AGRICULTURAL RESEARCH COUNCIL

WEED RESEARCH ORGANIZATION

TECHNICAL REPORT No. 29

THE PRE-EMERGENCE SELECTIVITY BETWEEN PASTURE GRASSES OF TWELVE HERBICIDES: HALOXYDINE, PRONAMIDE, NC 8438, ORGA 3045, CHLORTOLURON, METOXURON, DICAMBA, ISOPROPALIN, CARBETAMIDE, MC 4379, MBR 8251 AND EMD-IT 5914

EMD-IT 5914 is difunon, MBR 8251 is perfluidone, MC 4379 is bifenox,
NC 8438 is ethofumesate, Orga 3045 is flupropanate-sodium, pronamide is propyzamide

A.M. Blair

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Price

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Overseas airmail - £1.50

BEGBROKE HILL, YARNTON, OXFORD

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THE PRE-EMERGENCE SELECTIVITY BETWEEN PASTURE GRASSES OF TWELVE HERBICIDES: HALOXYDINE, PRONAMIDE, NC 8438, ORGA 3045, CHLORTOLURON, METOXURON, DICAMBA, ISOPROPALIN, CARBETAMIDE, MC 4379, MBR 8251 AND EMD-IT 5914

A.M. Blair*
Agricultural Research Council, Weed Research Organization,
Begbroke Hill, Yarnton, Oxford OX5 1PF

SUMMARY

Twelve herbicides were tested for their pre-emergence selectivity, on a range of pasture grasses.

Haloxydine was very active; perennial ryegrass was more resistant than the other grasses.

Pronamide was also very active and showed no useful selectivity at the doses used; it is still possible that selectivity against P. trivialis could occur at lower doses.

NC 8438 showed selectivity between perennial ryegrass and the other grass species confirming previous reports.

Orga 3045 had similar effects on all the grasses though there was a tendency for ryegrass to be the most resistant.

Chlortoluron was active at the doses used on all grasses and showed no useful selectivity.

Metoxuron showed no useful selectivity between the grasses although perennial ryegrass and F. rubra were more resistant than the others.

Dicamba, at the doses used, showed no useful selectivity; perennial ryegrass was however the most resistant of the grasses tested.

Isopropalin had a much greater effect on P. trivialis, H. lanatus and A. tenuis than on perennial ryegrass and therefore could be selective at even lower doses.

Carbetamide was much less active on perennial ryegrass than the other grasses and could be used selectively to control the 'weed' grasses.

MC 4379 showed selectivity between perennial ryegrass and P. trivialis and A. tenuis, with F. rubra and H. lanatus also being markedly reduced.

MBR 8251 is a possible candidate herbicide for controlling P. trivialis and A. tenuis in perennial ryegrass.

EMD-IT 5914 had less effect on perennial ryegrass than on H. lanatus and A. tenuis and could possibly be used selectively in this context.

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* Herbicide Evaluation Section

INTRODUCTION

The Herbicide Evaluation Section of the Weed Research Organization investigates the selectivity of new herbicides which are in the process of commercial development by industry. Both pre- and post-emergence applications to a wide range of crop and weed species are involved. The potential of new herbicides to control weed grasses in newly sown grassland is investigated in separate experiments on a limited number of grass species.

Results from the pre-emergence experiments reported here should only be taken as preliminary indications of selectivities between grass species and are primarily a pointer to further work in the field. Pot experiments such as this do not give a reliable indication of the activity of specific doses of herbicides under field conditions.

METHODS AND MATERIALS

The techniques used are similar to those in previous pre-emergence selectivity experiments conducted by WRO (Richardson et al, 1972). Twelve herbicides were tested in three separate experiments, each compound being applied at three doses (Table 1). Hard polystyrene pots (90 mm diameter) were filled with about 400 gm of sandy loam topsoil containing 2.1% organic matter. Superphosphate at 30 gm per 36 litre soil was mixed in. A specified number of seeds of _Lolium perenne_, _Poa trivialis_, _Holcus lanatus_, _Festuca rubra_, _Agrostis stolonifera_ and _Agrostis tenuis_ were planted (Table 2). All seed was obtained from commercial sources except _H. lanatus_ which was collected in the field at Begbroke. Herbicides were used as formulated by the manufacturer for field experimentation. They were sprayed onto the soil surface through a laboratory sprayer fitted with a 'Teejet' 8002E fan nozzle moving at a constant speed along a track over a spray bench at a height of 300 mm above the soil surface. All treatments were replicated twice. After spraying, the pots were stood in foil dishes in the greenhouse; initially they received overhead watering, but subsequently moisture was supplied by sub-irrigation. Normal daylight was supplemented with a 14 hour photoperiod using warm white fluorescent light.

