Copper deficiency of wheat in Victoria. II. correction

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The soil type most cropped in the Southern Wimmera Region of Victoria (Yellow Duplex) is known to be marginally deficient in copper for wheat production, a problem that is exacerbated when the soil is waterlogged (1). This waterlogging also greatly reduces the effectiveness of soil applied copper, the standard technique used for correcting copper deficiencies in other states. (2). These experiments investigate the use of foliar applied copper.

Methods

Trials were conducted on Yellow Duplex Soils at three sites in the Southern Wimmera. At one site a commercial formulation of chelated copper was applied to the foliage as a spray at various rates and times of application. Treatments were Nil; 75 or 150 g Cu ha at late booting (BI and B2); 37.5 or 75 g Cy ha at late tillering (T0.5 and Tl) and; split applications of 75 g Cu ha at late tillering plus either 75 g or 150 g Cu ha at late booting (T1/B1 and TI/B2). At two sites formulations of copper were compared, these treatments included Nil; copper oxychloride; coppTr sulphate and a commercial chelated copper. All were applied at 75 g Cu ha at late tillering plus 150 g Cu ha⁻¹ at booting. All plots were sown to wheat. Quadrate samples were used at anthesis and maturity to estimate crop growth and yield components. Grain yield was measured by harvesting whole plots.

Results and discussion

Treatment	1	Grain Yield	(t ha)	Grains ear	Ears m
Nil		1.66		19.4	274
To. 5		2.83		26.6	320
T1		3.21		"30.9	329
Bl		1.99	22.9	284	
B2		2.04		22.9	285
T1/B1		3.33		33.3	333
T1/B2		3.22		32.5	301
LSD 5%		0.46		5.1	42

Table 1. Effect of Rate and Timing of Foliar Copper on Grain Yield and Yield Components.

Copper is an essential element and has many roles in the plant, the most important in wheat being the production of viable pollen (3). In the Rate and Timing of Application experiment the late booting treatments were applied after pollen set and resulted in only approximately 18% increase in grains ear and grain yield. When copper was applied at late tillering grain yield was increased by 1.55 t ha⁻¹ or 93% resulting from 60% more grains ear and 20% more ears m⁻². Split applications did not result in higher yields. This experiment supports previous data suggesting that copper should be applied to the foliage at late tillering (4).

The experiments comparing formulations showed little difference in grain yield response between salt formulations and the chelated formulation. Copper oxychloride and the chelated product both consistently performed well resulting in grain yield increases between 0.94 and 1.26 t ha but the chelated product is approximately seven times as expensive.

1. Flynn, A.G. and Gardner, W.K. 1987 Proc. 4th Aust. Agron. Conf. Melbourne.

2. Gartrell, J.W. and Glencross, R.N. 1968 W.A.J. Agric. 9(4) 517-21.

- 3. Graham, R.D. 1975 Nature, 254, 514-15.
- 4. Graham, R.D. 1976 J. Exp. Bot. 27(99) 717-24.