

THE SUPPRESSION OF GRASS WEEDS IN WHITE CLOVER SEED CROPS WITH CARBETAMIDE

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Summary

The use of carbetamide for grass weed control in white clover (*Trifolium repens*) seed crops was evaluated over a three-year period in both small plot and commercial user trials. Applications of carbetamide at 2.5 kg/ha or more, applied between late winter and late spring gave a degree of grass weed suppression and increase in number of clover seed-heads equivalent to that obtained by the use of paraquat at 0.3 kg/ha applied in the late spring/early summer period. Seed germination studies demonstrated that carbetamide does not impair white clover seed viability.

INTRODUCTION

THE IMPORTANCE of ryegrass (*Lolium* spp.) suppression in white clover (*Trifolium repens*) seed production has been well illustrated in the past and the work of Leonard (1964) demonstrated the value of paraquat for removal of ryegrass competition in white clover seed crops. User experience, however, has shown that the reliability of paraquat for ryegrass suppression may vary considerably with such factors as timing of application, seasonal conditions and rainfall all having important effects on the success of any paraquat application.

Investigations in the United Kingdom as well as in New Zealand established that a more recently developed herbicide, carbetamide, had a negligible effect on white clover at the rates necessary for the control of perennial ryegrass. This early experience has since been confirmed from applications of carbetamide to ryegrass/white clover pastures by Atkinson (1970) and Meeklah *et al.* (1970).

During spring 1968, May & Baker (New Zealand) Ltd. embarked on a programme to investigate grass weed suppression by carbetamide in white clover seed crops. This programme was culminated during the 1971-2 season by a series of observations of farmer usage. The details and results of this series of trials are presented below.

EXPERIMENTAL

Small-plot evaluations of carbetamide were made on white clover seed crops over three years. The applications, all of which were in Canterbury, were made to 9 m × 1.8 m plots using a wheeled, small plot precision sprayer applying approximately 225 l/ha. An application of the paraquat at 0.3 kg/ha was employed as a standard treatment for comparison at all applications. All treatments were replicated twice and randomized.

Visual estimates of the percentage cover by component species for each of the plots were made in randomized quadrats by two or more independent observers at approximately three months after spraying. Quantita-

tive assessments of white clover seed production were made from seed-head counts just prior to harvest using randomized quadrats.

Seed samples were also taken for testing to establish whether carbetamide had impaired seed viability.

Farmer evaluations were made over two years, all applications being made by the farmer employing his own equipment. Only simple visual assessments were made to establish grass weed suppression and clover seed production of these treatments.

RESULTS

The results of 9 small plot trials are presented in Tables 1 and 2. It should be noted that lower rates of carbetamide were used in some of the 1971 series of trials (Table 2). All rates of carbetamide performed as well as paraquat in terms of seed-head counts with the exception of the late October application at Site 7. (However, the applications at this site were made late in a very dry year.)

During the 1968-9 series of trials, carbetamide at 3.4 kg/ha or more gave grass weed suppression in excess of 95% of untreated control. However, the later trials show that carbetamide at 2.5 kg/ha gave similar results to paraquat.

Results of the seed germination tests from crops treated with carbetamide and paraquat as well as unsprayed controls, are presented in Table 3. These illustrate that carbetamide and paraquat do not impair seed viability at the recommended rates of application.

TABLE 1: GRASS WEED SUPPRESSION AND WHITE CLOVER SEED HEAD DENSITY
1968-69 Series of Trials

Site No.	Date Sprayed (1968)	Treatment (kg/ha)	Grass Cover (%)	No. of Seed-heads*
1	Oct. 17	carbetamide 2.25	10	358
		carbetamide 3.4	2	356
		carbetamide 4.5	2	360
		paraquat 0.3	1	350
		Unsprayed	50	205
2	Sep. 19	carbetamide 2.25	10	242
		carbetamide 3.4	1	302
		carbetamide 4.5	0.5	297
		paraquat 0.3	1	240
		Unsprayed	57	149
3	Oct. 16	carbetamide 2.25	1	252
		carbetamide 3.4	0.5	247
		carbetamide 4.5	0.5	227
		paraquat 0.3	0.5	217
		Unsprayed	55	124

*Mean number of seed-heads per 0.58 m² quadrat.

