

Tolerance of barley to phenoxy herbicides

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Summary A field experiment was conducted under a weed free situation during 2001 at Avondale (in the Mediterranean environment of Western Australia) to determine optimum application times and rates for phenoxy herbicides (MCPA and 2,4-D) on barley. Five barley varieties (Unicorn, Stirling, Harrington, Gairdner and Skiff) were planted in strips, and cross sprayed with amine and ester formulations of the herbicides. The varieties were chosen to have a range of maturity times, while the herbicides were applied at weekly intervals starting from 1–2 leaf stage (Z11–Z12) to Z17–Z18 and after full flag leaf emergence. Five plants from each variety at each time of herbicide application were dissected to determine the development stage of the ear heads. Ear head deformities in terms of missing spikelets, rachis thinning and supernumerary spikelets were observed before harvest.

MCPA (amine and ester) is registered for use from three leaf stage to flag leaf emergence (Z13–Z33) at 250 g a.i. ha⁻¹, with up to 1000 g a.i. ha⁻¹ after Z15. 2,4-D amine at 800 g a.i. ha⁻¹ and 2,4-D ester at 560 g a.i. ha⁻¹ is registered for use from Z15 to Z33.

Head deformities were observed in all varieties when sprayed with phenoxy herbicides at or before the double ridge stage of ear development. Unicorn, Stirling and Harrington tolerated low rates of MCPA amine and ester (250 g a.i. ha⁻¹) from as early as

Z11–Z12. Low rates of 2,4-D amine (250 g a.i. ha⁻¹) from Z13–Z14 were tolerated well by all varieties except Skiff. Higher rates (500 and 750 g a.i. ha⁻¹) were tolerated if applied at Z15–Z16 onwards. Similarly, 2,4-D ester 400 and 600 g a.i. ha⁻¹ applied at Z15–Z16 through to Z17–Z18 did not have any adverse effect on seed yield of all the varieties. Application of 2,4-D (both formulations) after flag leaf emergence or/and head emergence caused no head deformities or yield reduction.

The studies indicated that addition of one leaf to the number of leaves present at double ridge is the time at which higher rates of 2,4-D or MCPA can be applied with minimal head deformities. For slower maturing varieties this was often later than the application timing indicated on the product label. However, visual ear head deformity symptoms caused by phenoxy herbicides were not a good indicator of yield penalty.

Keywords Barley, phenoxy, MCPA, 2,4-D, ear head deformities, double ridge.

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