IMPROVING THE EFFICACY OF GLYPHOSATE IN MINIMUM/ NO-TILLAGE CEREAL PRODUCTION BY VARYING WATER VOLUME USED IN APPLICATION

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In Tasmania, direct drilled cereal cropping has been adopted by fewer growers compared to other Australian States (ABS, 1996). Experience indicates it is difficult to obtain reliable weed control prior to sowing a cereal crop under Tasmanian conditions unless rates of up to 900 g a.i./ha of glyphosate are used, especially in the higher rainfall areas (>750 mm) Whereas on the mainland, the average glyphosate rate used is 360 g a.i./ha (Dollin *et al*. 1988). The registered rates for glyphosate use in pre sowing minimum tillage are 360 to 540 g a.i./ha in New South Wales, South Australia, Victoria and Western Australia, yet in Tasmania the registered rates are 540 to 1080 g a.i./ha (Chambers, 1997). This study aimed to determine if increased volume of application could enhance glyphosate efficacy enabling lower doses to be used by Tasmanian farmers.

Experiments were established at a high rainfall site (Flowerdale, 1200 mm) and a low rainfall site (Cressy, 670 mm) in Tasmania representing potential cereal cropping districts. Treatments consisted of four rates of glyphosate (180, 360, 540, 720 g a.i./ha) applied in three volumes of water (50, 100, 200 L) at each site. Barley (*Hordeum vulgare* cv. Franklin) was direct drilled into the experiment sites in autumn. Observations were made every 6 to 8 weeks. Efficacy is expressed in these results as a visual assessment of percentage regrowth cover of clover, grass, and flatweed over a 0.25 m^2 quadrat.

At Flowerdale, the efficacy of the lower doses of glyphosate (180 and 360 g a.i./ha) on grass were significantly improved by the higher application volume. The grass component of the treated areas was a clear indicator of treatment efficacy and interactions. The use of 180 g a.i./ha of glyphosate in 200 L ha^{-1} of water did not differ significantly from 720 g a.i./ha of glyphosate in 200 L ha^{-1} of water. Low dose efficacy was clearly improved by an increase in application volume. There were no efficacy differences between application volumes when glyphosate was applied at 720 g a.i./ha. At Cressy, the increased dose rates of glyphosate did not significantly improve the efficacy of treatments. The more significant benefits in control were within the lowest dose rate by increasing volume of application from 50 to 100 litres and at the highest dose increasing volume of application from 100 litres to 200 litres of water.

The potential to increase glyphosate efficacy through increased application volume was demonstrated at both sites. This water volume effect was more evident at the lower dose rates (180 g a.i./ha and 360 g a.i./ha) and became less evident at the higher dose rates. Although increased dose rate generally showed increased efficacy, the level of significance was much less between 540 g a.i./ha and 720 g a.i./ha, and a lower dose in a higher volume was just as beneficial as a higher dose in a lower volume.

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