WEED RESEARCH ORGANIZATION

TECHNICAL REPORT No. 38

THE ACTIVITY AND PRE-EMERGENCE SELECTIVITY OF SOME RECENTLY DEVELOPED HERBICIDES: METAMITRON; HOE 22870; HOE 23408; RH 2915; RP 20630

HOE 22870 is clofop acid, HOE 23408 is diclofop-methyl, RH 2915 is oxyfluorfen

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NOTE

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THE ACTIVITY AND PRE-EMERGENCE SELECTIVITY OF SOME RECENTLY DEVELOPED HERBICIDES: METAMITRON, HOE 22870, HOE 23408, RH 2915 AND RP 20630

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SUMMARY

The pre-emergence selectivities of five new herbicides, applied as soil surface sprays, were tested on a range of 36 temperate and 23 tropical crop and weed species. The persistence of each herbicide in the soil was also determined in conjunction with this test. The foliar and soil activity of each herbicide were examined on six selected species.

Metamitron was found to have great potential for control of nearly all annual broad-leaved and grass weeds, while the tolerance of sugar beet was outstanding. Selective weed control in certain legume crops, such as pea, would also appear to be possible.

HOE 22870 controlled *Veronica persica*, all tropical and certain temperate annual grass weeds, notably *Alopecurus myosuroides*, while temperate cereals (wheat, barley and oat) and all broad-leaved crops were tolerant.

HOE 23408 was an effective treatment for certain grass weeds, notably *Avena fatua* in addition to the tropical annual grasses and *Veronica persica*. Most broad-leaved crops and temperate cereals were tolerant.

RH 2915 has a very high level of activity and gave good control of several annual grass and broad-leaved weeds, as well as the perennial *Allium vineale*. Some large seeded temperate and tropical legumes were tolerant.

RP 20630 exhibited a type of activity similar to the dinitrophenyl ether herbicides and also to the chemically similar oxadiazon. However it would appear to be more effective than oxadiazon on annual broad-leaved weeds, while the control of annual grass weeds is as good. *Convolvulus arvensis* also showed some sensitivity. Groundnut was very tolerant but selectivity in other crops would be very marginal.

All five herbicides have a moderate period of persistence in the soil.

INTRODUCTION

The pre-emergence selectivities of new herbicides are investigated on a large number of pot-grown crop and weed species at WRO. The

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* Herbicide Group
** ODM Tropical Weeds Group

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 measured and these data, in conjunction with crop susceptibilities, are useful in planning 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 to those in the field.

The present report gives pre-emergence selectivity and persistence data on five new herbicides. Results of activity experiments are included to provide information on levels of phytotoxicity, type and route of action.

METHODS AND MATERIALS

The activity experiment was carried out 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) post-emergence to the foliage only, avoiding contact with the soil, (ii) post-emergence to the soil only, as a drench avoiding foliage 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	1-2	1.8	2 unifoliate leaves	1-2 trifoliate leaves	1½-2 trifoliate leaves
Kale (*Brassica oleracea acephala*)	Marrow-stem	15	5-8	0.6	1½-2½ leaves	2½-4½ leaves	3½-4½ leaves
Polygonum amphibium	WRO Clone 1	6	2-4	1.2	2½-7 leaves	3½-8 leaves	6½-11 leaves
Perennial ryegrass (*Lolium perenne*)	S 23	20	10	0.6	2-3 leaves	5-6 leaves tillering	6-10 leaves, tillering
Avena fatua	1969/5 1969/6 Ditchley 1972/3	10	5	1.2	2½-3 leaves	4-6 leaves tillering	4½-7 leaves tillering
Agropyron repens	WRO Clone 31	6	3-5	1.2	2-3½ leaves	4½-6 leaves tillering	6-7 leaves tillering

Techniques for the selectivity experiment differed from previous practice in that all herbicides were applied to the soil surface following planting. Species were sown as detailed in Appendix 1, each being replicated twice for every treatment. Herbicides were applied to the soil surface using a laboratory sprayer operating at a pressure of 2.11 bars (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, normal daylight was supplemented with warm white fluorescent tubes to give a 14 hour photoperiod.

Radish (Raphanus raphanistrum) was included for ease of propagation and may be regarded as a crop or weed. To improve establishment Chenopodium album seeds were kept in 0.1 M potassium nitrate for 48 hours in the light; seeds of Polygonum aviculare were stored moist at 2°C for six months; tubers of Cyperus esculentus were stored moist at 2°C for 2 months to break dormancy. To protect from soil-borne pathogens all seeds except Chenopodium album, Polygonum aviculare and the temperate cereals were pretreated with one of the following: thiram, benomyl (for onion), Harvesan organomercury)for Avena fatua) or ethylmercuric phosphate + dieldrin (for sugar beet). Temperate cereal seeds were purchased already treated with a mercurial seed dressing.

Table 2. Soil and environmental conditions

Experiment number, type and herbicide(s) included	ACTIVITY EXPERIMENT 1 Metamitron RH 2915	 2 HOE 22870 HOE 23408	 3 RP 20630	Pre-emergence Selectivity test Metamitron RH 2915 HOE 22870 RP 20630 HOE 23408	
Date of spraying	26.9.74	14.11.74	7.5.75	16.1.75	
Main assessment completed	6.11.74	19.12.74	6.6.75	20.2.75	
Organic matter (%)	2.8	4.2	4.2	4.2	
Clay content (%)	16	13	13	13	
pH	7.7	7.0	7.0	7.0	
John Innes base fertilizer (g/kg)	5.0	5.0	5.0	1.5	
DDT (5% dust) (g/kg)	0.5	0.5	0.5	0.5	
Fritted trace elements (g/kg)	0.25	0.25	0.25	0.25	
Epsom salts (g/kg)	1.0	1.0	-	0.5	
Temperature (°C)				Temperate	Tropical
Mean	17	17	19	18	23
Maximum	23	23	30	24	30
Minimum	10	8	14	13	12
Relative humidity (%)					
Mean	70	70	60	65	50
Maximum	100	100	90	86	64
Minimum	45	50	26	38	32

Results were processed as before (Richardson and Dean, 1973). Survivors were counted and scored on a 0-7 scale as previously, where 0 = dead and 7 = control. It was not possible to computerise the data for Polygonum aviculare and Senecio vulgaris due to bad germination, while Cyperus esculentus tubers also showed variable sprouting. However observations of herbicidal effects were possible with most treatments and are referred to in the text where appropriate. Oxalis latifolia failed to emerge. Dwarf bean was raised under tropical conditions to improve growth.

