WEED RESEARCH ORGANIZATION

TECHNICAL REPORT No. 63

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NOTE

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THE ACTIVITY AND POST-EMERGENCE SELECTIVITY OF SOME RECENTLY DEVELOPED HERBICIDES: SSH-41, MB 30755, AC 213087 AC 222293 AND DOWCO 433

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SUMMARY

Five herbicides were examined for their post-emergence selectivity on 37 temperate and 28 tropical crop and weed species. The route of action of these herbicides was determined on six selected species in a separate test. Oryza barthii was included for the first time.

SSH-41, a mainly soil-acting herbicide was very effective on many broad-leaved and grass weeds post-emergence, with possible selectivity in barley. pea and maize.

MB 30755 also exhibited most of its activity through the soil but considerable effects on broad-leaved species were found through foliar uptake. Many annual broad-leaved species were susceptible post-emergence while certain cereal crops (barley, oat, maize and sorghum), carrot and perennial ryegrass were tolerant.

AC 213087 and AC 222293 were more effective as soil applied treatments. Control of Avena fatua, Alopecurus myosuroides and certain broad-leaved weeds such as Galium aparine was achieved, although weeds of the Compositae and Caryophyllaceae families were resistant. The temperate cereals, barley and wheat were the most tolerant crops, but lettuce also possessed tolerance, especially to AC 222293.

Dowco 433, was active largely as a foliar treatment on broad-leaved species, while monocotyledonous species were resistant. The annual broad-leaved weed control spectrum included members of the Compositae and Polygonaceae families, but more notably Galium aparine and Veronica persica. Wheat, barley and perennial ryegrass were the three most tolerant crops but oat, onion and tropical cereals (maize, sorghum and rice) also showed some tolerance.

INTRODUCTION

The pre- and post-emergence selectivities of new herbicides are investigated at WRO on a large number of pot-grown crop and weed species, at the same time obtaining experience of the type of effects produced by each compound. The limitations of these investigations are that only one crop variety or source of weed species is used and growth is 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.

This report gives indications of the post-emergence selectivity of five new herbicides. Results of activity experiments are also included to provide information on levels of phytotoxicity, type and route of action.

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* Herbicide Group
** ODA Tropical Weeds Group

METHODS AND MATERIALS

(a) Activity experiments (AE1, AE2)

These 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.

Experimental details are summarised in Tables 1 and 2.

(b) Post-emergence selectivity experiment

The technique for this experiment was as before (Richardson and Parker, 1977). Plants were raised in 9 or 10 cm diameter plastic pots in soil taken from a field (Begbroke North) at Begbroke Hill. Planting dates were staggered so that the majority of species had reached the 2 to 4 leaf stage by the time of spraying. However, it can be seen in the Appendix that several species were at a more advanced stage of growth. Temperate species were raised in the open and tropical species in the glasshouse.

Table 1. Plant data for activity experiments (AE)

Species	Cultivar/ source	No. per pot at spraying		Depth of planting (cm)	Stage of growth		
					Spraying	Assessment	
		pre-	post		post-em	pre-em	post-em
Dwarf bean (Phaseolus vulgaris)	The Prince	3-4	1-2	2.0	2 uni-foliate leaves	1½-2 tri-foliate leaves	1½-2½ tri-foliate leaves
Kale (Brassica oleracea acephala)	Marrowstem	10	5	0.5	1½-2 leaves	2½-4 leaves	3-4 leaves
Polygonum amphibium	WRO Clone 1	6	4-5	1.0	4-6 leaves	6-8 leaves	8-10 leaves
Perennial ryegrass (Lolium perenne)	S 23	15	10	0.5	2½-3 leaves	6-9 leaves, tillering	6-10 leaves, tillering
Avena fatua	WRO 1978 B&S Supplies 1976	10	5	1.0	2½-3 leaves	6-10 leaves, tillering	6½-10 leaves, tillering
Agropyron repens	WRO Clone 31	6	5	1.0	2-3 leaves	5-10 leaves, tillering	5-8 leaves, tillering

NB: AC 213087 is confidential, AC 222293 is imazamethabenz-methyl, Dowco 433 is fluroxypyr,
MB 30755 is 1-(3,4-dichlorobenzyl)-4,5-dimethylcarbonamido) imidazole (May & Baker),
SSH-41 is monisuron

Table 2. Soil and environmental conditions

Experiment number type and herbicide(s) included	AE 1 SSH-41	AE 2 AC 213087 AC 222293 Dowco 433 MB 30755	Post-emergence selectivity test SSH-41 MB 30755 AC 222293 Dowco 433 AC 213087	
Date of spraying	15.11.79	19.6.80	14.8.80 28.8.80	
Main assessment completed	4.1.80	24.7.80	23.9.80	
Organic matter (%)	4.1	4.1	4.1	
Clay content (%)	15.0	15.0	15.0	
pH (in water; 1:2 soil:water ratio)	7.0	7.0	7.0	
Vitax Q4 (g/kg) fertilizer	5.0	-	-	
Vitax QS 3 (g/kg) fertilizer	-	3.0	3.0	
Superphosphate (g/kg)	-	1.0	1.0	
DDT (5% dust) (g/kg)	0.4	0.4	0.4	
Hydrated Mg SO4 (g/kg)	1.0	1.0	1.0	
Temperature (°C)			Temperate	Tropical
Mean	16	20	17	23
Maximum	24	35	25	38
Minimum	9	11	9	12
Relative humidity (%)				
Mean	63	55	80	75
Maximum	88	90	95	91
Minimum	32	30	34	34

Before spraying, each species was thinned to constant number per pot. Certain plant material was pre-treated to improve establishment:- Chenopodium album seeds were soaked in 0.1 M potassium nitrate solution and then kept in the light for two days prior to planting; Veronica persica, Agrostis stolonifera and tobacco seeds were sown in a tray of peat compost and seedlings (1-2 true leaves) transplanted into the potting medium; tubers of Cyperus esculentus and Oxalis latifolia were stored moist at 2°C for four and five weeks respectively prior to planting, to break dormancy; soil beneath 10 day old fenugreek plants was innoculated with a 10 ml infusion of Rhizobium meliloti Dang. (Rothamsted Catalogue No 2012). Perennial species were propagated vegetatively as indicated in Appendix 1.

To protect from soil-borne pathogens all seeds except Polygonum aviculare were pretreated with one of the following: thiram, Harvesan organomercury (for cereals and Avena fatua), ethylmercuric phosphate + dieldrin (for sugar beet), Milcol 30 (peas), benomyl T (onion). Root fragments of Cirsium arvense were washed in a colloidal copper solution (2 ml litre $^{-1}$) prior to planting. For dwarf bean, field bean and certain brassicas (kale, rape, cabbage, radish) 6% gum arabic solution was included with the thiram fungicide seed dressing to improve adhesion, as most of these species are susceptible to "damping off" diseases.

