FLUMETSULAM FOR CONTROL OF GIANT BUTTERCUP IN PASTURE

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ABSTRACT

Flumetsulam was evaluated for control of giant buttercup (*Ranunculus acris*) in nine trials in established pastures. Repeat annual applications of flumetsulam (50 g/ha) in spring or autumn gave 82 and 89% control respectively, 12 months after the third application. Spring applications gave greater control than autumn applications in the first year. After two or three applications over successive years there was no difference in control between spring and autumn applications. Flumetsulam was well tolerated by established white clover (*Trifolium repens*). Treatments gave a marked improvement in pasture utilization by dairy cows.

Keywords: flumetsulam, giant buttercup, weed control, white clover, tolerance

INTRODUCTION

Flumetsulam, a sulfonanilide herbicide from DowElanco, has undergone evaluation on New Zealand pastures and arable crops since 1986 (Hare *et al.* 1993). Current label claims cover use on new and established white clover and perennial ryegrass (*Lolium perenne*) pastures, lucerne (*Medicago sativa*) and clover seed crops and maize (*Zea mays*) to control a range of broadleaf weeds. Registration for use on chicory (*Cichorium intybus*) is anticipated.

Giant buttercup is a major weed of New Zealand dairy pastures due to its fibrous stems and bitter taste which reduce pasture palatability to dairy cows. This report summarizes giant buttercup control and white clover tolerance in trials carried out with flumetsulam in established pastures.

MATERIALS AND METHOD

Nine trials were conducted between 1992 -1996 on farms in Taranaki (4), Manawatu (3) and the Waikato (2) in established pastures with 30-60% ground cover of giant buttercup. Flumetsulam (Preside, DowElanco) was applied at several rates in addition to MCPA and MCPB herbicides (DowElanco) and thifensulfuron-methyl (Harmony, Du Pont) (Table 1). Treatments were applied by backpack precision sprayers using hand-held spray booms with a swath of 2 to 3 m. Booms were fitted with Spraying Systems 110015 flat fan nozzles at 380-500 mm intervals which operated at 200 kpa and applied 175-200 litres of spraymix per hectare. Treatments were arranged in randomized complete block design with three replicates; plot sizes ranged from 22 to 45 m^2.

Control of giant buttercup was assessed in seven trials which received repeated spring applications over either two or three successive years and two trials which received repeated autumn applications over three successive years. Both autumn applied trials were laid immediately adjacent to spring applied trials to allow comparison of giant buttercup control. White clover tolerance was determined from single applications to pastures in 18 spring and autumn trials at the above locations. All treatments were assessed for percent giant buttercup control and growth inhibition of white clover by visually comparing plant biomass and density in pasture relative to untreated.

TABLE 1: Treatments, date of application and herbicide formulations used in field trials. 3 **denotes application at the given date.**

Treatment	Rate (g ai/ha)	Date Applied October - November	May - June
flumetsulam[1]	25	3	3
	50	3	3
	100	3	3
MCPB	1540	3	
flumetsulam + MCPB	50 + 1540	3	
MCPA	2250	3	
thifensulfuron-methyl	15	3	

[1]Uptake Spraying Oil (500 ml/100 litres of spraymix) was added to all treatments containing flumetsulam.

Statistical Analysis

The number of trials (n) used in specific analyses are stated in figure legends. At each time of assessment, the number of trials containing each treatment (and hence SEM) was variable because not all trials contained all treatments and not all trials were treated and assessed over the full three year period. Data for giant buttercup control were analysed by analysis of variance using the SAS statistical package. Spring and autumn trials were analysed separately (Figs. 1, 2 and 4) as were comparisons between spring and autumn applications (Fig. 3) in adjacent trials on common dates of assessment.

RESULTS AND DISCUSSION

Control of Giant Buttercup

Percent regrowth suppression (assessed visually) for giant buttercup relative to the untreated plots is presented in Figs. 1-4. Initial knockdown of giant buttercup was slow. Herbicidal symptoms included immediate cessation of growth, chlorosis by two weeks after application followed by reddening of foliage prior to full brownout in six to eight weeks. This was followed by a period when giant buttercup was largely absent from pastures. Regrowth of some of the largest giant buttercup plants and emergence of new seedlings occurred 3-6 months after application. This was seen as a decline in regrowth suppression between treatments.

Control of giant buttercup increased with the rate of flumetsulam (Figs. 1 and 2). Repeat applications of flumetsulam (50 g/ha) over three consecutive years were required to achieve acceptable (80%+) giant buttercup control 12 months after the third application. Flumetsulam

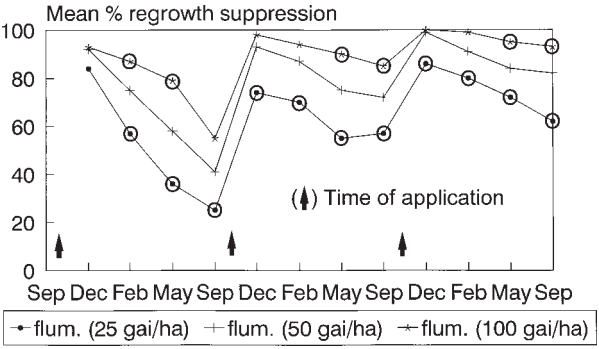

FIGURE 1: Percent regrowth suppression of giant buttercup from 3 repeat spring applications of flumetsulam to established pastures. Number of trials = 4-7. ○ denotes treatments significantly different (P<0.05) to flumetsulam (50 g/ha) at common time of rating. SEM at different times of rating ranged between 1.7 - 5.3.

at 50 g/ha was chosen as the label rate because it gave acceptable control and allowed a withholding period of 14 days between application and grazing.