Pairs of histograms are presented for each treatment, the upper representing mean plant survival and the lower, mean vigour score, both based on the results expressed as percentages of untreated controls. Each 'x' represents a 5% increment, but in the activity experiment histogram, each 'x' represents a 7% increment. A '+' indicates a value in excess of 100%. The percentage figures for each treatment are also inserted to the left of each histogram. 'R' indicates a result based on one replicate only and 'M' represents a missing treatment.

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

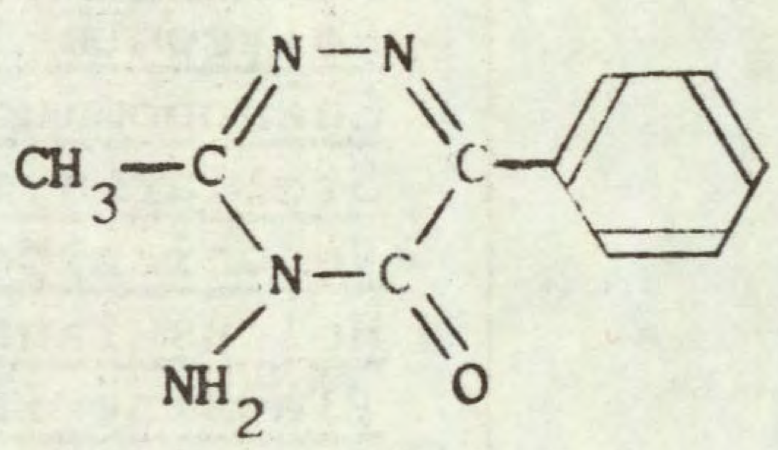
Soil persistence was monitored, in conjunction with the pre-emergence selectivity experiment. The technique differed from previously due to surface application of the compounds. Treated soil was kept in tins in the glasshouse and susceptible species were periodically sown disturbing the soil as little as possible.

METAMITRON

Code number BAYER 6676, DRW 1139 Trade name Goltix

Chemical name 4-amino-3-methyl-6-phenyl-1,2,4-triazin-5-one

Structure



Source Bayer Agrochemicals Ltd
Eastern Way
Bury St Edmunds
Suffolk

Information available and suggested uses

Preliminary investigations in the UK in 1973 showed safety to four sugar beet cultivars up to 10 kg/ha pre- and post-emergence. It controls a broad spectrum of weeds but is less effective against Mercurialis and Polygonum spp. It is recommended at 4 to 5 kg/ha pre-drilling, pre-emergence or post-emergence up to the 1 true leaf stage. If applied when weeds are larger the rate should be 7 kg/ha. Some pre-emergence work at 2 kg/ha has been successful.

Formulation used 70% w/w a.i. wettable powder

Spray volume for activity experiment 305 l/ha
for selectivity experiment 417 l/ha

RESULTS

Full histogram results are given on pages 8-13 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
6.125	sugar beet	Avena fatua Sinapis arvensis Raphanus raphanistrum Galium aparine Agropyron repens Allium vineale Cirsium arvense Tussilago farfara Digitaria sanguinalis + species below

(Table continued overleaf)

RATE (kg ai/ha)	CROPS: Vigour reduced by 15% or less	WEEDS: Number or vigour reduced by 70% or more
1.25	species above + pea sorghum rice pigeon pea groundnut soyabean cotton	Alopecurus myosuroides Polygonum lapathifolium Chenopodium album Stellaria media Veronica persica Holcus lanatus Eleusine indica Tagetes minuta + species below
0.5	species above + wheat dwarf bean perennial ryegrass field bean* cow pea jute*	Poa annua Poa trivialis Tripleurospermum maritimum Solanum nigrum Rumex obtusifolius Amaranthus retroflexus

* but note stand reductions

Comments on results

Activity experiments (see page 8)

Good activity was found on all 6 species in the activity test, although a much higher dose was needed than for the chemically-related metribuzin (Richardson and Dean, 1973). Most of the activity occurred as a result of the soil treatments. The surface and incorporated pre-emergence treatments caused similar degrees of phytotoxicity, although the former were slightly more effective with the smaller seeded and perennial species. The foliar spray was much less active, in contrast to metribuzin (Richardson and Dean, 1973).

Symptoms

Symptoms were similar to those caused by photosynthetic inhibitors such as ureas, triazines and triazinones. A pronounced chlorosis usually preceded die-back as a result of the soil treatments. Germination was not affected. The foliar spray caused some minor scorch and chlorosis, but this did not bring about any mortality of plants.

Soil persistence

White clover was the most sensitive of all the species in the selectivity test being killed at 0.5 kg/ha and it was therefore chosen to monitor persistence of the herbicide in the soil. This same dose was undetectable ten weeks after application. Doses of 1.25 and 6.125 kg/ha caused 38 and 57% reductions in shoot fresh weight respectively, after thirty six weeks, but were undetectable after fifty weeks.

Selectivity among temperate species

At 6.125 kg/ha, all annual and perennial broad-leaved and grass weeds were controlled, with the exception of Convolvulus arvensis. Even at the lowest dose of 0.5 kg/ha, five weed species were controlled and many severely damaged. Composite species were particularly sensitive, observations on Senecio vulgaris showing it to be even more so than Tripleurospermum maritimum, while Cirsium arvense and Tussilago farfara were the most susceptible of all the perennial species, both eventually dying from the 1.25 kg/ha dose. Polygonaceous weeds (P. lapathifolium and P. aviculare) were adequately controlled or even killed by 1.25 kg/ha, in spite of the manufacturers' suggestions to the contrary, while Rumex obtusifolius was susceptible at the lowest dose. In contrast to metribuzin, members of the Solanaceae (Solanum nigrum and tomato) were very sensitive to metamitron.

Metamitron would appear to have great potential for weed control in sugar beet. The tolerance level and margin of selectivity is very high, more so than with other herbicides used in this crop. (In a subsequent post-emergence selectivity test, sugar beet was unaffected by 8.0 kg/ha while excellent weed control was found at this and at lower doses.) A more complete weed control spectrum is apparent than with any other single herbicide used in this crop, and this was achieved with a surface pre-emergence spray, incorporation being unnecessary. The moderate period of persistence in the soil may also mean that late germinating weeds (a problem in sugar beet, especially with Chenopodium album and others) can be controlled, while there would appear to be no danger to a subsequent crop.

Some further investigation on peas would seem worthwhile in view of the control of many problem weeds, notably Polygonum species, in this crop. The potential control of Poa species and Rumex obtusifolius in perennial ryegrass is also of interest and warrants some further experimentation.