A series of treatments were included to investigate possible uses for safeners. Maize, wheat and barley were treated with NA (1,8-naphthalic anhydride) at 0.5% w/w of seeds (see p. 56 & 58). Sorghum seeds were acquired from Ciba-Geigy already dressed with cyometrinil, α-(cyanomethoximino benzacetonitrile (see page).

Herbicides were applied using a laboratory sprayer operating at a pressure of 207 kPa (30 lb/in^2) with an 8002 Tee Jet-band spray nozzle moving at constant speed 45 cm above the stationary plants. Stages of growth at spraying and assessment are summarised in Appendix 1. After spraying, the plants were protected from rainfall for 24 hours and then given an overhead watering, by means of a rose at the end of a trigger hose attached to the mains water supply, to wash any residues off the foliage. The pots were then returned to their original position in the glasshouse or the open. Watering throughout the experiment was done from overhead. Additional fertilizer in solution was applied to all species at one week intervals after spraying (5 ml litre^{-1} Vitafeed 301). Insecticide and fungicide solutions were applied to individual species as required.

(c) Assessment and processing of results

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

Histograms are presented for the results of each treatment, the upper of each pair represents mean plant survival and the lower, mean vigour score, both calculated as percentages of untreated controls. Actual percentage figures are displayed to the left of each row of x's (in selectivity test only). The same information is displayed in the histogram, each 'x' representing a 5% increment, but in the activity experiment each 'x' represents a 7% increment. A '+' indicates a value in excess of 100%. A value of 100 = as untreated control and 0 = a complete kill. 'R' indicates results based on one replicate only.

A table of observed selectivities, using the criteria specified, is presented below for each compound along with comments to highlight salient points. Radish (Raphanus raphistrum) was included for ease of propagation and may be regarded as a crop or weed.

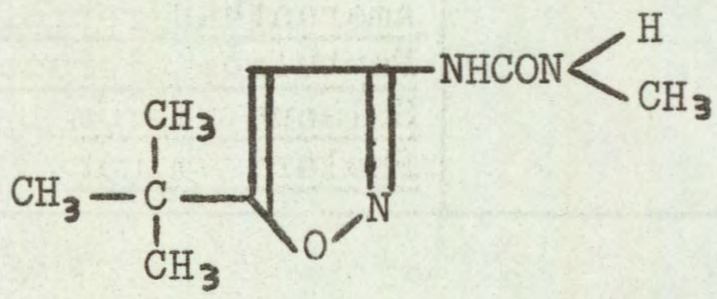
Several species, notably the perennials, were kept for extra periods to observe later effects or the degree of recovery from injury and these final observations are referred to in the text.

SSH-41

Code number SSH-41

Chemical name 1-(5-t-butylisoxazol-3-yl)-3-methyl urea

Structure



Source

Shionogi & Co Ltd
12 Doshomachi Sanchome
Higashi-ku
Osaka 541
Japan

Information available and suggested uses

Annual grass and broad-leaved weed control pre- and early post-emergence in maize and potatoes at 0.5-0.75 kg a.i./ha and as a directed spray in fruit trees at 0.75-1.5 kg a.i./ha.

Formulation used 50% w/w a.i. wettable powder

Spray volume for activity experiment 370 l/ha
for post-emergence selectivity experiment 345 l/ha

RESULTS

Full results are given in the histograms on pages 8-14 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
0.75 & 2.25	None	None listed as no crops tolerant
0.25	barley barley + safener (NA) pea maize + safener (NA)	Beta vulgaris Avena fatua Alopecurus myosuroides Poa annua & P. trivialis Raphanus raphanistrum Tripleurospermum maritimum Senecio vulgaris Polygonum lapathifolium Galium aparine Chenopodium album Stellaria media Spergula arvensis

Table continued overleaf

NB: AC 213087 is confidential, AC 222293 is imazamethabenz-methyl, Dowco 433 is fluroxypyr, MB 30755 is 1-(3,4-dichlorobenzyl)-4,5-dimethylcarbonamido) imidazole (May & Baker), SSH-41 is monisuron

RATE (kg a.i./ha)	CROPS: vigour reduced by 15% or less	WEEDS: number or vigour reduced by 70% or more
0.25		Rumex obtusifolius Holcus lanatus Cirsium arvense Amaranthus retroflexus Portulaca oleracea Solanum nigrum Phalaris minor

Comments on results

Activity experiment

The foliar spray caused only minor effects at the higher doses, more so on broad-leaved than grass species. Soil drenches were much more effective on all species. This should be borne in mind when considering the results of the post-emergence selectivity test where there was the opportunity for both foliar and soil uptake. Pre-emergence sprays were the most effective treatments, however, the surface spray being more active than when incorporated, for kale and perennial ryegrass. Differences were less clear cut with the other species.

Symptoms

There were generally very similar to those caused by photosynthetic inhibitors such as ureas and triazines. A slight scorch resulted from the foliar spray, sometimes accompanied by chlorosis. In the soil treatments, necrosis and die-back were often preceded by chlorosis. Germination was unaffected by pre-emergence treatments, chlorosis again preceding die-back, usually from an early growth stage.

Post-emergence selectivity among temperate species

Of the 20 weeds tested, 16 were controlled or killed at the lowest dose of 0.25 kg/ha. Bromus sterilis, the two perennial grasses (Agropyron repens and Agrostis stolonifera), and Veronica persica were the only exceptions, the latter species showing the highest tolerance.

Barley and pea were the only two crops tolerant and then only at the lowest dose of 0.25 kg/ha. All other crops were sensitive, in particular the smaller seeded species. The seed dressing of naphthalic anhydride safener had no influence on the response of wheat and barley to SSH-41.

The possibilities for selective control of all annual grass weeds, including Avena fatua and Alopecurus myosuroides, as well as many broad-leaved weeds, notably Galium aparine in barley, deserves further study. The failure to control Veronica persica is a disadvantage, however, a feature which SSH-41 has in common with other substituted urea herbicides, such as isoproturon and chlortoluron. Further testing in pea may also be worthwhile.

Selectivity among tropical species

High activity was shown on most of the small-seeded broad-leaved species, including the three weeds and jute. Control of these is clearly possible in maize at 0.25 kg/ha or a little less but grasses would not be controlled. The NA seed treatment protected maize to a small extent but not enough to allow any

substantial increase in dose. Cyperus spp were relatively resistant and both recovered from the middle dose of 0.75 kg/ha. Cynodon dactylon and Oxalis latifolia recovered from the low dose but were eventually killed by 0.75 kg/ha, a result of some potential interest if the compound is shown to be safe in any perennial crops.