FARMER USAGE

In all, 32 different applications of carbetamide were made by farmers over the 1970-1 and 1971-2 seasons. The timing of application varied from

TABLE 2: GRASS WEED SUPPRESSION AND WHITE CLOVER SEED HEAD DENSITY
1971 Series of Trials

Site No.	Date Sprayed (1971)	Treatment (kg/ha)	Grass Cover (%)	No. of Seed-heads*
4	Aug. 27	carbetamide 1.6	trace	282
		carbetamide 2.5	trace	268
		carbetamide 3.4	0	226
		paraquat 0.3	4	286
		Unsprayed	10	226
5	Oct. 7	carbetamide 1.6	1	296
		carbetamide 2.5	trace	282
		carbetamide 3.4	trace	314
		paraquat 0.3	trace	302
		Unsprayed	10	226
6	Nov. 4	carbetamide 1.6	6	285
		carbetamide 2.5	trace	326
		carbetamide 3.4	1	268
		paraquat 0.3	trace	319
		Unsprayed	10	226
7	Oct. 20	carbetamide 1.6	—	—
		carbetamide 2.5	5	177
		carbetamide 3.4	—	—
		paraquat 0.3	3	269
		Unsprayed	30	—
8	Early Sep.	carbetamide 1.6	—	—
		carbetamide 2.5	trace	432
		carbetamide 3.4	—	—
		paraquat 0.3	0	371
		Unsprayed	20	—
9	Late Sep.	carbetamide 1.6	—	—
		carbetamide 2.5	trace	402
		carbetamide 3.4	—	—
		paraquat 0.3	3	342
		Unsprayed	25	—

*Mean number of seed-heads per 0.58 m² quadrat.

TABLE 3: THE EFFECT OF CARBETAMIDE AND PARAQUAT ON WHITE CLOVER SEED VIABILITY

Sites	Treatment (kg/ha)	Germinated Seed	Hard Seed	Abnormal Seedlings	Others
2 (1970)	carbetamide 1.7	69	24	5	2
	carbetamide 2.25	69	22	5	4
	paraquat 0.3	69	25	4	2
27 (1971)	carbetamide 2.5	95	2	2	1
	paraquat 0.3	91	3	5	1
	Unsprayed	94	1	4	1

early August until late September. Most of these farmers applied carbetamide at a standard rate of 2.5 kg/ha except the few with heavy grass weed infestation where a rate of 3.4 kg/ha was employed. A comparative treatment of paraquat at 0.3 kg/ha was also applied by over 50% of the users. Of the 32 carbetamide applications, 9 (31%) were considered to have given a poor result, 10 (25%) were considered satisfactory, while 13 (41%) were considered better than the standard treatment when simple visual assessments were made by the farmers. Of the 14 applications where paraquat was applied by the farmers to adjacent areas of the same pasture in which the carbetamide was applied, 5 (35%) considered the results to be poor, 5 (35%) considered the results to be satisfactory, while 4 (29%) considered the results to be better than paraquat.

DISCUSSION

The results show that carbetamide is likely to give a seed production increase through the suppression of grass weeds similar to that given by paraquat when applied at the same time. Although the optimum time of application of carbetamide for ryegrass suppression is between the mid-winter and early spring periods, the late October/early November applications at 2.5 kg/ha give similar results to paraquat made at the same time (Table 2). All herbicide treatments evaluated increased white clover seed production over unsprayed controls. assessed from seed-head counts, while carbetamide has been shown from the seed tests to have no detrimental effect on seed viability.

The observation was made that carbetamide at the rates necessary for grass weed suppression had no obvious detrimental effect on white clover, whereas paraquat had a severe initial effect on the crop from which the clover eventually recovered often with the aid of irrigation. It seems therefore that the use of carbetamide for grass weed suppression could have an advantage over paraquat as an insurance against a season with an early summer drought or for use in those areas with a lighter soil and where post-spray irrigation is not possible.

The ultimate test for any herbicide is its acceptance and reliability in the hands of the commercial user. When carbetamide was evaluated by experienced growers of white clover seed crops and compared with paraquat, it was found that carbetamide performed as well as the standard treatment.

ACKNOWLEDGEMENT

The authors are indebted to S. L. Cranfield and D. S. Griffiths, and the many farmers who participated in the trials.

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