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THE ACTIVITY AND PRE-EMERGENCE SELECTIVITY OF SOME RECENTLY DEVELOPED HERBICIDES: R 40244, AC 206784, PENDIMETHALIN, BUTRALIN, ACIFLUORFEN AND FMC 39821

NB: AC 206784 is xylachlor, FMC 39821 is 5-(2-chlorobenzyloxy)-2-ethyl-4-methyl-1,3-dioxane (FMC), R 40244 is flurochloridone

W G RICHARDSON, T M WEST and C PARKER

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Agricultural Research Council Weed Research Organization, Begbroke Hill, Yarnton, Oxford, OX5 1PF

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RICHARDSON, W.G., WEST, T.M. and PARKER, C. The activity and pre-emergence selectivity of some recently developed herbicides: R 40244, AC 206784, pendimethalin, butralin, acifluorfen and FMC 39821. Technical Report Agricultural Research Council Weed Research Organization, 1979, pp 71.

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W.G. Richardson,* T.M. West* and C. Parker**

ARC Weed Research Organization, Begbroke Hill, Yarnton, Oxford OX5 1PF

SUMMARY

In a series of pot experiments in the glasshouse, six herbicides were examined for pre-emergence selectivities as surface sprays on 63 temperate and tropical crop and weed species. In a separate set of treatments, maize and sorghum seeds were each treated with a dressing of an antidote to investigate possible protection from herbicide injury. The route of entry of all six herbicides was examined in another test on six selected test species. In conjunction with the pre-emergence selectivity test, persistence of the herbicides in the soil was examined. Additional species included in the selectivity test for the first time were sterile brome (Bromus sterilis) and Bromus pectinatus.

R 40244 gave excellent control of most annual, but not perennial, weeds while carrot, cotton, groundnut and some other mostly tropical leguminous crops were tolerant.

AC 206784 controlled mainly annual grass weeds and a few broad-leaved weeds. A range of temperate and tropical cereals and legumes as well as brassica crops were tolerant. It was generally less active and selective than pendimethalin with which it was compared.

Butralin gave selective control of annual grass and some broad-leaved weeds, but not Stellaria media. Grass weeds were much more resistant. A range of temperate and tropical legume crops showed good tolerance.

Acifluorfen controlled several annual and perennial broad-leaved weeds, but not Stellaria media. Grass weeds were much more resistant. Good crop tolerance of a range of temperate and tropical legumes was found.

FMC 39821 was highly active on nearly all weed species. Groundnut showed outstanding tolerance but most other crops were sensitive apart from certain other tropical legumes and a few other broad-leaved species.

Persistence in the soil was relatively short for AC 206784, moderate to long for pendimethalin, butralin and acifluorfen and long for R 40244 and FMC 39821.

INTRODUCTION

The pre- and post-emergence activities and selectivities of new herbicides are investigated on a large number of pot-grown crop and weed species at WRO. The objectives are to discover selectivities, crop and weed susceptibilities and to obtain experience of the type of effects produced by each compound. Soil persistence is also monitored and these data, in conjunction with crop susceptibilities, are useful in considering subsequent cropping of treated land. Attention is drawn to the limitations of these investigations; i.e. use of only one crop variety or source of weed species and growth in one particular soil type at only one depth of sowing without intraspecific competition. Consequently the results should only be used as a guide for further work, as plant responses in pot experiments can be very different from those in the field.

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* Herbicide Performance Group, ** ODA Tropical Weeds Group

NB: AC 206784 is xylachlor, FMC 39821 is 5-(2-chlorobenzyloxy)-2-ethyl-4-methyl-1,3-dioxane (FMC), R 40244 is flurochloridone

The present report gives pre-emergence selectivity data on R 40244, AC 206784, pendimethalin, butralin, acifluorfen and FMC 39821. Results of activity experiments are also included for five of these to provide information on levels of phytotoxicity, type and route of action. The corresponding data for pendimethalin have already been published (Richardson and Dean, 1975).

METHODS AND MATERIALS

Activity experiments (AE1, AE2, AE3 and AE4). These were carried out in the glasshouse on six selected species as described previously (Richardson and Dean, 1973). Four annual species were raised from seeds and two perennials from rhizome fragments. Herbicides were applied by four different methods:

i. a post-emergence spray to the foliage only, avoiding contact with the soil.
ii. post-emergence to the soil only, as a drench avoiding foliar contact.
iii. pre-emergence to the soil surface.
iv. pre-emergence with thorough incorporation before planting.

Species data are summarised in Table 1 and soil and environmental conditions in Table 2.

Table 1. Plant data for activity experiments

Species	Cultivar /source	No.per pot at spraying		Depth of planting (cm)	Post-emergence stage of growth at spraying	Stage of growth at assessment	
		pre	post-			pre-	post-
Dwarf bean (Phaseolus vulgaris)	The Prince	3	2	1.8	2 unifoliate leaves	1-2½ tri foliate leaves	1-2 tri foliate leaves
Kale (Brassica oleracea acephala)	Marrowstem	10-15	3-5	0.6	½-2 leaves	2½-3½ leaves	1½-4 leaves
Polygonum amphibium	WRO Clone 1	6	4-5	1.2 or 1.8	3½-4½ leaves	5-8 leaves	6½-8 leaves
Perennial ryegrass (Lolium perenne)	S 23	10-15	10	0.6	1½-3 leaves	6-8 leaves, tillering	5-7 leaves, tillering
Avena fatua	Boxworth/ Bourton-on-the-water 1973	8-10	4-5	1.2	2-2½ leaves	4-7 leaves, tillering	4½-7 leaves, tillering
Agropyron repens	WRO Clone 1	6	4-5	1.2	2-3 leaves	6-10 leaves, tillering	3½-7 leaves, tillering

NB: AC 206784 is xylachlor, FMC 39821 is 5-(2-chlorobenzyloxy)-2-ethyl-4-methyl-1,3-dioxane (FMC), R 40244 is flurochloridone

Table 2. Soil and environment conditions

Experiment no., type and herbicide(s) included	AE 1 Pendimethalin	AE 2 Butralin	AE 3 AC 206784 Acifluorfen FMC 39821	AE 4 R40244	Pre-emergence selectivity test. R 40244, Butralin, AC 206784, Acifluorfen, Pendimethalin, FMC39821	
Date of spraying	14.4.72	14.5.71	6.7.78	8.6.79	6.12.78	
Main assessment	18.5.72	8.6.71	7.8.78	10.7.79	29.1.79	
Soil moisture at spraying (%)	13.0	-	-	-	13.0	
Organic matter (%)	2.8	2.8	4.1	4.1	4.1	
Clay content (%)	16.0	16.0	15.0	15.0	15.0	
pH	7.7	7.7	7.0	7.0	7.0	
John Innes Base fertilizer (g/kg)	4.0	4.0	-	-	-	
Osmacote 15.12.15 (g/kg)	-	-	1.75	-	-	
Vitax Q4 (g/kg)	-	-	-	5.0	2.5	
DDT (5% dust) (g/kg)	0.5	0.5	0.5	0.4	0.4	
Fritted trace elements	0.25	-	0.01	-	-	
Hydrated Mg SO_4 (g/kg)	-	-	1.0	1.0	1.0	
Temperature (°C)					Temperate	Tropical
Mean	18	18	21	21	18	20
Maximum	27	28	33	34	23	27
Minimum	8	13	13	12	3	12
Relative humidity (%)						
Mean	60	65	50	65	50	45
Maximum	90	95	84	88	78	62
Minimum	25	34	30	30	30	35

Pre-emergence selectivity experiment

Techniques for the selectivity experiment were as previously described (Richardson and Dean, 1973), all herbicides being applied as surface pre-emergence treatments. Species were sown as detailed in Appendix 1, each being replicated twice for every treatment. Herbicides were applied using a laboratory sprayer operated at a pressure of 207 k Pa (30 lb/in^2) and moving at constant speed, 30 cm above the soil. Subsequent watering was from overhead. Soil and environmental conditions are summarised in Table 2. During the experiment plants were raised in the glasshouse, normal daylight being supplemented by high pressure sodium lighting to provide a 14 hour photoperiod for temperate species and a 12 hour photoperiod for tropical species.

Radish was included for ease of propagation and may be regarded as

a crop or weed. To improve establishment of certain species, the following treatments were applied:-
seeds of Chenopodium album were kept in 0.1 potassium nitrate for 48 hours in the light; seeds of Polygonum aviculare and Sinapis arvensis were soaked for 30 minutes in concentrated sulphuric acid, washed for 1 hour in running tap water and soaked for 48 hours in aqueous gibberellic acid (250 ppm); tubers of Cyperus esculentus and bulbs of Oxalis latifolia were kept at 2°C for 6 weeks prior to planting. Dwarf bean seeds were selected by testing their electrical conductivity, after soaking for 1 hour in water, discarding those whose conductivity was greater than 10mhos. To protect from soilborne pathogens, all seeds (except G. aparine, P. aviculare, H. lanatus, P. annua, P. trivialis, B. sterilis) were pre-treated with one of the following: thiram, captan, thiram + methyl bromide (for onion only), ethylmercuric phosphate + thiram (sugar beet only), aldrin (cotton only), harvesan organomercury (Avena fatua only). Temperate cereal seeds were purchased already treated with a mercurial seed dressing, and maize with captan A + teraquinone. In addition, a series of treatments were included for maize and sorghum in which seeds were treated with antidotes to investigate possible protection from herbicide injury. Maize seeds were treated with NA (1,8-naphthalic anhydride) at 1.0% w/w of seeds (see computer no. 56, abbreviation MAIZE + A) while sorghum seeds were acquired from Ciba-Geigy already dressed with CGA 43089 , α - (cyanomethoximino) benzacetonitrile (see computer no. 58, abbreviation SORG + A).

The seeds of some brassica species, kale and rape, which are particularly susceptible to disease, were treated with thiram, a 6% gum arabic solution being used prior to dressing to give better adhesion.In addition, 'Cheshunt Compound' or benomyl (for dwarf bean) fungicide solutions were applied as soil drenches to protect against fungal diseases.

