Integrated weed management - the role of competitive cultivars

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Herbicide resistance, grower attitudes and community pressure all point towards reduced pesticide usage in farming systems. Whilst many of the principles of integrated weed management (I.W.M.) arc already understood, the economic need for farmers to pursue prolonged periods of cropping means that implementation of these principles will be more difficult.

A potentially valuable I.W.M. tool, but as yet virtually untapped, is the use of crop cultivars which are more tolerant of weeds. Work by Reeves and Brooke (I) indicated that there were significant differences between wheat cultivars in their ability to withstand competition from annual ryegrass *(Lolium rigidum).* However, this research was overwhelmed by the onset of the 'herbicide revolution', and not followed up. More recently, the authors - and Cousens and Lemerle in New South Wales - have commenced studies aimed at developing cereal cultivars that are more competitive with weeds.

Methods

At Roseworthy, 54 wheat cultivars. including named varieties and breeders' crossbreds, were grown in the field with six levels of weed competition. Annual ryegrass *(Lolium rigidum), the* major weed present was sown at densities of 0, 52, 115, 219, 272 and 496 plants/sq.m. Wheat was sown at 65 kg/ha resulting in an establishment of approximately 160 plants/sq.m. there was little variation between cultivars; amended D.A.P. (N 19:P13) was applied at 110 kg/ha.

Results and discussion

Weed-free grain yields of the 54 cultivars ranged from 2.7 t/ha to 5.7 t/ha. Yield reductions caused by weeds differed significantly between cultivars (P=0.05). At the highest weed density, 496 ryegrass plants/sq.m., yield reductions (compared to weed-free yields) ranged from 43% down to zero. Of the named varieties the highest losses occurred with Batavia (43%), Rosella (38%) and Wyuna (37%), whilst the lowest loss occurred with Aroona (10%). The most competitive cultivar overall was a crossbred (RAC 710 CO 2943-8) from the Roseworthy breeding program.

The results obtained in this experiment confirm earlier findings (1), that wheat cultivars differ in their ability to compete with weeds. Adaptation to the Roseworthy environment appeared to be a significant factor in competitiveness with weeds, as 16 of the 17 cultivars least affected by the weed competition were crossbreds or varieties from the Roseworthy breeding program. Aroona another S.A. variety, was the exception to this trend. These results indicate that competitiveness is likely to be a function of genotype x environment, rather than genotype alone.

There is clear scope, however, to produce wheat cultivars that are more competitive with weeds and less dependent on herbicide use. Screening for such characteristics should be carried out on a regional basis.

References

1. Reeves, T.G. and Brooke, H.D. 1977. Proc. 6th Asian-Pacific Weeds Conference. Jakarta, 1977 pp.167-172