ACTIVITY EXPERIMENT

SSH-41

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

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

UNTREATED xxxxxxxxxxxxxx no. of survivors
CONTROL xxxxxxxxxxxxxx vigour of survivors

SPECIES	SSH-41 0.25 kg/ha		SSH-41 0.75 kg/ha		SSH-41 2.25 kg/ha	
WHEAT	100	xxxxxxxxxxxxxxxxxxxx	12	xx	0	
(1)	50	xxxxxxxxxx	21	xxxx	0	
WHEAT + S	100	xxxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	0	
(2)	64	xxxxxxxxxxxxx	29	xxxxxx	0	
BARLEY	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx
(3)	100	xxxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	29	xxxxxx
BARLEY + S	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx	25 R	xxxxx
(4)	100 R	xxxxxxxxxxxxxxxxxxxx	57 R	xxxxxxxxxxx	14 R	xxx
OAT	100	xxxxxxxxxxxxxxxxxxxx	0		0	
(5)	57	xxxxxxxxxxx	0		0	
PER RYGR	25	xxxxx	0		0	
(6)	21	xxxx	0		0	
ONION	0 R		0 R		0 R	
(8)	0 R		0 R		0 R	
DWF BEAN	100	xxxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(9)	79	xxxxxxxxxxxxxxxx	7	x	14	xxx
FLD BEAN	0		0		0	
(10)	0		0		0	
PEA	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx	0 R	
(11)	100 R	xxxxxxxxxxxxxxxxxxxx	57 R	xxxxxxxxxxx	0 R	
W CLOVER	0		0		0	
(12)	0		0		0	
RAPE	0		0		0	
(14)	0		0		0	

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MB 30755 is 1-(3,4-dichlorobenzyl)-4,5-dimethylcarbonamido) imidazole (May & Baker),
SSH-41 is monisuron

SPECIES	SSH-41 0.25 kg/ha		SSH-41 0.75 kg/ha		SSH-41 2.25 kg/ha
KALE	0		0		0
(15)	0		0		0
CABBAGE	0		0		0
(16)	0		0		0
CARROT	80	xxxxxxxxxxxxxxxx	0		0
(18)	43	xxxxxxxxx	0		0
PARSNIP	0		0		0
(19)	0		0		0
LETTUCE	0		0		0
(20)	0		0		0
FENUGREEK	0		0		0
(21)	0		0		0
SUG BEET	0		0		0
(22)	0		0		0
BETA VUL	50	xxxxxxxxxx	0		0
(23)	29	xxxxxx	0		0
BROM STE	100	xxxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	0
(24)	100	xxxxxxxxxxxxxxxxxxxx	14	xxx	0
AVE FATU	20	xxxx	0		0
(26)	14	xxx	0		0
ALO MYOS	0		0		0
(27)	0		0		0
POA ANN	0		0		0
(28)	0		0		0

POST-EMERGENCE SELECTIVITY TEST

SPECIES	SSH-41 0.25 kg/ha		SSH-41 0.75 kg/ha		SSH-41 2.25 kg/ha	
POA TRIV	0		0		0	
(29)	0		0		0	
RAPH RAP	0		0		0	
(31)	0		0		0	
TRIP MAR	0		0		0	
(33)	0		0		0	
SEN VULG	0		0		0	
(34)	0		0		0	
POL LAPA	0		0		0	
(35)	0		0		0	
GAL APAR	0 R		0 R		0 R	
(38)	0 R		0 R		0 R	
CHEN ALB	0		0		0	
(39)	0		0		0	
STEL MED	0		0		0	
(40)	0		0		0	
SPER ARV	0		0		0	
(41)	0		0		0	
VER PERS	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	12	xx
(42)	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	21	xxxx
RUM OBTU	0		0		0	
(44)	0		0		0	
HOLC LAN	0		0		0	
(45)	0		0		0	

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MB 30755 is 1-(3,4-dichlorobenzyl)-4,5-dimethylcarbonamido) imidazole (May & Baker),
SSH-41 is monisuron

SPECIES	SSH-41 0.25 kg/ha		SSH-41 0.75 kg/ha		SSH-41 2.25 kg/ha	
AG REPEN	100	xxxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	25	xxxxx
(47)	43	xxxxxxxxx	21	xxxx	14	xxx
AG STOLO	37	xxxxxxx	0		0	
(48)	36	xxxxxxx	0		0	
CIRS ARV	0		0		0	
(50)	0		0		0	
MAIZE + S	100	xxxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx
(56)	86	xxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	43	xxxxxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(57)	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	43	xxxxxxxxx
SORG + S	100	xxxxxxxxxxxxxxxxxxxx	0		0	
(58)	50	xxxxxxxxxx	0		0	
SORGHUM	100	xxxxxxxxxxxxxxxxxxxx	0		0	
(59)	43	xxxxxxxxx	0		0	
RICE	50	xxxxxxxxxx	0		0	
(60)	14	xxx	0		0	
PIGEON P	0 R		0 R		0 R	
(61)	0 R		0 R		0 R	
COWPEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(62)	50	xxxxxxxxxx	14	xxx	14	xxx
CHICKPEA	50	xxxxxxxxxx	0		0	
(63)	14	xxx	0		0	
GRNDNUT	100 R	xxxxxxxxxxxxxxxxxxxx	50 R	xxxxxxxxxx	0 R	
(64)	71 R	xxxxxxxxxxxxxx	29 R	xxxxxx	0 R	

POST-EMERGENCE SELECTIVITY TEST

SPECIES	SSH-41 0.25 kg/ha	SSH-41 0.75 kg/ha	SSH-41 2.25 kg/ha
SOYABEAN	100 xxxxxxxxxxxxxxxxxxxx	100 xxxxxxxxxxxxxxxxxxxx	100 xxxxxxxxxxxxxxxxxxxx
(65)	50 xxxxxxxxxx	21 xxxx	14 xxx
COTTON	100 xxxxxxxxxxxxxxxxxxxx	87 xxxxxxxxxxxxxxxxx	87 xxxxxxxxxxxxxxxxx
(66)	57 xxxxxxxxxxx	29 xxxxxx	14 xxx
JUTE	0	0	0
(67)	0	0	0
KENAF	100 xxxxxxxxxxxxxxxxxxxx	100 xxxxxxxxxxxxxxxxxxxx	87 xxxxxxxxxxxxxxxxx
(68)	21 xxxx	14 xxx	14 xxx
TOBACCO	20 xxxx	0	0
(69)	36 xxxxxxx	0	0
SESAMUM	17 R xxx	0 R	0 R
(70)	43 R xxxxxxxxx	0 R	0 R
TOMATO	0 R	0 R	0 R
(71)	0 R	0 R	0 R
OR BART	80 xxxxxxxxxxxxxxxx	0	0
(73)	36 xxxxxxx	0	0
ELEU IND	62 R xxxxxxxxxxxx	37 R xxxxxxx	0 R
(74)	86 R xxxxxxxxxxxxxxxxx	29 R xxxxxx	0 R
ECH CRUS	100 xxxxxxxxxxxxxxxxxxxx	0	0
(75)	79 xxxxxxxxxxxxxxxx	0	0
ROTT EXA	94 xxxxxxxxxxxxxxxxxx	0	0
(76)	64 xxxxxxxxxxxxx	0	0
DIG SANG	92 xxxxxxxxxxxxxxxxx	17 xxx	0
(77)	71 xxxxxxxxxxxxxx	14 xxx	0