Selectivity among tropical species

Selective control of annual broad-leaved weeds and Eleusine indica would appear possible at 1.25 kg/ha in a number of crops including sorghum and pigeon pea but other annual grass weeds were much more tolerant and no outstanding possibilities are apparent.

ACTIVITY EXPERIMENT

METAMITRON

		0.5 kg/ha	2.0 kg/ha	8.0 kg/ha
DWARF BEAN	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxx xxxxxxxx	xxx xx
	I	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxx xxxxxxxx	o o
KALE	F	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxx xxxx	o o
	P	xxxxxxxxxxxxxx + xxxxxxxxxx	xxxxxxxxxxx xxxxxx	o o
	I	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxx	o o
<u>POLYGONUM AMPHIBIUM</u>	F	xxxxxxxxxxxxxx + xxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxx	o o
	P	xxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxx	xxxxxxxxxxxxx xxxxxx
	I	xxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxxx	xxxxxxxxxxxxx xxxxx
PERENNIAL RYEGRASS	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxx xxxxxxx	xxxxxxxxxxxxx xxxx
	P	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxx xxxxxx	o o
	I	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxx	xxx xxxx
<u>AVENA FATUA</u>	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxx	xxxxxxxxxxxxx xxxx	o o
	P	xxxxxxxxxxxxx xxxxxxxxx	xxx xxxxx	o o
	I	xxxxxxxxxxxxx xxxxxxxxx	xx xx	o o
<u>AGROPYRON REPENS</u>	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxx xxxx	xxxxxx xxx
	P	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxx	xxxxxxxx xxxx
	I	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxx	xxxxxxxx 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

SPECIES	METAMITRON 0.50 KG/HA		METAMITRON 1.25 KG/HA		METAMITRON 6.125 KG/HA	
WHEAT	126	xxxxxxxxxxxxxxxxxxxx +	118	xxxxxxxxxxxxxxxxxxxx +	79	xxxxxxxxxxxxxxxx
(1)	93	xxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	29	xxxxxx
BARLEY	102	xxxxxxxxxxxxxxxxxxxx +	89	xxxxxxxxxxxxxxxxxx	19	xxxx
(2)	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	14	xxx
OAT	93	xxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxxx	0	
(3)	64	xxxxxxxxxxxxx	43	xxxxxxxxx	0	
PER RYGR	97	xxxxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxxx	0	
(4)	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	0	
ONION	55	xxxxxxxxxxx	41	xxxxxxxx	0	
(8)	50	xxxxxxxxxx	14	xxx	0	
DWF BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(9)	93	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	29	xxxxxx
FLD BEAN	65	xxxxxxxxxxxxx	91	xxxxxxxxxxxxxxxxxx	0	
(10)	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	0	
PEA	104	xxxxxxxxxxxxxxxxxxxx +	104	xxxxxxxxxxxxxxxxxxxx +	104	xxxxxxxxxxxxxxxxxxxx +
(11)	93	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx
W CLOVER	0		0		0	
(12)	0		0		0	
RAPE	100	xxxxxxxxxxxxxxxxxxxx	53	xxxxxxxxxxx	0	
(14)	57	xxxxxxxxxxx	36	xxxxxxx	0	
KALE	89	xxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx	0	
(15)	57	xxxxxxxxxxx	36	xxxxxxx	0	
CARROT	106	xxxxxxxxxxxxxxxxxxxx +	77	xxxxxxxxxxxxxxx	0	
(18)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	0	

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES	METAMITRON 0.50 KG/HA		METAMITRON 1.25 KG/HA		METAMITRON 6.125 KG/HA	
LETTUCE	75	xxxxxxxxxxxxxxx	4	x	0	
(20)	50	xxxxxxxxxx	21	xxxx	0	
SUG BEET	97	xxxxxxxxxxxxxxxxxxx	105	xxxxxxxxxxxxxxxxxxxx +	86	xxxxxxxxxxxxxxxxx
(21)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
AVE FATU	103	xxxxxxxxxxxxxxxxxxxx +	91	xxxxxxxxxxxxxxxxxx	0	
(26)	71	xxxxxxxxxxxxxx	36	xxxxxxx	0	
ALO MYOS	107	xxxxxxxxxxxxxxxxxxxx +	57	xxxxxxxxxxx	6	x
(27)	57	xxxxxxxxxxx	29	xxxxxx	14	xxx
POA ANN	54	xxxxxxxxxxx	0		0	
(28)	29	xxxxxx	0		0	
POA TRIV	7	x	0		0	
(29)	14	xxx	0		0	
SIN ARV	170	xxxxxxxxxxxxxxxxxxxx +	30	xxxxxx	0	
(30)	79	xxxxxxxxxxxxxxxx	36	xxxxxxx	0	
RAPH RAP	90	xxxxxxxxxxxxxxxxxx	70	xxxxxxxxxxxxxx	0	
(31)	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	0	
TRIP MAR	13	xxx	0		0	
(33)	14	xxx	0		0	
POL LAPA	78	xxxxxxxxxxxxxxxx	52	xxxxxxxxxx	0	
(35)	50	xxxxxxxxxx	21	xxxx	0	
GAL APAR	102	xxxxxxxxxxxxxxxxxxxx +	89	xxxxxxxxxxxxxxxxxx	55	xxxxxxxxxxx
(38)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	14	xxx
CHEN ALB	40	xxxxxxxx	3	x	0	
(39)	43	xxxxxxxxx	7	x	0	

SPECIES	METAMITRON 0.50 KG/HA		METAMITRON 1.25 KG/HA		METAMITRON 6.125 KG/HA	
STEL MED	44	xxxxxxxxx	9	xx	0	
(40)	57	xxxxxxxxxxx	14	xxx	0	
VER PERS	48	xxxxxxxxxx	0		0	
(42)	57	xxxxxxxxxxx	0		0	
SOL NIG	9	xx	0		0	
(43)	14	xxx	0		0	
RUM OBTU	10	xx	5	x	0	
(44)	21	xxxx	7	x	0	
HOLC LAN	88	xxxxxxxxxxxxxxxxxx	18	xxxx	0	
(45)	50	xxxxxxxxxx	21	xxxx	0	
AG REPEN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	73	xxxxxxxxxxxxxxx
(47)	86	xxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	29	xxxxxx
ALL VIN	52	xxxxxxxxxx	62	xxxxxxxxxxxx	21	xxxx
(49)	79	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	29	xxxxxx
CIRS ARV	109	xxxxxxxxxxxxxxxxxxxx +	68	xxxxxxxxxxxxxx	0	
(50)	86	xxxxxxxxxxxxxxxxx	36	xxxxxxx	0	
TUS FARF	100	xxxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxxx	12	xx
(51)	86	xxxxxxxxxxxxxxxxx	36	xxxxxxx	7	x
CONV ARV	150	xxxxxxxxxxxxxxxxxxxx +	138	xxxxxxxxxxxxxxxxxxxx +	46	xxxxxxxxx
(52)	93	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx
(58)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	36	xxxxxxx
SORGHUM	105	xxxxxxxxxxxxxxxxxxxx +	100	xxxxxxxxxxxxxxxxxxxx	74	xxxxxxxxxxxxxxx
(59)	93	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	43	xxxxxxxxx

