

THE FIELD-EXPOSURE AND METABOLIC REACTION OF WHEAT  
CULTIVARS TO CHLORSULFURON

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*Abstract.* The reaction of spring wheat cultivars to chlorsulfuron depends of the movement and persistence of the herbicide in the soil and its uptake and metabolism by the plant. At the end of 85 days in a field experiment at Perth, W.A., we found only 10% of the applied chlorsulfuron ( $20 \text{ mg m}^{-2}$ ) remained in the surface 18 cm of soil where roots were concentrated. The partition of loss was: 20% degradation and 80% leached below 18 cm; the half-life for the combined modes of loss was 30 days. A limestone treatment that raised the surface pH from 5.7 to 6.6 had no effect on the rate or mode of loss. There was no herbicide-effect on root growth of wheat (cv. Jacup) 55 days after herbicide application; the mean root density was  $8 \text{ cm (cm}^3 \text{ soil)}^{-1}$  in the top 6 cm and it decreased to  $1 \text{ cm cm}^{-3}$  at 18 cm depth. Based on levels of shoot nitrogen at 55 days, there was no herbicide-effect on root function of Jacup; there was  $0.30 \text{ g N (m}^2 \text{ crop)}^{-1}$  for 112 plants  $\text{m}^{-2}$  and additional fertilizer nitrogen of  $1.7 \text{ g N m}^{-2}$  (as urea) at 32 days gave an addition of  $0.45 \text{ g N (m}^2 \text{ crop)}^{-1}$  during the subsequent 23 days. Selective action of chlorsulfuron alleviated some of the competitive effect for nitrogen by 574 plants  $\text{m}^{-2}$  of great brome, *Bromus diandrus* Roth.

Pulse-chase experiments with  $^{14}\text{C}$ -chlorsulfuron showed that detached leaves of sensitive cultivars metabolised chlorsulfuron more slowly than tolerant cultivars. The half-life of chlorsulfuron at  $15^\circ\text{C}$  in Cranbrook, a sensitive cultivar, was 18 h while the half-life in Gamanya, a tolerant cultivar, was only 8 h. There were significant genotype x environment interactions with greater sensitivity of cultivars at low temperatures.