SPECIES	SSH-41 0.25 kg/ha		SSH-41 0.75 kg/ha		SSH-41 2.25 kg/ha	
AMAR RET	0		0		0	
(78)	0		0		0	
PORT OLE	0		0		0	
(79)	0		0		0	
SOL NIG	0		0		0	
(81)	0		0		0	
BROM PEC	100	xxxxxxxxxxxxxxxxxxxx	0		0	
(82)	57	xxxxxxxxxxx	0		0	
SNOW POL	100	xxxxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxx	30	xxxxxx
(83)	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
PHAL MIN	86	xxxxxxxxxxxxxxxxx	0		0	
(84)	29	xxxxxx	0		0	
CYP ESCU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	43	xxxxxxxxx
(85)	71	xxxxxxxxxxxxxx	36	xxxxxxx	14	xxx
CYP ROTU†	-		-		-	
(86)	93	xxxxxxxxxxxxxxxxxx	56	xxxxxxxxxxx	29	xxxxxx
OXAL LAT	67	xxxxxxxxxxxxx	50	xxxxxxxxxx	33	xxxxxxx
(87)	36	xxxxxxx	29	xxxxxx	14	xxx
CYN DACT†	-		-		-	
(88)	71	xxxxxxxxxxxxxx	7	x	0	

† Results based on vigour scores only

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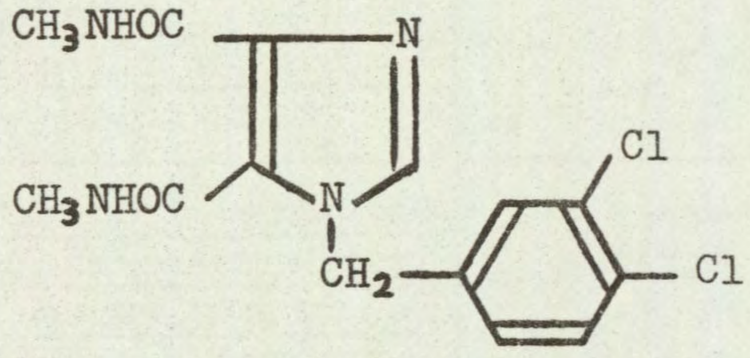
MB 30755

Code number: MB 30755

Chemical name: 1-(3,4-dichlorobenzyl)-4,5-dimethylcarbonamido) imidazole

Structure



Source

May & Baker Ltd
Ongar Research Station
Fyfield Road
Ongar
Essex, UK

Information available and suggested uses

Control of broad-leaved weeds in cereals, post-emergence at 0.75-1.5 kg a.i./ha and possibly clovers.

Formulation used: 50% w/v a.i. aqueous suspension + 'Tween 20' surfactant at 0.075 (activity experiment) or 0.1 ml/l final concentration (post-emergence selectivity test).

Spray volume: for activity experiment 370 l/ha
for post-emergence selectivity experiment 345 l/ha

RESULTS

Full results are given in the histograms on pages 18-24 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
4.0	barley barley + safener (NA) carrot maize maize + safener	Avena fatua Alopecurus myosuroides Agrostis stolonifera Echinochloa crus-galli Digitaria sanguinalis Portulaca oleracea Phalaris minor Oxalis latifolia Bromus pectinatus + 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
1.0	species above + oat sorghum sorghum + safener (cyometrinil) groundnut	Poa trivialis Holcus lanatus Veronica persica Solanum nigrum Cirsium arvense Amaranthus retroflexus + species below
0.25	species above + perennial ryegrass cowpea	Raphanus raphanistrum Tripleurospermum maritimum Senecio vulgaris Polygonum lapathifolium Chenopodium album Stellaria media Spergula arvensis Rumex obtusifolius

Comments on results

Activity experiment

Only minor effects resulted from the foliar spray. Generally greater activity was found with soil drenches to established plants. This should be considered when interpreting the results of the post-emergence selectivity experiment where there was the opportunity for both foliar and soil effects. Pre-emergence treatments were active on certain species, kale being very susceptible but dwarf bean was highly tolerant. This activity pre-emergence was generally less than with soil drench post-emergence treatments. Incorporating the herbicide resulted in more activity than the surface treatments on the grasses and Polygonum amphibium, but the reverse was the case with kale at 1.0 kg/ha.

Symptoms

A slight scorch resulted from the foliar spray sometimes accompanied by chlorosis. Similarly, soil drenches to established plants, as well as causing inhibition of growth and necrosis, also induced chlorosis. Pre-emergence treatments brought about similar effects, chlorosis preceding necrosis and die-back. Germination was not affected. Kale died back from the cotyledon leaf stage. Thus symptoms were similar to those caused by photosynthetic inhibitor herbicides such as ureas and triazines.

Post-emergence selectivity among temperate species

Annual broad-leaved weeds were the most susceptible species, 9 of the 11 tested being controlled or killed at the lowest dose of 0.25 kg/ha. The three exceptions were Veronica persica, Beta vulgaris and Galium aparine, the former requiring 1.0 kg/ha for control but the two latter withstood even the highest dose. At the higher doses, certain grass weeds were also controlled, Poa trivialis and Holcus lanatus at 1.0 kg/ha and Avena fatua, Alopecurus myosuroides and Agrostis stolonifera at 4.0 kg/ha. Poa annua, Bromus sterilis and Agropyron repens survived the highest dose.

NB: AC 213087 is confidential, AC 222293 is imazamethabenz-methyl, Dowco 433 is fluroxypyr,
MB 30755 is 1-(3,4-dichlorobenzyl)-4,5-dimethylcarbonamido) imidazole (May & Baker),
SSH-41 is monisuron

Carrot and barley were the most tolerant crops, withstanding the highest dose of 4.0 kg/ha. Perennial ryegrass and oat were the only other crops showing tolerance to 0.25 and 1.0 kg/ha respectively. Most other crops were very sensitive including onion, lettuce, sugar beet, brassicas and legumes.

MB 30755 is similar to several urea herbicides eg metoxuron in that a wide range of many broad-leaved weeds is controlled but Veronica persica and Galium aparine are more resistant. Also the possible control of blackgrass (Alopecurus myosuroides) and wild oat (Avena fatua) in barley is a feature in common, although a high dose of MB 30755 was needed to achieve this. The susceptibility of white clover was unexpected in view of the information received from the manufacturers.

