WEED RESEARCH ORGANIZATION

THE ACTIVITY AND POST-EMERGENCE SELECTIVITY OF SOME RECENTLY DEVELOPED HERBICIDES: HOE 22870, HOE 23408, FLAMPROP-METHYL, METAMITRON AND CYPERQUAT

HOE 22870 is clofop acid, HOE 23408 is diclofop-methyl

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NOTE

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THE ACTIVITY AND POST-EMERGENCE SELECTIVITY OF SOME RECENTLY DEVELOPED HERBICIDES: HOE 22870, HOE 23408, FLAMPROP-METHYL, METAMITRON AND CYPERQUAT

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SUMMARY

Five herbicides were examined for their early post-emergence selectivity on 61 temperate and tropical crop and weed species. The route of action for two of these herbicides, flamprop-methyl and cyperquat, was determined on six selected species in a separate test.

HOE 22870 was found to control Alopecurus myosuroides and certain tropical annual grass weeds in temperate cereals, onions and the majority of broad-leaved crops.

HOE 23408 exhibited a spectrum of activity similar to that of HOE 22870 but also controlled Avena fatua. The control of A. myosuroides however was not as efficient as with HOE 22870.

Flamprop-methyl exhibited potential control of certain grass weeds notably A. fatua in wheat, barley, perennial ryegrass and several broad-leaved crops. This herbicide was also found to possess some activity through the soil.

The outstanding feature with metamitron was the very high tolerance of sugar beet at doses which provided excellent control of most annual weeds.

Cyperquat was found to have a high specificity for controlling Cyperus species while several temperate and tropical crops were tolerant.

INTRODUCTION

The pre- and post-emergence 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. Attention is drawn to the limitations of these investigations; e.g. 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; plant responses in pot experiments can be very different to those in the field.

The present report gives indications of the post-emergence selectivity of five new herbicides. Results of activity experiments are included for flamprop-methyl and cyperquat to provide information on levels of phytotoxicity, type and route of action. Those for HOE 22870, HOE 23408 and metamitron were reported previously (Richardson et al., 1976).

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* Herbicide Group
† ODM Tropical Weeds Group

METHODS AND MATERIALS

(a) Activity experiments

The activity experiments were carried out on six selected species as described previously (Richardson and Dean, 1974). 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 (AE)

Species	Cultivar/ source	No. per pot at spraying		Depth of planting (cm)	Post-emergence stage at 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	1-1½ trifoliate leaves	1½-2 trifoliate leaves
Kale (*Brassica oleracea acephala*)	Marrow-stem	15	5	0.6	1½-2½ leaves	2½-4½ leaves	3½-4½ leaves
Polygonum amphibium	WRO Clone 1	6	3-4	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	6-8 leaves, tillering
Avena fatua	WRO 69-5 (AE1) 72-3 (AE2)	10	4-5	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

(b) Post-emergence selectivity experiment

The technique for this experiment was as before (Richardson and Dean, 1974). Plants were raised in 8.9 cm diameter plastic pots in a sandy loam topsoil from a field at Begbroke Hill. Soil conditions are summarised in Table 2. Planting dates were staggered so that the majority of plants had reached the 2-4 leaf stage by the time of spraying. Temperate species were raised in the open and tropical species in the glasshouse. Environmental conditions during the course of the experiment are recorded in Table 2.

Table 2. Soil and environmental conditions

Experiment number, type and herbicide(s) included	AE 1 Cyperquat	AE 2 Flamprop-methyl	Post-emergence selectivity test HOE 22870 Metamitron HOE 23408 Cyperquat Flamprop-methyl	
Date of spraying	26.9.74	7.5.75	17.6 and 26.6.75	
Main assessment completed	6.11.74	6.6.75	15.7.75	
Organic matter (%)	2.8	4.2	4.2	
Clay content (%)	16	13	13	
pH	7.7	7.0	7.0	
John Innes Base fertilizer (g/kg)	5.0	5.0	4.0	
DDT (5% dust) (g/kg)	0.5	0.5	0.5	
Fitted trace elements (g/kg)	0.25	0.25	0.25	
Epsom salts (g/kg)	1.0	-	1.0	
Temperature (°C)			Temperate	Tropical
Mean	17	19	17	25
Maximum	23	30	25	34
Minimum	10	14	5	18
Relative humidity (%)				
Mean	70	60	65	55
Maximum	100	90	100	75
Minimum	45	26	30	30

