A SURVEY OF YARROW CONTROL WITH CLOPYRALID ON CANTERBURY MIXED CROPPING FARMS

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SUMMARY

Clopyralid at 200 to 400 g ai/ha gave 94% control of yarrow (*Achillea millefolium*) when applied to actively growing foliage in 37 farmer applied assessments. All applications were followed by a competitive crop, mostly cereals, which helped to achieve the high levels of control. Best control was achieved when treated areas were surface cultivated before or after treatment compared to zero tillage. The addition of glyphosate (0.54 to 1.08 kg ai/ha) in zero tillage areas did not compensate for cultivation.

INTRODUCTION

Yarrow has become a problem weed for Canterbury's mixed cropping farmers for reasons outlined by Bourdot *et al* (1979). It is generally spread through farms by seed which often occurs as a contaminant in legume crops. As selective herbicides for yarrow control are not available for use in legume crops the farmer must try to control yarrow before planting legumes.

Clopyralid is an effective herbicide for controlling yarrow. Bourdot and Hurrell (1984) showed that clopyralid at 250 g ai/ha gave 99% mortality of seedlings and Field and Jayaweera (1985) demonstrated that rhizome buds on mature yarrow were controlled by clopyralid or glyphosate if the rhizomes were fragmented. However there is a lack of information concerning the control of mature yarrow with herbicides under field cropping.

This survey attempted to determine the effect of clopyralid on well established yarrow when combined with crop competition. Cultivation, tank mixing with glyphosate, and month of application were also investigated.

METHODS AND MATERIALS

Farmers who used clopyralid (Versatill) in Canterbury in 1984 were identified by stock and station agents. Thirty-seven sites on 23 properties were identified which accounted for about 30% of the volume of clopyralid used in field crops. Treatments were applied by contractors or farmers using vehicle mounted boom sprayers with either fan nozzles applying 150 to 220 litre/ha (32 sites) or C.D.A. equipment applying 20 to 40 litre/ha (five sites). Treatment times ranged from February to October but most sites were treated in May (12 sites) or August-September (nine sites). All sites were planted into crop 1 to 12 weeks after treatment (34 cereals, 1 pasture, 1 pea and 1 linseed). Twenty-three of the 34 cereal crops were treated with post-emergent herbicides for broadleaf weeds. Chlorsulfuron, MCPA and MCPA/dichlorprop/dicamba were used.

Yarrow was assessed at treatment and after the crop was harvested 5 to 16 months (mean 10 months) after spraying. Yarrow ground cover was visually estimated by placing 20, 1 m x 1 m quadrats randomly over the treated area. Control was assessed by comparing yarrow cover at treatment and after harvest, and expressing the difference as percent control. Other agronomic factors were determined by consultation with the farmers.

Glyphosate (Roundup) was applied, primarily for grass control, on 26 sites; eight at 540 g ai/ha, seven at 720 g ai/ha and 11 at 1080 g ai/ha. All except six of these sites were drilled without cultivation (direct drilling).

A minimum tillage technique of either shallow discing or shallow grubbing was used on all the cultivated sites. Four of these sites were subsequently ploughed. Two

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sites were cultivated 5 weeks prior to treatment with clopyralid while the remaining 13 sites were cultivated 2 to 8 weeks after treatment.

Six sites had untreated areas to compare with areas treated with 200 or 300 g ai/ha clopyralid. Three of these sites were cultivated and three direct drilled.

Only three sites were treated with 400 g ai/ha clopyralid and these are included with the 300 g ai/ha rate in Table 1. All were cultivated, one with glyphosate and two without glyphosate.

RESULTS AND DISCUSSION

Results are presented in Table 1.

In this survey surface cultivation significantly improved yarrow control with clopyralid, particularly at the 200 g ai/ha rate. The significance of surface cultivation is presumed to be in fragmentation of rhizomes. Bourdot (1982) found fragmentation of rhizomes using mechanical techniques could significantly improve yarrow control. Field and Jayaweera (1985) supported his results and also observed that treatment with glyphosate (2160 g ai/ha) or clopyralid (500 g ai/ha) prevented bud growth and increased rhizome rotting over a 42 day period, when rhizomes were fragmented to 40, 80 and 160 mm long. Clopyralid was more effective on longer rhizome fragments and glyphosate on shorter fragments.

TABLE 1: Yarrow control (% reduction in ground cover after 6-12 months) using clopyralid with and without glyphosate and cultivation.

		Clopyralid g ai/ha	
		200	300/400
Cultivated	+ glyphosate	99 [—] (2)	100 [—] (4)
	– glyphosate	97 [—] (1)	99 [1.2] (8)
Not cultivated	+ glyphosate	85 [4.2] (11)	96 [1.6] (9)
	– glyphosate	ND	99 [—] (2)
Treated	+ clopyralid	96 [1.0] (2)	98 [2.5] (4)
Untreated	– clopyralid	–8 [8.5] (2)	4 [14.1] (4)
Autumn		94 [3.4] (5)	98 [1.2] (11)
Winter/Spring		80 [5.5] (7)	98 [1.4] (9)

[] standard error of the mean of size (n)

[—] no standard error as all sites had the same value

() number of sites

Glyphosate was applied at rates ranging from 540 to 1080 g ai/ha

ND = no data

t-Tests

cultivated vs not cultivated

Significantly different at both 200 g ai/ha and 300 g ai/ha rates of clopyralid

clopyralid 200 vs 300 g ai/ha

Significantly different in not cultivated sites. Not significant in cultivated sites.

clopyralid with and without glyphosate

Not significant at either 200 or 300 g ai/ha clopyralid.

clopyralid vs untreated

Significantly different at both 200 and 300 g ai/ha.

autumn vs winter/spring application

Significantly different at 200 g ai/ha clopyralid. Not significant at 300 g ai/ha clopyralid.

In non-cultivated sites 300 g ai/ha clopyralid gave better control than 200 g ai/ha but this was still not as effective as cultivation. The addition of glyphosate did not significantly affect control at either rate of clopyralid.

In the untreated areas at six sites, yarrow cover remained constant over the assessment period, demonstrating that no cultivation or a single surface cultivation was

ineffective in reducing yarrow density. In contrast, treatment with clopyralid at these sites reduced yarrow cover by 96-98%. Autumn applications of clopyralid were found to be more effective than winter/spring applications. This supports the findings of Field and Jayaweera (1985).

Cereal herbicides for broadleaf weed control are largely ineffective against yarrow (Bourdote and Hurrell 1984) and therefore unlikely to affect control. Competition from following crops, particularly cereals, is probably a more important factor in achieving good control.

The combination of clopyralid and cultivation successfully controlled yarrow at 15 sites. The use of a herbicide with mechanical cultivation avoids the need for multiple cultivations (Bourdote 1982) and the constraints of this method. Where zero tillage is used by the farmer these results show that clopyralid at 300 g ai/ha will give adequate yarrow control when treatment is followed by a competitive crop. However the suggested programme for yarrow control on Canterbury mixed cropping farms is to treat actively growing yarrow in autumn with 200 to 300 g ai/ha clopyralid followed by surface cultivation and planting of a competitive crop. A spring application will also give acceptable results.

CONCLUSIONS

Clopyralid effectively controlled yarrow when rhizomes were fragmented by surface cultivation before or after treatment.

Best results were obtained from autumn rather than winter or spring treatment.

The addition of glyphosate to clopyralid in tank mixture did not affect yarrow control.

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