Selectivity among tropical species

Activity was relatively low on all but a few broad-leaved species which were crops (jute, sesamum and tomato) rather than weeds. Only at 4 kg/ha was useful selectivity shown against a range of annual broad-leaved and grass species, in maize. Sorghum and groundnut tolerated 1 kg/ha but at this dose only Amaranthus was controlled, very incompletely. Perennials and some important annuals Eleusine and Rottboellia were not controlled even at 4 kg/ha and the practical value of the compound for post-emergence use seems doubtful.

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MB 30755 is 1-(3,4-dichlorobenzyl)-4,5-dimethylcarbonamido) imidazole (May & Baker),
SSH-41 is monisuron

ACTIVITY EXPERIMENT

MB 30755

		0.25 kg/ha	1.0 kg/ha	4.0 kg/ha
DWARF BEAN	F	xxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxx
	I	xxxxxxxxxxxxx xxxxxxxxxxxx +	xxxxxxxxxxxxx xxxxxxxxxxxx +	xxxxxxxxxxxxx xxxxxxxxxxxx
KALE	F	xxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxx	o o
	P	xxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxx xxxxxxxxxxx	o o
	I	xxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxx +	o o
POLYGONUM AMPHIBIUM	F	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxx xxxx
	P	xxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxx +
	I	xxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxx xxxxxxxx
PERENNIAL RYEGRASS	F	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxx xxxxxxx
	P	xxxxxxxxxxxxx xxxxxxxxxxxx +	xxxxxxxxxxxxx xxxxxxxxxxxx +	xxxxxxx xxxxxxxx
	I	xxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxx xxxx
AVENA FATUA	F	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxx
	S	xxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxxxxx	xxx xxxxxx
	P	xxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxx xxxxxxxxxx
	I	xxxxxxxxxxxx xxxxxxxxxxxx +	xxxxxxxxxxxx xxxxxxxxxxx +	xxxxxxxxxxxx xxx +
AGROPYRON REPENS	F	xxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxxxxx
	S	xxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxxxx	xxxxxxx xxxxx
	P	xxxxxxxxxxxx xxxxxxxxxxxx +	xxxxxxxxxxxx xxxxxxxxxxxx +	xxxxxxxxxxxx xxxxxxxxxx
	I	xxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxx xxxxxxxxxxxx +	xxxxxxxxxxxx xxxxxxx +

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

UNTREATED xxxxxxxxxxxxx no. of survivors
CONTROL xxxxxxxxxxxxx vigour of survivors

SPECIES	MB 30755 0.25 kg/ha		MB 30755 1.0 kg/ha		MB 30755 4.0 kg/ha	
WHEAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(1)	64	xxxxxxxxxxxxx	64	xxxxxxxxxxxxx	57	xxxxxxxxxxx
WHEAT + S	100	xxxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxxx
(2)	43	xxxxxxxxx	57	xxxxxxxxxxx	57	xxxxxxxxxxx
BARLEY	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(3)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
BARLEY + S	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx
(4)	100 R	xxxxxxxxxxxxxxxxxxxx	86 R	xxxxxxxxxxxxxxxxx	86 R	xxxxxxxxxxxxxxxxx
OAT	80	xxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxx
(5)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
PER RYGR	100	xxxxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxxx	58	xxxxxxxxxxx
(6)	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	36	xxxxxx
ONION	0 R		0 R		0 R	
(8)	0 R		0 R		0 R	
DWF BEAN	100	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(9)	57	xxxxxxxxxxx	43 R	xxxxxxxxx	43	xxxxxxxxx
FLD BEAN	25	xxxxx	0		0	
(10)	21	xxxx	0		0	
PEA	50 R	xxxxxxxxxx	50 R	xxxxxxxxxx	50 R	xxxxxxxxxx
(11)	29 R	xxxxxx	43 R	xxxxxxxxx	29 R	xxxxxx
W CLOVER	8	xx	0		0	
(12)	21	xxxx	0		0	
RAPE	0		0		0	
(14)	0		0		0	

POST-EMERGENCE SELECTIVITY TEST

SPECIES	MB 30755 0.25 kg/ha		MB 30755 1.0 kg/ha		MB 30755 4.0 kg/ha	
KALE	10	xx	0		0	
(15)	14	xxx	0		0	
CABBAGE	0		0		0	
(16)	0		0		0	
CARROT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(18)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
PARSNIP	100	xxxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxxx
(19)	79	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx
LETTUCE	8	xx	0		0	
(20)	14	xxx	0		0	
FENUGREEK	0		0		0	
(21)	0		0		0	
SUG BEET	42	xxxxxxxx	8	xx	0	
(22)	43	xxxxxxxxx	7	x	0	
BETA VUL	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxx
(23)	79	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	57	xxxxxxxxxx
BROM STE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx
(24)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx
AVE FATU	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	80	xxxxxxxxxxxxxxxx
(26)	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	29	xxxxxx
ALO MYOS	40	xxxxxxxx	40	xxxxxxxx	10	xx
(27)	57	xxxxxxxxxxx	57	xxxxxxxxxxx	21	xxxx
POA ANN	70	xxxxxxxxxxxxxx	50	xxxxxxxxxx	40	xxxxxxxx
(28)	57	xxxxxxxxxxx	43	xxxxxxxxx	50	xxxxxxxxxx

NB: AC 213087 is confidential, AC 222293 is imazamethabenz-methyl, Dowco 433 is fluroxypyr,
MB 30755 is 1-(3,4-dichlorobenzyl)-4,5-dimethylcarbonamido) imidazole (May & Baker),
SSH-41 is monisuron

SPECIES	MB 30755 0.25 kg/ha		MB 30755 1.0 kg/ha		MB 30755 4.0 kg/ha	
POA TRIV	80	xxxxxxxxxxxxxxxx	30	xxxxxx	0	
(29)	43	xxxxxxxxx	14	xxx	0	
RAPH RAP	0		0		0	
(31)	0		0		0	
TRIP MAR	19	xxxx	0		0	
(33)	43	xxxxxxxxx	0		0	
SEN VULG	15	xxx	0		0	
(34)	29	xxxxxx	0		0	
POL LAPA	25	xxxxx	0		0	
(35)	43	xxxxxxxxx	0		0	
GAL APAR	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx	60 R	xxxxxxxxxxx
(38)	71 R	xxxxxxxxxxxxxx	71 R	xxxxxxxxxxxxxx	43 R	xxxxxxxxx
CHEN ALB	10	xx	0		0	
(39)	21	xxxx	0		0	
STEL MED	0		0		0	
(40)	0		0		0	
SPER ARV	0		0		0	
(41)	0		0		0	
VER PERS	100	xxxxxxxxxxxxxxxxxxxx	0		0	
(42)	57	xxxxxxxxxxx	0		0	
RUM OBTU	0		0		0	
(44)	0		0		0	
HOLC LAN	70	xxxxxxxxxxxxxx	30	xxxxxx	0	
(45)	43	xxxxxxxxx	36	xxxxxxx	0	