SPECIES	METAMITRON 0.50 KG/HA		METAMITRON 1.25 KG/HA		METAMITRON 6.125 KG/HA	
RICE	88	xxxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx
(60)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
PIGEON P	77	xxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxxx
(61)	86	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
COWPEA	103	xxxxxxxxxxxxxxxxxxxx +	111	xxxxxxxxxxxxxxxxxxxx +	39	xxxxxxxx
(62)	100	xxxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	14	xxx
CHICKPEA	89	xxxxxxxxxxxxxxxxxx	81	xxxxxxxxxxxxxxxx	41	xxxxxxxx
(63)	79	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	14	xxx
GRNDNUT	93	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxxx +
(64)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx
SOYABEAN	112	xxxxxxxxxxxxxxxxxxxx +	125	xxxxxxxxxxxxxxxxxxxx +	137	xxxxxxxxxxxxxxxxxxxx +
(65)	93	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
COTTON	96	xxxxxxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx
(66)	93	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	36	xxxxxxx
JUTE	53	xxxxxxxxxxx	5	x	0	
(67)	86	xxxxxxxxxxxxxxxxx	36	xxxxxxx	0	
KENAF	104	xxxxxxxxxxxxxxxxxxxx +	69	xxxxxxxxxxxxxx	0	
(68)	64	xxxxxxxxxxxxx	50	xxxxxxxxxx	0	
SESAMUM	78	xxxxxxxxxxxxxxxx	26	xxxxx	0	
(70)	64	xxxxxxxxxxxxx	57	xxxxxxxxxxx	0	
TOMATO	23	xxxxx	0		0	
(71)	29	xxxxxx	0		0	
OR PUNCT	120	xxxxxxxxxxxxxxxxxxxx +	92	xxxxxxxxxxxxxxxxxx	102	xxxxxxxxxxxxxxxxxxxx +
(73)	79	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	36	xxxxxxx

PRE-EMERGENCE SELECTIVITY EXPERIMENT

PRE-EMERGENCE SELECTIVITY EXPERIMENT

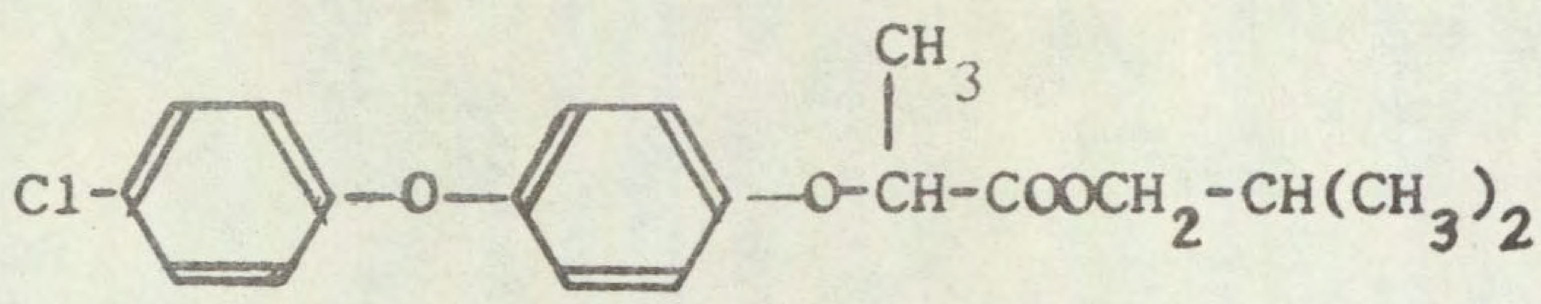
SPECIES	METAMITRON 0.50 KG/HA		METAMITRON 1.25 KG/HA		METAMITRON 6.125 KG/HA	
ELEU IND	76	xxxxxxxxxxxxxxx	31	xxxxxx	0	
(74)	43	xxxxxxxxx	14	xxx	0	
ECH CRUS	94	xxxxxxxxxxxxxxxxxxx	101	xxxxxxxxxxxxxxxxxxxx +	74	xxxxxxxxxxxxxxx
(75)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	43	xxxxxxxxx
ROT EXAL	110	xxxxxxxxxxxxxxxxxxxx +	105	xxxxxxxxxxxxxxxxxxxx +	40	xxxxxxxx
(76)	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	36	xxxxxxx
DIG SANG	119	xxxxxxxxxxxxxxxxxxxx +	150	xxxxxxxxxxxxxxxxxxxx +	6	x
(77)	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	21	xxxx
AMAR RET	7	x	0		0	
(78)	21	xxxx	0		0	
TAG MIN	43	xxxxxxxxx	0		0	
(80)	57	xxxxxxxxxxx	0		0	
CYP ROTU	95	xxxxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxxx +	87	xxxxxxxxxxxxxxxxx
(86)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx

HOE 22870

Code number HOE 22870 **Trade name** -

Chemical name 2-(4-(4'-chlorophenoxy)-phenoxy)-isobutyl propionate

Structure



Source Hoechst Chemicals Ltd
Hoechst House
Kew Bridge
Brentford
Middlesex

Information available and suggested uses

Suggested for control of a range of annual grass weeds, including *Alopecurus myosuroides* in brassicae, carrots, winter and spring cereals (wheat, barley and oats), celery, field beans, lettuce, lucerne, onions, peas, potatoes, spinach and sugar beet, at 0.3-1.0 kg/ha after crop and weed emergence.