Assessment and processing of results

Results were processed as described before (Richardson and Dean, 1973). Survivors were counted and scored for vigour on a 0-7 scale as previously, where 0 = dead, and 7 = as untreated control. It was not possible to analyse by computer the data for Chenopodium album, Cyperus esculentus, Solanum nigrum, Oxalis latifolia and dwarf bean because of variable germination/emergence and growth but some observations were made and are referred to in the text where appropriate. To improve growth, dwarf bean, considered as a temperate species, was raised under tropical conditions. Phalaris minor was raised under temperate conditions for the first eight days after sowing before transferring to the tropical glasshouse.

Pairs of histograms are presented for each treatment, the upper representing mean plant survival and the lower, mean vigour score, both calculated as percentages of untreated controls. Each 'x' represents a 5% increment but in the activity experiments each 'x' represents a 7% increment. A '+' indicates a value in excess of 100%; 'R' indicates a result based on one replicate only and 'M' represents a missing treatment.

A table of observed selectivities, using the criteria specified, is presented for each herbicide along with comments to highlight salient points.

Soil persistence

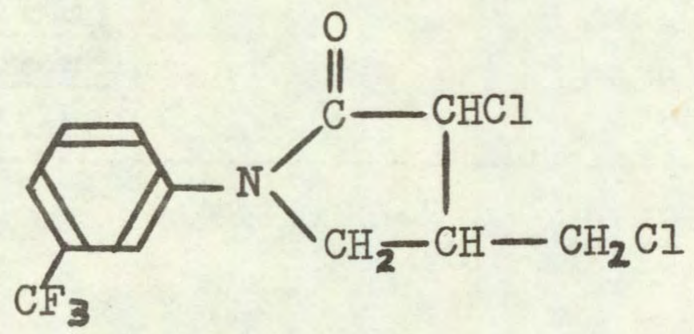
Soil persistence was monitored, in conjunction with the pre-emergence selectivity experiment. Tins containing soil were sprayed with the herbicides, together with tins containing untreated soil for controls. These were trans-

ferred to the temperate glasshouse and watered as necessary, from overhead. Temperature during this period was 16°C (minimum 3°C, maximum 33°C) and relative humidity 60% (minimum 22%, maximum 90%). Susceptible species were periodically sown shallowly, disturbing the soil as little as possible. Plants were harvested three to four weeks after sowing, when they had reached a predetermined growth stage, the number and fresh weight of shoots being recorded. Periodical bioassays were carried out at six to eight week intervals for up to a year, unless the herbicides had disappeared before then. Herbicides are considered to have disappeared when shoot fresh weights of the test plants are 80% or more as compared with the controls. Results are presented in graphical form for each herbicide and comments are made in the text.

Code number R 40244

Chemical name 1-(m-trifluoromethylphenyl)-3-chloro-4-chloromethyl-2-pyrrolidone

Structure



Source

Stauffer Chemicals
Baystrait House
Station Road
Biggleswade
Beds SG18 8AL

Information available and suggested uses

Control of broad-leaved and grass weeds at 0.25 to 0.5 kg ai/ha early pre-emergence in potatoes and pre-emergence in umbelliferous crops. Weeds are controlled with pre-emergence surface, pre-plant incorporated or early post-emergence sprays and preliminary observations indicate control of some perennial weeds post-emergence.

Formulation used 24% w/v a.i. emulsifiable concentrate.

Spray volume for activity experiment 370 l/ha.
for pre-emergence selectivity experiment 437 l/ha.

RESULTS

Full results are given in the histograms on pages 9-14 and potential selectivities are summarised in the following table.

Rate (kg ai/ha)	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
1.6	carrot groundnut cotton	Bromus sterilis Avena fatua Tripleurospermum maritimum Senecio vulgaris Polygonum lapathifolium Galium aparine Convolvulus arvensis Oryza punctata Bromus pectinatus + species below
0.4	species above + pea maize + antidote pigeon pea cowpea chickpea soyabean kenaf	Alopecurus myosuroides Poa annua Raphanus raphanistrum Stellaria media Eleusine indica Echinochloa crus-galli + species below

0.1	species above +	Poa trivialis
	wheat	Sinapis arvensis
	barley	Polygonum aviculare
	oat	Veronica persica
	field bean *	Rumex obtusifolius
	maize	Holcus lanatus
	sorghum + antidote	Digitaria sanguinalis
	sorghum	Amaranthus retroflexus
	rice	Snowdenia polystachya
	tomato	Phalaris minor

* some stand reduction, not due to herbicide

Comments on results

Activity experiment

The foliar spray showed some activity, more so on broad-leaved than on grass species but effects were not lethal. Much greater activity resulted from the soil drench treatments. However, the most active treatments were pre-emergence. Surface applications were more effecitive than when incorporated for kale, perennial ryegrass, Avena fatua and Polygonum amphibium, but the reverse was true for dwarf bean and Agropyron repens.This should be borne in mind when considering the results of the preemergence selectivity test. Species susceptibility seemed to decrease in the order small-seeded annuals > large-seeded annuals > perennials.

Symptoms

A pronounced chlorosis, or rather albinism, was the most striking feature. Some scorch occurred with the foliar spray. Several species exhibited a red or purple pigmentation. Germination was not affected by the pre-emergence treatments, plants usually dying back preceded by albinism. The tissue immediately adjacent to the midrib and veins of broadleaved species was usually albinoid often giving a variegated appearance. Symptoms are thus very reminiscent of those caused by aminotriazole and norflurazon.

Soil persistence

Results are presented in the graph on page 15. Using Veronica persica as the test species, a long period of persistence was found. Doses of 0.4 and 1.6 kg/ha were still lethal to plants 48 weeks after treatment while at 0.1 kg/ha symptoms were still visible.

Pre-emergence selectivities among temperate species

An impressive weed control spectrum was evident with all annual grass and broad-leaved weeds either killed or controlled at 1.60 kg/ha, several of these showing sensitivity even at the lowest dose of 0.1 kg/ha. Perennial weeds were resistant with the exception of Convolvulus arvensis which was susceptible at the high dose, only one plant eventually surviving treatment.

Carrot showed outstanding tolerance, only mild effects appearing at 1.6 kg/ha after the main assessment, with a slight stunting and paleness of the newer leaves. However, shoot fresh weights were slightly in excess of the control plants when harvested, nearly 14 weeks after spraying. At this time some tap roots were smaller and more stumpy than in controls but their fresh weight was depressed by only 15%. Pea was tolerant at 0.4 kg/ha and was reduced somewhat in vigour at 1.6 kg/ha. All three cereals and field bean were tolerant

to the lowest dose. Onion, lettuce and white clover were particularly sensitive.

R 40244 shows considerable promise for the control of most annual weeds in carrots, having a broad weed spectrum, possibly even wider than other herbicides used in this crop. Perennial weeds are generally resistant however and results with wheat, barley and oat suggest that control of volunteer cereals may be more difficult than annual weeds. Its rather long persistence may give extended weed control but there may be some risk to subsequent crops.

Pre-emergence selectivity among tropical species

This compound showed high activity against most small-seeded broadleaved and annual grass weeds including Solanum nigrum and excellent potential selectivity in several broad-leaved crops, including pigeon pea, cowpea, chickpea, kenaf, soyabean, cotton and groundnut, the last two showing good tolerance even at the highest dose.

Sorghum was not protected against damage by treatment with safener CGA 43089 but maize was distinctly protected by NA, such that there was potential selectivity at the 0.4 kg dose. Rottboellia however was not controlled and C rotundus showed complete resistance.

ACTIVITY EXPERIMENT

R40244

		0.1 kg/ha	0.4 kg/ha	1.6 kg/ha
DWARF BEAN	F	xxxxxxxxxxxxxxx xxxxxxx	xxxxxxxxxxxxxxx xxxx	xxxxxxxxxxxxxxx xx
	S	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxx
	P	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxx
	I	xxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxx
KALE	F	xxxxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxxxx xxxxx	xxxxxxxxxxxxxxx xx
	S	xxxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxxxx xxxxx	xxxxxxxxxxxxxxx xxxx
	P	xxxxxxxxxxxx xxxxxxxxxx	o o	o o
	I	xxxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxx xxxxx	o o
POLYGONUM AMPHIBIUM	F	xxxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxxxx xxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxx
	P	xxxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxx xxxxx
	I	xxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx
PERENNIAL RYEGRASS	F	xxxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxxxx xxx
	P	xxxxxxxxxxxxxx xxxxxxxxxxx	o o	o o
	I	xxxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxx	o o
AVENA FATUA	F	xxxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxx	xxxxxxxxxxxxxxx xxxxx
	P	xxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxx xxxxxxxx	xxx xxxx
	I	xxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxx	xxxxxxxx xxx
AGROPYRON REPENS	F	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxx
	P	xxxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxx
	I	xxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxxxx xxxx

Key: F = post-emergence, foliar application
S = post-emergence, soil drench
P = pre-emergence, surface film
I = pre-planting, incorporated