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MB 30755 is 1-(3,4-dichlorobenzyl)-4,5-dimethylcarbonamido) imidazole (May & Baker),
SSH-41 is monisuron

SPECIES	MB 30755 0.25 kg/ha		MB 30755 1.0 kg/ha		MB 30755 4.0 kg/ha	
AG REPEN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxxx
(47)	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	43	xxxxxxxxx
AG STOLO	100	xxxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx	12	xx
(48)	71	xxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	14	xxx
CIRS ARV	33	xxxxxxx	0		0	
(50)	36	xxxxxxx	0		0	
MAIZE + S	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(56)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(57)	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
SORG + S	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(58)	100	xxxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxx
SORGHUM	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(59)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxx
RICE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	30	xxxxxx
(60)	79	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	29	xxxxxx
PIGEON P	67 R	xxxxxxxxxxxx	33 R	xxxxxxx	0 R	
(61)	57 R	xxxxxxxxxx	43 R	xxxxxxxx	0 R	
COWPEA	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(62)	86	xxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
CHICKPEA	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	33	xxxxxxx
(63)	71	xxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	21	xxxx
GRNDNUT	100 R	xxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxx
(64)	57 R	xxxxxxxxxx	86 R	xxxxxxxxxxxxxxxx	71 R	xxxxxxxxxxxxxx

NB: AC 213087 is confidential, AC 222293 is imazamethabenz-methyl, Dowco 433 is fluroxypyr,
MB 30755 is 1-(3,4-dichlorobenzyl)-4,5-dimethylcarbonamido) imidazole (May & Baker),
SSH-41 is monisuron

SPECIES	MB 30755 0.25 kg/ha		MB 30755 1.0 kg/ha		MB 30755 4.0 kg/ha	
SOYABEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(65)	79	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	57	xxxxxxxxxx
COTTON	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(66)	57	xxxxxxxxxx	50	xxxxxxxxxx	21	xxxx
JUTE	0		0		0	
(67)	0		0		0	
KENAF	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(68)	79	xxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	14	xxx
TOBACCO	90	xxxxxxxxxxxxxxxxxx	40	xxxxxxxx	10	xx
(69)	79	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	14	xxx
SESAMUM	0 R		0 R		0 R	
(70)	0 R		0 R		0 R	
TOMATO	0 R		0 R		0 R	
(71)	0 R		0 R		0 R	
OR BART	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(73)	93	xxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx
ELEU IND	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx	62 R	xxxxxxxxxxx
(74)	86 R	xxxxxxxxxxxxxxxx	71 R	xxxxxxxxxxxxxx	71 R	xxxxxxxxxxxxxx
ECH CRUS	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	17	xxx
(75)	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	21	xxxx
ROTT EXA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(76)	86	xxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx
DIG SANG	100	xxxxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxx	0	
(77)	93	xxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	0	

POST-EMERGENCE SELECTIVITY TEST

SPECIES	MB 30755 0.25 kg/ha		MB 30755 1.0 kg/ha		MB 30755 4.0 kg/ha	
AMAR RET	50	xxxxxxxxxx	25	xxxxx	0	
(78)	50	xxxxxxxxxx	43	xxxxxxxxx	0	
PORT OLE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	33	xxxxxxx
(79)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx	7	x
SOL NIG	50 R	xxxxxxxxxx	25	xxxxx	0	
(81)	57 R	xxxxxxxxxxx	57	xxxxxxxxxxx	0	
BROM PEC	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	0	
(82)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxx	0	
SNOW POL	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(83)	79	xxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
PHAL MIN	100	xxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	0	
(84)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx	0	
CYP ESCU	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(85)	64	xxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	43	xxxxxxxxx
CYP ROT†	-		-		-	
(86)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
OXAL LAT	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	33	xxxxxxx
(87)	64	xxxxxxxxxxxxx	43	xxxxxxxxx	14	xxx
CYN DACT†	-		-		-	
(88)	100	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx

† results based on vigour scores only

NB: AC 213087 is confidential, AC 222293 is imazamethabenz-methyl, Dowco 433 is fluroxypyr, MB 30755 is 1-(3,4-dichlorobenzyl)-4,5-dimethylcarbonamido) imidazole (May & Baker), SSH-41 is monisuron

AC 213087

Code number AC 213087

Chemical name Confidential

Structure -

Source Cyanamid International Ltd
Fareham Road
Gosport
Hants PO13 OAS
UK

Information available and suggested uses

Control of Alopecurus myosuroides in cereals, pre-emergence at 0.5-1.0 kg a.i./ha.

Formulation used 50% w/w a.i. wettable powder

Spray volume for activity experiment 370 l/ha
for post-emergence selectivity experiment 345 l/ha

RESULTS

Full results are given in the histograms on pages 28-34 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
4.0	barley + safener (NA)	Galium aparine Veronica persica Agrostis stolonifera Oryza barthii Eleusine indica Amaranthus retroflexus Oxalis latifolia Bromus pectinatus Cyperus rotundus Cynodon dactylon + 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
1.0	species above + wheat wheat + safener (NA) barley	Avena fatua Poa annua Raphanus raphanistrum Polygonum lapathifolium Rumex obtusifolius Holcus lanatus Phalaris minor Cyperus esculentus + species below
0.25	species above + carrot parsnip lettuce fenugreek sorghum	Alopecurus myosuroides Poa trivialis Solanum nigrum

Comments on results

Activity experiment

The foliar spray caused minor effects on only three of the species, dwarf bean, Polygonum amphibium and Avena fatua and then only at the higher doses. Much more activity resulted from soil drenches to established plants with Avena fatua showing the greatest susceptibility. This fact should be borne in mind when considering the results of the post-emergence selectivity test where uptake of the herbicide from both leaves and soil was possible. Pre-emergence treatments were the most effective, however, grasses and P. amphibium being killed by 1.0 kg/ha. With perennial ryegrass and Agropyron repens (and also P. amphibium at 1.0 kg/ha) surface treatment was more active than incorporation. With kale and A. fatua there was no difference between the two methods of pre-emergence application but dwarf bean was more susceptible to incorporated rather than surface treatments at the lower doses.