Before spraying all species were thinned to constant number with a maximum of 9 plants per pot. Certain plant material was pre-treated to improve establishment. Chenopodium album seeds were soaked in 0.1 M potassium nitrate solution and kept in the light 3 days prior to planting. Seeds of Polygonum aviculare were kept moist at 2°C for 6 months before sowing. Tubers of Cyperus esculentus were stored moist at 4°C for 4 weeks prior to planting to break dormancy while bulbs of Oxalis latifolia were stored at 2°C for 4 weeks prior to heating at 45°C for 4 hours before planting. Perennial species were propagated vegetatively as denoted in Appendix 1.

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. Immediately after sowing a 2% solution of polyvinyl alcohol (Elvanol) was applied to the soil surface of pots of those species normally slow to germinate or which are susceptible to soil capping, to improve emergence.

Stages of growth (exclusive of cotyledons) at spraying and at assessment are summarised in Appendix 1. After spraying the plants were protected from rainfall for 24 hours and then given an overhead watering to wash any residues off the foliage. The pots were then returned to their original position in the glasshouse or the open. Additional fertiliser in solution and insecticide and fungicide were applied to individual species as required.

Radish (Raphanus raphanistrum) was included for ease of propagation and may be regarded as a crop or weed. Snowdenia polystachya was treated at more than one stage of growth, each being given a different computer number i.e. 83 and 84 (see histograms and Appendix 1). Several species, notably the perennials, were kept for a period of several weeks to observe later effects on the degree of recovery from injury and these final observations are referred to in the text.

(c) Assessment and processing of results

Results were processed as before (Richardson and Dean, 1974). Survivors were counted and scored on a 0-7 scale as previously, where 0 = dead and 7 = control.

Histograms are presented for each traatment and consist of a pair of figures; the upper figure represents mean plant survival and the lower, mean vigour score, both calculated as percentages of untreated controls. The same information is displayed as a histogram where each 'x' represents a 5% increment, but in the activity experiment histograms, 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.

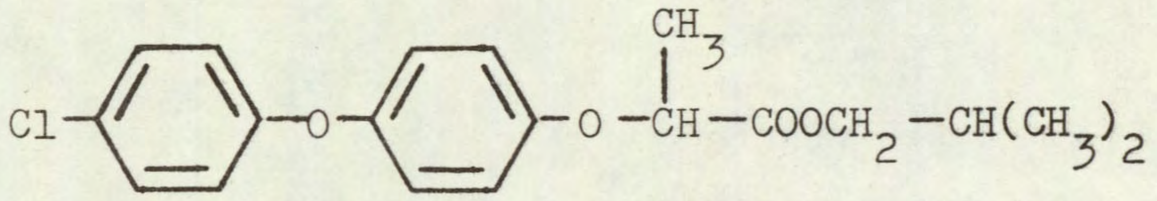
A table of observed selectivities, using the criteria specified, are presented for each compound along with comments to highlight salient points.

HOE 22870

Code number HOE 22870 Trade name -

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

Structure



Source

Hoechst UK Limited
Agricultural Department
Hoechst House
Salisbury Road
Hounslow, Middlesex TW4 6JH

Information available and suggested uses

Suggested for control of a range of annual grass weeds including Alopecurus myosuroides in brassicas, 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 200 l/ha

RESULTS

Full histogram results are presented on pages 8-13 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 by 70% or more
3.0	barley oat onion dwarf bean field bean pea white clover rape kale cabbage carrot parsnip lettuce sugar beet radish	Oryza punctata + species below

(Table continued overleaf)

RATE kg a.i./ha	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
3.0	pigeon pea chickpea groundnut soyabean tobacco sesamum tomato	Oryza punctata + species below
1.0	species above + wheat swede cotton jute kenaf	species below
0.33	species above + perennial ryegrass rice cowpea	Alopecurus myosuroides Eleusine indica Echinochloa crus-galli

Comments on results

The results of the activity experiment were reported earlier (Richardson et al., 1976) when it was found that HOE 22870 was highly active on certain grasses, especially as foliar or pre-emergence surface sprays. Symptoms were reminiscent of those caused by dinitrophenyl ethers except that a more systemic effect was found, including a powerful inhibition of the root systems.

