

Herbicide carryover in wheat stubbles

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Summary. An experiment was conducted to investigate whether herbicides used in-crop were carried through to the next season in the stubbles of that crop. Lucerne and subterranean clover were grown through wheat stubble, and growth depressions were recorded over a range of herbicide treatments. Visual symptoms of herbicide damage were also noted. Lucerne reacted to all herbicide groups but subterranean clover only reacted to Logran and Lontrel + MCPA.

Introduction

In the winter rainfall areas it has been traditional practice to burn crop stubbles in the autumn, prior to seedbed preparation and sowing. With the advent of conservation farming methods during the 1980s interest has been generated in retaining the stubbles on the soil surface for their contribution through soil erosion reduction, improved moisture at sowing and their contribution to soil organic matter.

Stubble retention adoption has been relatively slow because of the physical burden of large quantities of stubble and because the dry summers experienced in this region are not conducive to the breakdown of this material. This lack of breakdown of the material in summer also has implications chemically, since the straw remains unleached, particularly where the autumn break occurs late. Thus germination of crops or pastures may occur in association with leachate from the straw which may contain allelochemicals (1,2) or, as described in this paper, herbicides used on the crop in the previous year.

Methods

Advantage was taken of the availability of a range of stubbles from the herbicide x variety experiments undertaken by D. Lemerle and B. Hinkley at the Agricultural Research Institute, Wagga Wagga. Selected stubbles were collected immediately following harvest and stored in dry, dark conditions until required for experimentation. A glasshouse trial was commenced in the following May. Pots 17 cm in diameter were filled with a sandy loam potting mix, sown with the chosen species and the chopped stubbles were placed on the soil surface at the equivalent of 4 Oa. Pots were then watered twice daily to keep the straw moist for the duration of the experiment to encourage the formation of leachate in the surface soil layers. Evaluation of the effects were then undertaken by measuring the dry matter production of tops and roots of the sown species after five weeks.

The stubbles of wheat, cv. Corella, were chosen for the experiment as the effect had previously been observed in this variety. Lucerne, *Medicago sativa* and subterranean clover, *Trifolium subterraneum* cv. Junee were the test species used. The control treatment consisted of stubble with no added herbicide and was compared with stubbles containing the recommended and twice the recommended rates of the herbicide studied. The herbicides (and the lx rate) used were Lontrel + MCPA (0.15 + 0.5 kg ai/ha), Glean (15 g ai/ha), Tordon 242 (0.026 kg picloram + 0.42 kg MCPA ai/ha), Ally + Lontrel (4.2 g + 0.15 kg ai/ha), Ally (4.2 g ai/ha) and Dicamba + MCPA (80 + 340 g ai/ha). All chemicals were applied at the three to five leaf stage of the crop. The experiment was conducted in a randomised block design with four replications.

Results and discussion

No significant differences in germination percentage were recorded between treatments in this experiment. However, substantial growth depressions were recorded. In lucerne, all herbicides affected both shoot (Fig. 1) and root (Fig. 2) growth, although in the case of Tordon and Ally these occurred only at double the recommended rate.

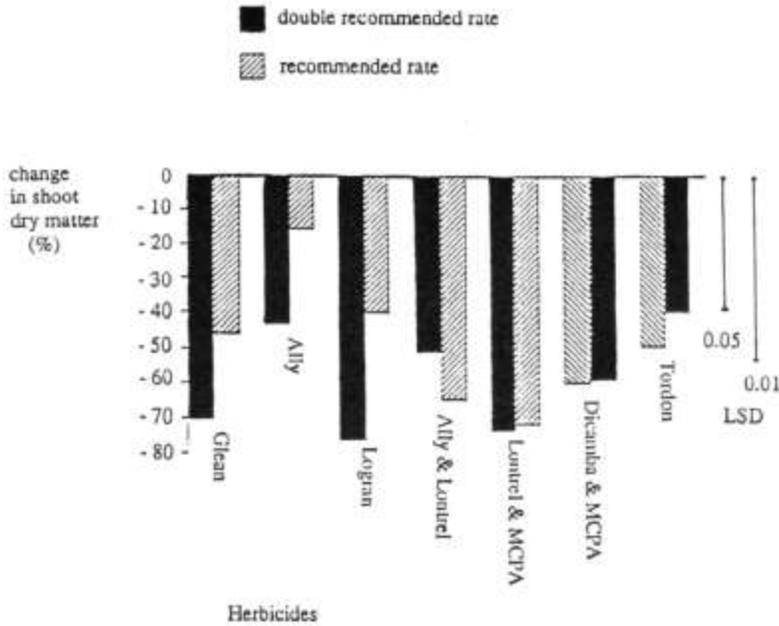


Figure 1. The percentage change in shoot dry matter yield from control treatment due to herbicide effects on lucerne (control dry matter yield 2.2 g/pot).