Symptoms

The main symptoms were a powerful inhibition of the growing points and a pronounced yellowing or chlorosis of leaves. Several species showed leaf deformities, such as lanceolate or inrolled leaves, which were similar in some respects to symptoms caused by phenoxyalkanoic acid herbicides. A few species showed a proliferation of miniature leaves near the inhibited growing point (eg rape and Veronica persica). Necrosis usually developed slowly, mainly progressing from the growing points. Localised scorch spots, probably due to spray droplets, were noted on only pea and rape. Perennial ryegrass and Agropyron repens developed darker green leaves which were often shiny in appearance. In pre-emergence treatments, higher doses usually prevented the grasses from emerging, either from the soil or the coleoptile. Similarly at higher doses Polygonum amphibium failed to emerge while kale was stopped at the cotyledon leaf stage. At lower doses both of these species exhibited some growth regulator symptoms with lanceolate and strap-shaped leaves and kale showed extra dentation at the leaf margins. P. amphibium subsequently produced a proliferation of side shoots with small chlorotic, twisted stems and leaves and often inhibited growing points.

Post-emergence selectivity among temperate species

Annual grass weeds were generally very susceptible with the exception of Bromus sterilis, which was unaffected even at the highest dose. The rather advanced stage of growth of B. sterilis at spraying may well have been responsible for its resistance, however. Alopecurus myosuroides and Poa trivialis were controlled at 0.25 kg/ha; Poa annua, Holcus lanatus and more notably, Avena fatua at 1.0 kg/ha. Of the perennial grasses, Agrostis stolonifera needed 4.0 kg/ha for adequate control, and vigour of Agropyron repens was reduced by only 50% at this dose. An interesting range of broad-leaved annual weeds were susceptible: Solanum nigrum at 0.25 kg/ha (although this was raised as a tropical species); Raphanus raphanistrum and polygonaceous weeds (Polygonum lapathifolium and Rumex obtusifolius) at 1.0 kg/ha and Galium aparine and Veronica persica at 4.0 kg/ha. The two latter species exhibited pronounced symptoms even at the lowest dose, however. A common feature was the shallow dose response with many weeds, including sensitive and more resistant species. Compositae (Tripleurospermum maritimum, Senecio vulgaris and Cirsium arvense) and Caryophyllaceae (Stellaria media and Spergula arvensis) were generally resistant. Chenopodium album was also not controlled but it was sprayed at a more advanced growth stage than the other species.

The cereals, barley and wheat were the most tolerant of the crop species tested. Moreover the NA safener tended to reduce symptoms at the highest dose, notably with barley. Carrot, parsnip, lettuce and fenugreek were the other tolerant crops but only at the lowest dose. Oat, onion, sugar beet and all brassicas and legumes (other than fenugreek) were sensitive.

Although future development of AC 213087 by the manufacturers is unlikely, nevertheless it has some interesting characteristics. The selective control in wheat and barley of A. myosuroides and Avena fatua is noteworthy, as are the useful effects on G. aparine and V. persica; these weeds being of major importance in these cereals. The resistance of composite, caryophyllaceous and possibly other broad-leaved weeds would necessitate use in mixture with other herbicides, however. Also the safening effect of NA on barley, though marginal and at a high dose, is nevertheless of academic interest.

Selectivity among tropical species

Only Solanum nigrum was controlled at the lowest dose of 0.25 kg/ha while sorghum was the only crop to tolerate this dose. Maize was only slightly protected by NA and sorghum not at all by cyometrinil. There seems little prospect for use of this herbicide in any of the tropical annual crops tested. In wheat it would appear that Phalaris minor may be selectively controlled at 1 kg/ha, but as crops and weed were not grown under the same conditions this would need confirmation. Bromus pectinatus was very much more affected than B. sterilis and was substantially reduced at 1 kg/ha but again the higher temperature conditions may account for this different response. Activity on Cyperus species and Oxalis latifolia was relatively high. There was no recovery from the highest dose and regrowth was very much delayed at 1 kg/ha, suggesting some possibilities deserving further trial in perennial crops.

ACTIVITY EXPERIMENT

AC 213087

		0.25 kg/ha	1.0 kg/ha	4.0 kg/ha
DWARF BEAN	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx
	P	xxxxxxxxxxxxxx xxxxxxxxxx	xxxxxxxxxxxxx xxxxxxxx	xxxxxxxxx xxxx
	I	xxxxxxxxxxxxxx xxxxxx	xxxxxxxxxxxxxx + xxxxx	xxxxxxxxxxx xxxx
KALE	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxx
	P	xxxxxxxxxxxxxx xxxxxx	xxxxxxxxxxxxxx xxxx	xxxxxxxxxxxx xxxx
	I	xxxxxxxxxxxxx xxxxxx	xxxxxxxxx xxxx	xxxxxxxxxxxxx xxx
POLYGONUM AMPHIBIUM	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxx
	P	xxxxxxxxxxxxxx xxxxxxxxx	o o	o o
	I	xxxxxxxxx xxxxx	xxxxxx xxxx	o o
PERENNIAL RYEGRASS	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxx
	P	xxxxxxxxxxxx xxxxxxxxx	xxxx xx	x x
	I	xxxxxxxxxxxxxx + xxxxxxxxx	xxxxxxxxxxx xxxxx	xxxxxxxx xxx
AVENA FATUA	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxx	xxxxxxxxxxxxxx xxxxx	xxxxxxxxxxxxxx xxx
	P	xxxxx xxxxx	o o	o o
	I	xxxxx xxxxx	o o	o o
AGROPYRON REPENS	F	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx
	S	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxxxxxx	xxxxxxxxxxxxxx xxxxxxxxxx
	P	xxx xxxxx	o o	o o
	I	xxxxxxxxxxxxx xxxxxxx	xxxxxxxx xxxx	o o

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

UNTREATED xxxxxxxxxxxxxx no. of survivors
CONTROL xxxxxxxxxxxxxx vigour of survivors

SPECIES	AC 213087 0.25 kg/ha		AC 213087 1.0 kg/ha		AC 213087 4.0 kg/ha	
WHEAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(1)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx
WHEAT + S	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(2)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx
BARLEY	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(3)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	79	xxxxxxxxxxxxxxx
BARLEY + S	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx
(4)	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx
OAT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx
(5)	43	xxxxxxxxx	21	xxxx	14	xxx
PER RYGR	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxx
(6)	79	xxxxxxxxxxxxxxxx	57	xxxxxxxxxx	36	xxxxxxx
ONION	60 R	xxxxxxxxxxxx	40 R	xxxxxxxx	0 R	
(8)	57 R	xxxxxxxxxxx	29 R	xxxxxx	0 R	
DWF BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx
(9)	57	xxxxxxxxxxx	36	xxxxxxx	29	xxxxxx
FLD BEAN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	75	xxxxxxxxxxxxxxx
(10)	57	xxxxxxxxxxx	29	xxxxxx	29	xxxxxx
PEA	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx
(11)	71 R	xxxxxxxxxxxxxx	57 R	xxxxxxxxxxx	43 R	xxxxxxxxx
W CLOVER	92	xxxxxxxxxxxxxxxxx	83	xxxxxxxxxxxxxxxx	42	xxxxxxxx
(12)	43	xxxxxxxxx	29	xxxxxx	14	xxx
RAPE	100	xxxxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxx	67	xxxxxxxxxxxxx
(14)	43	xxxxxxxxx	29	xxxxxx	14	xxx