Spring applications of flumetsulam at 50 g/ha gave greater control than autumn applications in the first season after application (Fig. 3). Thus spring is the recommended time of application because it is the season when maximum pasture production is required to maintain lactating dairy cows. There was no difference in control between spring and autumn applications after two or three applications over successive years.

Following spring applications, control of giant buttercup using flumetsulam (50 g/ha) was generally equivalent to MCPA and significantly greater than thifensulfuron-methyl and MCPB over a three year period (Fig. 4). The addition of MCPB, a likely

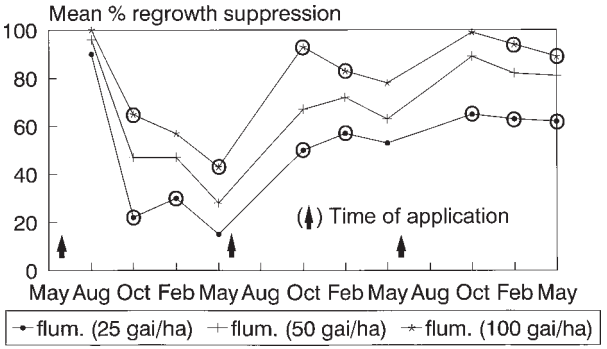

FIGURE 2: Percent regrowth suppression of giant buttercup from 3 repeat autumn applications of flumetsulam to established pastures. Number of trials = 2. ○ denotes treatments significantly different (P<0.05) to flumetsulam (50 g/ha) at common time of rating. SEM at different times of rating ranged between 2.4 - 5.8.

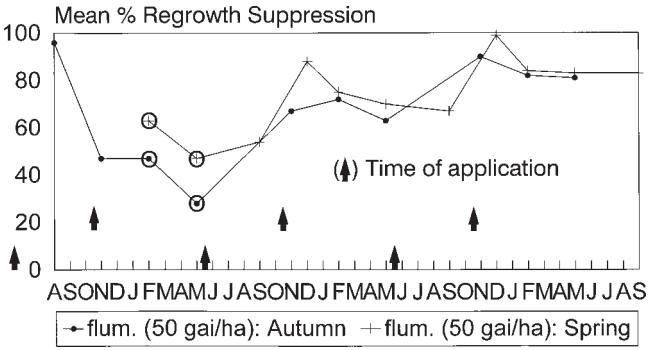

FIGURE 3: Comparison of percent regrowth suppression of giant buttercup from 3 repeat spring and autumn applications of flumetsulam (50 g/ha) in immediately adjacent trials in established pastures. Number of both spring and autumn trials = 2. ○ denotes significant differences (P<0.05) between treatments at common times of rating. SEM for common times of rating was 4.3.

mixing partner for thistle control in spring, to flumetsulam did not significantly increase control of giant buttercup.

White Clover Tolerance

Data of visual percent suppression of white clover relative to untreated are presented in Table 2 below.

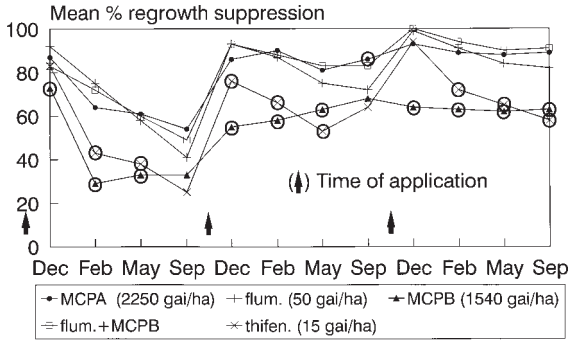

FIGURE 4: Percent regrowth suppression of giant buttercup from 3 repeat spring applications of herbicide treatments to established pastures. Number of trials for flumetsulam = 4-7; MCPA = 3-4; MCPB = 2-4; flumetsulam + MCPB = 2-5; thifensulfuron-methyl = 2-5. ○ denotes treatments significantly different ($P<0.05$) to flumetsulam (50 g/ha) at common times of rating. SEM for individual treatments at different times of rating ranged between 1.7 - 7.7.

TABLE 2: Percentage suppression (assessed visually) of white clover relative to untreated 1-2 months after application of herbicides to established pastures in either autumn or spring.

Treatment	Rate (g ai/ha)	Mean % suppression	Range	No. trials assessed
flumetsulam	25	5	0-20	16
	50	6	0-20	18
	100	18	0-40	14
MCPB	1540	3	0-20	7
flumetsulam + MCPB	50+1540	9	0-23	8
MCPA	2250	67	30-92	6
thifensulfuron-methyl	15	60	30-87	6

The tolerance of white clover and other pasture species to flumetsulam is caused by their ability to rapidly metabolize and detoxify the herbicide. Table 2 shows that flumetsulam (50 g/ha) was well tolerated by white clover within the first one to two months after application. When metabolism was slowed by unusually cold and wet conditions after application, some minor yellowing of pastures occurred. With the return of active growth conditions, such yellowing disappeared within three to seven days. Suppression was slight and transient compared to the marked, longer term suppression caused by MCPA and thifensulfuron-methyl.

Pasture Utilization

Control of giant buttercup from flumetsulam resulted in a marked improvement in pasture utilization by dairy cows (Harris unpubl. data). Preferential grazing of flumetsulam

treated plots occurred, due to the reduction in density of giant buttercup and increase in clover content compared to MCPA or thifensulfuron-methyl treatments.

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