PRE-EMERGENCE SELECTIVITY EXPERIMENT

R 40244

SPECIES		0.1 Kg/ha		0.4 Kg/ha		1.6 Kg/ha
WHEAT	100	xxxxxxxxxxxxxxxxxxxx	108	xxxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxxxx
(1)	93	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx
BARLEY	112	xxxxxxxxxxxxxxxxxxxx+	112	xxxxxxxxxxxxxxxxxxxx+	119	xxxxxxxxxxxxxxxxxxxx+
(2)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	43	xxxxxxxxx
OAT	100	xxxxxxxxxxxxxxxxxxxx	88	xxxxxxxxxxxxxxxxxx	106	xxxxxxxxxxxxxxxxxxx+
(3)	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	43	xxxxxxxxx
PER RYGR	76	xxxxxxxxxxxxxxx	54	xxxxxxxxxxx	33	xxxxxxx
(4)	64	xxxxxxxxxxxxx	14	xxx	14	xxx
ONION	0		0		0	
(8)	0		0		0	
FLD BEAN	71	xxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(10)	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	36	xxxxxxx
PEA	117	xxxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxxx	133	xxxxxxxxxxxxxxxxxxx+
(11)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx
W CLOVER	13	xxx	0		0	
(12)	29	xxxxxx	0		0	
RAPE	93	xxxxxxxxxxxxxxxxxx	20	xxxx	0	
(14)	71	xxxxxxxxxxxxxx	14	xxx	0	
KALE	93	xxxxxxxxxxxxxxxxxx	63	xxxxxxxxxxxx	0	
(15)	50	xxxxxxxxxx	21	xxxx	0	
CARROT	107	xxxxxxxxxxxxxxxxxxx+	107	xxxxxxxxxxxxxxxxxxx+	114	xxxxxxxxxxxxxxxxxxx+
(18)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
LETTUCE	0		0		0	
(20)	0		0		0	

SPECIES	0.1 Kg/ha		0.4 Kg/ha		1.6 Kg/ha	
SUG BEET	86	xxxxxxxxxxxxxxxxx	17	xxx	0	
(21)	64	xxxxxxxxxxxxx	29	xxxxxx	0	
BROM STE	139	xxxxxxxxxxxxxxxxxxxx+	110	xxxxxxxxxxxxxxxxxxxx+	132	xxxxxxxxxxxxxxxxxxxx+
(24)	100	xxxxxxxxxxxxxxxxxxx	43	xxxxxxxxx	14	xxx
AVE FATU	93	xxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxx
(26)	93	xxxxxxxxxxxxxxxxxx	43	xxxxxxxxx	14	xxx
ALO MYOS	95	xxxxxxxxxxxxxxxxxx	107	xxxxxxxxxxxxxxxxxxx+	63	xxxxxxxxxxxxx
(27)	50	xxxxxxxxxx	21	xxxx	14	xxx
POA ANN	62	xxxxxxxxxxxx	0		0	
(28)	43	xxxxxxxxx	0		0	
POA TRIV	9	xx	0		0	
(29)	14	xxx	0		0	
SIN ARV	3	x	3	x	0	
(30)	7	x	7	x	0	
RAPH RAP	80	xxxxxxxxxxxxxxxx	21	xxxx	27	xxxxx
(31)	57	xxxxxxxxxxx	21	xxxx	14	xxx
TRIP MAR	106	xxxxxxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxxx	12	xx
(33)	71	xxxxxxxxxxxxxx	36	xxxxxxx	14	xxx
SEN VULG	67	xxxxxxxxxxxxx	111	xxxxxxxxxxxxxxxxxxx+	0	
(34)	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	0	
POL LAPA	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(35)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	21	xxxx
POL AVIC	0		0		21	xxxx
(36)	0		0		7	x

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES	0.1 Kg/ha		0.4 Kg/ha		1.6 Kg/ha	
GAL APAR	99	xxxxxxxxxxxxxxxxxxxx	85	xxxxxxxxxxxxxxxxx	76	xxxxxxxxxxxxxxx
(38)	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	14	xxx
STEL MED	35	xxxxxxx	0		0	
(40)	50	xxxxxxxxxx	0		0	
VER PERS	0		0		0	
(42)	0		0		0	
RUM OBTU	25	xxxxx	0		0	
(44)	14	xxx	0		0	
HOLC LAN	0		0		0	
(45)	0		0		0	
AG REPEN	109	xxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(47)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
ALL VIN	157	xxxxxxxxxxxxxxxxxxx+	117	xxxxxxxxxxxxxxxxxxx+	98	xxxxxxxxxxxxxxxxxx
(49)	100	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
CIRS ARV	133	xxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxx	177	xxxxxxxxxxxxxxxxxx+
(50)	100	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
TUS FARF	109	xxxxxxxxxxxxxxxxxx+	95	xxxxxxxxxxxxxxxxx	82	xxxxxxxxxxxxxxx
(51)	100	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx
CONV ARV	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxx
(52)	79	xxxxxxxxxxxxxxx	57	xxxxxxxxxx	14	xxx
MILLET	96	xxxxxxxxxxxxxxxxx	5	x	0	
(55)	64	xxxxxxxxxxxxx	14	xxx	0	
MAIZE + A	91	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	109	xxxxxxxxxxxxxxxxxx+
(56)	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx

PRE-EMERGENCE SELECTIVITY EXPERIMENT

R 40244

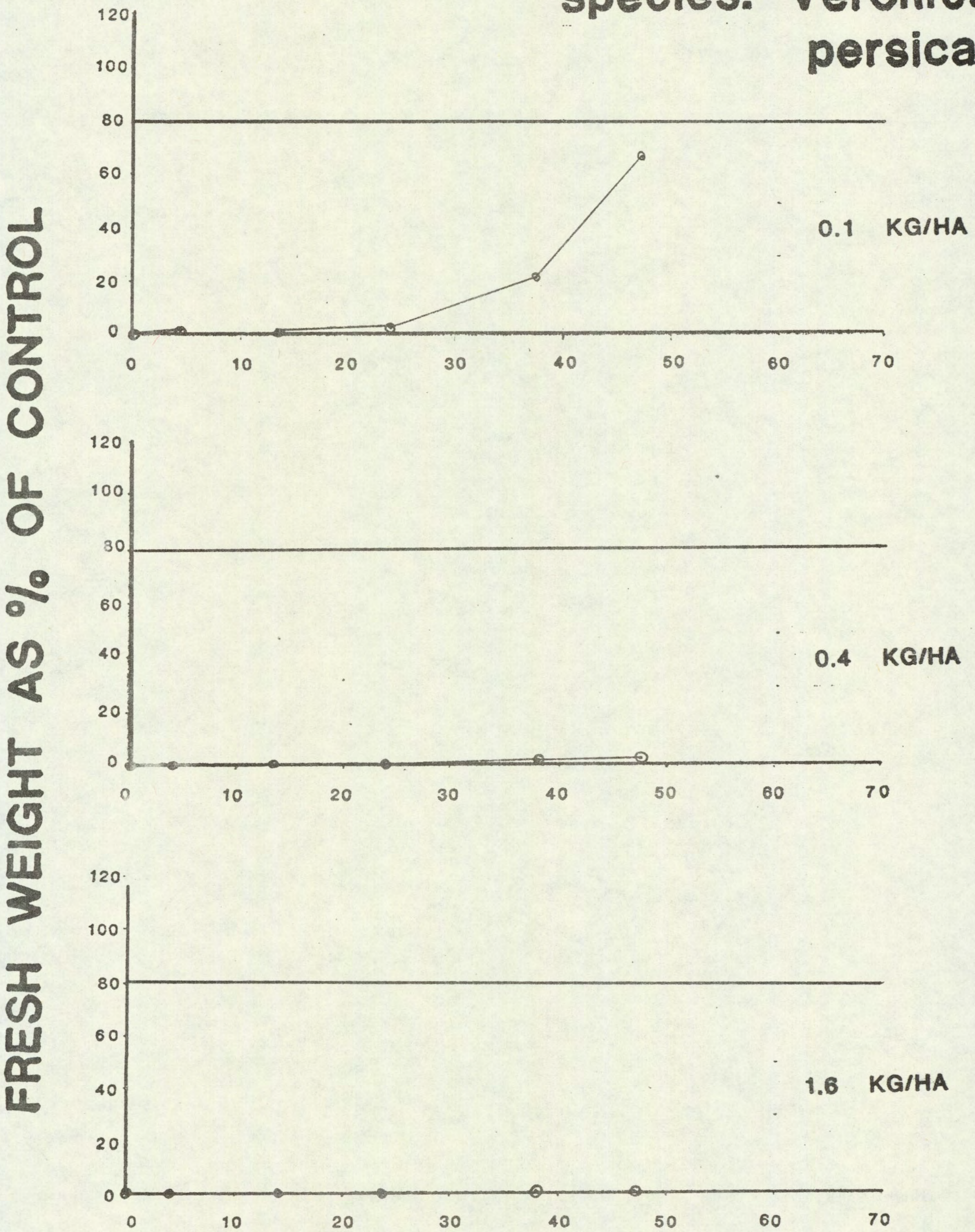
SPECIES	0.1 Kg/ha		0.4 Kg/ha		1.6 Kg/ha	
MAIZE	103	xxxxxxxxxxxxxxxxxxx+	103	xxxxxxxxxxxxxxxxxxx+	94	xxxxxxxxxxxxxxxxxx
(57)	100	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	36	xxxxxxx
SORG + A	107	xxxxxxxxxxxxxxxxxx+	107	xxxxxxxxxxxxxxxxxx+	20	xxxx
(58)	100	xxxxxxxxxxxxxxxxxx	43	xxxxxxxxx	7	x
SORGHUM	107	xxxxxxxxxxxxxxxxxx+	113	xxxxxxxxxxxxxxxxxx+	40	xxxxxxxx
(59)	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx	14	xxx
RICE	98	xxxxxxxxxxxxxxxxxx	89	xxxxxxxxxxxxxxxxx	89	xxxxxxxxxxxxxxxxx
(60)	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	29	xxxxx
PIGEON P	91	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	82	xxxxxxxxxxxxxxx
(61)	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
COWPEA	97	xxxxxxxxxxxxxxxxx	106	xxxxxxxxxxxxxxxxxx+	71	xxxxxxxxxxxxx
(62)	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx
CHICKPEA	133	xxxxxxxxxxxxxxxxxx+	122	xxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxx
(63)	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
GRNDNUT	95	xxxxxxxxxxxxxxxxx	68	xxxxxxxxxxxxx	82	xxxxxxxxxxxxxxx
(64)	93	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx
SOYABEAN	100	xxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx
(65)	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
COTTON	110	xxxxxxxxxxxxxxxxxx+	120	xxxxxxxxxxxxxxxxxx+	90	xxxxxxxxxxxxxxxxx
(66)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
JUTE	0		0		0	
(67)	0		0		0	
KENAF	94	xxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxx	106	xxxxxxxxxxxxxxxxxx+
(68)	93	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES	0.1 Kg/ha		0.4 Kg/ha		1.6 Kg/ha	
SESAMUM	74	xxxxxxxxxxxxxxx	4	x	0	
(70)	36	xxxxxxx	7	x	0	
TOMATO	114	xxxxxxxxxxxxxxxxxxxx+	0		0	
(71)	93	xxxxxxxxxxxxxxxxxx	0		0	
OR PUNCT	107	xxxxxxxxxxxxxxxxxxxx+	99	xxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxx
(73)	93	xxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
ELEU IND	105	xxxxxxxxxxxxxxxxxxx+	0		0	
(74)	57	xxxxxxxxxxx	0		0	
ECH CRUS	107	xxxxxxxxxxxxxxxxxxx+	4	x	0	
(75)	50	xxxxxxxxxx	14	xxx	0	
ROTT EXA	77	xxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxx
(76)	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx
DIG SANG	10	xx	16	xxx	3	x
(77)	14	xxx	7	x	7	x
AMAR RET	0		13	xxx	0	
(78)	0		7	x	0	
SNOW POL	30	xxxxxx	15	xxx	4	x
(83)	36	xxxxxxx	14	xxx	7	x
PHAL MIN	25	xxxxx	12	xx	8	xx
(83)	43	xxxxxxxxx	14	xxx	7	x
CYP ROTU	94	xxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxx+	122	xxxxxxxxxxxxxxxxxx+
(86)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx
BROM PEC	108	xxxxxxxxxxxxxxxxxx+	61	xxxxxxxxxxx	24	xxxxx
(88)	100	xxxxxxxxxxxxxxxxxx	43	xxxxxxxxx	14	xxx