The germination of _F. rubra_ was particularly erratic and this should be remembered when considering the results.

Table 1. Herbicides applied and dates of treatments

Herbicides	Doses	Expt. No.	Date of treatment
Haloxydine	0.07, 0.14, 0.28	1	8.1.70
Pronamide	0.07, 0.14, 0.28	1	8.1.70
NC 8438 (2-ethoxy-2,3-dihydro-3,3-dimethyl-5 benzofuranylmethane sulphonate)	0.28, 0.56, 1.12	1	8.1.70
ORGA 3045 (sodium 2,2,3,3-tetrafluoro-propionate)	0.07, 0.14, 0.28	1	8.1.70

(Table continued overleaf)

Table 1 (continued)

Herbicides	Doses	Expt. No.	Date of treatment
Chlortoluron	0.28, 0.56, 1.12	2	14.1.70
Metoxuron	0.28, 0.56, 1.12	2	14.1.70
Dicamba	0.28, 1.12, 4.48	2	14.1.70
Isopropalin	0.25, 0.5 , 1.0	3	7.1.72
Carbetamide	0.25, 0.5 , 1.0	3	7.1.72
MC 4379 (confidential)	0.75, 1.5 , 3.0	3	7.1.72
MBR 8251 (1,1,1-trifluoro-4'-(phenylsulfonyl)methanesulfono-o-toluidide)	0.25, 0.5 , 1.0	3	7.1.72
EMD-IT 5914 (confidential)	0.5 , 1.0 , 2.0	3	7.1.72

Table 2. Details of species sown and stage of growth at assessment

Species	Cultivar	No. seeds planted	Depth of planting (mm)	Stage of growth at assessment (untreated control)
Perennial ryegrass	S23	8	10	3-4 leaves just starting to tiller
Festuca rubra		12	10	"
Poa trivialis		12	10	"
Holcus lanatus		10	10	"
Agrostis stolonifera		12	2-3	"
Agrostis tenuis		10	2-3	"

Assessment and processing of results

The main assessment was made and punched directly onto punch cards 4-6 weeks after spraying. The numbers of survivors and their vigour, expressed on a 0-7 subjective scoring scale, were recorded for each treatment. Scale points were defined as follows:

0 = completely dead
1 = moribund but not all tissue dead
2 = alive, with some green tissue, but unlikely to make much further growth
3 = very stunted, but apparently still making some growth
4 = considerable inhibition of growth
5 = readily distinguishable inhibition of growth
6 = some detectable adverse effect as compared with control - colour difference, morphological abnormality, epinasty or very slight reduction in growth
7 = indistinguishable from control

The punched cards were processed by the Rothamsted ORION computer, the printout of which gives the data in the form of a set of histograms for each herbicide. Each histogram of the set indicates the response of one species to a particular dose of the herbicide. The species abbreviation is followed by the computer serial number in brackets. For each species at each dose of herbicide there are two histograms comprised of x's with numerical values given on the left (Table 3); the upper figure represents mean plant survival as a percentage of untreated controls and the lower figure shows mean vigour score, derived from the 0-7 subjective scoring scale, as a percentage of untreated controls. For each histogram each 'x' represents a 5% increment in the value being plotted. An 'r' indicates a result based on one replicate only and an 'm' represents a missing treatment. The comments made on each herbicide are intended merely to highlight points of interest.

Table 3. Key to computer printout

```
   |
   |____________________________  100%
50 |xxxxxxxxxx
   |____________________________  mean plant survival as % untreated control i.e. 50%
25 |xxxxx
                                  mean vigour score as % untreated control i.e. 25%
```

Abbreviation used	Computer serial no.	species
PER RYGR	4	Perennial ryegrass
FEST RUB	25	*Festuca rubra*
POA TRIV	29	*Poa trivialis*
HOLC LAN	45	*Holcus lanatus*
AG STOLO	48	*Agrostis stolonifera*
AGR TEN	56	*Agrostis tenuis*

RESULTS

HALOXYDINE

Chemical name 3,5-dichloro-2,6-difluoro-4-hydroxypyridine

Experiment number 1 (G.70.2)

Formulation used aqueous concentrate 200 g/l a.e., from Plant Protection Ltd

Doses kg ai/ha - 0.070, 0.140, 0.280
lb ai/ac - 0.062, 0.125, 0.250

Spray volume 338 l/ha (30.1 gal/ac)

Experiment treated 8.1.70 Assessment completed 9.2.70

Information available and suggested uses

Haloxydine was originally suggested by the manufacturers for control of many grasses and broad-leaved weeds, pre-crop emergence in oil seed rape, kale and other Brassica crops. Richardson et al (1971) confirmed this.