Formulation used 36% w/v a.i. emulsifiable concentrate

Spray volume for activity experiment 305 l/ha
for selectivity experiment 417 l/ha

RESULTS

Full results are given in the histograms on pages 17-22 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
5.4	oat dwarf bean field bean pea white clover rape kale carrot lettuce sugar beet pigeon pea cow pea chick pea groundnut soyabean cotton jute kenaf sesamum tomato	*Veronica persica* *Rottboellia exaltata* *Amaranthus retroflexus* + species below

(Table continued overleaf)

RATE (kg ai/ha)	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
0.9	species above + wheat barley radish	Alopecurus myosuroides Poa trivialis Oryza punctata Digitaria sanguinalis + species below
0.15	species above + onion maize sorghum rice	Echinochloa crus-galli Eleusine indica

Comments on results

Activity experiment (see page 17)

Apart from a mild scorch due to the foliar spray, and this only at the highest dose, broad-leaved species were resistant. However all three grass species, particularly perennial ryegrass, were susceptible to all four application methods. In the post-emergence treatments, foliar sprays and soil drenches caused similar degrees of phytotoxicity within each of the grass species. Surface pre-emergence sprays were markedly more active to perennial ryegrass than the incorporated treatments (suggesting the possibility that uptake is greater via the emerging shoots), but *Avena fatua* and *Agropyron repens* showed a similar degree of response to both of the pre-emergence application methods.

Symptoms

A severe inhibition of main shoots occurred on grasses as a result of both types of post-emergence treatment, usually accompanied by chlorosis. In addition, some mild scorch symptoms also developed as a result of the foliar spray. Pre-emergence treatments at the higher doses on the grasses resulted in die-back just before or just after leaf tip emergence from the coleoptile. At lower doses, where leaves did develop, they were often retarded, with very narrow leaf blades, inhibited main shoots and an overall dark green colour. However the most characteristic symptom on the grasses, seen mainly with the soil treatments, especially the soil drenches, but also to some extent with the foliar spray, was a powerful inhibition of the roots, particularly the secondary roots. This resulted in the plants being very weakly anchored in the soil and tending to fall over. In the selectivity experiment, *Veronica persica* died back soon after emergence at the higher doses while plants less severely affected were retarded with crinkled and deformed leaves. *Tripleurospermum maritimum* was retarded in growth at the high dose, due to poor root development. Although the symptoms described are similar in some respects to those caused by nitrophenyl ethers, a more systemic effect is apparent with HOE 22870.

Soil persistence

Perennial ryegrass was used to detect soil residues, this species initially being reduced by 60% in fresh weight of shoots at 0.15 kg/ha and killed at 0.90 and 5.40 kg/ha. No symptoms were detectable when treatments of 0.15 kg/ha were assayed after sixteen weeks. After thirty six weeks, doses of 0.90 and 5.40 kg/ha were undetectable.

Selectivity among temperate species

In the selectivity experiment, two of the smaller seeded annual grass weeds were susceptible, Alopecurus myosuroides and Poa trivialis, there being 83 and 100% mortality respectively with a dose of 0.90 kg/ha. However, Poa annua, Avena fatua and Holcus lanatus were resistant. Veronica persica was the only broad-leaved weed to show susceptibility. A subsequent test has shown that this species can be adequately controlled at a dose of 2.0 kg/ha.

All of the broad-leaved crops showed good tolerance. The cereals showed considerable resistance, especially oats. Onion and, in particular, perennial ryegrass were susceptible.

HOE 22870 shows promise for the control of A. myosuroides in cereals and broad-leaved crops. Unfortunately other important grass weeds and virtually all broad-leaved weeds are resistant, so that its use as a single compound is limited and its compatibility with other herbicides will need to be studied. It is probably of more use as a post-emergence rather than a pre-emergence herbicide, a current test showing even better control of A. myosuroides post-emergence in cereals and broad-leaved crops. However the residual activity would give it some potential as a contact pre-emergence treatment.

Selectivity among tropical species

Excellent control of the annual grass weeds other than Rottboellia was achieved at 0.9 kg/ha or below, and selectivity was good in all the broad-leaved crops. The much higher dose of 5.4 kg/ha was required for control of Rottboellia but even this was still well tolerated by most crops. The excellent margin of safety in jute, kenaf, sesamum, cowpea, cotton and tomato is likely to be of particular interest, though other compounds will have to be added for control of broad-leaved weeds.

ACTIVITY EXPERIMENT

HOE 22870

		0.25 kg/ha	1.00 kg/ha	4.00 kg/ha
DWARF BEAN	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxxxx
	I	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx
KALE	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxx + xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxxxx
	I	xxxxxxxxxxxxxx + xxxxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxxxxxx
<u>POLYGONUM AMPHIBIUM</u>	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx
	P	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx
	I	xxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxxxx
PERENNIAL RYEGRASS	F	xxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxx xxxxxx	xxxxxxxx xxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxx xxxxxxx	x xxx
	P	xxx xxxxx	x x	o o
	I	xxxxxxxxxxxxxx + xxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxx	x xxxx
<u>AVENA FATUA</u>	F	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxx
	P	xxxxxxxxxxxxxx + xxxxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxx
	I	xxxxxxxxxxxxxx + xxxxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxx xxxxxxxxxx
<u>AGROPYRON REPENS</u>	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx
	P	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxx xxxxxxxxx
	I	xxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxx	xxxxxxxxxxxx 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