PERSISTENCE OF R 40244

species: Veronica persica



TIME OF SOWING
weeks after treatment

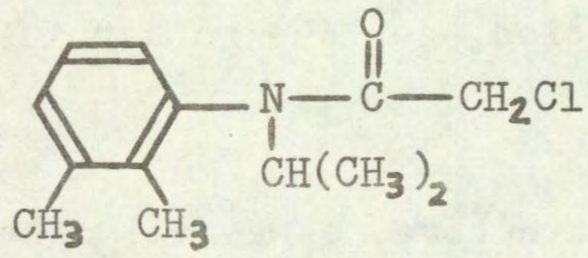
NB: AC 206784 is xylachlor, FMC 39821 is 5-(2-chlorobenzyloxy)-2-ethyl-4-methyl-1,3-dioxane (FMC), R 40244 is flurochloridone

AC 206784

Code number AC 206784

Chemical name 2-chloro-N-(2,3-dimethylphenyl)-N-(1-methylethyl)acetamide

Structure



Source Cyanamid International Ltd
Fareham Road
Gosport
Hants PO13 0AS

Information available and suggested uses

Pre-emergence or pre-plant incorporated for control of grass and broad-leaved weeds in wheat, barley, maize, rice, peas, beans and cotton at 2.0 to 6.0 kg a.i./ha depending upon soil type.

Formulation used 48% w/v a.i. emulsifiable concentrate.

Spray volume for activity experiment 394 l/ha.
for pre-emergence selectivity experiment 437 l/ha.

RESULTS

Full results are given in the histograms on pages 19-24and potential selectivities are summarised in the following table.

RATE (kg ai/ha)	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
4.0	wheat pea rape kale radish cowpea chickpea groundnut soyabean cotton kenaf	Bromus sterilis Avena fatua Alopecurus myosuroides Senecio vulgaris Veronica persica Phalaris minor + species below
1.0	species above + barley field bean carrot sugar beet maize maize + antidote sorghum + antidote tomato	Poa annua Poa trivialis Oryza punctata Echinochloa crus-galli Digitaria sanguinalis Amaranthus retroflexus + species below

NB: AC 206784 is xylachlor, FMC 39821 is 5-(2-chlorobenzyloxy)-2-ethyl-4-methyl-1,3-dioxane (FMC), R 40244 is flurochloridone

0.25	species above +	Holcus lanatus
	oat	Eleusine indica
	onion	Snowdenia polystachya
	lettuce	
	sorghum	
	pigeon pea *	
	sesamum	

* some stand reduction, not due to herbicide

Activity experiment

The soil treatments were the most active, especially the pre-emergence applications on the grass species. Surface pre-emergence sprays were generally the most active particularly on perennial ryegrass. Grasses were resistant to the foliar spray, but broad-leaved species were temporarily damaged, especially kale.

Symptoms

The foliar spray caused moderate to severe scorch within a day or so of spraying the broad-leaved species, but plants generally recovered, suggesting that solvent rather than herbicide damage was the cause. All three soil treatments caused retardation of growth, particularly of the grass species. The leaves of treated plants were always a darker green and often trapped. Higher doses, pre-emergence, often resulted in a failure of the leaves of grasses to emerge from the soil or the coleoptile, or necrosis and early death. Some chlorosis of P. amphibium was seen with pre-emergence surface treatments, together with leaf crinkling and stunting. Broad-leaved species treated preemergence often exhibited miniature, deformed leaves, with the colour of these varying from pale to dark green.

With certain species, e.g. brassicas, sugar beet, wheat and barley, root systems were weakened. This was also true for large-seeded legumes and adverse effects on nodulation were noted on roots of field beans. The symptoms described are thus very similar to those caused by herbicides such as amides, carbamates and dinitroanilines.

Soil persistence

Results are presented in the graph on page 25. Using perennial ryegrass as the sensitive test species, doses of 0.25 and 1.0 kg/ha were undetectable by the third assay, 14 weeks after spraying, and had almost disappeared at the second assay, only four weeks after spraying. The high dose of 4.0 kg/ha was undetectable after 38 weeks.

Pre-emergence selectivity among temperate species

Annual grasses were controlled; Holcus lanatus at 0.25 kg/ha, both Poa species at 1.0 kg/ha and Avena fatua, Alopecurus myosuroides and Bromus sterilis at 4.0 kg/ha. Only two broad-leaved weeds (Senecio vulgaris and Veronica persica) were controlled at 4.0 kg/ha although certain others were affected. Perennial weeds were resistant.

Wheat, pea and all three brassicas (rape, kale, radish) were tolerant at 4.0 kg/ha. Barley and field bean were reduced in vigour by only 29% at this dose and tolerated 1.0 kg/ha, as did carrot and sugar beet. Oat, onion and lettuce were reduced in vigour by only 21-29% at this dose. White clover and perennial ryegrass were sensitive.

Generally, AC 206784 is less active than pendimethalin; selective control being possible, but at somewhat higher doses. One interesting exception however

is the greater sensitivity of Bromus sterilis and the control of this weed in wheat merits further study in view of its increasing importance in direct drilling situations (Harvey, J J, private communication). Even so, inclusion of another herbicide will be necessary to extent the spectrum of weed control in wheat and other crops.

Selectivity among tropical species

AC 206784 was much less active than pendimethalin on most crops and weed species, but selectivities were in general similar. One exception was Bromus pectinatus which proved almost equally susceptible to AC 206784 and hence could, perhaps, be selectively controlled in wheat at a high dose. The other most striking difference was the much greater susceptibility of rice and Oryza punctata. The compound might therefore be of value where rice occurs as a weed in wheat in a wheat/rice rotation. Maize was not in this case protected by NA but sbrghum was quite distinctly protected by CGA 43089 such that there was potential selectivity against a range of annual weeds (but not Rottboellia) at 1 kg/ha. Solanum nigrum was apparently controlled by 4 kg/ha but recovered from 1 kg/ha. Oxalis latifolia was not controlled.

NB: AC 206784 is xylachlor, FMC 39821 is 5-(2-chlorobenzyloxy)-2-ethyl-4-methyl-1,3-dioxane (FMC), R 40244 is flurochloridone

NB: AC 206784 is xylachlor, FMC 39821 is 5-(2-chlorobenzyloxy)-2-ethyl-4-methyl-1,3-dioxane (FMC), R 40244 is flurochloridone

ACTIVITY EXPERIMENT

AC 206784

		0.5 kg/ha	2.0 kg/ha	8.0 kg/ha
DWARF BEAN	F	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx
	I	xxxxxxxxxxxxxx +	xxxxxxxxxxxxxx +	xxxxxxxxxxxxxx
KALE	F	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxx +	xxxxxxxxxxxxxx +	xxxxxxxxxxxxxx
	I	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx +	xxxxxxxxxxxxxx +
POLYGONUM AMPHIBIUM	F	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx
	I	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx +	xxxxxxxxxxxxxx
PERENNIAL RYEGRASS	F	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx
	P	xxxxxx	oo	oo
	I	xxxxxxxxxxxxxx	xxxxxx	oo
AVENA FATUA	F	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xx
	I	xxxxxxxxxxxxxx +	xxxxxxxxxxxxxx +	xxxxxx
AGROPYRON REPENS	F	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxx	xxxxxxxxxxxx	xxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxx	xxxxxxxxxxxx	xxxxxx
	I	xxxxxxxxxxxxxx	xxxxxxxxxxxxxx	xxxxxxxx

Key: F = Post-emergence, foliar application
S = Post-emergence, soil drench
P = Pre-emergence, surface film
I = Pre-planting, incorporated