Results

See histograms on next page.

Comment

This compound was extremely active. At the top dose of 0.28 kg ai/ha all species were killed or very severely damaged; even at the lowest dose of 0.07 kg ai/ha, perennial ryegrass and F. rubra were the only species to survive, and the vigour of F. rubra was markedly lower than that of perennial ryegrass. Perennial ryegrass seemed to be more severely damaged in this experiment than in one with similar treatments reported by Richardson et al (1971). Hence this is a possible herbicide for the selective control of P. trivialis, H. lanatus and A. stolonifera in perennial ryegrass.

SPECIES	0.07 kg ai/ha		0.14 kg ai/ha		0.28 kg ai/ha	
PER RYGR	88	xxxxxxxxxxxxxxxxxx	69	xxxxxxxxxxxxxx	6	x
(4)	64	xxxxxxxxxxxxx	29	xxxxxx	7	x
FEST RUB	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	10	xx
(25)	21	xxxx	21	xxxx	7	x
POA TRIV	0		8	xx	0	
(29)	0		7	x	0	
HOLC LAN	0		0		0	
(45)	0		0		0	
AG STOLO	0		0		0	
(48)	0		0		0	

PRONAMIDE

<u>Chemical name</u> 3,5-dichloro-N-(1,1-dimethylpropynyl)benzamide

<u>Experiment number</u> 1 (G.70.2)

<u>Formulation used</u> wettable powder 75% w/w, from Rohm & Haas Ltd

<u>Doses</u> kg ai/ha - 0.070, 0.140, 0.280
lb ai/ac - 0.0625, 0.125, 0.250

<u>Spray volume</u> 338 l/ha (30.1 gal/ac)

<u>Experiment treated</u> 8.1.70 <u>Assessment completed</u> 9.2.70

<u>Information available and suggested uses</u>

Original suggestions were for pre- and early post-emergence control of a wide range of seedling grass and dicotyledonous weeds. It was suggested as selective in new plantings of small-seeded legumes and in lettuce, with additional possibilities in leguminous and composite crops. Richardson <u>et al</u> (1971) confirmed most of these selectivities.

<u>Results</u>

See histograms on next page.

<u>Comment</u>

This is a very active compound which showed no useful selectivity between grasses at the doses used. This was in agreement with findings of Richardson <u>et al</u> (1971). It is still possible that selectivity against <u>Poa trivialis</u> could occur at an even lower dose.

PRONAMIDE

SPECIES	0.07 kg ai/ha		0.14 kg ai/ha		0.28 kg ai/ha	
PER RYGR	50	xxxxxxxxxx	19	xxxx	0	
(4)	36	xxxxxxx	14	xxx	0	
FEST RUB	10	xx	29	xxxxxx	29	xxxxxx
(25)	7	x	7	x	14	xxx
POA TRIV	0		0		0	
(29)	0		0		0	
HOLC LAN	48	xxxxxxxxxx	6	x	0	
(45)	14	xxx	7	x	0	
AG STOLO	7	x	0		0	
(48)	14	xxx	0		0	

NC 8438

Chemical name — 2-ethoxy-2,3-dihydro-3,3-dimethyl-5-benzofuranyl-methanesulphonate

Experiment number — 1 (G.70.2)

Formulation used — wettable powder 20% w/w, from Fisons Pest Control Ltd

Doses — kg ai/ha - 0.28, 0.56, 1.12
lb ai/ac - 0.25, 0.50, 1.0

Spray volume — 338 l/ha (30.1 gal/ac)

Experiment treated — 8.1.70 Assessment completed 9.2.70

Information available and suggested uses

This herbicide was originally suggested by Pfeiffer (1969) to control *Agropyron repens*, *Agrostis gigantea*, *Cyperus rotundus* and *C. esculentus* as well as several panicoid grasses in a number of crops including sugar beet, french beans, carrots, onions, cotton and groundnuts. The potential of this herbicide for controlling a range of grasses in perennial ryegrass at establishment is also mentioned by Pfeiffer.

Results

See histograms on next page.