Selectivity amongst temperate species

Alopecurus myosuroides was highly sensitive, being adequately controlled by 0.33 kg/ha. Some suppression of Poa species was also found. However Avena fatua was resistant as were all other weeds tested.

All broad-leaved crops were tolerant, only swede being slightly checked at 3.0 kg/ha. Barley and oat were tolerant at this dose, while wheat was later found to have recovered from minor initial effects. Onion also showed complete tolerance. Perennial ryegrass was sensitive at 1.0 and 3.0 kg/ha.

Some potential control of A. myosuroides may be expected in broad-leaved and cereal crops. The residual effect in the soil, reported earlier (Richardson et al., 1976), could also prove advantageous for controlling later germinating seedlings. The resistance of other grass weeds is a disadvantage and compatibility with other herbicides will need to be examined. The sensitivity of perennial ryegrass to HOE 22870 may be of interest, as this species has been known to cause problems in cereals in recent years. Also there is now a need for a herbicide to suppress this species in order to allow clovers to become better established in leys and grassland. HOE 22870 would appear to be a

strong candidate for this purpose. It is one of the only herbicides which can selectively control A. myosuroides and ryegrass in a wide range of crops as a post-emergence foliar spray, although there are several which can do this pre-emergence. Furthermore, the results here suggest that the susceptibility of A. myosuroides is such that control of this species could be achieved even in perennial ryegrass. Recent work by Schwerdtle & Schumacher (1975) has also shown that A. myosuroides is still susceptible at relatively late growth stages.

The pattern of selectivity was generally similar to that tound pre-emergence (Richardson et al., 1976). Although A. myosuroides was slightly more sensitive post-emergence, Poa species were more sensitive pre-emergence, especially P. trivialis. Also Veronica persica was resistant post-emergence in contrast to its susceptibility pre-emergence.

Selectivity among tropical crops

The outstanding features of this compound and the related HOE 23408 are their remarkable safety on tropical legumes and several other broad-leaved crops combined with very high activity on several of the major annual grasses. Eleusine and Echinochloa should be selectively controlled in all the broad-leaved crops tested and the safety in crops such as tobacco, jute, kenaf, pigeon pea, sesamum and tomato is particularly notable. Digitaria sanguinalis was considerably more tolerant, partly because it was at a rather more advanced stage of growth than other species at the time of spraying, but it is understood from the manufacturers that this species is more resistant in the field too. Pre-emergence results already published (Richardson et al., 1976) show that it can be controlled at that stage, and early post-emergence treatment might also be effective. Increased tolerance with age is shown by Snowdenia polystachya (a serious grass weed of cereals in Ethiopia) of which there were two sets in this experiment. The older set (computer code 84) being appreciably less affected than the younger set (83). Although the younger set was not apparently too well controlled at the time of the main assessment the plants were greatly weakened by damage to their adventitious root systems and the effects from 3 kg/ha became more severe subsequently and most plants would eventually have died. It appears possible that a dose of about 2 kg/ha would be selective against this weed in wheat but further testing is needed with both species being treated under the same conditions. Rottboellia was also severely weakened at 1 and 3 kg/ha and selective control should be possible in most broad-leaved crops. Again root systems were affected and many plants collapsed at soil level.

HOE 22870 is slightly less active than HOE 23408 and higher doses might be needed in the field but it apparently has greater intrinsic safety on jute, kenaf and sesamum and might be particularly useful in those crops.

POST-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		HOE 22870 0.33 kg/ha		HOE 22870 1.0 kg/ha		HOE 22870 3.0 kg/ha
WHEAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(1)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx
BARLEY	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(2)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
OAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(3)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
PER RYGR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	62	xxxxxxxxxxx
(4)	86	xxxxxxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
ONION	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(8)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
DWF BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(9)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
FLD BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(10)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
PEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(11)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
W CLOVER	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(12)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
RAPE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(14)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
KALE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(15)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx

POST-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		HOE 22870 0.33 kg/ha		HOE 22870 1.0 kg/ha		HOE 22870 3.0 kg/ha
CABBAGE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(16)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
SWEDE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(17)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
CARROT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(18)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
PARSNIP	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(19)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
LETTUCE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(20)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
SUG BEET	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(21)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
AVE FATU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(26)	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
ALO MYOS	69	xxxxxxxxxxxxxx	44	xxxxxxxxx	12	xx
(27)	29	xxxxxx	21	xxxx	7	x
POA ANN	69	xxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(28)	64	xxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
POA TRIV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	62	xxxxxxxxxxxx
(29)	57	xxxxxxxxxxx	50	xxxxxxxxxx	43	xxxxxxxxx
SIN ARV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(30)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx

POST-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		HOE 22870 0.33 kg/ha		HOE 22870 1.0 kg/ha		HOE 22870 3.0 kg/ha
RAPH RAP	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(31)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
TRIP MAR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xsxxxxxxxxxxxxxxxxxx
(33)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
SEN VULG	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(34)	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
POL LAPA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(35)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
POL AVIC	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(36)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
GAL APAR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(38)	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
CHEN ALB	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(39)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
STEL MED	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(40)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
SPER ARV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(41)	100	xx xxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
VER PERS	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(42)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
RUM OBTU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(44)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx

POST-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		HOE 22870 0.33 kg/ha		HOE 22870 1.0 kg/ha		HOE 22870 3.0 kg/ha
AG REPEN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(47)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
AG STOLO	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(48)	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	0		0	
(58)	57	xxxxxxxxxx	0		0	
SORGHUM	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxx
(59)	64	xxxxxxxxxxxx	57	xxxxxxxxxx	43	xxxxxxxx
RICE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(60)	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	50	xxxxxxxxx
PIGEON P	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(61)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
COWPEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(62)	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
CHICKPEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(63)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
GRNDNUT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(64)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx
SOYABEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(65)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
COTTON	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(66)	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx

POST-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES	HOE 22870 0.33 kg/ha		HOE 22870 1.0 kg/ha		HOE 22870 3.0 kg/ha	
JUTE	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(67)	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
KENAF	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(68)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
TOBACCO	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(69)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
SESAMUM	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(70)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
TOMATO	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(71)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
OR PUNCT	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	82	xxxxxxxxxxxxxxx
(73)	71	xxxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
ELEU IND	0		0		0	
(74)	0		0		0	
ECH CRUS	17	xxx	0		0	
(75)	14	xxx	0		0	
ROTT EXA	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(76)	64	xxxxxxxxxxxxx	57	xxxxxxxxxxx	50	xxxxxxxxxx
DIG SANG	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(77)	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
AMAR RET	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(78)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx

POST-EMERGENCE SELECTIVITY EXPERIMENT

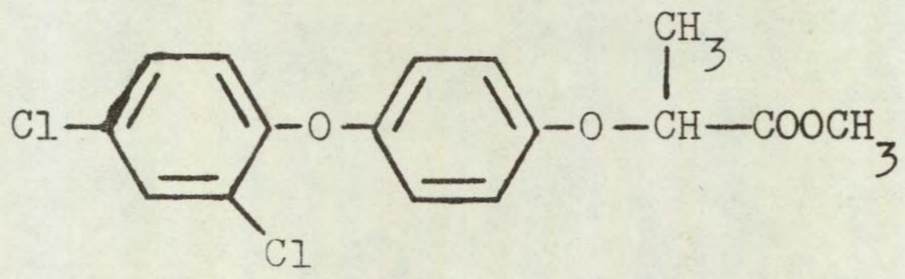
SPECIES		HOE 22870 0.33 kg/ha		HOE 22870 1.0 kg/ha		HOE 22870 3.0 kg/ha
PORT OLE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(79)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
SOL NIG	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(81)	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
SNOW POL	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(83)	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx	36	xxxxxxx
SNOW POL	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(84)	64	xxxxxxxxxxxxx	64	xxxxxxxxxxxxx	64	xxxxxxxxxxxxx
CYP ESCU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(85)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
CYP ROTU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(86)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
OXAL LAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(87)	86	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx

HOE 23408

Code number HOE 23408 Trade name -

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

Structure



Source

Hoechst UK Limited
Agricultural Department
Hoechst House
Salisbury Road
Hounslow, Middlesex TW4 6JH

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 200 l/ha

RESULTS

Full histogram results are presented on pages 17-22 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 by 70% or more
3.0	wheat barley onion dwarf bean field bean pea white clover rape kale cabbage parsnip lettuce sugar beet radish	*Avena fatua Alopecurus myosuroides Poa trivialis Oryza punctata Snowdenia polystachya + species below

* but see text

(Table continued overleaf)