PRE-EMERGENCE SELECTIVITY EXPERIMENT

AC 206784

SPECIES	0.25 Kg/ha		1.00 Kg/ha		4.00 Kg/ha	
WHEAT	108	xxxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(1)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
BARLEY	112	xxxxxxxxxxxxxxxxxxxx+	112	xxxxxxxxxxxxxxxxxxxx+	91	xxxxxxxxxxxxxxxxx
(2)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
OAT	94	xxxxxxxxxxxxxxxxxxx	88	xxxxxxxxxxxxxxxxxx	88	xxxxxxxxxxxxxxxxxx
(3)	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx
PER RYGR	94	xxxxxxxxxxxxxxxxxxx	72	xxxxxxxxxxxxxx	33	xxxxxxx
(4)	64	xxxxxxxxxxxxx	14	xxx	14	xxx
ONION	103	xxxxxxxxxxxxxxxxxxx+	86	xxxxxxxxxxxxxxxx	77	xxxxxxxxxxxxxx
(8)	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
FLD BEAN	114	xxxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxxxx	114	xxxxxxxxxxxxxxxxxxxx+
(10)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
PEA	117	xxxxxxxxxxxxxxxxxxx+	133	xxxxxxxxxxxxxxxxxxx+	117	xxxxxxxxxxxxxxxxxxx+
(11)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
W CLOVER	103	xxxxxxxxxxxxxxxxxxx+	86	xxxxxxxxxxxxxxxx	9	xx
(12)	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	14	xxx
RAPE	99	xxxxxxxxxxxxxxxxxxx	108	xxxxxxxxxxxxxxxxxxx+	102	xxxxxxxxxxxxxxxxxxx
(14)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
KALE	101	xxxxxxxxxxxxxxxxxxx	110	xxxxxxxxxxxxxxxxxxx+	106	xxxxxxxxxxxxxxxxxxx+
(15)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
CARROT	121	xxxxxxxxxxxxxxxxxxx+	143	xxxxxxxxxxxxxxxxxxx+	93	xxxxxxxxxxxxxxxxxx
(18)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
LETTUCE	110	xxxxxxxxxxxxxxxxxxx+	95	xxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxx
(20)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	43	xxxxxxxxx

SPECIES	0.25 Kg/ha		1.00 Kg/ha		4.00 Kg/ha	
SUG BEET	107	xxxxxxxxxxxxxxxxxxxx+	93	xxxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxx
(21)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
BROM STE	146	xxxxxxxxxxxxxxxxxxx+	124	xxxxxxxxxxxxxxxxxx+	66	xxxxxxxxxxxx
(24)	100	xxxxxxxxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
AVE FATU	80	xxxxxxxxxxxxxxxx	89	xxxxxxxxxxxxxxxxx	102	xxxxxxxxxxxxxxxxxx
(26)	100	xxxxxxxxxxxxxxxxxx:	43	xxxxxxxxx	29	xxxxxx
ALO MYOS	142	xxxxxxxxxxxxxxxxxx+	107	xxxxxxxxxxxxxxxxxx+	75	xxxxxxxxxxxxxx
(27)	100	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	21	xxxx
POA ANN	51	xxxxxxxxxx	4	x	0	
(28)	50	xxxxxxxxxx	14	xxx	0	
POA TRIV	57	xxxxxxxxxxx	2	x	0	
(29)	57	xxxxxxxxxxx	14	xxx	0	
SIN ARV	92	xxxxxxxxxxxxxxxx	56	xxxxxxxxxx	50	xxxxxxxxx
(30)	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	50	xxxxxxxxx
RAPH RAP	102	xxxxxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxx
(31)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx
TRIP MAR	118	xxxxxxxxxxxxxxxxxx+	101	xxxxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxx
(33)	100	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	36	xxxxxxx
SEN VULG	78	xxxxxxxxxxxxxxx	144	xxxxxxxxxxxxxxxxxx+	78	xxxxxxxxxxxxxxx
(34)	64	xxxxxxxxxxxxx	57	xxxxxxxxxx	29	xxxxxx
POL LAPA	150	xxxxxxxxxxxxxxxxxx+	175	xxxxxxxxxxxxxxxxxx+	125	xxxxxxxxxxxxxxxxxx+
(35)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
POL AVIC	83	xxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxx	41	xxxxxxxx
(36)	100	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	71	xxxxxxxxxxxxx

PRE-EMERGENCE SELECTIVITY EXPERIMENT

AC 206784

SPECIES	0.25 Kg/ha		1.00 Kg/ha		4.00 Kg/ha	
GAL APAR	103	xxxxxxxxxxxxxxxxxxxx+	94	xxxxxxxxxxxxxxxxxxx	85	xxxxxxxxxxxxxxxxx
(38)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
STEL MED	134	xxxxxxxxxxxxxxxxxxx+	94	xxxxxxxxxxxxxxxxxxx	117	xxxxxxxxxxxxxxxxxxx+
(40)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
VER PERS	104	xxxxxxxxxxxxxxxxxxx+	67	xxxxxxxxxxxxx	46	xxxxxxxxx
(42)	50	xxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
RUM OBTU	100	xxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	137	xxxxxxxxxxxxxxxxxxx+
(44)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
HOLC LAN	22	xxxx	0		0	
(45)	21	xxxx	0		0	
AG REPEN	109	xxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxxx	55	xxxxxxxxxxx
(47)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
ALL VIN	137	xxxxxxxxxxxxxxxxxxx+	91	xxxxxxxxxxxxxxxxx	130	xxxxxxxxxxxxxxxxxxx+
(49)	93	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx
CIRS ARV	67	xxxxxxxxxxxxx	117	xxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxx
(50)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
TUS FARF	109	xxxxxxxxxxxxxxxxxx+	109	xxxxxxxxxxxxxxxxxx+	109	xxxxxxxxxxxxxxxxxx+
(51)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
CONV ARV	100	xxxxxxxxxxxxxxxxxx	62	xxxxxxxxxxx	75	xxxxxxxxxxxxxx
(52)	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
MILLET	0		0		0	
(55)	0		0		0	
MAIZE + A	109	xxxxxxxxxxxxxxxxxx+	109	xxxxxxxxxxxxxxxxxx+	109	xxxxxxxxxxxxxxxxxx+
(56)	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx

PRE-EMERGENCE SELECTIVITY EXPERIMENT

AC 206784

SPECIES		0.25 Kg/ha		1.00 Kg/ha		4.00 Kg/ha
MAIZE	94	xxxxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxxx+	103	xxxxxxxxxxxxxxxxxxx+
(57)	79	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
SORG + A	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	107	xxxxxxxxxxxxxxxxxxx+
(58)	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
SORGHUM	100	xxxxxxxxxxxxxxxxxxx	107	xxxxxxxxxxxxxxxxxxx+	107	xxxxxxxxxxxxxxxxxxx+
(59)	100	xxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxx
RICE	98	xxxxxxxxxxxxxxxxxxx	20	xxxx	0	
(60)	79	xxxxxxxxxxxxxxxx	36	xxxxxxx	0	
PIGEON P	36	xxxxxxx	73	xxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
(61)	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	14	xxx
COWPEA	79	xxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxx
(62)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
CHICKPEA	111	xxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxxx	122	xxxxxxxxxxxxxxxxxxx+
(63)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
GRNDNUT	109	xxxxxxxxxxxxxxxxxxx+	68	xxxxxxxxxxxxxx	82	xxxxxxxxxxxxxxxx
(64)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
SOYABEAN	92	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(65)	86	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
COTTON	100	xxxxxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx	110	xxxxxxxxxxxxxxxxxxx+
(66)	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
JUTE	57	xxxxxxxxxxx	16	xxx	14	xxx
(67)	79	xxxxxxxxxxxxxxxx	29	xxxxxx	21	xxxx
KENAF	94	xxxxxxxxxxxxxxxxxx	106	xxxxxxxxxxxxxxxxxxx+	88	xxxxxxxxxxxxxxxxx
(68)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx

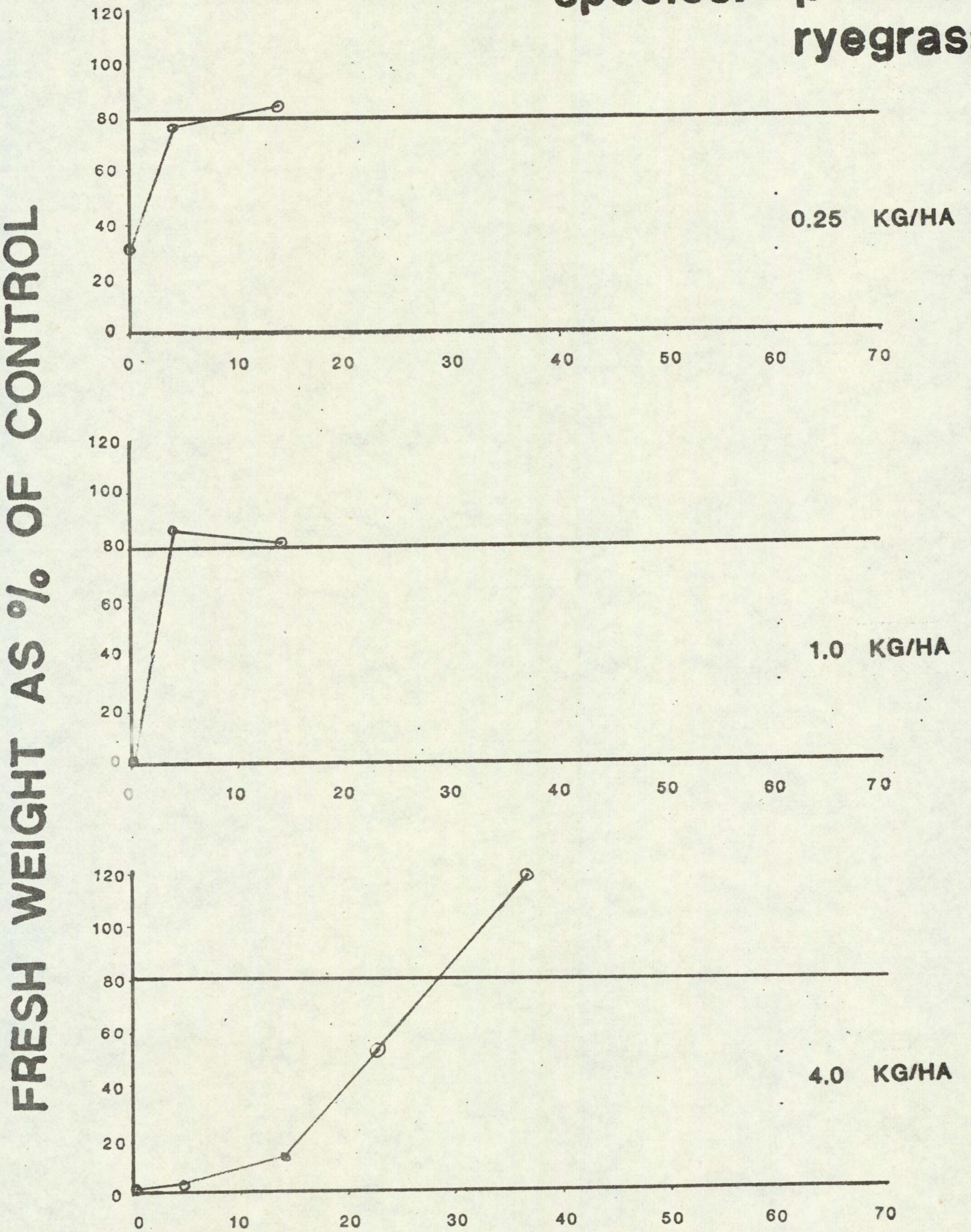
AC 206784

SPECIES	0.25 Kg/ha		1.00 Kg/ha		4.00 Kg/ha	
SESAMUM	91	xxxxxxxxxxxxxxxxxx	148	xxxxxxxxxxxxxxxxxxxx+	48	xxxxxxxxxx
(70)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx
TOMATO	114	xxxxxxxxxxxxxxxxxxx+	103	xxxxxxxxxxxxxxxxxxx+	83	xxxxxxxxxxxxxxxx
(71)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxx
OR PUNCT	99	xxxxxxxxxxxxxxxxxxx	13	xxx	0	
(73)	64	xxxxxxxxxxxxx	29	xxxxxx	0	
ELEU IND	0		0		0	
(74)	0		0		0	
ECH CRUS	99	xxxxxxxxxxxxxxxxxxx	32	xxxxxx	0	
(75)	50	xxxxxxxxxx	29	xxxxxx	0	
ROTT EXA	77	xxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxx	54	xxxxxxxxxx
(76)	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	57	xxxxxxxxxx
DIG SANG	106	xxxxxxxxxxxxxxxxxxx+	80	xxxxxxxxxxxxxxx	5	x
(77)	64	xxxxxxxxxxxxx	29	xxxxxx	14	xxx
AMAR RET	65	xxxxxxxxxxxxx	26	xxxxx	13	xxx
(78)	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	29	xxxxxx
SNOW POL	4	x	0		0	
(83)	21	xxxx	0		0	
PHAL MIN	74	xxxxxxxxxxxxxxx	41	xxxxxxxx	8	xx
(84)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx	14	xxx
CYP ROTU	103	xxxxxxxxxxxxxxxxxxx+	103	xxxxxxxxxxxxxxxxxxx+	47	xxxxxxxxx
(86)	100	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	57	xxxxxxxxxx
BROM PEC	106	xxxxxxxxxxxxxxxxxxx+	97	xxxxxxxxxxxxxxxxx	33	xxxxxxx
(88)	100	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	36	xxxxxxx

NB: AC 206784 is xylachlor, FMC 39821 is 5-(2-chlorobenzyloxy)-2-ethyl-4-methyl-1,3-dioxane (FMC), R 40244 is flurochloridone

PERSISTENCE OF AC 206784

species: perennial ryegrass



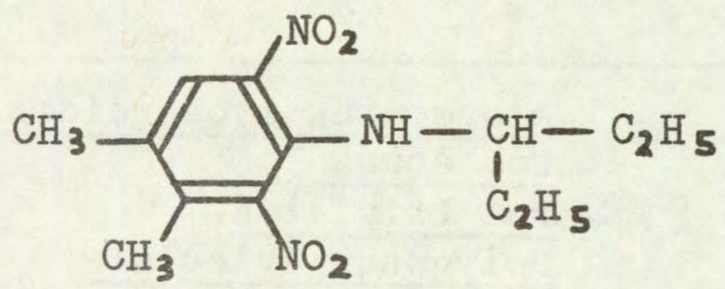
TIME OF SOWING
weeks after treatment

Pendimethalin

Code number AC 92553 **Trade name** Stomp, Prowl

Chemical name N-(1-ethylpropyl)-2,6-dinitro-3,4-xylidine

Structure



Source Cyanamid International Ltd
Fareham Road
Gosport
Hants PO13 0AS

Information available and suggested uses

Already marketed for pre-emergence control of annual grass and certain broad-leaved weeds at up to 2.0 kg ai/ha depending on soil type. Crops suggested are winter cereals, cotton, maize, potatoes, peas, carrots, onions, leeks, Phaseolus beans, tobacco, chickpea, cowpea, soybeans, rice, sunflower, banana, pineapple, sisal, sugarcane, tree crops, vines, and some transplanted crops (Cyanamid International Corporation, Technical Information on Stomp herbicide, August 1978). Winfield et al (1978) reported control of a range of broad-leaved weeds (including Galium aparine) as well as Alopecurus myosuroides and Poa annua in winter barley at 2.0 to 6.0 kg ai/ha. It is now approved for use in winter barley.

Formulation used 33% w/v a.i. emulsifiable concentrate.

Spray volume for activity experiment 352 l/ha
for pre-emergence selectivity experiment 437 l/ha

RESULTS

Full histogram results are presented on pages 29-34 and potential selectivities are summarised in the following Table.

RATE (kg ai/ha)	CROPS: vigour reduced by less than 15%	WEEDS: number or vigour reduced by 70% or more
4.0	groundnut	Avena fatua Tripleurospermum maritimum Senecio vulgaris Convolvulus arvensis Oryza punctata Bromus pectinatus + species below

NB: AC 206784 is xylachlor, FMC 39821 is 5-(2-chlorobenzyloxy)-2-ethyl-4-methyl-1,3-dioxane (FMC), R 40244 is flurochloridone

1.0	species above + wheat barley carrot radish cowpea cotton kenaf	Polygonum lapathifolium Sinapis arvensis + species below
0.25	species above + oat field bean pea rape maize + antidote rice chickpea soyabean	Alopecurus myosuroides Poa annua Poa trivialis Polygonum aviculare Stellaria media Veronica persica Rumex obtusifolius Holcus lanatus Eleusine indica Echinochloa crus-galli Rottboellia exaltata Digitaria sanguinalis Amaranthus retroflexus Snowdenia polystachya Phalaris minor

Comments on results

Activity experiment

Results have been described previously (Richardson and Dean, 1975) but are presented again on page 29 for comparative purposes. Activity was found to be largely via the soil, especially with the preemergence treatments to the grasses. The smaller seeded species, kale and perennial ryegrass were more sensitive to surface than incorporated pre-emergence treatments, but the reverse was true for the larger-seeded Avena fatua and dwarf bean and also Agropyron repens. The foliar spray caused severe scorch of broad-leaved species, though effects were not lethal. Thus the pattern of activity is similar to that of AC 206784.

Symptoms

These were identical to those described for AC 206784, being typical of the amide, carbamate and dinitroaniline groups. However inhibition of root systems was sometimes more severe than with AC 206784, for example with wheat, where secondary as well as primary roots were inhibited. Roots of large-seeded legumes were also more inhibited by pendimethalin while effects on the nodules of field beans and peas were generally more severe.

Soil Persistence

Results are presented in the graph on page 35. A considerable period of persistence in the soil was found previously (Richardson and Dean, 1975) and this appears to be the case for the surface spray also. Using perennial ryegrass as the sensitive test species as in the earlier test, 1.0 and 4.0 kg/ha caused 26% and 75% shoot fresh weight reductions respectively, 48 weeks after spraying.

Pre-emergence selectivity among temperate species

Weed control was generally better in this test than found previously

(Richardson and Dean, 1975) although then the herbicide was incorporated into the soil. Four annual grasses were susceptible to the lowest dose, including Alopecurus myosuroides. The highest dose was needed to control Avena fatua while Bromus sterilis was reduced in vigour by only 50%. Several annual broad-leaved weeds were controlled at the lower doses, including polygonaceous species, Veronica persica and Stellaria media. The highest dose was needed to control the compositae (Tripleurospermum maritimum and Senecio vulgaris) while Galium aparine was resistant. Perennial weeds were generally resistant with the exception of Convolvulus arvensis which was killed by 4.0 kg/ha and severely damaged by lower doses.

Wheat and barley tolerated 1.0 kg/ha and were reduced in vigour by only 29% at 4.0 kg/ha, but no temperate crop was resistant to this dose. Carrot and radish tolerated 1.0 kg/ha, the former being reduced in vigour by only 21% at the highest dose. Oat, field bean, pea and rape tolerated the lowest dose. Lettuce, sugar beet, white clover, perennial ryegrass and onion were sensitive, contrasting with the earlier test where the herbicide was incorporated (Richardson, and Dean, 1975) when some of these crops, notably onion, showed good tolerance.

Comparison with the earlier pre-emergence experiment, where the herbicide was incorporated, shows some marked differences. Activity is generally greater as a surface spray on both annual weeds and crops. Selective control in many of these crops is still good, however, notably in the cereals (wheat and barley) and carrot. Even so, consideration may have to be given to mixing with other herbicides to attain satisfactory control of certain other weeds such as the Compositae, Avena fatua and perennials.

Pre-emergence selectivity among tropical species

Application of pendimethalin as a surface pre-emergence treatment rather than incorporated as in the previous test (Richardson and Dean, 1975) showed a slightly wider range of selectivities, being safer particularly in cotton, rice and maize, but more damaging to the small seeded species such as jute and sesamum. Solanum nigrum was controlled by 1 kg/ha and Oxalis latifolia by 4 kg/ha.

Without protectant maize was more seriously affected than expected and the anticipated selectivity against Rottboellia was not clear cut. There was however an unexpectedly distinct protection by NA at all three doses, helping to provide full selectivity at least at the lowest dose. Sorghum was not as well protected by the CGA 43089 safener. There was apparently useful selectivity against Rottboellia in rice. There is apparent selectivity against Phalaris minor and Snowdenia polystachya in wheat but crop and weeds were not grown under the same conditions.