Comment

The effect of this herbicide was variable on all five grass species, apparently healthy plants being mixed with obviously stunted plants in the same pot. However perennial ryegrass was very definitely more resistant than the other species. At the maximum dose used of 1.12 kg ai/ha some of the ryegrass plants survived although with very reduced vigour. A few plants of *H. lanatus* also survived but the vigour of these was even more reduced.

F. rubra and *P. trivialis* were the most susceptible species with few if any plants surviving treatment at even the lowest dose of 0.28 kg ai/ha.

This herbicide showed obvious promise for the pre-emergence control of other grass species in perennial ryegrass. This confirmed the suggested use in this context by Pfeiffer (1969).

SPECIES	0.28 kg ai/ha		0.56 kg ai/ha		1.12 kg ai/ha	
PER RYGR	81	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	63	xxxxxxxxxxxxx
(4)	36	xxxxxxx	50	xxxxxxxxxx	14	xxx
FEST RUB	0		10	xx	0	
(25)	0		7	x	0	
POA TRIV	17	xxx	8	xx	0	
(29)	7	x	7	x	0	
HOLC LAN	24	xxxxx	42	xxxxxxxx	18	xxxx
(45)	7	x	14	xxx	7	x
AG STOLO	70	xxxxxxxxxxxxxx	28	xxxxxx	0	
(48)	43	xxxxxxxxx	14	xxx	0	

ORGA 3045

Chemical name	sodium 2,2,3,3-tetrafluoropropionate
Experiment number	1 (G.70.2)
Formulation used	aqueous concentrate 808 gm litre^{-1} a.e., from Orgachemia Ltd
Doses	kg ai/ha - 0.070, 0.140, 0.280 lb ai/ac - 0.0625, 0.125, 0.250
Spray volume	338 l/ha (30.1 gal/ac)
Experiment treated	8.1.70
Assessment completed	9.2.70

Information available and suggested uses

The manufacturers originally suggested Orga 3045 for the control of annual and perennial grass weeds, both pre- and post-emergence, in turnip, rape, cabbage, kale and some horticultural crops. Aelbers et al (1969) reported that in laboratory tests it had been observed that Poa spp was more susceptible than Lolium spp.

Results

See histograms on next page.

Comment

At the top dose of 0.28 kg ai/ha all species were reduced in vigour although there were many survivors. Although the five grass species appeared to vary relatively little in their responses to these treatments, ryegrass tended to be the most resistant. Richardson et al (1971) found that perennial ryegrass was more resistant to this herbicide than in the experiment described here.

SPECIES	0.07 kg ai/ha		0.14 kg ai/ha		0.28 kg ai/ha	
PER RYGR	94	xxxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxxx	81	xxxxxxxxxxxxxxxx
(4)	93	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
FEST RUB	57	xxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	76	xxxxxxxxxxxxxxx
(25)	64	xxxxxxxxxxxxx	50	xxxxxxxxxxxx	36	xxxxxxx
POA TRIV	75	xxxxxxxxxxxxxxx	58	xxxxxxxxxxxx	75	xxxxxxxxxxxxxxx
(29)	36	xxxxxxx	71	xxxxxxxxxxxxxx	21	xxxx
HOLC LAN	61	xxxxxxxxxxxx	61	xxxxxxxxxxxx	85	xxxxxxxxxxxxxxxxx
(45)	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	57	xxxxxxxxxxx
AG STOLO	70	xxxxxxxxxxxxxx	91	xxxxxxxxxxxxxxxxxx	77	xxxxxxxxxxxxxxx
(48)	43	xxxxxxxxx	36	xxxxxxx	14	xxx

CHLORTOLURON

Chemical name N'-(3-chloro-4-methylphenyl)-NN-dimethylurea

Experiment number 2 (G.70.5)

Formulation used wettable powder 80% w/w, from CIBA-GEIGY Ltd

Doses kg ai/ha - 0.28, 0.56, 1.12
lb ai/ac - 0.25, 0.50, 1.00

Spray volume 338 l/ha (30.1 gal/ac)

Experiment treated 14.1.70 Assessment completed 17.2.70

Information available and suggested uses

Chlortoluron is approved for control of blackgrass and some other grass and broad-leaved weeds when applied pre- or post-emergence in winter barley and winter wheat (Ministry of Agriculture, Fisheries and Food, Great Britain 1973).

Results

See histograms on next page.

Comment

At the top dose of 1.12 kg ai/ha *F. rubra* showed slightly greater resistance than the other species. Conversely *P. trivialis* and *H. lanatus* were slightly more susceptible, but differences in response between the species were marginal even at the lowest dose.