RATE kg a.i./ha	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
3.0	pigeon pea groundnut soyabean	Avena fatua Alopecurus myosuroides Poa trivialis Oryza punctata Snowdenia polystachya + species below
1.0	species above + swede carrot chickpea cotton tobacco tomato	Rottboellia exaltata + species below
0.33	species above + oat rice cowpea kenaf	Eleusine indica Echinochloa crus-galli

Comments on results

Activity and pre-emergence selectivity experiment results were reported earlier (Richardson et al., 1976) when the route of action and symptoms produced on susceptible species were found to be similar to HOE 22870. The pattern of selectivity found here was similar to that found in the pre-emergence selectivity test, but activity was generally higher post-emergence.

Selectivity among temperate species

Certain annual grass weeds were controlled while all broad-leaved and perennial weeds were resistant. The high dose of 3.0 kg/ha had controlled Avena fatua two weeks after spraying and all plants were eventually killed at this dose. At 1.0 kg/ha all plants in one replicate were eventually killed while those in the others were very stunted and failed to produce panicles. Alopecurus myosuroides also showed some sensitivity although not so great as with HOE 22870, being controlled at 3.0 kg/ha and reduced in vigour at 1.0 kg/ha. Poa trivialis showed some sensitivity but Poa annua was quite resistant.

Wheat, barley, onion and most broad-leaved crops were tolerant. Among the latter, swede and carrot were slightly affected at 3.0 kg/ha but tolerant at 1.0 kg/ha. Oat was sensitive to 3.0 kg/ha but recovered from initial effects at 1.0 kg/ha. Perennial ryegrass was very sensitive, slightly more so than to HOE 22870.

Potential selective control of A. fatua, A. myosuroides and P. trivialis in cereals, onion and broad-leaved crops can be expected. Some potential for suppressing perennial ryegrass in swards including clover is apparent, as was the case with HOE 22870.

Although the pattern of pre- and post-emergence selectivity is generally similar, A. fatua and A. myosuroides were more sensitive post-emergence. As with HOE 22870, however, Poa species and V. persica were more sensitive pre-emergence (Richardson et al., 1976).

Selectivity among tropical crops

This compound was somewhat more active than HOE 22870 but the selectivity was generally similar; the main differences being that jute, kenaf and sesamum were relatively more sensitive. Effects on Digitaria sanguinalis were only slightly better than those of HOE 22870 and more work is needed on this latter species at an earlier growth stage. Selectivity against Snowdenia in wheat should be even better and a dose of 1 kg/ha could be effective at an early stage of growth. Selectivity against other grasses in tropical wheat will also of course be of great interest. Control of grass weeds including Rottboellia in tropical legumes will be one of the greatest potentialities of both compounds - particularly in those crops susceptible to alachlor and in which pre-planting incorporation of herbicides (e.g. trifluralin) would be inconvenient. They could be especially useful as an aid to the establishment of ground-cover legumes in perennial crops, and further testing will be well worthwhile at various growth stages but particularly early post-emergence.

POST-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES	HOE 23408 0.33 kg/ha		HOE 23408 1.0 kg/ha		HOE 23408 3.0 kg/ha	
WHEAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(1)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
BARLEY	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(2)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
OAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(3)	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	50	xxxxxxxxxx
PER RYGR	100	xxxxxxxxxxxxxxxxxxxx	81	xxxxxxxxxxxxxxx	44	xxxxxxxxx
(4)	79	xxxxxxxxxxxxxxx	36	xxxxxxx	29	xxxxxx
ONION	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(8)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
DWF BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(9)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
FLD BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(10)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
PEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(11)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
W CLOVER	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(12)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
RAPE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(14)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
KALE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(15)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx

POST-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES	HOE 23408 0.33 kg/ha		HOE 23408 1.0 kg/ha		HOE 23408 3.0 kg/ha	
CABBAGE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(16)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
SWEDE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(17)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
CARROT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(18)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
PARSNIP	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(19)	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
LETTUCE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(20)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
SUG BEET	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(21)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
AVE FATU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(26)	86	xxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
ALO MYOS	100	xxxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxxx	12	xx
(27)	79	xxxxxxxxxxxxxxx	57	xxxxxxxxxxx	21	xxxx
POA ANN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	81	xxxxxxxxxxxxxxxx
(28)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx
POA TRIV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	0	
(29)	64	xxxxxxxxxxxxx	64	xxxxxxxxxxxxx	0	
SIN ARV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(30)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx

SPECIES	HOE 23408 0.33 kg/ha		HOE 23408 1.0 kg/ha		HOE 23408 3.0 kg/ha	
RAPH RAP	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(31)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
TRIP MAR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(33)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
SEN VULG	100	xxxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(34)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
POL LAPA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(35)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
POL AVIC	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(36)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
GAL APAR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(38)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
CHEN ALB	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(39)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
STEL MED	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(40)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
SPER ARV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(41)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
VER PERS	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(42)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
RUM OBTU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(44)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx

POST-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		HOE 23408 0.33 kg/ha		HOE 23408 1.0 kg/ha		HOE 23408 3.0 kg/ha
AG REPEN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxx
(47)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
AG STOLO	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(48)	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	0		0	
(58)	50	xxxxxxxxxx	0		0	
SORGHUM	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(59)	79	xxxxxxxxxxxxxxx	57	xxxxxxxxxx	43	xxxxxxxxx
RICE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(60)	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	57	xxxxxxxxxx
PIGEON P	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(61)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
COWPEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(62)	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
CHICKPEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(63)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
GRNDNUT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(64)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
SOYABEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(65)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
COTTON	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(66)	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx

SPECIES	HOE 23408 0.33 kg/ha		HOE 23408 1.0 kg/ha		HOE 23408 3.0 kg/ha	
JUTE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(67)	79	xxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	64	xxxxxxxxxxxxx
KENAF	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(68)	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	57	xxxxxxxxxx
TOBACCO	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(69)	86	xxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
SESAMUM	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(70)	79	xxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	50	xxxxxxxxx
TOMATO	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(71)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
OR PUNCT	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
(73)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxx	29	xxxxxx
ELEU IND	0		0		0	
(74)	0		0		0	
ECH CRUS	0		0		0	
(75)	0		0		0	
ROTT EXA	100	xxxxxxxxxxxxxxxxxxx	85	xxxxxxxxxxxxxxxxx	30	xxxxxx
(76)	43	xxxxxxxxx	29	xxxxxx	29	xxxxxx
DIG SANG	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(77)	100	xxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
AMAR RET	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(78)	100	xxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx

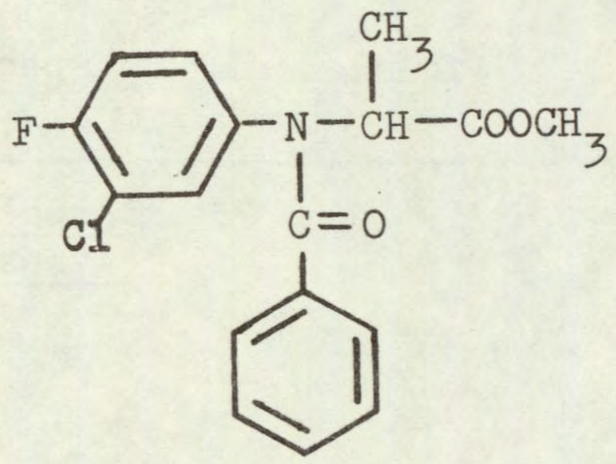
SPECIES		HOE 23408 0.33 kg/ha		HOE 23408 1.0 kg/ha		HOE 23408 3.0 kg/ha
PORT OLE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(79)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
SOL NIG	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(81)	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
SNOW POL	42	xxxxxxxx	42	xxxxxxxx	42	xxxxxxxx
(83)	57	xxxxxxxxxxx	36	xxxxxxx	21	xxxx
SNOW POL	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(84)	57	xxxxxxxxxxx	50	xxxxxxxxxx	57	xxxxxxxxxxx
CYP ESCU	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(85)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
CYP ROTU	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(86)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
OXAL LAT	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(87)	100	xxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	71	xxxxxxxxxxxxx

FLAMPROP-METHYL

Code number WL 29761 **Trade name** Mataven

Chemical name methyl (±)-2-[N-(3-chloro-4-fluorophenyl)benzamido] propionate

Structure



Source

Shell Research Limited
Woodstock Agricultural Research Centre
Sittingbourne
Kent
ME9 8AG

Information available and suggested uses

Haddock et al., 1974 reported good control of Avena spp. in wheat at rates of 0.45-0.60 kg/ha in extensive field trials in Europe during 1973 and 1974, with an adequate margin of safety. Limited data from glasshouse and field tests have indicated useful activity against Alopecurus myosuroides and Agropyron repens.