NB: AC 213087 is confidential, AC 222293 is imazamethabenz-methyl, Dowco 433 is fluroxypyr,
MB 30755 is 1-(3,4-dichlorobenzyl)-4,5-dimethylcarbonamido) imidazole (May & Baker),
SSH-41 is monisuron

SPECIES	AC 213087 0.25 kg/ha		AC 213087 1.0 kg/ha		AC 213087 4.0 kg/ha	
KALE	100	xxxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(15)	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	36	xxxxxxx
CABBAGE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(16)	71	xxxxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
CARROT	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(18)	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx
PARSNIP	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	87	xxxxxxxxxxxxxxxx
(19)	86	xxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	43	xxxxxxxxx
LETTUCE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(20)	100	xxxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	50	xxxxxxxxxx
FENUGREK	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(21)	100	xxxxxxxxxxxxxxxxxxxx	57	xxxxxxxxxxx	43	xxxxxxxxx
SUG BEET	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(22)	29	xxxxxx	29	xxxxxx	29	xxxxxx
BETA VUL	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(23)	57	xxxxxxxxxxx	43	xxxxxxxxx	36	xxxxxxx
BROM STE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(24)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
AVE FATU	100	xxxxxxxxxxxxxxxxxxxx	0		0	
(26)	57	xxxxxxxxxxx	0		0	
ALO MYOS	60	xxxxxxxxxxxx	50	xxxxxxxxxx	70	xxxxxxxxxxxxx
(27)	21	xxxx	14	xxx	14	xxx
POA ANN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	60	xxxxxxxxxxx
(28)	57	xxxxxxxxxxx	21	xxxx	14	xxx
BETA VUL	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(23)	57	xxxxxxxxxxx	43	xxxxxxxxx	36	xxxxxxx
BROM STE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(24)	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	86	xxxxxxxxxxxxxxxxx
AVE FATU	100	xxxxxxxxxxxxxxxxxxxx	0		0	
(26)	57	xxxxxxxxxxx	0		0	
ALO MYOS	60	xxxxxxxxxxxx	50	xxxxxxxxxx	70	xxxxxxxxxxxxx
(27)	21	xxxx	14	xxx	14	xxx
POA ANN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	60	xxxxxxxxxxx
(28)	57	xxxxxxxxxxx	21	xxxx	14	xxx

NB: AC 213087 is confidential, AC 222293 is imazamethabenz-methyl, Dowco 433 is fluroxypyr,
MB 30755 is 1-(3,4-dichlorobenzyl)-4,5-dimethylcarbonamido) imidazole (May & Baker),
SSH-41 is monisuron

SPECIES	AC 213087 0.25 kg/ha		AC 213087 1.0 kg/ha		AC 213087 4.0 kg/ha	
POA TRIV	90	xxxxxxxxxxxxxxxxxx	60	xxxxxxxxxxxx	20	xxxx
(29)	29	xxxxxx	14	xxx	7	x
RAPH RAP	100	xxxxxxxxxxxxxxxxxxx	30	xxxxxx	40	xxxxxxxx
(31)	36	xxxxxxx	7	x	14	xxx
TRIP MAR	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(33)	100	xxxxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxxx	57	xxxxxxxxxxx
SEN VULG	123	xxxxxxxxxxxxxxxxxxx +	154 R	xxxxxxxxxxxxxxxxxxx +	123	xxxxxxxxxxxxxxxxxxx +
(34)	100	xxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxx	93	xxxxxxxxxxxxxxxxxx
POL LAPA	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	92	xxxxxxxxxxxxxxxxx
(35)	50	xxxxxxxxxx	29	xxxxxx	29	xxxxxx
GAL APAR	100 R	xxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxx
(38)	71 R	xxxxxxxxxxxxxx	57 R	xxxxxxxxxx	29 R	xxxxxx
CHEN ALB	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(39)	79	xxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx	57	xxxxxxxxxx
STEL MED	94	xxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxx	94	xxxxxxxxxxxxxxxxxx
(40)	64	xxxxxxxxxxxx	64	xxxxxxxxxxxx	36	xxxxxx
SPER ARV	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(41)	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxx
VER PERS	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxx
(42)	57	xxxxxxxxxx	36	xxxxxxx	29	xxxxxx
RUM OBTU	100	xxxxxxxxxxxxxxxxxxx	0		0	
(44)	43	xxxxxxxxx	0		0	
HOLC LAN	100	xxxxxxxxxxxxxxxxxxx	90	xxxxxxxxxxxxxxxxx	60	xxxxxxxxxxx
(45)	36	xxxxxxx	21	xxxx	14	xxx

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MB 30755 is 1-(3,4-dichlorobenzyl)-4,5-dimethylcarbonamido) imidazole (May & Baker),
SSH-41 is monisuron

SPECIES	AC 213087 0.25 kg/ha		AC 213087 1.0 kg/ha		AC 213087 4.0 kg/ha	
AG REPEN	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(47)	100	xxxxxxxxxxxxxxxxxxxx	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx
AGRO STOLO	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	37	xxxxxxx
(48)	64	xxxxxxxxxxxxx	36	xxxxxxx	7	x
CIRS ARV	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(50)	79	xxxxxxxxxxxxxxxx	50	xxxxxxxxxx	36	xxxxxxx
MAIZE + S	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(56)	71	xxxxxxxxxxxxxx	50	xxxxxxxxxx	29	xxxxxx
MAIZE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(57)	64	xxxxxxxxxxxxx	43	xxxxxxxxx	29	xxxxxx
SORG + S	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(58)	71	xxxxxxxxxxxxxx	57	xxxxxxxxxx	43	xxxxxxxxx
SORGHUM	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(59)	86	xxxxxxxxxxxxxxxxx	64	xxxxxxxxxxxx	36	xxxxxxx
RICE	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(60)	57	xxxxxxxxxxx	43	xxxxxxxxx	43	xxxxxxxxx
PIGEON P	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx
(61)	43 R	xxxxxxxxx	43 R	xxxxxxxxx	29 R	xxxxxx
COWPEA	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx	100	xxxxxxxxxxxxxxxxxxxx
(62)	57	xxxxxxxxxxx	43	xxxxxxxxx	36	xxxxxxx
CHICKPEA	100	xxxxxxxxxxxxxxxxxxxx	50	xxxxxxxxxx	0	
(63)	57	xxxxxxxxxxx	14	xxx	0	
GRNDNUT	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx	100 R	xxxxxxxxxxxxxxxxxxxx
(64)	57 R	xxxxxxxxxxx	43 R	xxxxxxxxx	29 R	xxxxxx

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