SPECIES	0.28 kg ai/ha		0.56 kg ai/ha		1.12 kg ai/ha	
PER RYGR	34	xxxxxxx	7	x	7	x
(4)	43	xxxxxxxxx	7	x	7	x
FEST RUB	17	xxx	17	xxx	25	xxxxx
(25)	50	xxxxxxxxxx	21	xxxx	14	xxx
POA TRIV	6	x	12	xx	0	
(29)	7	x	14	xxx	0	
HOLC LAN	15	xxx	0		0	
(45)	14	xxx	0		0	
AG STOLO	26	xxxxx	26	xxxxx	0	
(48)	14	xxx	7	x	0	

METOXURON

Chemical name N'-(3-chloro-4-methoxyphenyl)-NN-dimethylurea

Experiment number 2 (G.70.5)

Formulation used wettable powder 80% w/w from Sandoz via Farm Protection Ltd

Doses kg ai/ha - 0.28, 0.56, 1.12
lb ai/ac - 0.25, 0.50, 1.00

Spray volume 338 l/ha (30.1 gal/ac)

Experiment treated 14.1.70 Assessment completed 17.2.70

Information available and suggested uses

Metoxuron is approved for the control of blackgrass, mayweed and some other broad-leaved weeds post-emergence in winter barley, winter wheat and carrot (Ministry of Agriculture, Fisheries and Food, Great Britain 1973).

Results

See histograms on next page.

Comment

Perennial ryegrass and F. rubra were marginally more resistant to metoxuron than P. trivialis, H. lanatus and A. stolonifera. At 0.56 kg ai/ha there were some relatively vigorous survivors of perennial ryegrass and F. rubra but there were very few survivors of the other species.

SPECIES	0.28 kg ai/ha		0.56 kg ai/ha		1.12 kg ai/ha	
PER RYGR	89	xxxxxxxxxxxxxxxxxx	68	xxxxxxxxxxxxxx	27	xxxxx
(4)	86	xxxxxxxxxxxxxxxxx	43	xxxxxxxxx	21	xxxx
FEST RUB	100	xxxxxxxxxxxxxxxxxxxx	25	xxxxx	42	xxxxxxxx
(25)	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	43	xxxxxxxxx
POA TRIV	53	xxxxxxxxxxx	6	x	0	
(29)	36	xxxxxxx	7	x	0	
HOLC LAN	40	xxxxxxxx	10	xx	0	
(45)	36	xxxxxxx	7	x	0	
AG STOLO	37	xxxxxxx	4	x	4	x
(48)	29	xxxxxx	7	x	7	x

METOXURON

DICAMBA

Chemical name 3,6-dichloro-2-methoxybenzoic acid

Experiment number 2 (G.70.5)

Formulation used aqueous concentrate 320 g/l a.e., from Fisons Pest Control Ltd

Doses kg ai/ha - 0.28, 1.12, 4.48
lb ai/ac - 0.25, 1.00, 4.00

Spray volume 338 l/ha (30.1 gal/ac)

Experiment treated 14.1.70 Assessment completed 17.2.70

Information available and suggested uses

Dicamba is approved for control of many broad-leaved weeds especially black bindweed, knotgrass, redshank, chickweed and mayweeds post-emergence in cereals and grass seed crops; it also controls clover and knotgrass in turf, docks in grassland and bracken in land to be planted to forest trees (Ministry of Agriculture, Fisheries and Food, Great Britain 1973).

Results

See histograms on next page.

Comment

The top dose of 4.48 kg ai/ha dicamba severely damaged all species. 1.12 kg ai/ha also markedly reduced the vigour of all species although perennial ryegrass and *F. rubra* showed a greater degree of resistance than the other species. At the lowest dose of 0.28 kg ai/ha *P. trivialis* and *A. stolonifera* were more susceptible than the other species. An intermediate dose between 0.28 and 1.12 kg ai/ha might show some selectivity.