Formulation used 15% w/v a.i. emulsifiable concentrate

Spray volume for activity experiment 305 l/ha
for selectivity experiment 200 l/ha

RESULTS

Full histogram results are presented on pages 27-32 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 by 70% or more
3.0	wheat barley perennial ryegrass dwarf bean rape carrot parsnip lettuce sugar beet maize	Alopecurus myosuroides Poa trivialis + species below

(Table continued overleaf)

RATE kg a.i./ha	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
3.0	pigeon pea chickpea cotton jute tobacco	Alopecurus myosuroides Poa trivialis + species below
1.0	species above + onion field bean swede radish rice soyabean	Agrostis stolonifera *(Avena fatua)
0.33	None listed as no weeds controlled	None

* Avena fatua eventually - see text

Comments on results

Activity experiment

Full histogram results are presented for this test on page 26. Activity was found with foliar and soil treatments on most of the species. Avena fatua was the most susceptible species, particularly to the foliar spray although some activity was found in the soil as a result of post-emergence drenches and pre-emergence surface application, mainly at the higher doses. Although Agropyron repens showed some sensitivity to the foliar spray, this was only temporary, all plants eventually making good recovery, but useful effects were also found pre-emergence at the high dose. Perennial ryegrass was resistant to post-emergence foliar sprays and soil drenches, but pre-emergence treatments at the high dose were damaging and some kill resulted from the surface spray. Dwarf bean and kale were damaged by the foliar spray but Polygonum amphibium was unaffected.

Symptoms

Mild to severe contact scorch resulted from the foliar sprays. A. fatua also suffered a powerful inhibition and eventual kill of the main shoot, followed by necrosis of the older leaves. Die-back was accompanied by a gummy exudation of the leaves. Some extra tillers were produced at the lower dose but these were usually inhibited and deformed. Leaves were often seen to exhibit a darker green colouration. Inhibition of main shoots of grasses and buds of broad-leaved species was noted as a result of the soil treatments, a darker green colour of leaves again developing. Pre-emergence treatments on grasses at the high dose resulted in a failure to emerge from the coleoptile or death soon after emergence.

Selectivity among temperate species

Although Avena fatua was not sufficiently controlled at assessment two weeks after spraying, later observations showed a complete kill at 3.0 kg/ha while only one very weak plant eventually survived treatment at 1.0 kg/ha. Furthermore, a severe inhibition was also apparent at this time with plants treated with only 0.3 kg/ha. Alopecurus myosuroides and Poa trivialis were controlled at 3.0 kg/ha and severely reduced at 1.0 kg/ha. Poa annua was resistant, comparing with HOE 22870 and HOE 23408. No effects were found on Agropyron repens, in contrast to the activity experiment, but Agrostis stolonifera proved to be highly susceptible, no plants surviving treatment at 3.0 kg/ha while only a few recovered from 1.0 kg/ha. Broad-leaved weeds were resistant.

Wheat and barley were tolerant to 3.0 kg/ha but oat was susceptible at all doses. Perennial ryegrass showed outstanding tolerance. Onion and several broad-leaved crops were also tolerant, notably rape, carrot and sugar beet. Pea, however, was severely inhibited at all doses while white clover was damaged at 1.0 and 3.0 kg/ha.

The selective control of A. fatua in wheat and barley is the most interesting and probably most important feature of this herbicide. Other WRO tests have shown it to be more active than its chemical analogues benzoylpropethyl and flamprop-isopropyl. However the possible control of this species in other crops such as perennial ryegrass and a break crop such as oil seed rape, merit further investigation. The possible suppression of other grass weeds e.g. Alopecurus myosuroides could give it an advantage over other post-emergence wild oat herbicides but the resistance of P. annua is unfortunate. Some further investigation on perennial grass weeds may be worthwhile in view of the susceptibility of A. stolonifera. The variation in response of A. repens in these two tests is not easy to explain, the same clonal material being used throughout, while the growth stages at treatment were similar. However the activity experiment, where the inhibition occurred, was carried out under glass, while in the selectivity test, plants were kept outside, possibly suggesting that environmental factors may be important with regard to activity.