ACTIVITY EXPERIMENT

PENDIMETHALIN

		0.125 kg/ha	0.75 kg/ha	4.5 kg/ha
DWF BEAN	F	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxxx (+)	xxxxxxxxxxxxxxx (+)	xxxxxxxxxxxxxxx
	I	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
KALE	F	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxxx (+)	xxxxxxxxxxxxxxx (+)	xxxxxxx x
	I	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxx
POL AMPH	F	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	P	xxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx (+)
	I	xxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx (+)	xxxxxxxxxxx xxxxxxxxxxxxxxx
PER RYGR	F	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	P	xxxxxxxxxx xxxxxxxxxxxxxxx	x xxxx	o o
	I	xxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxx xxxxxxxxxx	o o
AVE FATU	F	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx (+)	xxxxxxxxxxx xxxxxxxx
	I	xxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxx xxxxxxx	x xxx
AG REPENS	F	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx xxxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx	xxxxxxxxxxxxxxx
	I	xxxxxxxxxxxxxxx (+)	xxxxxxxxxxxxxxx	xxxxx xxxxxxx

Control xxxxxxxxxxxxxxx % No. of survivors
xxxxxxxxxxxxxxx % Vigour

Key: F = Post-emergence, foliar application
S = Post-emergence, soil drench
P = Pre-emergence, surface film
I = Pre-planting, incorporated

PRE-EMERGENCE SELECTIVITY EXPERIMENT

PENDIMETHALIN

SPECIES		0.25 Kg/ha		1.0 Kg/ha		4.0 Kg/ha
WHEAT	92	xxxxxxxxxxxxxxxxxx	123	xxxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxxx
(1)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
BARLEY	112	xxxxxxxxxxxxxxxxxxx+	105	xxxxxxxxxxxxxxxxxxx+	105	xxxxxxxxxxxxxxxxxxx+
(2)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
OAT	88	xxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxx
(3)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx
PER RYGR	61	xxxxxxxxxxxx	54	xxxxxxxxxx	40	xxxxxxxx
(4)	57	xxxxxxxxxxx	29	xxxxxx	14	xxx
ONION	77	xxxxxxxxxxxxxx	81	xxxxxxxxxxxxxxx	60	xxxxxxxxxxx
(8)	57	xxxxxxxxxx	36	xxxxxxx	29	xxxxxx
FLD BEAN	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	114	xxxxxxxxxxxxxxxxxx+
(10)	100	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx
PEA	133	xxxxxxxxxxxxxxxxxx+	133	xxxxxxxxxxxxxxxxxx+	117	xxxxxxxxxxxxxxxxxx+
(11)	100	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	43	xxxxxxxxx
W CLOVER	133	xxxxxxxxxxxxxxxxxx+	124	xxxxxxxxxxxxxxxxxx+	90	xxxxxxxxxxxxxxxxx
(12)	29	xxxxxx	29	xxxxxx	21	xxxx
RAPE	99	xxxxxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxx	82	xxxxxxxxxxxxxxxx
(14)	86	xxxxxxxxxxxxxxxx	43	xxxxxxxxx	14	xxx
KALE	114	xxxxxxxxxxxxxxxxxx+	114	xxxxxxxxxxxxxxxxxx+	114	xxxxxxxxxxxxxxxxxx+
(15)	64	xxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
CARROT	121	xxxxxxxxxxxxxxxxxx+	93	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
(18)	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
LETTUCE	110	xxxxxxxxxxxxxxxxxx+	114	xxxxxxxxxxxxxxxxxx+	99	xxxxxxxxxxxxxxxxxx
(20)	29	xxxxxx	29	xxxxx	21	xxxx

PENDIMETHALIN

SPECIES	0.25 Kg/ha		1.0 Kg/ha		4.0 Kg/ha	
SUG BEET	86	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	121	xxxxxxxxxxxxxxxxxxx+
(21)	71	xxxxxxxxxxxxxx	36	xxxxxxx	29	xxxxxx
BROM STE	102	xxxxxxxxxxxxxxxxxxx	117	xxxxxxxxxxxxxxxxxxx+	139	xxxxxxxxxxxxxxxxxxx+
(24)	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx
AVE FATU	93	xxxxxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxxx	73	xxxxxxxxxxxxxxx
(26)	64	xxxxxxxxxxxxx	43	xxxxxxxxx	21	xxxx
ALO MYOS	67	xxxxxxxxxxxxx	47	xxxxxxxxx	8	xx
(27)	29	xxxxxx	21	xxxx	7	x
POA ANN	11	xx	0		0	
(28)	14	xxx	0		0	
POA TRIV	0		0		0	
(29)	0		0		0	
SIN ARV	83	xxxxxxxxxxxxxxxx	114	xxxxxxxxxxxxxxxxxx+	86	xxxxxxxxxxxxxxxx
(30)	79	xxxxxxxxxxxxxxx	29	xxxxxx	29	xxxxxx
RAPH RAP	107	xxxxxxxxxxxxxxxxxx+	102	xxxxxxxxxxxxxxxxxx	107	xxxxxxxxxxxxxxxxxx+
(31)	93	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	43	xxxxxxxxx
TRIP MAR	113	xxxxxxxxxxxxxxxxxx+	89	xxxxxxxxxxxxxxxxx	106	xxxxxxxxxxxxxxxxxx+
(33)	93	xxxxxxxxxxxxxxxxx	36	xxxxxxx	14	xxx
SEN VULG	89	xxxxxxxxxxxxxxxxx	133	xxxxxxxxxxxxxxxxxx+	56	xxxxxxxxxxx
(34)	36	xxxxxxx	57	xxxxxxxxxxx	29	xxxxxx
POL LAPA	125	xxxxxxxxxxxxxxxxxx+	75	xxxxxxxxxxxxxx	125	xxxxxxxxxxxxxxxxxx+
(35)	43	xxxxxxxxx	29	xxxxxx	21	xxxx
POL AVIC	83	xxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxx	21	xxxx
(36)	29	xxxxxx	29	xxxxxx	7	x

PRE-EMERGENCE SELECTIVITY EXPERIMENT

PENDIMETHALIN

SPECIES		0.25 Kg/ha		1.0 Kg/ha		4.0 Kg/ha
GAL APAR	99	xxxxxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxxx+	90	xxxxxxxxxxxxxxxxxx
(38)	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx
STEL MED	110	xxxxxxxxxxxxxxxxxxxx+	120	xxxxxxxxxxxxxxxxxxxx+	49	xxxxxxxxxx
(40)	29	xxxxxx	29	xxxxxx	14	xxx
VER PERS	98	xxxxxxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxxx	89	xxxxxxxxxxxxxxxxxx
(42)	29	xxxxxx	29	xxxxxx	29	xxxxxx
RUM OBTU	87	xxxxxxxxxxxxxxxx	125	xxxxxxxxxxxxxxxxxxx+	0	
(44)	14	xxx	14	xxx	0	
HOLC LAN	4	x	0		0	
(45)	14	xxx	0		0	
AG REPEN	100	xxxxxxxxxxxxxxxxxxxx	91	xxxxxxxxxxxxxxxxxx	91	xxxxxxxxxxxxxxxxxx
(47)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
ALL VIN	98	xxxxxxxxxxxxxxxxxxxx	91	xxxxxxxxxxxxxxxxxx	91	xxxxxxxxxxxxxxxxxx
(49)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
CIRS ARV	100	xxxxxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxx
(50)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
TUS FARF	109	xxxxxxxxxxxxxxxxxxxx+	109	xxxxxxxxxxxxxxxxxxx+	109	xxxxxxxxxxxxxxxxxxx+
(51)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
CONV ARV	37	xxxxxxx	37	xxxxxxx	12	xx
(52)	57	xxxxxxxxxxx	43	xxxxxxxxx	7	x
MILLET	21	xxxx	16	xxx	0	
(55)	36	xxxxxxx	29	xxxxxx	0	
MAIZE + A	109	xxxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxxx	109	xxxxxxxxxxxxxxxxxxx+
(56)	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	57	xxxxxxxxxxx

PRE-EMERGENCE SELECTIVITY EXPERIMENT

PENDIMETHALIN

SPECIES		0.25 Kg/ha		1.0 Kg/ha		4.0 Kg/a
MAIZE	103	xxxxxxxxxxxxxxxxxxxx+	103	xxxxxxxxxxxxxxxxxxxx+	94	xxxxxxxxxxxxxxxxxx
(57)	79	xxxxxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
SORG + A	93	xxxxxxxxxxxxxxxxxx	60	xxxxxxxxxxxx	13	xxx
(58)	36	xxxxxxx	29	xxxxxx	7	x
SORG	87	xxxxxxxxxxxxxxxxx	27	xxxxx	0	
(59)	36	xxxxxxx	29	xxxxxx	0	
RICE	93	xxxxxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxxx	84	xxxxxxxxxxxxxxxx
(60)	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx
PIGEON P	73	xxxxxxxxxxxxxx	64	xxxxxxxxxxxx	64	xxxxxxxxxxxx
(61)	57	xxxxxxxxxx	36	xxxxxxx	21	xxxx
COWPEA	79	xxxxxxxxxxxxxx	88	xxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxx
(62)	100	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
CHICKPEA	111	xxxxxxxxxxxxxxxxxx+	111	xxxxxxxxxxxxxxxxxx+	89	xxxxxxxxxxxxxxxx
(63)	86	xxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	43	xxxxxxxxx
GRNDNUT	55	xxxxxxxxxx	95	xxxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxx
(64)	100	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx
SOYABEAN	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxx
(65)	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx	50	xxxxxxxxx
COTTON	110	xxxxxxxxxxxxxxxxxx+	110	xxxxxxxxxxxxxxxxxx+	100	xxxxxxxxxxxxxxxxxx
(66)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
JUTE	57	xxxxxxxxxx	54	xxxxxxxxxx	35	xxxxxx
(67)	29	xxxxx	29	xxxxxx	14	xxx
KENAF	100	xxxxxxxxxxxxxxxxx	106	xxxxxxxxxxxxxxxxx+	76	xxxxxxxxxxxxx
(68)	93	xxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxx
SESAMUM	70	xxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxx	43	xxxxxxxxx
(70)	43	xxxxxxxxx	21	xxxx	14	xxx