SPECIES	HOE 22870 0.15 KG/HA		HOE 22870 0.90 KG/HA		HOE 22870 5.40 KG/HA	
WHEAT	103	xxxxxxxxxxxxxxxxxxxxx +	103	xxxxxxxxxxxxxxxxxxxxx +	111	xxxxxxxxxxxxxxxxxxxxxx +
(1)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx
BARLEY	102	xxxxxxxxxxxxxxxxxxxx +	102	xxxxxxxxxxxxxxxxxxxx +	96	xxxxxxxxxxxxxxxxxxx
(2)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx
OAT	93	xxxxxxxxxxxxxxxxxxx	107	xxxxxxxxxxxxxxxxxxxxx +	93	xxxxxxxxxxxxxxxxxxx
(3)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
PER RYGR	59	xxxxxxxxxxxx	3	x	0	
(4)	71	xxxxxxxxxxxxxx	14	xxx	0	
ONION	68	xxxxxxxxxxxxxx	68	xxxxxxxxxxxxxx	41	xxxxxxxx
(8)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	43	xxxxxxxxx
DWF BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(9)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
FLD BEAN	104	xxxxxxxxxxxxxxxxxxxxx +	104	xxxxxxxxxxxxxxxxxxxxx +	91	xxxxxxxxxxxxxxxxxx
(10)	93	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
PEA	78	xxxxxxxxxxxxxxxx	78	xxxxxxxxxxxxxxxx	91	xxxxxxxxxxxxxxxxxx
(11)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
W CLOVER	113	xxxxxxxxxxxxxxxxxxxxxxx +	113	xxxxxxxxxxxxxxxxxxxxxxx +	101	xxxxxxxxxxxxxxxxxxxx +
(12)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
RAPE	105	xxxxxxxxxxxxxxxxxxxxx +	95	xxxxxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxxx
(14)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx
KALE	98	xxxxxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxxxx +	103	xxxxxxxxxxxxxxxxxxxxx +
(15)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
CARROT	92	xxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxxx
(18)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES	HOE 22870 0.15 KG/HA		HOE 22870 0.90 KG/HA		HOE 22870 5.40 KG/HA	
LETTUCE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(20)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
SUG BEET	109	xxxxxxxxxxxxxxxxxxxx +	101	xxxxxxxxxxxxxxxxxxxx +	109	xxxxxxxxxxxxxxxxxxxx +
(21)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
AVE FATU	87	xxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxxx +	99	xxxxxxxxxxxxxxxxxxxx
(26)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
ALO MYOS	72	xxxxxxxxxxxxxx	17	xxx	0	
(27)	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	0	
POA ANN	79	xxxxxxxxxxxxxxxx	85	xxxxxxxxxxxxxxxxx	59	xxxxxxxxxxxx
(28)	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx	43	xxxxxxxxx
POA TRIV	49	xxxxxxxxxx	0		0	
(29)	57	xxxxxxxxxxx	0		0	
SIN ARV	130	xxxxxxxxxxxxxxxxxxxx +	200	xxxxxxxxxxxxxxxxxxxx +	160	xxxxxxxxxxxxxxxxxxxx +
(30)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
RAPH RAP	75	xxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx
(31)	93	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx
TRIP MAR	68	xxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxxxx	72	xxxxxxxxxxxxxx
(33)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx
POL LAPA	143	xxxxxxxxxxxxxxxxxxxx +	52	xxxxxxxxxx	143	xxxxxxxxxxxxxxxxxxxx +
(35)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx
GAL APAR	102	xxxxxxxxxxxxxxxxxxxx +	89	xxxxxxxxxxxxxxxxxx	89	xxxxxxxxxxxxxxxxxx
(38)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
CHEN ALB	109	xxxxxxxxxxxxxxxxxxxx +	102	xxxxxxxxxxxxxxxxxxxx +	76	xxxxxxxxxxxxxxx
(39)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx

SPECIES	HOE 22870 0.15 KG/HA		HOE 22870 0.90 KG/HA		HOE 22870 5.40 KG/HA	
STEL MED	84	xxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxxx
(40)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
VER PERS	70	xxxxxxxxxxxxx	70	xxxxxxxxxxxxx	0	
(42)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	0	
SOL NIG	96	xxxxxxxxxxxxxxxxxx	117	xxxxxxxxxxxxxxxxxxx +	104	xxxxxxxxxxxxxxxxxxx +
(43)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
RUM OBTU	112	xxxxxxxxxxxxxxxxxxx +	97	xxxxxxxxxxxxxxxxxx	81	xxxxxxxxxxxxxxx
(44)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
HOLC LAN	103	xxxxxxxxxxxxxxxxxxx +	97	xxxxxxxxxxxxxxxxxx	44	xxxxxxxxx
(45)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	36	xxxxxxx
AG REPEN	73	xxxxxxxxxxxxxx	109	xxxxxxxxxxxxxxxxxxx +	91	xxxxxxxxxxxxxxxxx
(47)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
ALL VIN	72	xxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxx
(49)	86	xxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
CIRS ARV	95	xxxxxxxxxxxxxxxxxx	109	xxxxxxxxxxxxxxxxxxx +	109	xxxxxxxxxxxxxxxxxxx +
(50)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
TUS FARF	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxx
(51)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
CONV ARV	81	xxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxxx +	127	xxxxxxxxxxxxxxxxxxx +
(52)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxx
(58)	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	36	xxxxxxx
SORGHUM	95	xxxxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxx	89	xxxxxxxxxxxxxxxxx
(59)	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	50	xxxxxxxxx

PRE-EMERGENCE SELECTIVITY EXPERIMENT

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES	HOE 22870 0.15 KG/HA		HOE 22870 0.90 KG/HA		HOE 22870 5.40 KG/HA	
RICE	97	xxxxxxxxxxxxxxxxxxx	22	xxxx	0	
(60)	86	xxxxxxxxxxxxxxxxx	36	xxxxxxx	0	
PIGEON P	87	xxxxxxxxxxxxxxxxx	135	xxxxxxxxxxxxxxxxxxxx +	126	xxxxxxxxxxxxxxxxxxxx +
(61)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
COWPEA	95	xxxxxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxxx	111	xxxxxxxxxxxxxxxxxxxx +
(62)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx
CHICKPEA	97	xxxxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxxx	97	xxxxxxxxxxxxxxxxxxx
(63)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
GRNDNUT	93	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx
(64)	79	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
SOYABEAN	100	xxxxxxxxxxxxxxxxxxxx	112	xxxxxxxxxxxxxxxxxxxx +	125	xxxxxxxxxxxxxxxxxxxx +
(65)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
COTTON	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxxxx
(66)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
JUTE	92	xxxxxxxxxxxxxxxxxx	116	xxxxxxxxxxxxxxxxxxxx +	92	xxxxxxxxxxxxxxxxxx
(67)	93	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx
KENAF	98	xxxxxxxxxxxxxxxxxxxx	110	xxxxxxxxxxxxxxxxxxxx +	92	xxxxxxxxxxxxxxxxxx
(68)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
SESAMUM	104	xxxxxxxxxxxxxxxxxxxx +	98	xxxxxxxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxxxx +
(70)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx
TOMATO	110	xxxxxxxxxxxxxxxxxxxx +	115	xxxxxxxxxxxxxxxxxxxx +	104	xxxxxxxxxxxxxxxxxxxx +
(71)	93	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
OR PUNCT	51	xxxxxxxxxx	5	x	0	
(73)	71	xxxxxxxxxxxxxx	29	xxxxxx	0	