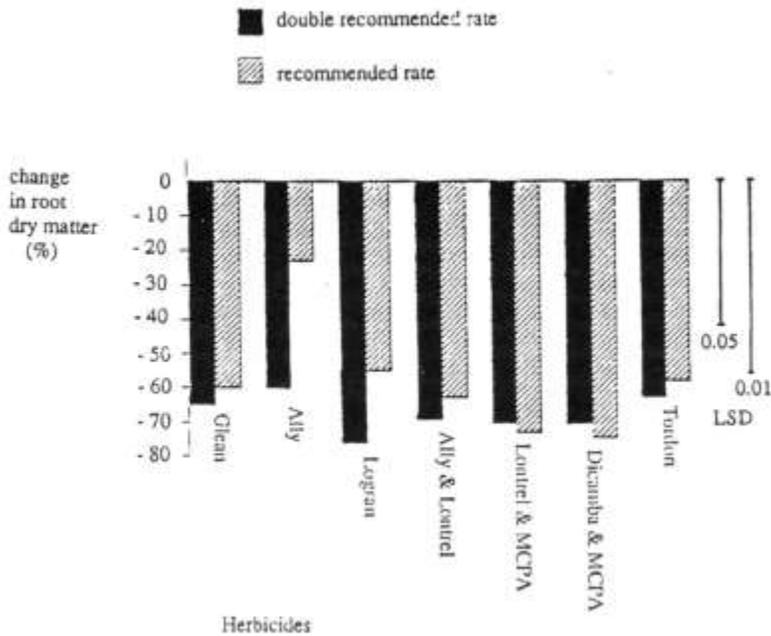


Figure 2. The percentage change in root dry matter yield from control treatment due to herbicide effects on lucerne (control dry matter yield 0.52 g/pot).

In subterranean clover, only Logran and Lontrel + MCPA produced significant effects (Figs 3 and 4) although depressions have been obtained to other herbicides (Pratley, unpublished data), particularly Tordon and the sulphonyl urea group.

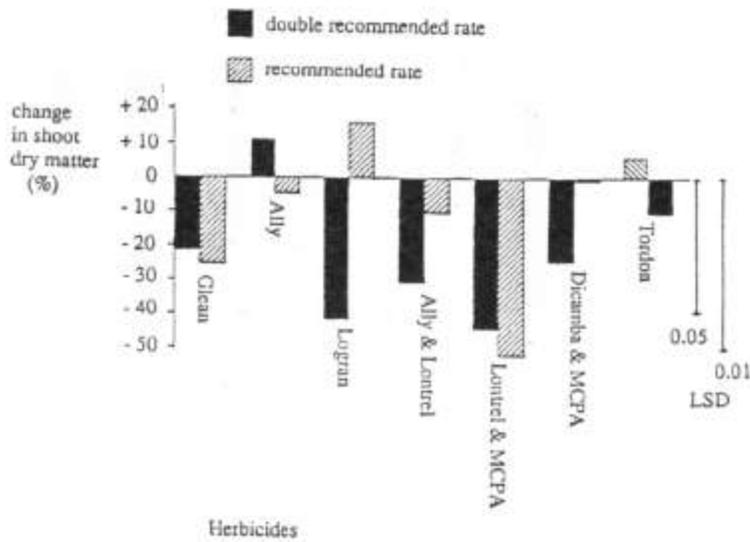


Figure 3. The percentage change in shoot dry matter yield from control treatment due to herbicide effects on subterranean clover (control dry matter yield 4.2 g/pot).

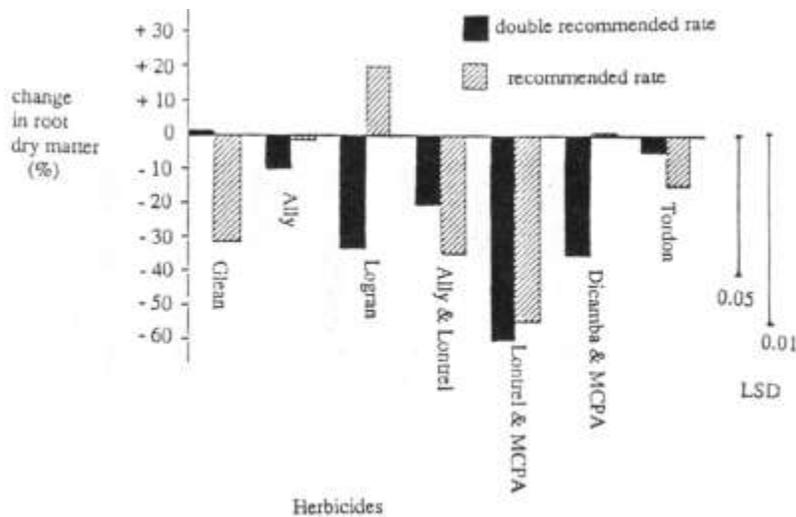


Figure 4. The percentage change in root dry matter yield from control treatment due to herbicide effects on subterranean clover (control dry matter yield 1.5 g/pot).

In both lucerne and subterranean clover, visual symptoms of cupped and distorted leaves were present in the Tordon and sulphonyl urea treatments, when compared with the unsprayed stubble controls, confirming herbicidal damage. In some cases the plants outgrew the symptoms.

The results of this investigation make it apparent that under conditions where leaching of crop stubbles does not take place to any extent prior to sowing, susceptible crop and pasture species being established will be at risk of some herbicide damage. The extent of the damage will vary with the herbicide involved and the species sown as well as the preceding climatic conditions. Other work (Pratley, unpublished data) shows variation also between straw varieties in terms of carryover effect.

In years of pronounced herbicide effects, the build-up of resistance in weed species to the particular herbicide would be enhanced. In years of minimal rainfall during summer and autumn, farmers may be

well advised to consider the susceptibility of the species to be sown to the herbicides previously used. Where applicable, a change of species or the burning of the stubbles should occur. The long term planning of rotations should also include consideration of potential herbicide carryover in succeeding years.

Acknowledgments

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References

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