvements from the applied foliar nutrients nor any interaction with lime.

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