SPECIES		0.28 kg ai/ha		1.12 kg ai/ha		4.48 kg ai/ha
PER RYGR	95	xxxxxxxxxxxxxxxxxxx	41	xxxxxxxx	27	xxxxx
(4)	79	xxxxxxxxxxxxxxxx	21	xxxx	14	xxx
FEST RUB	67	xxxxxxxxxxxxx	25	xxxxx	0	
(25)	71	xxxxxxxxxxxxxx	29	xxxxxx	0	
POA TRIV	29	xxxxxx	0		0	
(29)	43	xxxxxxxxx	0		0	
HOLC LAN	75	xxxxxxxxxxxxxxx	5	x	0	
(45)	71	xxxxxxxxxxxxxx	7	x	0	
AG STOLO	11	xx	0		0	
(48)	29	xxxxxx	0		0	

DICAMBA

ISOPROPALIN

Chemical name 4-isopropyl-2,6-dinitro-N,N-di(*n*-propyl)aniline

Experiment number 3 (G.72.3)

Formulation used emulsifiable concentrate 720 g/l from Eli Lilly & Co

Doses kg ai/ha - 0.25, 0.5, 1.0
lb ai/ac - 0.23, 0.45, 0.89

Spray volume 352 l/ha (31.3 gal/ac)

Experiment treated 14.1.70 **Assessment completed** 17.2.70

Information available and suggested uses

This herbicide was originally suggested by the manufacturers for the pre-emergence control of seedling grasses and broad-leaved species in tomato, pepper, beans, peas and potatoes.

Results

See histograms on next page.

Comment

Perennial ryegrass and *F. rubra* were much more resistant to 0.25 and 0.5 kg ai/ha isopropalin than the other species. At 1.0 kg ai/ha *F. rubra* was also markedly reduced whereas perennial ryegrass was not. There is no obvious explanation for the apparently variable germination of the perennial ryegrass.

ISOPROPALIN

SPECIES	0.25 kg ai/ha		0.5 kg ai/ha		1.0 kg ai/ha	
PER RYGR	60	xxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx
(4)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx
FEST RUB	55	xxxxxxxxxxx	64	xxxxxxxxxxxxx	9	xx
(25)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxxx	36	xxxxxxx
POA TRIV	0		0		0	
(29)	0		0		0	
HOLC LAN	14	xxx	14	xxx	0	
(45)	7	x	7	x	0	
AGR TEN	0		0		0	
(56)	0		0		0	

CARBETAMIDE

<u>Chemical name</u> D-N-ethyl-2-(phenylcarbamoyloxy)propionamide

<u>Experiment number</u> 3 (G.72.3)

<u>Formulation used</u> emulsifiable concentrate 300 g/l from Rhône-Poulenc via May & Baker Ltd

<u>Doses</u> kg ai/ha - 0.25, 0.5, 1.0
lb ai/ac - 0.23, 0.45, 0.89

<u>Spray volume</u> 352 l/ha (31.3 gal/ac)

<u>Experiment treated</u> 7.1.72 <u>Assessment completed</u> 10.2.72

<u>Information available and suggested uses</u>

Carbetamide is active against many grasses both pre- and post-emergence and is well tolerated by forage legumes, in particular alfalfa and clovers (Rhône-Poulenc 1973).

<u>Results</u>

See histograms on next page.

<u>Comment</u>

Perennial ryegrass showed good resistance to all three doses of carbetamide. <u>F. rubra</u> was much more resistant than the other 'weed' species although plant numbers were reduced as the dose increased; however plant vigour was not reduced to the same extent indicating that any plants remaining were moderately healthy. <u>P. trivialis</u>, <u>H. lanatus</u> and <u>A. tenuis</u> were well controlled in this experiment; confirmation of this is required in field experiments.

SPECIES	0.25 kg ai/ha		0.5 kg ai/ha		1.0 kg ai/ha	
PER RYGR	90	xxxxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx
(4)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx
FEST RUB	82	xxxxxxxxxxxxxxxx	55	xxxxxxxxxxx	27	xxxxx
(25)	93	xxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	57	xxxxxxxxxxx
POA TRIV	0		0		0	
(29)	0		0		0	
HOLC LAN	0		0		0	
(45)	0		0		0	
AGR TEN	25	xxxxx	0		0	
(56)	7	x	0		0	

CARBETAMIDE

MC 4379

Chemical name confidential

Experiment number 3 (G.72.3)

Formulation used emulsifiable concentrate 240 g/l from Mobil Chemical International

Doses kg ai/ha - 0.75, 1.5, 3.0
lb ai/ac - 0.67, 1.34, 2.68

Spray volume 352 l/ha (31.3 gal/ac)

Experiment treated 7.1.72 Assessment completed 10.2.72

Information available and suggested uses

This herbicide was originally suggested by the manufacturers for pre- and post-emergence control of grass and broad-leaved weeds in cereals, maize, rice, sugarcane and soyabeans.

Results

See histograms on next page.