Selectivity among tropical crops

No useful activity was shown on the tropical annual grasses and it appears unlikely that the compound will have a use in the tropics other than for wild oat control in wheat and barley.

ACTIVITY EXPERIMENT

FLAMPROP-METHYL

		0.33 kg/ha	1.0 kg/ha	3.0 kg/ha
DWARF BEAN	F	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxx
	P	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx
	I	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxxx xxxxxx
KALE	F	xxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxxx xxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxx xxxxxx
	I	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx + xxxxxxxxxx	xxxxxxxxxxxxxx + xxxxx
POLYGONUM AMPHIBIUM	F	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxx xxxxxx
	I	xxxxxxxxxxxxx + xxxxxxxxxxx	xxxxxxxx xxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxx
PERENNIAL RYEGRASS	F	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxx
	P	xxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxx xxxxxxxxx	xxxxxxx xxxxxxx
	I	xxxxxxxxxxxxx + xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxx
AVENA FATUA	F	xxxxxxxxxxxxx xxxxxxx	xxxxxxxxxxxxx xxxx	xxxxxxxxxxxxx xxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxx
	P	xxxxxxxxxxxxx + xxxxxxxxxxxxx	xxxxxxxxx xxxxxxxxxx	xxxxxx xxxxxx
	I	xxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxxx
AGROPYRON REPENS	F	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxx xxxxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxx xxxxxxx	xxxxxxxx xxxx
	I	xxxxxxxxxxxxx + xxxxxxxxxxxxx	xxxxxxxxxxx xxxxxxxxx	xx xxxx

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

POST-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES	FLAMPROP-METHYL 0.33 kg/ha		FLAMPROP-METHYL 1.0 kg/ha		FLAMPROP-METHYL 3.0 kg/ha	
WHEAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(1)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
BARLEY	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(2)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
OAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(3)	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	43	xxxxxxxxx
PER RYGR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(4)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
ONION	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(8)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
DWF BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(9)	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
FLD BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(10)	93	xxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
PEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(11)	57	xxxxxxxxxx	57	xxxxxxxxxx	43	xxxxxxxxx
W CLOVER	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(12)	86	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx	43	xxxxxxxxx
RAPE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(14)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
KALE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(15)	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	64	xxxxxxxxxxxx

SPECIES		FLAMPROP-METHYL 0.33 kg/ha		FLAMPROP-METHYL 1.0 kg/ha		FLAMPROP-METHYL 3.0 kg/ha
CABBAGE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(16)	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx	57	xxxxxxxxxxx
SWEDE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(17)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
CARROT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(18)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
PARSNIP	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(19)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
LETTUCE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(20)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
SUG BEET	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(21)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
AVE FATU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(26)	57	xxxxxxxxxxx	36	xxxxxxx	36	xxxxxxx
ALO MYOS	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(27)	93	xxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
POA ANN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(28)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
POA TRIV	100	xxxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxxx	37	xxxxxxx
(29)	57	xxxxxxxxxxx	43	xxxxxxxxx	14	xxx
SIN ARV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxxx
(30)	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	50	xxxxxxxxxx

POST-EMERGENCE SELECTIVITY EXPERIMENT

SPECIES		FLAMPROP-METHYL 0.33 kg/ha		FLAMPROP-METHYL 1.0 kg/ha		FLAMPROP-METHYL 3.0 kg/ha
RAPH RAP	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(31)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
TRIP MAR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(33)	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
SEN VULG	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(34)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
POL LAPA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(35)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
POL AVIC	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(36)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
GAL APAR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(38)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
CHEN ALB	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(39)	86	xxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
STEL MED	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(40)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
SPER ARV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(41)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
VER PERS	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(42)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx
RUM OBTU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(44)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx

SPECIES		FLAMPROP-METHYL 0.33 kg/ha		FLAMPROP-METHYL 1.0 kg/ha		FLAMPROP-METHYL 3.0 kg/ha
AG REPEN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(47)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
AG STOLO	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(48)	64	xxxxxxxxxxxxx	29	xxxxxx	29	xxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(58)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx
SORGHUM	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(59)	100	xxxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	43	xxxxxxxxx
RICE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(60)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
PIGEON P	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(61)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
COWPEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(62)	71	xxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
CHICKPEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(63)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
GRNDNUT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(64)	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
SOYABEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(65)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
COTTON	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(66)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx

Click here to continue