PRE-EMERGENCE SELECTIVITY EXPERIMENT

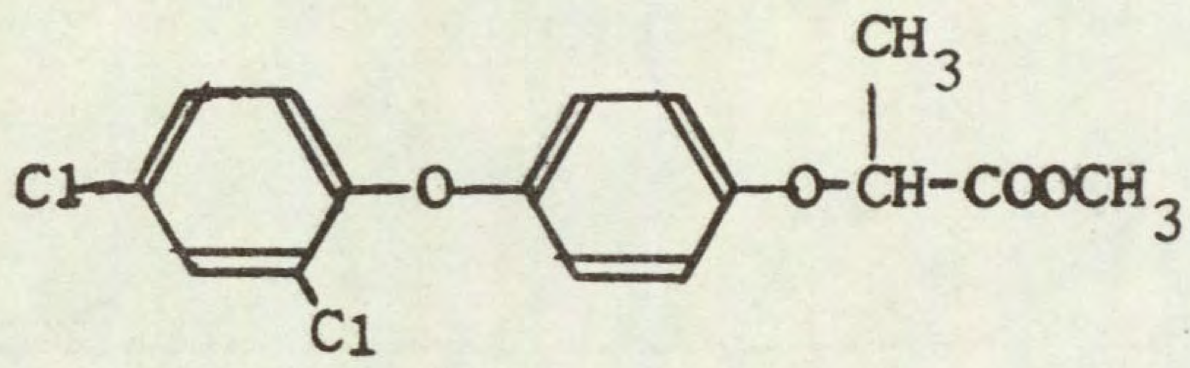
SPECIES	HOE 22870 0.15 KG/HA		HOE 22870 0.90 KG/HA		HOE 22870 5.40 KG/HA	
ELEU IND	6	x	0		0	
(74)	14	xxx	0		0	
ECH CRUS	30	xxxxxx	0		0	
(75)	50	xxxxxxxxxx	0		0	
ROT EXAL	115	xxxxxxxxxxxxxxxxxxxx +	100	xxxxxxxxxxxxxxxxxxxx	85	xxxxxxxxxxxxxxxxx
(76)	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	29	xxxxxx
DIG SANG	137	xxxxxxxxxxxxxxxxxxxx +	25	xxxxx	0	
(77)	43	xxxxxxxxx	29	xxxxxx	0	
AMAR RET	64	xxxxxxxxxxxxx	129	xxxxxxxxxxxxxxxxxxxx +	29	xxxxxx
(78)	93	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
TAG MIN	90	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	51	xxxxxxxxxx
(80)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
CYP ROTU	79	xxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxxx +
(86)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx

HOE 23408

Code number HOE 23408 **Trade name** -

Chemical name 2-(4-(2',4'-dichlorophenoxy)-phenoxy)-methylpropionate

Structure



Source Hoechst Chemicals Ltd
Hoechst House
Kew Bridge
Brentford
Middlesex

Information available and suggested uses

Suggested for control of a range of annual grass weeds, including *Avena fatua* in brassicas, carrots, spring and winter cereals (barley and wheat), celery, field beans, lettuce, lucerne, onions, peas, potatoes, spinach and sugar beet at 0.5-1.5 kg/ha post-crop and weed emergence. It is also believed to be effective against *Alopecurus myosuroides* but not *Poa annua*.

Formulation used 36% w/v a.i. emulsifiable concentrate

Spray volume for activity experiment 305 l/ha
for selectivity experiment 417 l/ha

RESULTS

Full results are given in the histograms on pages 26-31 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
5.4	wheat dwarf bean field bean pea white clover rape kale carrot lettuce sugar beet radish pigeon pea cow pea chick pea tomato soyabean cotton kenaf	*Avena fatua* *Alopecurus myosuroides* *Poa annua* *Veronica persica* *Rottboellia exaltata* + species below

(Table continued overleaf)

RATE (kg ai/ha)	CROPS: Vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
0.9	species above + barley oat onion sesamum	Poa trivialis Holcus lanatus Oryza punctata Echinochloa crus-galli Digitaria sanguinalis + species below
0.15	species above + maize sorghum groundnut jute	Eleusine indica

Comments on results

Activity experiment (see page 26)

The level and type of activity was generally very similar to that found with HOE 22870. However perennial ryegrass and in particular *Avena fatua* were more sensitive to HOE 23408. Also there was a tendency for more post-emergence foliar than soil drench activity on these two species.

Symptoms

Symptoms produced on susceptible species were also very similar to those caused by HOE 22870. Considerable scorch damage was seen on *A. fatua* with the foliar spray while some leaves varied in colour from dark green to yellow. Development of the secondary roots was severely inhibited resulting in plants falling over from the base. This latter symptom was also seen in the pre-emergence treatments, while the retarded leaves and shoots again varied in colour from very dark to pale green.

Soil persistence

Using perennial ryegrass as the sensitive test species a moderate period of persistence in the soil has been found. The dose of 0.15 kg/ha was undetectable sixteen weeks after application, After thirty six weeks, 0.90 kg/ha no longer caused any symptoms but after fifty weeks 5.4 kg/ha reduced shoot fresh weight by 90%.

Selectivity among temperate species

In the selectivity test, as with HOE 22870, activity was found on certain annual grass weeds. However HOE 23408 was much more active on *A. fatua* and much less active on *Alopecurus myosuroides*. The same difference in response between the *Poa* species was found as with HOE 22870, *P. trivialis* being more susceptible than *P. annua*. However the latter species was more sensitive to HOE 23408 than to HOE 22870. *Holcus lanatus* was also much more sensitive to HOE 23408 with 74 and 100% plant mortality at 0.90 and 5.4 kg/ha respectively. All perennial and nearly all broad-leaved weeds were resistant. *Veronica persica* was controlled at 5.40 kg/ha while *Tripleurospermum maritimum* was also reduced at this dose, again corresponding to HOE 22870.

All the broad-leaved crops were tolerant. Wheat tolerated 5.40 kg/ha while barley and oat were only slightly affected. Perennial ryegrass was sensitive, slightly more so than to HOE 22870. Unfortunately onion showed a very variable response and a further experiment is necessary before any conclusions can be drawn regarding this species.

Although HOE 23408 has shown some potential in these tests for controlling certain annual grass weeds, notably A. fatua, in most broad-leaved crops and cereals, it is likely to be of greater benefit as a post-emergence spray than as a pre-emergence treatment, a subsequent test showing that A. fatua is more sensitive post-emergence. However it has certain features of interest as a pre-emergence treatment and the advantage that incorporation is unnecessary. Also it is noteworthy that it is capable of controlling A. fatua in cultivated oat, pre-emergence, although the margin of selectivity is not great.

Selectivity among tropical species

The activity of this compound on tropical grass species was very similar to that of HOE 22870, but safety on broad-leaved crops was not quite so good. Selectivity against annual grasses was therefore a little narrower but still excellent for all broad-leaved crops other than perhaps jute and groundnut. Rottboellia required a higher dose than other annual grasses but could still be controlled selectively in most of the broad-leaved crops. Broad-leaved weeds and Cyperus rotundus were resistant and other compounds would have to be used to achieve control of a complete weed spectrum.