Comment

Perennial ryegrass showed good resistance to this herbicide. Although the vigour of F. rubra was reduced as the dose increased the trend in plant numbers was erratic. P. trivialis was susceptible to all doses; H. lanatus and A. tenuis results were very variable and difficult to interpret. In view of the greater resistance of perennial ryegrass to 3.0 kg ai/ha there would seem to be possibilities of selectively controlling 'weed' grasses at establishment of a new ley; this would require confirmation in the field.

SPECIES	0.75 kg ai/ha		1.5 kg ai/ha		3.0 kg ai/ha	
PER RYGR	90	xxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx
(4)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx
FEST RUB	64	xxxxxxxxxxxxx	82	xxxxxxxxxxxxxxxx	27	xxxxx
(25)	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	36	xxxxxxx
POA TRIV	29	xxxxxx	0		0	
(29)	21	xxxx	0		0	
HOLC LAN	43	xxxxxxxxx	86	xxxxxxxxxxxxxxxxx	43	xxxxxxxxx
(45)	57	xxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	36	xxxxxxx
AGR TEN	25	xxxxx	50	xxxxxxxxxx	0	
(56)	7	x	7	x	0	

MC 4379

MBR 8251

Chemical name	1,1,1-trifluoro-4'-(phenylsulfonyl)methanesulfono-o-toluidide
Experiment number	3 (G.72.3)
Formulation used	50% w/w wettable powder from 3M Company
Doses	kg ai/ha - 0.25, 0.5, 1.0 lb ai/ac - 0.23, 0.45, 0.89
Spray volume	352 l/ha (31.3 gal/ac)
Experiment treated	7.1.72
Assessment completed	10.2.72

Information available and suggested uses

This herbicide was suggested for control of Cyperus esculentus and some other grass and broad-leaved weeds both pre- and post-emergence. It has been used safely pre-emergence in alfalfa, cabbage, cotton, cucumber, flax, peanuts, rape, rice, soyabenas, strawberries, sunflowers and tobacco.

Results

See histograms on next page.

Comment

Perennial ryegrass and F. rubra showed good resistance to 0.25 and 0.5 kg ai/ha but plant numbers were reduced at 1.0 kg ai/ha; the survivors, however, appeared healthy. P. trivialis, H. lanatus and A. tenuis were susceptible at all doses. There are possibilities of controlling P. trivialis and A. tenuis in perennial ryegrass at doses below 0.5 kg ai/ha this would require confirmation in the field.

SPECIES		0.25 kg ai/ha		0.5 kg ai/ha		1.0 kg ai/ha
PER RYGR	90	xxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx	20	xxxx
(4)	93	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx
FEST RUB	100	xxxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	45	xxxxxxxxx
(25)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
POA TRIV	29	xxxxxx	0		0	
(29)	14	xxx	0		0	
HOLC LAN	29	xxxxxx	14	xxx	0	
(45)	50	xxxxxxxxxx	50	xxxxxxxxxx	0	
AGR TEN	0		0		0	
(56)	0		0		0	

EMD-IT 5914

Chemical name confidential

Experiment number 3 (G.72.3)

Formulation used 80% w/w wettable powder (EMD 7061H) from Celamerck

Doses kg ai/ha - 0.5, 1.0, 2.0
lb ai/ac - 0.45, 0.89, 1.78

Spray volume 352 l/ha (31.3 gal/ac)

Experiment treated 7.1.72 Assessment completed 10.2.72

Information available and suggested uses

This herbicide was suggested by the manufacturers for use in rice and cotton.

Results

See histograms on next page.

Comment

Perennial ryegrass showed good resistance to all doses although there is no obvious explanation for the greater numbers surviving at the higher doses. *F. rubra* was slightly less resistant, particularly at higher doses. *P. trivialis* showed a greater tolerance of this herbicide than of others in this experiment. *H. lanatus* and *A. tenuis* were markedly reduced. The apparent increase in survival rate of *H. lanatus* at 2.0 kg ai/ha was in fact due to a single plant surviving on the edge of a pot. Further experimentation would be required to see whether 2.0 kg ai/ha would satisfactorily control *P. trivialis*, *H. lanatus* and *A. tenuis* in perennial ryegrass in the field.

