Selective control of St. John's wort with Starane® in a native grass pasture

M.H. Campbell and H.I. Nicol,
NSW Agriculture, Orange Agricultural Institute, Forest Rd, Orange, NSW, 2800

In 1997 an experiment was set down on the property of Vic Parkinson, "Gowan Green", Baker's Swamp near Wellington NSW to examine the effects of herbicides in selectively removing St. John's wort from a native perennial grass pasture.

The experiment was sited on a non-arable hill heavily infested with the narrow leaved variety of St. John's wort where superphosphate had been aerially applied in 1985 and 1993 and subterranean clover seed sown in 1993. The pasture was lightly grazed with Aberdeen Angus cattle and Merino wethers until 1999 when heavy grazing was imposed for two months in winter to force animals to graze the pasture to ground level. At spraying on 13 November 1997 St. John's wort occupied 48% ground cover, native grasses 14%, naturalised clovers 10% and the remainder 28%.

Starane® (20% a. i.; fluoroxypyr) was applied on 13 November 1997 at 0, 1, 2, and 3 L/ha and these treatments were over sprayed with all combinations of the four rates on 19 November 1998 (Table 1). Grazon® (40% a. i.; triclopyr + picloram) and glyphosate (45% a. i.) were each applied at 3 L/ha on the above two occasions. Molybdenised superphosphate was applied to two replications on 20 February 1998 at 100 kg/ha. At each spraying the St. John's wort was in full flower. Herbicides were applied in 500 L/ha of water with 0.5 L/ha of a non-ionic surfactant from a hand-held pneumatic sprayer. Treatments were in randomised blocks with four replications.

Results

Table 1. Effect of single and split applications of herbicides on ground cover (%) of St. John's wort and native perennial grasses measured on 25 November 1999.

Herbicide and rate (L/ha)	St. John's wort		Native perennial grasses	
Starane®				
Single application	Nov. 1997	Nov. 1998	Nov. 1997	Nov. 1998
0	33 d^	33 d	20 ef	20 ef
1	38 d	8 b	30 cd	37 b
2	17 c	3 a	35 bc	41 ab
3	17 c	4 a	26 de	41 ab
Split applications	Nov. 1997 + Nov. 1998		Nov. 1997 + Nov. 1998	
2 (1 + 1)	5 a		35 bc	
3 (1 + 2, 2 + 1)	4 a		36 bc	
4 (1 + 3, 2 + 2, 3 + 1)	2 a		40 ab	
5 (2 + 3, 3 + 2)	0 a		36 b	
6 (3 + 3)	0 a		38 ab	
Grazon®				
6 (3 + 3)	0 a		44 a	
Glyphosate				
6 (3 + 3)	8 b		18 f	

^Values in columns not followed by a common letter differ significantly P<0.05

Complete kills of St. John's wort were obtained from split applications of Starane® at 2 + 3, 3 + 2 and 3 + 3 L/ha and Grazon® at 3 + 3 L/ha in successive Novembers (Table 1). Single applications were more effective from the 1998 than from the 1997 spraying but no single application gave a complete kill. Glyphosate was inferior to Starane® and Grazon® (Table 1). Ground cover of native perennial grasses was increased by Starane® and Grazon® above that of the control whereas glyphosate had no effect (Table1).

Starane® and Grazon® reduced the ground cover of the low quality threeawn spear grass (*Aristida* spp.) and promoted the ground cover of the higher quality redleg grass (*Bothriochloa macra, Agropyron cristatum, Dicanthium sericeum, Austrodanthonia* spp, *Stipa* spp.) association (Table 2).

Table 2. Effect of herbicides on ground cover (%) of native perennial grasses measured on 5 March 1998

Herbicide	Redleg grass association	Threeawn spear grass
Nil	15 d^	27 b
Starane® (mean 15 treatments)	38 a	21 c
Grazon®	35 a	21 c
Glyphosate	28 b	18 cd

^Values not followed by a common letter differ significantly P<0.05

Clover content, with or without superphosphate, was not affected by Starane® or glyphosate but was reduced by Grazon®; superphosphate increased clover content.

Discussion

In this experiment split applications of Starane® (2 + 3, 3 + 2, 3 + 3 L/ha) and Grazon® (3 + 3 L/ha) at full flower in successive Novembers 1997/98 gave 100% kill of St. John's wort (Table 1). The results for Starane® agree with those achieved by spraying St. John's wort in full flower in Decembers 1993/1994 at Orange NSW where 100% kill was achieved by applying 2 + 3, 3 + 3 and 4 + 3 L/ha (Campbell and Nicol 1997). The lowest rate of Starane® that gave 100% kill in both experiments was 5 L/ha applied as 2 + 3 or 3 + 2 L/ha. In practice it may be most effective to apply 3 L/ha in the first application because of the greater biomass of the weed present then or to apply equal rates of 2.5 L/ha in each split application.

The advantage of Starane® over Grazon® and glyphosate is that, when applied at full flower in late spring or early summer, it does not affect the regeneration of annual clovers or native or introduced perennial grasses in the following year whereas Grazon® reduces clovers and glyphosate reduces grasses (Campbell and Nicol 1997).

Conclusions

These results show that St. John's wort can be killed with split applications of Starane® in consecutive years when the weed is in full flower and growing well after good rain. For long-term control on non-arable land subterranean clover seed and superphosphate should be aerially applied in the late autumn after the first spraying and allowed to set seed by spelling until the following autumn.

After the second split application the area should be heavily set stocked. If small

amounts of the weed returns the area should be grazed even more heavily in winter until it begins to flower, to force animals (fine wool Merino sheep with at least four months wool) to graze the weed (Bourke 1999). Grazing in winter has the advantage that the poison level in the weed is low (Bourke 1999) and heavier grazing pressure can be exerted then than in other seasons. This grazing should be repeated annually with biennial superphosphate additions and spelling in summer to allow the native grasses to seed. If large amounts of St. John's wort return the area can be re-sprayed with Starane® and the whole process started again. Crofts (1989) devised a grazing system for developing hill country using low rates of aerially applied superphosphate and subterranean clover seed which would be suitable, after the application of Starane®, to maintain native grass pastures and control St. John's wort .

In this experiment glyphosate was less effective than Starane® and Grazon® in reducing St. John's wort. However glyphosate has application for killing St. John's wort and associated species before aerial sowing introduced pastures (Arnott and Campbell 1994).

References

Arnott, R. and Campbell, M. H. (1994). Control of St. John's wort on large paddocks in hill country by the aerial spray-sow technique and by grazing management. *Proceedings 9th Conference Grassland Society NSW, Queanbeyan*, 98-9.

Bourke, C. (1999). Control of St. John's wort by a grazing management system that uses merino sheep. *Proceedings 12th Australian Weeds Conference, Hobart, Tasmania.*, 4-7.

Campbell, M. H. and Nicol, H. I. (1997). Improving herbicide effectiveness on St. John's wort and replacing it with pasture on non-arable land. *Plant Protection Quarterly* **12**, 93-6.

Crofts, F.C. (1989). Managing and developing native grass pastures for sustained production and profitability. *Proceedings 4th Conference Grassland Society NSW, Tamworth.*, 71-6.