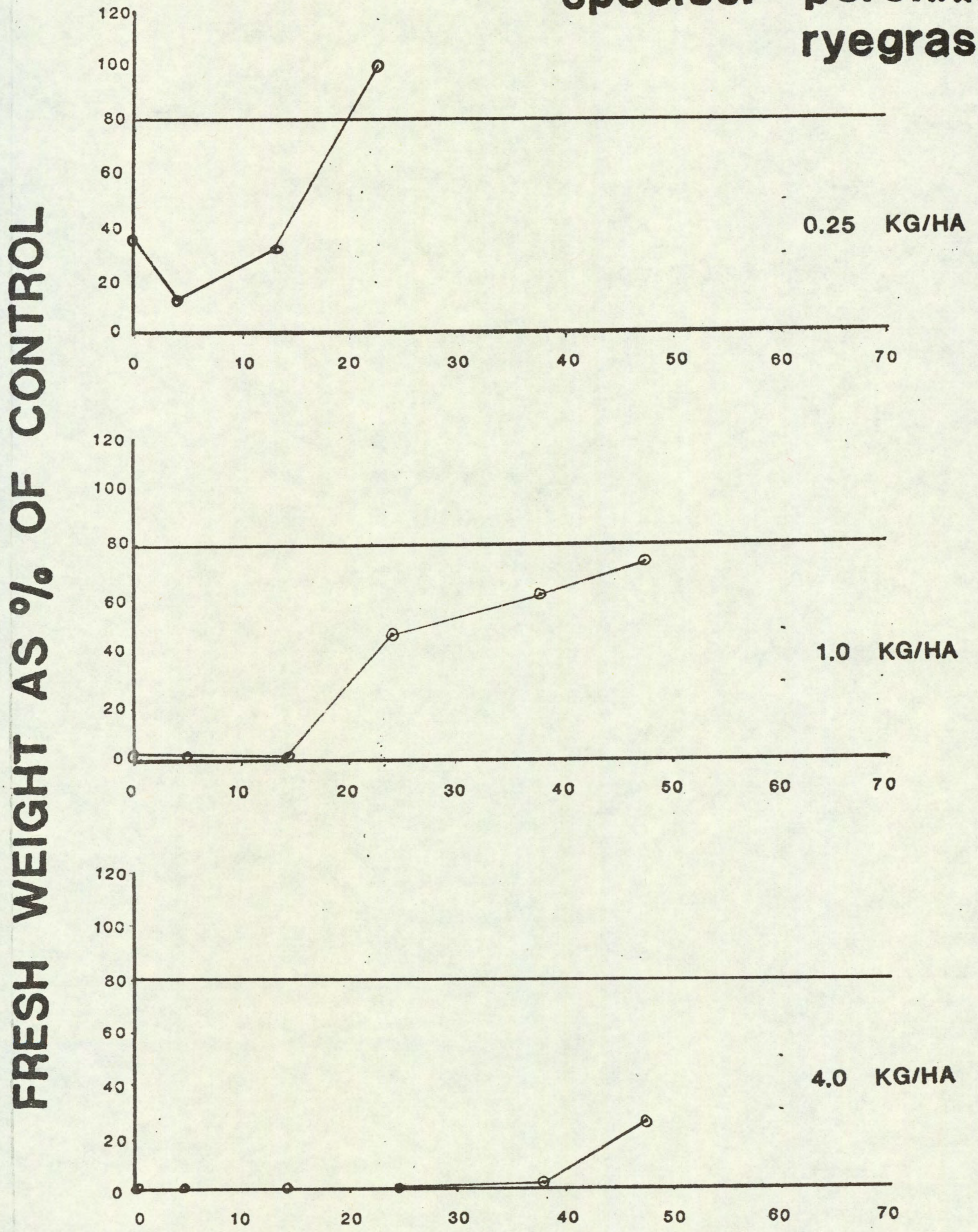
PRE-EMERGENCE SELECTIVITY EXPERIMENT

PENDIMETHALIN

SPECIES							
TOMATO	72	xxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxxx+	114	xxxxxxxxxxxxxxxxxxxx+
(71)	43	xxxxxxxxx	29	xxxxxx	14	xxx
OR PUNCT	85	xxxxxxxxxxxxxxxxx	85	xxxxxxxxxxxxxxxxx	36	xxxxxxx
(73)	50	xxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
ELEU IND	4	x	0		0	
(74)	14	xxx	0		0	
ECH CRUS	0		0		0	
(75)	0		0		0	
ROTT EXA	56	xxxxxxxxxxx	21	xxxx	33	xxxxxxx
(76)	29	xxxxxx	14	xxx	14	xxx
DIG SANG	8	xx	0		0	
(77)	14	xxx	0		0	
AMAR RET	130	xxxxxxxxxxxxxxxxxxx+	52	xxxxxxxxxx	0	
(78)	29	xxxxxx	14	xxx	0	
SNOW POL	7	x	0		0	
(83)	14	xxx	0		0	
PHAL MIN	58	xxxxxxxxxxx	12	xx	0	
(84)	29	xxxxxx	7	x	0	
CYP ROTU	94	xxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxx+	84	xxxxxxxxxxxxxxxxx
(86)	100	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
BROM PEC	94	xxxxxxxxxxxxxxxxx	85	xxxxxxxxxxxxxxxx	23	xxxxx
(88)	79	xxxxxxxxxxxxxxx	57	xxxxxxxxxx	29	xxxxxx

PERSISTENCE OF PENDIMETHALIN

species: perennial ryegrass



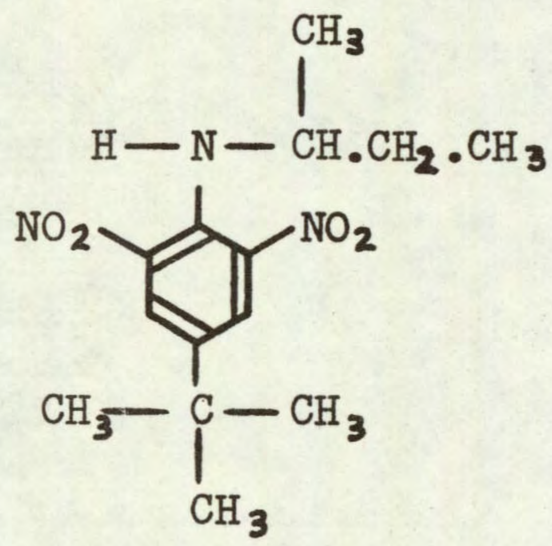
Butralin

Other common name Dibutalin (WSSA approved)

Code number A 820 **Trade name** Amex 820A

Chemical name 2,6-dinitro-N-S-butyl-4-t-butylaniline

Structure



Source Amchem Products Inc.,
Agricultural Research and Development
International Division
Ambler, Pa,
USA

Information available and suggested uses

A pre-emergence or pre-plant incorporated treatment for control of mainly grass and some broad-leaved weeds in cotton, soybeans, watermelons, peanuts, certain types of peas and beans, tobacco, okra, peppers, transplanted tomatoes. It has also been tested for weed control in turf and forestry.

Formulation used 48% w/v a.i. emulsifiable concentrate.

Spray volume for activity experiment 388 l/ha
for pre-emergence selectivity experiment 437 l/ha

RESULTS

Full results are given in the histograms on pages 39-44 and potential selectivities are summarised in the following table.

RATE (kg/a.i./ha)	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced 70% or more
4.0	barley carrot cowpea * soyabean kenaf	Alopecurus myosuroides Polygonum lapathifolium Galium aparine Stellaria media Convolvulus arvensis Rottboellia exaltata Amaranthus retroflexus Bromus pectinatus + species below

1.0	species above + wheat oat pea rape sugar beet radish chickpea groundnut * cotton	Polygonum aviculare Veronica persica + species below
0.25	species above + kale maize + antidote tomato	Poa annua Poa trivialis Rumex obtusifolius Holcus lanatus Eleusine indica Echinochloa crus-galli Digitaria sanguinalis Snowdenia polystachya Phalaris minor

* some stand reduction, but not due to herbicide

Comments on results
Activity experiment

Effects were confined mainly to the soil, particularly the pre-emergence, treatments. In the latter, incorporation increased activity as compared with the surface, spray, for P. amphibium and the grasses, but with kale the reverse effect occurred. This should be borne in mind when considering the results of the selectivity test when butralin was sprayed on the surface. The foliar spray damaged broad-leaved species but only temporarily.

Symptoms

These were typical of other dinitroanaline herbicides, e.g. trifluralin and pendimethalin. The foliar spray caused some minor scorch and chlorosis of the leaves of broad-leaved species, within a day or so of spraying, presumably due to solvent damage. The major symptoms resulting from soil treatments were a severe inhibition of the main shoots and tillers of grasses, leaves often being trapped and consequently deformed, together with an overall darker green colour of foliage. Broad-leaved species treated pre-emergence were often stopped at the cotyledon leaf stage. Where the bud developed beyond this stage, leaves were usually trapped and therefore deformed while colour varied from pale to dark green. At high doses preemergence, there was often a failure to emerge from the soil. Some inhibition of roots and occasionally weakening of stems was noted. In peas and field beans, nodulation was also adversely affected by the higher doses.

Soil persistence

Results are presented in the graph on page 45. Using perennial ryegrass as the sensitive test species, the lower doses of 0.25 and 1.0 kg/ha were undetectable 14 and 24 weeks respectively after spraying. The high dose of 4.0 kg/ha was still causing a 58% reduction in shoot fresh weight, 48 weeks after treatment, however.

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