SPECIES		0.5 kg ai/ha		1.0 kg ai/ha		2.0 kg ai/ha
PER RYGR	70	xxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(4)	86	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
FEST RUB	100	xxxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	55	xxxxxxxxxxx
(25)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
POA TRIV	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	0	
(29)	36	xxxxxxx	50	xxxxxxxxxx	0	
HOLC LAN	0		0		14	xxx
(45)	0		0		50	xxxxxxxxxx
AGR TEN	25	xxxxx	25	xxxxx	0	
(56)	14	xxx	7	x	0	

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ABBREVIATIONS

ångström	Å
Abstract	Abs.
acid equivalent*	a.e.
acre	ac
active ingredient*	a.i.
approximately equal to*	$\simeq$
aqueous concentrate	a.c.
bibliography	bibl.
boiling point	b.p.
bushel	bu
centigrade	C
centimetre*	cm
concentrated	concd
concentration	concn
concentration × time product	ct
concentration required to kill 50% test animals	LC50
cubic centimetre*	cm^3
cubic foot*	ft^3
cubic inch*	in^3
cubic metre*	m^3
cubic yard*	yd^3
cultivar(s)	cv.
curie*	Ci
degree Celsius*	^{o}C
degree centigrade*	^{o}C
degree Fahrenheit*	^{o}F
diameter	diam.
diameter at breast height	d.b.h.
divided by*	÷ or /
dry matter	d.m.
emulsifiable concentrate	e.c.
equal to*	=
fluid	fl.
foot	ft

freezing point	f.p.
from summary	F.s.
gallon	gal
gallons per hour	gal/h
gallons per acre	gal/ac
gas liquid chromatography	GLC
gramme	g
hectare	ha
hectokilogram	hkg
high volume	HV
horse power	hp
hour	h
hundredweight*	cwt
hydrogen ion concentration*	pH
inch	in.
infra red	i.r.
kilogramme	kg
kilo ($\times 10^3$)	k
less than	$<$
litre	l.
low volume	LV
maximum	max.
median lethal dose	LD50
medium volume	MV
melting point	m.p.
metre	m
micro ($\times 10^{-6}$)	μ
microgramme*	μg
micromicro (pico: $\times 10^{-12}$)*	μμ
micrometre (micron)*	μm (or μ)
micron (micrometre)*[×]	μm (or μ)
miles per hour*	mile/h
milli ($\times 10^{-3}$)	m
milliequivalent*	m.equiv.
milligramme*	mg
millilitre	ml

× The name micrometre is preferred to micron and μm is preferred to μ.

millimetre*	mm
millimicro* (nano: $\times 10^{-9}$)	n or mμ
minimum	min.
minus	-
minute	min
molar concentration*	M (small cap)
molecule, molecular	mol.
more than	>
multiplied by*	×
normal concentration*	N (small cap)
not dated	n.d.
oil miscible concentrate	o.m.c. (tables only)
organic matter	o.m.
ounce	oz
ounces per gallon	oz/gal
page	p.
pages	pp.
parts per million*	ppm
parts per million by volume*	ppmv
parts per million by weight*	ppmw
percent(age)*	%
pico (micromicro: $\times 10^{-12}$)	p or μμ
pint	pint
pints per acre	pints/ac
plus or minus*	±
post-emergence	post-em.
pound	lb
pound per acre*	lb/ac
pounds per minute	lb/min
pound per square inch*	lb/in^2
powder for dry application	p. (tables only)
power take off	p.t.o.
precipitate (noun)	ppt.
pre-emergence	pre-em.
quart	quart
relative humidity	r.h.
revolution per minute*	rev/min
second	s
soluble concentrate	s.c.
soluble powder	s.p.
solution	soln
species (singular)	sp.
species (plural)	spp.
specific gravity	sp. gr.
square foot*	ft^2
square inch*	in^2
square metre*	m^2
square root of*	√
sub-species*	ssp.
summary	s.
temperature	temp.
ton	ton
tonne	t
ultra-low volume	ULV
ultra violet	u.v.
vapour density	v.d.
vapour pressure	v.p.
<u>varietas</u>	var.
volt	V
volume	vol.
volume per volume	v/v
water soluble powder	w.s.p. (tables only)
watt	W
weight	wt
weight per volume*	w/v
weight per weight*	w/w
wettable powder	w.p.
yard	yd
yards per minute	yd/min

* Those marked * should normally be used in the text as well as in tables, etc.

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5. A survey of the problem of aquatic weed control in England and Wales. October, 1967. T.O. Robson. Price - £0.25.

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7. Flame cultivation experiments 1965. October, 1966. G.W. Ivens. Price - £0.25.

8. The development of selective herbicides for kale in the United Kingdom. 2. The methylthiotriazines. Price - £0.25.

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