If field performance is good under varying soil moisture conditions this could be a very safe and useful treatment for crops such as cotton, kenaf, sesamum, cowpea and other legumes.

ACTIVITY EXPERIMENT

HOE 23408

		0.25 kg/ha	1.00 kg/ha	4.00 kg/ha
DWARF BEAN	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx
	P	xxxxxxxxxxxxxx + xxxxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxxx
	I	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx
KALE	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx
	P	xxxxxxxxxxxxxx + xxxxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxx
	I	xxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx
POLYGONUM AMPHIBIUM	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx
	I	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx
PERENNIAL RYEGRASS	F	xxxxxxxxxx xxxx	xxxxxx xxx	o o
	S	xxxxxxxxxxx xxxxxxxxxx	xxx xxxxx	xxx xxxx
	P	x xx	o o	o o
	I	xxxxxxxxxxxxxx + xxxxxxxxxxxx	xxxxxxxxx xxxxx	o o
AVENA FATUA	F	xxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxx xxxx	xxxxxxx xxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxx	x xx
	P	xxxxxxxxxxxxxx + xxxxxxxx	xxxxxxxxxxx xxxxxxx	xxxxx xxxx
	I	xxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxx xxxxxxx
AGROPYRON REPENS	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx
	I	xxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxxx	xxxxxxxxxxxx xxxxxxx

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

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES	HOE 23408 0.15 KG/HA		HOE 23408 0.90 KG/HA		HOE 23408 5.40 KG/HA	
WHEAT	118	xxxxxxxxxxxxxxxxxxxx +	111	xxxxxxxxxxxxxxxxxxxx +	118	xxxxxxxxxxxxxxxxxxxx +
(1)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
BARLEY	102	xxxxxxxxxxxxxxxxxxxx +	102	xxxxxxxxxxxxxxxxxxxx +	102	xxxxxxxxxxxxxxxxxxxx +
(2)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx
OAT	73	xxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(3)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
PER RYGR	31	xxxxxx	7	x	0	
(4)	57	xxxxxxxxxxx	21	xxxx	0	
ONION	41	xxxxxxxx	95	xxxxxxxxxxxxxxxxxxx	41	xxxxxxxx
(8)	64	xxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
DWF BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(9)	93	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
FLD BEAN	91	xxxxxxxxxxxxxxxxxx	104	xxxxxxxxxxxxxxxxxxxx +	104	xxxxxxxxxxxxxxxxxxxx +
(10)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
PEA	104	xxxxxxxxxxxxxxxxxxxx +	104	xxxxxxxxxxxxxxxxxxxx +	104	xxxxxxxxxxxxxxxxxxxx +
(11)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
W CLOVER	119	xxxxxxxxxxxxxxxxxxxx +	95	xxxxxxxxxxxxxxxxxxx	101	xxxxxxxxxxxxxxxxxxxx +
(12)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
RAPE	79	xxxxxxxxxxxxxxxx	89	xxxxxxxxxxxxxxxxxx	95	xxxxxxxxxxxxxxxxxxx
(14)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
KALE	98	xxxxxxxxxxxxxxxxxxxx	98	xxxxxxxxxxxxxxxxxxxx	103	xxxxxxxxxxxxxxxxxxxx +
(15)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
CARROT	87	xxxxxxxxxxxxxxxxx	102	xxxxxxxxxxxxxxxxxxxx +	102	xxxxxxxxxxxxxxxxxxxx +
(18)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx

SPECIES	HOE 23408 0.15 KG/HA		HOE 23408 0.90 KG/HA		HOE 23408 5.40 KG/HA	
LETTUCE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	96	xxxxxxxxxxxxxxxxxxx
(20)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
SUG BEET	109	xxxxxxxxxxxxxxxxxxxx +	97	xxxxxxxxxxxxxxxxxxx	105	xxxxxxxxxxxxxxxxxxxx +
(21)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
AVE FATU	99	xxxxxxxxxxxxxxxxxxxx	99	xxxxxxxxxxxxxxxxxxxx	43	xxxxxxxxx
(26)	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	21	xxxx
ALO MYOS	100	xxxxxxxxxxxxxxxxxxxx	84	xxxxxxxxxxxxxxxxx	16	xxx
(27)	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	43	xxxxxxxxx
POA ANN	88	xxxxxxxxxxxxxxxxxx	48	xxxxxxxxxx	0	
(28)	71	xxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	0	
POA TRIV	42	xxxxxxxx	7	x	0	
(29)	50	xxxxxxxxxx	14	xxx	0	
SIN ARV	140	xxxxxxxxxxxxxxxxxxxx +	170	xxxxxxxxxxxxxxxxxxxx +	100	xxxxxxxxxxxxxxxxxxxx
(30)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx
RAPH RAP	105	xxxxxxxxxxxxxxxxxxxx +	80	xxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(31)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
TRIP MAR	91	xxxxxxxxxxxxxxxxxx	108	xxxxxxxxxxxxxxxxxxxx +	55	xxxxxxxxxxx
(33)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
POL LAPA	117	xxxxxxxxxxxxxxxxxxxx +	91	xxxxxxxxxxxxxxxxxx	91	xxxxxxxxxxxxxxxxxx
(35)	93	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx
GAL APAR	89	xxxxxxxxxxxxxxxxxx	116	xxxxxxxxxxxxxxxxxxxx +	89	xxxxxxxxxxxxxxxxxx
(38)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
CHEN ALB	99	xxxxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxxx	89	xxxxxxxxxxxxxxxxxx
(39)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx

PRE-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES	HOE 23408 0.15 KG/HA	HOE 23408 0.90 KG/HA	HOE 23408 5.40 KG/HA
STEL MED	99	111 +	67
(40)	100	100	93
VER PERS	118 +	91	11
(42)	100	100	21
SOL NIG	65	130 +	104 +
(43)	100	100	86
RUM OBTU	76	81	127 +
(44)	93	100	100
HOLC LAN	94	26	0
(45)	86	36	0
AG REPEN	109 +	100	109 +
(47)	100	100	86
ALL VIN	31	124 +	134 +
(49)	64	93	100
CIRS ARV	68	95	95
(50)	100	100	100
TUS FARF	100	87	75
(51)	93	100	100
CONV ARV	138 +	92	138 +
(52)	100	100	93
MAIZE	100	100	60
(58)	100	71	21
SORGHUM	100	105 +	79
(59)	100	64	43